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# Exploring the Connections Between Students' Mindsets and Their Writing: An Intervention Study With a Course-Embedded Writing Tutor

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# EXPLORING THE CONNECTIONS BETWEEN STUDENTS' MINDSETS AND THEIR WRITING: AN INTERVENTION STUDY WITH A COURSE-EMBEDDED WRITING TUTOR

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Title: Exploring the Connections Between Students' Mindsets and Their Writing: An Intervention Study With a Course-Embedded Writing Tutor

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In this dissertation, the author investigates the efficacy of an embedded tutoring intervention designed to improve students' mindsets and writing performance. The dissertation uses Dweck's (2006) mindset theory as a theoretical framework to understand how students' beliefs concerning the malleability of their writing abilities affect them as writers. By using a replicable, aggregable, data-supported (RAD) research design, the author investigates the degree to which engineering students' mindsets changed over the course of a semester, the extent to which an embedded tutor influenced students' mindsets and writing, and the impact of students' mindsets on their writing processes and performance. The study's mixed methods include surveys, interviews, and writing assessment. The results showed that students who received the embedded tutoring intervention improved their mindsets more significantly than students in the control and comparison groups. In addition to becoming more growth-minded, these students' final drafts were also significantly better in terms of organization, style, and mechanics.

The dissertation contributes to writing center scholarship by providing further evidence of tutoring efficacy, and the dissertation extends mindset literature in psychology. By describing growth-minded writers' experiences and practices, the study confirms Dweck's findings about growth-minded students' beliefs in the power of effort, their positive response to failure and criticism, and their commitment to learning. Importantly, the dissertation describes salient traits of growth-minded writers but demonstrates that students may not exhibit all traits and may even

display growth- and fixed-minded traits simultaneously. These findings suggest that writing mindsets have more fluidity than is currently described in the mindset literature.

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# CHAPTER ONE

# INTRODUCTION

Over the course of 12 years working in writing centers, I have heard many students say they are not good writers. Students often make these statements in matter-of-fact tones, not necessarily depressed or frustrated, but resolved to the fact that they will never develop writing competence, as if such a trait is only bestowed on certain people. Indeed, according to Mercer and Ryan (2010), "The belief that individuals are born with a special, remarkable talent in a particular field is not uncommon" (p. 436). Mercer and Ryan stress that such beliefs are "particularly widespread" in fields where people believe natural talent predicts success, like sports and the arts (p. 436). Decades ago, Palmquist and Young (1992) explored the possibility that composition students might perceive writing as a natural gift. They argued that "a large proportion of students enter the classroom believing that the ability to write well is a gift" (p. 138). Their study, designed to investigate the connections among students' beliefs, writing apprehension, and writing proficiency, was inconclusive, but they declared that "the notion of giftedness" might be harmful because it can lead to writing apprehension and resistance to instruction (p. 162). Psychologists have shown that belief in innate abilities can undermine academic success and cause students to resist challenge, effort, and productive risk-taking (Blackwell, Trzesniewski, & Dweck, 2007; Dweck, 2006). What if these harmful outcomes could be prevented or diminished?

## Background of the Study

I have observed times when tutors help clients overcome their beliefs that they are bad writers and motivate them to try harder and eventually succeed. How do they do it? How are students changed by a tutor's instruction? Literature in writing center studies does not

satisfactorily answer these questions. Although North (1984) argued that writing center tutors seek to change student writers—to "produce better writers, not better writing" (p. 438)—writing center professionals have not sufficiently demonstrated what this change looks like or how deeply such transformations reach (Deal, 2011). In her extensive review of writing center research, Deal (2011) argues that writing center scholars do not fully understand the effects writing tutors have on students' development, even though anecdotal evidence is strong that they do. Research has described writing center visits, student demographics, and student satisfaction rates (Schendel & Macauley, 2012), offering clear evidence that most students who visit writing centers return for second visits and that students give high ratings to their tutoring sessions (Huang, 2011). In order to show direct evidence of tutors' positive impact on students' writing skills, however, researchers must "go beyond our current reliance on use counts and satisfaction surveys for assessment" (Thompson, 2006, p. 40) to discover exactly how writers benefit from tutoring sessions. To address this gap, many scholars, including Jones (2001), Lerner (2001), and Thompson (2006), have pushed for more quantitative assessments and more meaningful, "*sophisticated* evaluations" (Bell, 2000, p. 7) to help writing center practitioners identify exactly how writers are changed by tutors. Rather than focusing primarily on external outcomes like student satisfaction and grades, Lerner (2001) insists that researchers examine the "effects [of writing center consultations] with far more impact" (p. 3). What might these internal, impactful effects be and how do tutors' influences produce better writers?

While I recognize that students' reasons for feeling incapable of writing well could stem from a number of factors, such as their personal backgrounds, teachers' appraisals, or even their mood, I investigate the possibility that their *mindsets* play a role. Research in psychology has shown that when students encounter difficult tasks, their mindsets—their "core assumptions

about the malleability of personal qualities"—matter significantly (Blackwell, Trzesniewski, & Dweck, 2012; Yeager & Dweck, 2012, p. 303). Students' mindsets directly influence their beliefs and behaviors, which in turn affect their learning strategies and performance (Blackwell, Trzesniewski, & Dweck, 2007). In particular, psychologists have found that students with a "fixed" mindset—who believe intelligence and ability are unchangeable, innate traits—experience more negative outcomes than students with a "growth" mindset, who see intelligence and ability as malleable and flexible (Dweck, 2006), a phenomenon that I describe in more detail in Chapter 2.

This research in psychology has led me to hypothesize that one of the primary ways tutors impact struggling writers is by helping them develop growth mindsets. Mindsets may be at the heart of writing center work, if tutors seek to "change" writers, as North (1984) declared decades ago. Therefore, I seek to test this hypothesis by investigating (1) the ways in which students' mindsets influence their writing processes and performance and (2) the degree to which a tutor who is trained in mindset theory affects students' mindsets and writing performance. I aim to show that writing center scholars have an opportunity to study mindsets within the context of tutoring and to contribute to current scholarly discussions about the role students' mindsets play in their writing.

**Key Terms**

Dweck's (2006) theory of growth and fixed mindsets provides the theoretical framework for this study. Dweck (2006) defines mindsets in the following ways:

- *Mindsets* are implicit beliefs that "frame the running account that's taking place in people's heads. They guide the whole interpretation process" (p. 215).

- The *fixed mindset* is characterized by the belief that personal qualities and abilities are innate and unchangeable.
- The *growth mindset* is characterized by the belief that qualities and abilities are malleable and open to improvement.

Limpo and Alves (2014) apply Dweck's theory to a writing context and defined mindset as "beliefs about the malleability of [one's] writing skills" (p. 574). They defined growth mindset as the position that writing ability is "an increasable skill" that can be improved through effort (p. 583). For the purposes of my research, I have adapted their writing-specific definitions of mindset. That is, when I refer to mindset, I use the following definition:

- *Mindset* is the degree to which students see writing ability as malleable.

In Chapter 2, I operationalize these terms further to theorize how the construct may manifest in a writing context.

This study seeks to discover the degree to which students' mindsets affect their writing processes and performance. I use the following definitions for key writing terms:

- *Writing process* is a series of actions completed when composing, such as drafting, seeking and responding to feedback, expending effort, embracing or avoiding challenge, experimenting with writing styles, procrastinating, and so forth.
- *Writing performance* refers to the quality of a written product, the outcome of the writing process.

## The Problem

Writing teachers and tutors know that many students believe they are incapable of becoming strong writers. As Jones (2001) writes, "Many students view writing as a 'gift,' that one either has or does not have, with little that can be done about it" (p. 11). Psychologists have

found that when students struggle with difficult subjects or tasks, their mindsets significantly influence their success (Blackwell, Trzesniewski, & Dweck, 2007). In particular, a fixed mindset can be harmful because it leads students to avoid taking risks and expending necessary effort in challenging situations (Dweck, 2006). Studies in psychology have shown that growth-minded students, on the other hand, tend to work harder (Blackwell Trzesniewski, & Dweck, 2007), persist and overcome failure (Blackwell, Trzesniewski, & Dweck, 2007), perform better academically (Aronson, Fried, & Good, 2002; Blackwell, Trzesniewski, & Dweck, 2007; Good, Aronson, & Inzlicht, 2003; Yeager et al., 2014), and even enjoy better health (Yeager et al., 2014). Many of these studies have been conducted in academic contexts that students perceive as difficult, such as learning mathematics, transitioning to junior high school (Blackwell, Trzesniewski, & Dweck, 2007), or studying a foreign language (Mercer & Ryan, 2010). However, only one published study—according to my extensive review of the literature—has investigated how fixed mindsets affect students' writing (Limpo & Alves, 2014). They found that students with growth mindsets wrote higher quality essays and responded better to writing instruction. They encourage future writing researchers to "delve into the cognitive and motivational factors that mediate the effect of writing beliefs" and to examine how writing beliefs impact writers (p. 584). As writing competence continues to be seen as a critical component of education and later career success (Plata, 2008), it is vital we investigate how writing and mindsets are connected.

If students' statements about "not being good writers" reflect fixed mindsets toward writing ability, I hypothesize that students' beliefs and attitudes undermine their performance and their enjoyment of writing, since one's mindset directly influences one's beliefs, behaviors, learning strategies, and performance (Blackwell, Trzesniewski, & Dweck, 2007). If fixed

mindsets impede writing performance, as they do in other contexts (Dweck, 2006), writing center professionals and compositionists need to understand the potential implications for writers, teachers, and tutors. With the exception of Limpo and Alves's (2014) groundbreaking study, researchers in composition studies and writing center studies have not studied students' mindsets in the context of writing. Such research is important because discovering insights into students' mindsets can influence future pedagogical practices, methods of teaching writing, and tutor education protocols.

## Purpose

This study seeks to explore how students' mindsets affect their writing processes and their written performance, and to investigate the effects of a tutoring intervention on students' mindsets and writing. The research occurred in the context of a semester-long engineering course with a course-embedded tutor who was trained in mindset theory. The tutor, called a Writing Fellow, was an experienced and paid University Writing Center tutor who provided writing instruction to students in the engineering class. Specifically, she had two tasks that comprised the tutoring intervention: (1) delivering an in-class lesson on growth mindset theory and (2) consulting with students individually to give them feedback on their literature review drafts.

Since psychologists have discovered that people's mindsets matter, especially when confronting challenging subjects and tasks (Aronson, Fried, & Good, 2002; Blackwell, Trzesniewski, & Dweck, 2007; Good, Aronson, & Inzlicht, 2003), I surveyed and interviewed consenting engineering students about their mindsets and conducted statistical analyses to explore the degree to which the writing tutor influenced students' mindsets. By assessing mindset changes that occurred in the class with an embedded writing tutor, I argue that we can assess more meaningful tutoring outcomes—such as students' internal beliefs, attitudes, and

interpretive frameworks—which would allow writing center practitioners to demonstrate that tutors do more than improve students' grades and retention rates. Exploring mindset has enabled me to investigate the embedded tutor's impact on the writer, not only on the writing. As Bell (2000) asserts, "Writing centers are aiming to alter behavior" (p. 15); one way to test the effectiveness of such interventions is to examine the writing tutor's influence on students' mindsets, the catalyst for behavior (Blackwell, Trzesniewski, & Dweck, 2007).

My purpose is not to explore the accuracy of the growth or fixed mindset, but to study how students' perceptions of their abilities (their mindsets) affected their writing processes and performance. Like Mercer and Ryan (2010), who study mindset in the context of foreign language learning and clarify that their "concern is not with aptitude per se, but rather with learners' beliefs about the role of aptitude" (p. 436), my concern was not with endorsing one mindset over another but rather with exploring the impact of mindsets. I aimed to understand how students' growth and fixed mindsets affected them as writers.

## Research Questions

This study explores the degree to which students' mindsets affect their writing and the degree to which students experience changes in their mindsets after taking an engineering class with an embedded writing tutor. The study's methodological approach and design are guided by the following research questions:

1. How do students' mindsets affect their writing processes and writing performance?
2. To what degree do students' mindsets change over the course of the semester?
3. How, and to what degree, does an embedded writing tutor who is trained in mindset theory affect students' mindsets and their writing?

Scholarship in composition and writing center studies does not address these questions, but literature in psychology can inform and justify such investigations. Specifically, my literature review in Chapter 2 draws from leaders in the fields of social psychology, applied psychology, and developmental psychology to lay a theoretical framework for understanding the connections between mindset and writing.

## Methodological Approaches

In order to explore students' mindsets at the beginning and end of the course, to measure potential mindset changes over the course of the semester, and to understand how students' mindsets affect their writing processes and performance, I used a replicable, aggregable, data-supported (RAD) research design. Driscoll and Perdue (2012) advocate this research approach because it enables researchers to build evidence-based conclusions that contribute to larger scholarly discussions. They write, "RAD research includes designing and describing studies through clear methods, participant selection, and analysis, so we can build upon prior studies and engage in a discussion sustained by research and data-supported practices" (p. 31). RAD research offers replicable methods and gathers data that can be compared across contexts. A RAD design was appropriate for my study because I used data to draw comparisons across students and across time, I built on current research in psychology, and I developed evidence-based conclusions about the relationships between students' mindsets and their writing.

I selected an engineering class with an embedded writing tutor for the context of my research for three main reasons: First, the embedded writing tutor was able to deliver a lesson in class on growth mindset, which resembled the design of several intervention studies in psychology (Aronson, Fried, & Good, 2002; Blackwell, Trzesniewski, & Dweck, 2007; Yeager et al., 2014). Since I built my study on existing research in psychology, it was important that I

closely adapted these studies' methodological design. Second, the engineering class provided access to a variety of writers, rather than relying solely on students who voluntarily seek help from a tutor in the University Writing Center. This design prevented self-selection bias. Finally, the educational landscape currently emphasizes STEM disciplines, so conducting the study in this context demonstrates that embedded writing tutors have an important role in other similar courses that the university values. Writing center professionals know anecdotally that "Students in classes ranging from math to psychology benefit from peer tutors' writing expertise in the classroom and establish tutoring relationships that extend outside the classroom to the writing center environment" (Spigelman & Grobman, 2005, p. 7). Collecting data that substantiates this experiential knowledge can make strong cases for the benefits of embedding tutors in courses from a variety of disciplines. I elaborate on the context for this research and the methodological approach in Chapter 3.

## Significance of the Study

This study offers theoretical, methodological, and pedagogical contributions to writing center and composition studies. Theoretically, this study fills critical gaps in composition and writing center literature concerning writers' mindsets. Such research is needed in composition and writing center studies in order to understand how students' mindsets affect their writing processes and performance. Because psychologists argue that students' mindsets are critical to their learning and development (Blackwell, Trzesniewski, & Dweck, 2007), I hypothesized that fixed and growth mindsets play a significant role in students' strategies and success with writing. Likewise, their mindsets likely play a crucial role in students' writing practices (e.g., response to feedback, willingness to revise). Thus, investigating these connections can enable teachers and tutors to intervene when students' mindsets seem to be hindering their progress.

This dissertation also offers writing center professionals a method for assessing meaningful tutoring outcomes that appeal to powerful stakeholders. For years, I have been aware through attending conference talks, reading literature, and talking with colleagues that writing center researchers have struggled to make compelling cases for the value of writing center work. Even though scholars since North (1984) have claimed that tutors "produce better writers, not better writing" (p. 438), it is difficult to demonstrate empirically that tutors make lasting impacts on writers because drawing causal links between tutoring and writing improvement is complicated (Jones, 2001). As mentioned, researchers have called for more empirical methods that study deeper, internal factors, instead of relying on external factors like satisfaction surveys, grades, and retention rates to demonstrate tutorial success (Lerner, 2001; Schendel & Macauley, 2012; Thompson, 2006). My study explores the degree to which students' mindsets change as a result of working with a tutor. Such findings can help writing center administrators exhibit the benefits of a writing center for university stakeholders, especially because my results demonstrate the efficacy of an embedded tutoring program.

From a pedagogical perspective, this study helps teachers and tutors develop a deeper understanding of the flexibility of mindsets so they can help students re-conceptualize their notions of growth and development. Students are not the only ones who believe ability and intelligence are unchangeable. Even some faculty members argue that not all students can become writers. Since most students are capable of change and growth, teachers have a responsibility to help students see their potential and foster their growth. Yeager and Dweck (2012) argue that fixed mindsets undermine students' success because people create self-defeating prophecies when they view themselves and others through fixed mindsets. Mercer and Ryan (2010) agree, calling for more educators in their field to better understand "their learners'

mindsets as well as their own and to establish pedagogical approaches that could encourage a growth mindset in language learning classrooms" (p. 444).

Finally, this study contributes to unfolding understandings of mindset theory. Since scholars have not studied growth-minded approaches to writing, this dissertation's descriptions of growth-minded students' experiences and writing practices provide important insight into growth-minded writers' behaviors and beliefs. These findings add to existing knowledge concerning growth-minded traits, as described by Dweck (2006) and other psychologists (Blackwell, Trzesniewski, & Dweck, 2007). Since the results suggest that student writers can exhibit features of both growth- and fixed-mindedness within the same domain (writing), the dissertation extends Dweck's theory by suggesting that mindsets have more fluidity than is currently described in the literature.

## Study Overview

Research occurred in three sections of a semester-long engineering course, one of which had an embedded writing tutor whom I trained in methods of helping students develop growth mindsets. The first step of data collection involved administering a survey adapted from three validated instruments: Palmquist and Young's (1992) *Writing Questionnaire*, Dweck's (2000) *Mindset Scale*, and Limpo and Alves's (2014) *Implicit Theories of Writing Scale*. I used this survey to assess students' mindsets at the beginning of the course ($N = 57$), in order to establish a baseline from which I could compare students' mindsets again at the end of the semester ($N = 36$). I surveyed students in the experimental group who consulted with the embedded writing tutor and those in two comparison groups who did not receive the tutoring intervention, in order to explore the tutor's influence on students' mindsets. By using a survey similar to those used in other studies (Dweck, 2000; Limpo & Alves, 2014; Palmquist and Young, 1992), I am able to

connect my findings to the larger scholarly discussion regarding mindsets, an important goal of RAD research (Driscoll & Perdue, 2012). This research contributes to the few existing studies on mindset and writing, especially because my findings were statistically significant.

In addition to calculating and comparing students' mindset scores, I interviewed student participants about their mindsets at the end of the course to gain an understanding of how students' mindsets affect their writing. In the interview, students had an opportunity to describe any potential changes in their mindsets and to discuss their writing experiences and performance. Interviewing participants enabled me to listen to what they said about their experiences with challenging writing assignments, explore their perceptions of their mindsets and writing behaviors, and obtain a glimpse of the intricacies of their thinking about failure. I also interviewed the embedded tutor to gather her observations and perceptions of students' mindsets, writing processes, and writing performance. I coded all interview transcripts using an inductive approach to identify emerging themes that demonstrated patterns in students' beliefs, behaviors, learning strategies, and performance. The data gathered from these qualitative methods create triangulation with the survey data, providing a more robust understanding of the connections between students' mindsets and their writing.

Finally, I blindly rated 102 literature reviews (my participants' writing samples), using a trait-scoring rubric. The literature reviews were first and final drafts, written by students in all three treatment groups. I correlated these ratings with students' mindset scores to see whether growth-minded students revised their drafts substantially or performed at a higher level, as the psychological literature would suggest. The data also show whether students who worked with the tutor scored higher on their final drafts.

## Summary and Preview

In this introduction to the dissertation, I establish why writing teachers and writing center professionals should investigate the connection between students' mindsets and their writing. Research in psychology has shown people's mindsets matter, especially when students encounter difficult material (Aronson, Fried, & Good, 2002; Blackwell, Trzesniewski, & Dweck, 2007; Good, Aronson, & Inzlicht, 2003). Since many students struggle with writing (Johnson & Krase, 2012; Plata, 2008) and since many people believe artistic endeavors require innate talent (Mercer & Ryan, 2010), writing teachers and tutors need to know whether students hold fixed mindsets toward writing ability that can impede their learning, improvement, and performance. To date, the literature has not investigated these possibilities. Therefore, I sought to fill this important gap and to consider the possibility that course-embedded writing tutors play a significant role in students' mindset changes.

In Chapter 2, I review the literature on mindset interventions, drawing mainly from seminal studies in psychology. By demonstrating what psychologists have found in regards to the growth mindset and by highlighting methods for teaching and assessing mindset changes, I seek to establish that such interventions would work and be valuable in an embedded tutoring context. Such research is needed in writing center studies because writing center researchers have struggled to demonstrate that tutors actually "help to create changed writers" (Deal, 2011, p. 6). Writing center scholars need research that, according to Lerner (2001), "examines effects with far more impact than course or paper grades" (p. 3). I argue that studying tutors' influences on students' mindsets would constitute the kinds of effects Lerner seeks. To demonstrate that the writing center community would benefit from examining writers' mindsets, I review and synthesize literature from writing center studies to highlight prominent assessment practices. I

also describe the few studies that examine the impact of an embedded writing tutor's intervention to underscore the need for more empirical research in this context.

# CHAPTER TWO

## LITERATURE REVIEW

This dissertation explores how students' mindsets affect their writing processes and performance, and it investigates an embedded tutor's influence on students' mindsets and their writing. The research occurred in the context of a semester-long undergraduate engineering course with a course-embedded tutor who was trained in helping students develop growth mindsets. Since psychologists have discovered that people's mindsets influence their performance, especially when confronting challenging subjects and tasks (Aronson, Fried, & Good, 2002; Blackwell, Trzesniewski, & Dweck, 2007; Good, Aronson, & Inzlicht, 2003), this dissertation surveyed and interviewed engineering students to explore the degree to which their mindsets affected their writing and changed over the course of a semester. Additionally, the dissertation rated samples of students' writing to determine whether correlations existed among students' mindsets, their writing performance, and the tutoring intervention.

Current literature in composition does not study the connection between students' mindsets and their writing. Although psychologists have explored how mindsets influence students' performance in fields that many students perceive as difficult, such as mathematics (Blackwell, Trzesniewski, & Dweck, 2007) and foreign language learning (Mercer & Ryan, 2010), only one published study has examined how students' mindsets affect their writing (Limpo & Alves, 2014). Research such as the study presented here is needed because understanding the connection between mindsets and writing can inform and influence compositionists' pedagogical practices, tutor education materials, and writing across the curriculum initiatives, among other potential implications. Therefore, this study helps writing center practitioners and compositionists understand how students' mindsets affect them as

writers. Additionally, the study investigates meaningful tutoring outcomes (i.e., mindset changes), which would allow writing center practitioners to demonstrate that tutors do more than improve students' grades and retention rates.

In this chapter, I argue that the research literature in writing studies has overlooked a fundamental influence on student writers—their mindsets—and I describe literature in psychology that composition researchers can use to help fill this gap. An investigation into students' mindsets is timely because writing scholars seem increasingly interested in students' internal factors. Recent attention to students' habits of mind (National Council of Teachers of English, 2011), dispositions (Driscoll & Wells, 2012), and self-efficacy (Williams & Takaku, 2011) suggests compositionists and writing center scholars are invested in understanding how internal factors influence student writers. Psychologists' important research on mindset theory offers writing scholars a useful tool for assessing student development in a tutoring context. Therefore, after demonstrating how studying mindset intersects with compositionists' current interest in students' attitudes and beliefs, I review literature from psychology that establishes that students' mindsets influence their performance. First, I define and discuss the importance of students' mindsets, using Dweck's (2006) theories of growth and fixed mindsets. After explaining this theoretical framework and introducing the importance of mindset, I describe studies that measure the impact of interventions on students' mindsets to show that mindsets are malleable. These studies highlight research methods compositionists and writing center professionals can use to study mindset changes. Finally, I argue that mindset theory offers a framework for researching tutoring outcomes in the field of writing centers. Since writing center researchers have called for more attention to deep student learning outcomes (Huang, 2011; Lerner, 2001; Thompson 2006), I review literature on writing center assessment practices in

order to build the case for writing center research that investigates tutors' impacts on tutees' mindsets.

## Writing Scholars' Interest in Students' Internal Qualities

In 2011, the Council of Writing Program Administrators (CWPA), the National Council of Teachers of English (NCTE), and the National Writing Project collaborated to create a *Framework for Success in Postsecondary Writing*. This *Framework* identifies learning outcomes for college writing assignments, including eight key habits of mind, or "ways of approaching learning that are both intellectual and practical and that will support students' success in a variety of fields and disciplines" (p. 1). The *Framework* defines the eight habits of mind as follows:

- Curiosity – "the desire to know more about the world"
- Openness – "the willingness to consider new ways of being and thinking in the world"
- Engagement – "a sense of investment and involvement in learning"
- Creativity – "the ability to use novel approaches for generating, investigating, and representing ideas"
- Persistence – "the ability to sustain interest in and attention to short- and long-term projects"
- Responsibility – "the ability to take ownership of one's actions and understand the consequences of those actions for oneself and others"
- Flexibility – "the ability to adapt to situations, expectations, or demands"
- Metacognition – "the ability to reflect on one's own thinking as well as on the individual and cultural processes used to structure knowledge" (National Council of Teachers of English, 2011, p. 1).

The *Framework* asserts that students' habits of mind are integral to success in writing, stating that these eight habits of mind "serve as foundations for writing in college-level, credit-bearing courses," and they help students "meet the writing challenges in the full spectrum of academic courses and later in their careers" (p. 2). Essentially, the *Framework* draws a direct correlation between student's writing performance and their psychological factors, saying both are "central to success in college and beyond" (p. 2). The *Framework*'s emphasis on students' habits of mind demonstrates that experts from CWPA, NCTE, and the National Writing Project recognize how important students' internal factors are. Thus, the *Framework* implicitly calls for more serious attention to these factors, a call this dissertation responds to.

While the *Framework* uses the phrase "habits of mind" to refer to students' internal factors, scholars like Driscoll and Wells (2012) define "individual, internal qualities" as "dispositions" (p. 1). According to Driscoll and Wells (2012), dispositions such as "motivation, value, and self-efficacy" are "qualities that determine how learners use and adapt their knowledge" (p. 1). They argue that not enough researchers have considered how students' dispositions influence their ability to transfer their learning across contexts. They cite literature that "largely privileges actions and contexts" rather than "what the learner brings with him/her to the transfer problem" (p. 3). Driscoll and Wells provide a historical context for compositionists' renewed interest in student dispositions, and they identify "four specific dispositions (value, self-efficacy, attribution, and self-regulation)" that influence transfer. According to their description of disposition—"a critical foundation upon which learning is built and potentially transferred" (p. 13)—mindsets should also be considered influential for transfer too because psychologists have discovered that mindsets are the catalysts for behavior (Blackwell, Trzesniewski, & Dweck, 2007). Thus, when Driscoll and Wells ask, "How and where are dispositions formed?" (p. 13), I

propose researchers consider students' implicit beliefs about the nature of ability (i.e., their mindsets) as a fundamental starting point.

In *A New Writing Classroom: Listening, Motivation, and Habits of Mind*, Sullivan (2014) explains why dispositions and habits of mind are becoming more important to compositionists. He argues that simplistic argument-based pedagogy and an assessment-driven climate has reduced writing ability to "standardized test scores or particular curricular achievements and skill sets" (p. 163) that do not transfer to other writing contexts. Instead, Sullivan encourages writing teachers to anchor their pedagogy in new education research on motivation, new findings in neuroscience regarding neuroplasticity, and new research on transfer and mindfulness. He writes,

> A curricular emphasis on listening, empathy, and reflection, and a pedagogy that embraces openness and dialog is an approach to teaching writing that offers students transferable skills as well as habits of mind that will be of great value to them across a wide variety of disciplines and in many areas of their lives outside the classroom. (p. 49)

Sullivan argues that innovative research in psychology and neuroscience should convince compositionists to privilege students' "cognitive orientations" (p. 36) over their mastery of specific subjects, like "the thesis statement, MLA format, and even essays themselves" (p. 2). Sullivan's argument provides a rationale for the field's growing turn toward internal factors, like habits of mind, dispositions, and mindsets, the latter of which he specifically references when he discusses Dweck's "important work" (p. 35). Despite referencing Dweck, Sullivan does not consider how writing scholars might study students' mindsets.

Research on writers' self-efficacy also demonstrates compositionists' current interest in students' internal factors. Williams and Takaku (2011) assert, "Self-efficacy and adaptive help seeking can be understood as central not only to human agency but also to growth" (p. 6). In

their longitudinal study, they studied the relationships among self-efficacy, help seeking, writing center usage, and student performance. They found that writing center usage was highest for ESL students with low self-efficacy. Moreover, they discovered that "students who frequently obtained writing center tutoring received higher grades in composition than those who did not, regardless of their ESL or native-English-speaker status" (p. 13). This finding suggests that writing centers are effective, particularly for students who have low confidence in their writing ability but are willing to seek help. Bromley, Northway, and Schonberg (2016) also see increased self-efficacy in writing center users: Their mixed-methods study found that "many students experienced increased confidence in the areas of specific writing skills and task completing" ("Breakthroughs," para. 13).

While exploring self-efficacy demonstrates an interest in students' psychological factors, it is important to note that self-efficacy and mindset are not synonymous. Williams and Takaku (2011) define self-efficacy as "one's belief that he or she can perform well on a designated task" (p. 2). This definition differs from mindset in one fundamental area: Self-efficacy reflects a belief in one's ability to succeed, whereas mindset reflects a belief in one's potential for improvement. Mindset is a more foundational construct that describes one's belief regarding the nature of ability. Therefore, if compositionists are aware of the important role that self-efficacy plays in writers' success, investigating a more foundational influence like mindset is warranted.

## The Growth and Fixed Mindset

Researchers in social psychology, applied psychology, and developmental psychology have demonstrated that students' mindsets[1] directly affect their attitudes, learning strategies,

[1] Social and developmental psychologists also use the phrase "implicit theory of intelligence" to describe people's beliefs about the malleability of intelligence and/or ability. These psychologists use the terms "incremental theory" and "entity theory" to refer to the growth and fixed mindset, respectively.

performance, and success (Aronson, Fried, & Good, 2002; Blackwell, Trzesniewski, & Dweck, 2007; Good, Aronson, & Inzlicht, 2003). Dweck (2006) defines mindset as the way people think about learning and intelligence and theorizes that people tend to have either "growth" or "fixed" mindsets. People with growth mindsets believe that intelligence and ability are not fixed traits, but rather qualities that can be improved through effort. Growth-minded people recognize that "although people may differ in every which way—in their initial talents and aptitudes, interests, or temperaments—everyone can change and grow through application and experience" (p. 7). Studies have shown that students with a growth mindset outperform students with a fixed mindset: Growth-minded students tend to earn higher grades (Aronson, Fried, & Good, 2002), improve their achievement test scores (Good, Aronson, & Inzlicht, 2003), work harder with greater motivation (Blackwell Trzesniewski, & Dweck, 2007), and enjoy school more (Aronson, Fried, & Good, 2002). People with growth mindsets work harder, persist in the face of obstacles, are more open-minded, and are more willing to take risks (Dweck, 2006) than people who believe that intelligence is fixed at birth and cannot be increased through intentional means, such as learning new subjects or practicing new tasks.

People with fixed mindsets believe "that your qualities are carved in stone," that intelligence and ability are mostly unchangeable, permanent characteristics (Dweck, 2006, p. 6). Fixed-minded students tend to avoid challenges because they are afraid of failing, which they perceive as a reflection of their innate qualities (Dweck, 2006). Thus, they aim to display their intelligence and are more concerned with performance than learning. Fixed-minded students also tend to avoid effort because they see effort as a sign of weakness, assuming only weak students must work hard (Dweck, 2006). Fixed-minded students assume that if a task requires substantial effort, they must be unskilled. In fact, one seminal study (Dweck & Bempechat, 1983) found that

fixed-minded students reported feeling most smart "when a task was easy for them, when they didn't need to exert effort for success, when they didn't make mistakes, when they finished first" (as cited in Dweck, 1990, p. 208). These students' self-esteems were highest when they were performing or proving their intelligence, not when they were learning.

For all of the reasons described, psychologists believe fixed-minded students "are at a greater risk of negative academic outcomes—decreased confidence, loss of enjoyment, and performance impairment—when faced with difficulties or setbacks" because they see failure as confirmation of innate unchangeable qualities (Good, Aronson, & Inzlicht, 2003, p. 650). Surprisingly, many students strongly hold fixed notions of intelligence (Dweck, 2006). For this reason, teachers and tutors need to develop a deeper understanding of the flexibility of mindsets so they can help students re-conceptualize their notions of growth and development.

Although writing studies scholars have not defined and understood mindset in the context of writing, I operationalize mindset to theorize how mindsets may manifest in a writing context. Since researchers have found that mindsets directly influence attitudes, learning strategies, performance, and success (Blackwell, Trzesniewski, & Dweck, 2007), I theorize that students' mindsets influence their writing behaviors and performance. Mindsets matter most when people confront challenging material (Blackwell, Trzesniewski, & Dweck, 2007); therefore, I hypothesize that mindsets play a significant role for students who struggle with writing by impeding key writing practices that are necessary for performance and improvement. By applying Dweck's (2006) mindset research as a theoretical framework, I hypothesize that mindsets influence writers in the following ways:

- Fixed-minded students may believe only weak writers compose multiple drafts, assuming that strong writers have an innate ability and therefore can produce a high-quality draft

the first time. This hypothesis is based in Dweck's (2006) findings that fixed-minded students believe that skilled and intelligent people do not need to expend substantial effort.

- As a result, fixed-minded writers may avoid drafting and revision to save face, especially if they see effort as fruitless, which is characteristic of fixed-minded students (Dweck (2006). On the other hand, growth-minded writers may see revision as a natural component of learning because they tend to be more learning-oriented than performance-oriented (Dweck, 2006).
- Fixed-minded students may resist receiving negative feedback, even if constructive criticism could help them improve their drafts. This hypothesis is based in Dweck's (2006) assertions that fixed-minded students respond negatively to criticism. On the other hand, growth-minded writers may see feedback as an opportunity to improve and may be motivated to revise their drafts after receiving constructive criticism.
- Fixed-minded writers may not welcome challenge or risk-taking but instead give up easily because they tend to avoid failure (Dweck, 2006). In contrast, growth-minded writers may welcome challenging writing assignments that require substantial effort because they see difficult writing tasks as opportunities to improve their skills.

Operationalizing mindset in the above ways may help writing teachers and tutors understand why some students resist drafting, revision, and feedback. I applied this operational scheme in Chapter 4 when coding and analyzing the interview data, in order to understand engineering students' experiences and behaviors, and I discuss my findings in Chapter 5.

Although many scholars argue that a growth mindset can improve students' performance, they acknowledge that this mindset is not a panacea for all obstacles. Dweck (2006) points out

that growth-minded people experience setbacks and struggle with learning too, but they tend to ask themselves, "What can I learn from this? How can I improve?" when facing failure because they are "attuned to its implications for learning and constructive action" (p. 215). Mercer and Ryan (2010) concur that "even in cases where a strong growth mindset exists, learners may feel frustrated and helpless without the tools and metacognitive knowledge of strategies to put their effort to focused use" (p. 443). In other words, a growth mindset is not enough—students also need learning strategies, instruction, and skills "to ensure their efforts lead to actual improvement" (p. 443). Blackwell, Trzesniewski, and Dweck (2007) also clarify that mindset theory "does not imply that everyone has exactly the same potential in every domain, or will learn everything with equal ease. Rather, it means that for any given individual, intellectual ability can always be further developed" (p. 247). Thus, growth-minded writers may not automatically be strong writers. They may experience setbacks and failures in their writing, but their reactions to such poor performance will characterize their mindset. If they focus on improvement, effort, and practice rather than on seeing their mistakes as confirmation of innate ability, they will display a growth mindset.

It is important to note, too, that people do not display the same mindset all the time. Dweck (1990) explains: "Each of us may conceive of ourselves sometimes as a fixed object that is being judged and at other times as a dynamic system whose aim is to grow" (p. 208). People have "predispositions," then, toward growth or fixed mindsets, but mindsets seem to have a situational component (p. 208). Mercer and Ryan (2010) elaborate:

> It is possible for an individual to have a growth mindset in one particular domain and a fixed mindset in another; for example, an individual could simultaneously believe that artistic ability is a fixed entity, you either have artistic talent or you do not, while they

> may believe that sporting ability is something that can be developed through concerted effort and practice. (p. 437)

Therefore, psychologists generally view mindsets as operating on a continuum, and they "think of learners as having a tendency towards a particular mindset to varying degrees" (p. 438). Since mindsets are, to some extent, situationally bound, I only studied students' mindsets in the context of writing. That is, I sought to understand solely how students' beliefs about their writing ability, not intelligence in general or aptitude in other areas, affected them. It is quite possible that the students in my study had growth mindsets about their capability as engineering students or their technical skills but held firmly to fixed notions of writing ability.

Importantly, psychologists argue that mindsets influence people most when they confront challenging material (Blackwell, Trzesniewski, & Dweck, 2007). That is, a fixed mindset can be most detrimental when people encounter difficult obstacles, when their sense of themselves is tested. Since writing is a challenging subject for many students, mindsets likely play a significant role in situations where students struggle with writing and do not see themselves as writers. The challenging nature of writing, then, makes it a worthy subject to study in the context of mindset interventions. The following section will describe psychological studies that examine mindset interventions in the context of incoming freshmen transitioning to college, middle school children facing stereotype threat, junior high students enrolled in mathematics classes, and adolescents' theories of intelligence. I will also review the only study that assesses mindset changes in the context of writing.

## Studies That Assess Mindset Interventions

Several groundbreaking studies (Aronson, Fried, & Good, 2002; Blackwell, Trzesniewski, & Dweck, 2007; Good, Aronson, & Inzlicht, 2003; Wilson & Linville, 1982) have

sought to change students' mindsets and then assess the effects of that intervention. These studies with a pre- and post-test design demonstrate that interventions can change students' mindsets and a growth mindset can be taught. Indeed, Blackwell, Trzesniewski, and Dweck (2007) explicitly state that "more constructive mental models can be taught, with beneficial consequences for students' achievement" (p. 258). Such intervention studies typically encourage students to adopt a growth mindset by exposing them to the science behind brain plasticity and then examine the results, finding that most students who learn about growth mindset have later increased academic performance (Aronson, Fried, & Good, 2002; Blackwell, Trzesniewski, & Dweck, 2007; Good, Aronson, & Inzlicht, 2003; Yeager et al., 2014), increased persistence (Blackwell, Trzesniewski, & Dweck, 2007), better health (Yeager et al., 2014), decreased hostility toward others (Yeager, Miu, Powers, & Dweck, 2013), and decreased stress (Yeager et al., 2014), compared to the respective studies' comparison groups. These studies suggest that even relatively small interventions, which I will describe below, can make a significant impact on students' "attitudes and performance" (Blackwell, Trzesniewski, & Dweck, 2007, p. 259). Collectively, these studies validate my study's assumptions that a tutoring intervention can change students' mindsets.

**College Transitions**

In one of the earliest studies related to mindset, Wilson and Linville (1982) attempted to change students' way of thinking about difficulty. Although Wilson and Linville do not connect their goals to mindset theory, their study is relevant because they demonstrate that interventions can influence students' thinking. Their goal was to change participants' attributions for "dysfunctional behavior"—mistakes and problems—from unstable to stable causes (p. 368). The researchers, drawing from attribution therapy, hypothesized that if students could learn to

attribute difficulty and failure to unstable causes, they would be more likely to improve their task performance. Wilson and Linville's hypotheses align with Seligman's (2006) later research on explanatory style. Seligman theorizes that people are most healthy, happy, and successful when they adopt an optimistic explanatory style: when they interpret adversity as impermanent, nonpervasive, and impersonal. Adopting an optimistic explanatory style means recognizing that adversity does not last (impermanent), that it does not affect all areas of life (nonpervasive), and that it can be attributed to external (impersonal) causes. Unlike Seligman (2006), Wilson and Linville (1982) sought to change only students' attributional style as it related to permanence.

Using college freshmen as research participants, Wilson and Linville (1982) expose a group of students who were worried about their performance in college to data that suggested that early academic difficulties are normal in college. Believing they were helping the researchers create a survey, the undergraduates read statistics about the number of upperclassmen who had originally earned lower grades than anticipated and since improved their GPAs significantly. They also watched taped interviews with experienced upperclassmen and learned "that many people experience academic problems as freshmen, but do better in the upper class," which encouraged the freshmen to "infer that their own problems were due to unstable causes" (p. 368-9). Students were encouraged to think of their difficulties as temporary and due to normal, external reasons (i.e., a normal college atmosphere). The participants completed a questionnaire before and after the intervention that assessed their "attitudes toward performance, their expectations about future performance, and their mood" (p. 371). They answered questions from the GRE and solved 12 anagrams. The researchers collected GPA scores from participants and kept records of students' retention in college.

Wilson and Linville (1982) report that their results "were nothing less than dramatic" (p. 374). They found students in the intervention group (who were exposed to the idea that struggling early in college is normal) performed better in the short and long term, and they were more likely to stay in college. Specifically, the intervention students "answered more of the questions correctly [on the GRE questions] than did subjects in the no-information condition" (p. 372). They had a lower dropout rate (5% compared to 25% of the comparison group students), a difference that was statistically significant. Also, students in the treatment group experienced higher grades: "1 year after the completion of the study, subjects who had received information indicating that grades increase after the freshman year did in fact increase their grades more than subjects who did not receive this information" (p. 373). This example of a "simple and straightforward attributional intervention" that had "long-term effects" demonstrates that even small interventions can influence students' mindsets greatly (p. 375).

Interestingly, Wilson and Linville (1982) found that students' self-reports of their attitudes and moods did not correspond to the behavioral results. For instance, the researchers found no significant correlations between participants' reporting of their moods or expectations regarding their performance and their GPA or GRE scores. Consequently, they argue that "people's ability to *report* these attributions and internal states is limited," making the use of self-reported data limited (p. 376). This finding suggests methods of assessing mindset changes need to go beyond self-reported survey instruments and interview data. Wilson and Linville do acknowledge that people's self-reporting of "new internal states" is more likely to accurately reflect their behavior if "subjects are asked to deliberate about the reasons for their actions" (p. 375). This finding has direct implications for researchers. If researchers seek to understand students' implicit beliefs—and students are not good at reporting attributions and internal

states—gathering such data requires appropriate methods. Several researchers have solved this problem by gathering behavioral data (Limpo & Alves, 2014) and interviewing external audiences. For instance, Blackwell, Trzesniewski, and Dweck (2007) interviewed students' teachers to gather information about students' work effort and academic behavior. For this reason, in my study, I conducted semi-structured interviews with students so that I could ask them about their mindsets and experiences in more depth than a questionnaire allows. I also assessed students' writing and interviewed the embedded tutor to triangulate the data collected from students' self-reports.

**Stereotype Threat**

Another area of psychological research in mindsets that has implications for writing scholars is stereotype threat. Stereotype threat is a person's fear that he/she will confirm a negative stereotype, a concern that psychologists have shown negatively affects stereotyped groups. For writers who have non-standard home dialects (e.g., African American Vernacular English) or who compose in a second language, stereotypes concerning language use and writing with an accent can be threatening. Aronson, Fried, and Good (2002) examine whether they could change college students' mindsets in order to protect them against stereotype threat. The researchers hypothesized that encouraging African American students to see intelligence as "expandable" could help them improve academically. Specifically, they sought to help students develop a growth mindset.

In their study, the researchers separated participants into three groups: Two groups were told they were participating in a pen pal program, writing letters to younger students. One sub-group was instructed to tell their audience about the "expandable capacity" of intelligence that grows "like a muscle" through mental exertion (p. 117). The second sub-group was also asked to

participate in the pen pal program, but they were encouraged to stress the idea of multiple intelligences. The third group did not receive an intervention. Aronson, Fried, and Good (2002) found that students in the pen pal group who were taught intelligence is malleable were "more likely to endorse the incremental theory of intelligence," which the researchers tested through surveys (p. 120). Students in this group also earned higher grades, and, in the case of the African American students, reported they enjoyed school more. This study, like Wilson and Linville's (1985), confirms that "a relatively simple intervention" can have lasting and powerful influences on students' mindsets (p. 123), which suggests this study's embedded tutoring intervention could work, too.

Good, Aronson, and Inzlicht (2003) also sought to reduce the effects of stereotype by teaching students concepts they believed would diminish stereotype threat. In a five-year longitudinal study, they divided seventh-grade students in a computer class into four groups. One group was taught about the "expandable nature of intelligence" and the brain's neural pathways and connections that continue to grow (p. 651). The second group of students learned that educational difficulties and setbacks in junior high are normal and not a reflection of them as individuals, a message similar to the one Wilson and Linville (1982) advocated. These students were "trained to make nonpejorative attributions for difficulty" (p. 650-1), an attitudinal shift also advocated by Seligman (2006) who encourages people to adopt an optimistic explanatory style when confronted with adversity. Good, Aronson, and Inzlicht's (2003) third group received a combination of both messages, while the fourth group of students served as a control group. They learned about the consequences of abusing drugs. Students in these groups participated in lessons about their respective messages, read further about the concepts on restricted web sites,

and created their own websites to serve as public service announcements that endorsed the ideas they had learned.

Good, Aronson, and Inzlicht's (2003) found that students in all three experimental groups—especially girls—earned higher math scores than students in the control group. Also, both students who learned to think differently about adversity by attributing failure to external causes and those who learned about intelligence as malleable outperformed control-group students on reading tests. Most importantly, the researchers found a correlation between students who were most vulnerable to stereotype threat and their later increased standardized test scores, an outcome that they theorized was due to the intervention. It is worth noting that participants in both Good, Aronson, and Inzlicht's (2003) study and in Aronson, Fried, and Good (2002)'s study were instructed to write as part of the intervention. This component of the intervention is important because writing researchers have known for a long time that writing is a path to learning (Bereiter & Scardamalia, 1987; Emig, 1977). For instance, Langer and Applebee (1987) showed that the act of putting ideas into words transforms knowledge and leads to better retention and understanding. In the studies above, then, it may be that both writing and the assigned tasks, in combination, created the outcomes reported, although the researchers do not consider this possibility.

**Mathematics**

Psychologists have studied factors that make some students more resilient than others and suspect that mindsets play a significant role. Blackwell, Trzesniewski, and Dweck (2007) conducted two studies and an intervention designed to, first, see whether junior high students performed better in math after they learned about the malleability of intelligence and, second, to understand why people perform better academically when they adopt a growth mindset. The

researchers selected mathematics class as a site of research because, as they mention, it is a historically difficult subject, which is important because students' mindsets matter most when they are confronted with challenging material. In the first longitudinal study, Blackwell, Trzesniewski, and Dweck (2007) followed four groups of students over the course of five years. The researchers' data sets included students' prior math test scores, their responses to a motivational questionnaire that assessed their theories of intelligence, and their final math class grades. Comparing the questionnaire's findings with students' academic performance, the researchers found that "an incremental theory of intelligence, learning goals, positive beliefs about effort, non-helpless attributions, and strategies in response to failure formed a network of interrelated variables" (p. 250) that they call a student's "motivational framework" (p. 252). Specifically, they found correlations between students who displayed growth mindsets and corresponding higher math grades the following year.

After identifying the correlation among these factors, Blackwell, Trzesniewski, and Dweck (2007) developed a process model to illustrate the specific connections among factors like theory of intelligence, learning goals, learning strategies, effort beliefs, and attributions for failure. They tested the relationships among these variables using testing mediation, structural equation modeling, and other regression analyses and concluded that students' growth mindsets directly affect their beliefs and behaviors, which leads them to use more effective learning strategies and ultimately improve their grades. In fact, researchers concluded that students' motivational framework affected their performance even more than their prior mathematics knowledge did.

In the third part of their study, Blackwell, Trzesniewski, and Dweck (2007) created an intervention aimed at improving adolescents' mindsets. In the experimental group, 48 students

received eight 25-minute workshops on the malleability of intelligence. The second half of the class (43 students) served as a control group; they received instruction on memory. Both groups also learned about the brain's neural pathways and completed a motivational questionnaire. The researchers also interviewed the students' math teacher blindly about students' motivational behavior and positive changes over the year, which added necessary behavioral data that previous research lacks (Wilson & Linville, 1982). After re-administering the questionnaire three weeks after the intervention, the researchers found the experimental group was more likely to endorse a growth mindset. This change benefited the students in the experimental group academically: They were more likely to be praised by their teacher for exhibiting behaviors like improved work effort, persistence on assignments, and test scores, even though their teacher did not know which students were encouraged to adopt a growth mindset. Students in the experimental group also earned higher math grades the following year, compared to students in the control group whose math grades declined post-semester. Blackwell, Trzesniewski, and Dweck (2007) point out that their findings are preliminary and that further research is needed to draw more generalizable conclusions. My dissertation responds to this call for more research by using their methodology as a model and testing their observed connections between mindsets and performance in a writing context.

**Challenges to Dweck's Theory**

Donohoe, Topping, and Hannah (2013) conducted one of the few studies that challenge Dweck and her colleagues. Their study sought to measure the effectiveness of Dweck and Blackwell's (2008) computer program called *Brainology*, which promotes a growth mindset and teaches viewers about the brain's ability to develop and grow. The researchers asked 33 adolescents to complete this four-unit computer program and accompanying activity sheets,

which took nearly three hours over the course of several days. They then compared students' pre- and post-semester scores on two survey instruments that measured students' theories of intelligence and their levels of resilience. The researchers did not find significant changes in students who learned a growth mindset. Although the participants initially endorsed a growth mindset, in later focus groups, the effect seemed to have worn off. The researchers also did not find statistically significant results in terms of students' grades.

These findings challenge previous studies that show a growth mindset correlates with improved grades; however, this research cannot debunk Dweck's (2006) mindset theory because the study primarily evaluates the quality of *Brainology*, rather than critiquing the theory in general. This study mainly calls into question the usefulness and "stickiness" of computer programs that instruct students in intelligence malleability. Still, their findings are important because, according to Donohoe, Topping, and Hannah, previous studies also challenge the popular opinion that growth mindsets improve performance (Dupeyrat & Marine, 2005; Furnham, Chamorro-Premuzic, & McDougall, 2003; Kennett & Keefer, 2006; O'Shea, Cleary, & Breen, 2010; Simon et al., 2008). It is apparent from these studies that more research is needed to replicate and complicate current findings about the connection between mindset and performance.

## Writers' Implicit Beliefs

Although research into mindsets is growing in educational psychology, composition studies and writing center studies have yet to mine these areas. Limpo and Alves (2014) acknowledge this gap too, saying, "Writers' beliefs about the malleability of their writing ability have received little attention in the writing domain" (p. 572). Lavelle and Zuercher (2001) pointed out this oversight almost 15 years ago, saying, "the role of writers' intentions and beliefs

as related to writing processes has not been a major consideration" among writing theorists (p. 373). Studies have examined writers' cognitive processes and "problem-solving strategies" (Flower, 1981), revision techniques (Sommers, 1980), writing process stages (Britton et al., 1975), and avoidance of errors (Shaughnessy, 1977), but investigations into writers' mindsets are rare. One area that has received some attention is writers' motivations for writing, although Sullivan (2014) asserts, "there has not been a great deal of attention paid to intrinsic motivation in our literature" (p. 127). Bruning and Horn (2000) theorize "four clusters of conditions" that they say are "keys to developing motivation" (p. 25). At the top of their list is their recommendation that teachers "nurture functional beliefs about the nature of writing and its outcomes," including "beliefs in writing's potential, in one's capabilities as a writer, and in having control over writing tasks" (p. 27). They acknowledge that researchers have studied the effects of writer's self-efficacy, but they point out that "less is known about the patterns of other beliefs that students hold about writing and how they develop" (p. 29). They see promise in Dweck's research, specifically identifying this as an area for future writing research.

Bruning and Horn (2000) question whether some students have a fixed mindset about writing that has "negative motivational consequences, such as those that accompany a performative outlook (e.g., excessive concern with evaluation, risk aversion)" (p. 29). Bruning and Horn hypothesize that writers' self-talk can influence their negative attitudes and perhaps even their performance. Like Seligman (2006) who argues that our explanations of reality influence our perceptions, Bruning and Horn suggest that the way students explain writing situations to themselves can be harmful. They theorize that writers need to monitor "negative self-talk" because:

> No matter what their ability or how easy or hard the writing task, students variously may tell themselves that they aren't capable of writing well, blame themselves for waiting too long to write, consider writing to be a special talent that only others have, compare themselves unfavorably to an unrealistic standard of perfection, or assure themselves they can't begin writing because conditions aren't exactly right. (p. 34)

Although Bruning and Horn do not speculate on where this self-talk originates, it is logical to hypothesize that students' mindsets play a significant role. It is unclear why current research has not investigated such potentially critical components.

To date, according to my review of the literature, only one study examines students' mindsets in the context of writing. Limpo and Alves (2014) agree that significant gaps exist in the literature, contending that "the role of motivational factors has been neglected" in writing studies (p. 572). To address this research gap, they developed and administered an Implicit Theories of Writing scale to see whether 5$^{th}$ and 6$^{th}$ grade students' implicit beliefs about writing influenced how they well responded to writing instruction. They also sought to discover whether students' writing beliefs correlated to their essay length and quality. To answer their research questions, they conducted an intervention with a group of students who learned planning skills based on a new model of writing instruction. Limpo and Alves (2014) did not aim to change or influence students' mindsets; rather, they questioned whether students with a growth mindset responded better to writing instruction and ultimately influenced their essay length and quality. Since they did not test an intervention's ability to change students' mindsets, their study leaves important gaps for this dissertation to fill. Their survey provides a model for my study's instrument, and their findings regarding the correlations between students' mindsets and writing quality needs to be replicated.

Limpo and Alves (2014) split a group of 192 students into an intervention group and a comparison group. The intervention group received the new writing instruction, whereas the comparison group received the standard instruction. The researchers first administered an Implicit Theories of Writing scale, based off of Dweck's models, which asked students to indicate their level of agreement with the following statements: "My texts will always have the same quality, no matter how much I try to change it"; "No matter how many texts I write, their quality will always be the same"; and "I can't change the quality of my texts" (p. 576). Students completed this scale and provided a writing sample before the intervention, and they composed additional writing samples midway through the study and again at the end. These writing samples were assessed based on their length and writing "quality, coherence, syntax, and vocabulary" (p. 579). The researchers predicted that students whose survey results showed a growth mindset would benefit the most from writing instruction since growth-minded students are more likely to invest effort and take risks in their learning because they are not threatened by failure (Dweck, 2006).

Limpo and Alves (2014) found that students who learned planning strategies through the new instruction model did in fact write "longer and better texts than control students" at both mid-test and post-test points (p. 571). This discovery corresponds with Wallace's (1996) findings. Wallace, a composition scholar, also found that students who described their intentions for an essay before beginning their first drafts wrote better essays than students who did not verbalize their plans. Limpo and Alves (2014) discovered by comparing survey results to writing samples that students with higher growth mindset scores had better writing quality, confirming their hypothesis. They contend that students' improved performance was related to their growth mindset, not only to the instructional intervention. Their analysis shows that students' Implicit

Theories of Writing significantly predicted writing quality and improvement over time, although they did not predict essay length. Based on their findings, Limpo and Alves conclude that more research into writers' beliefs is needed, recommending that "Writing researchers should delve into the cognitive and motivational factors that mediate the effect of writing beliefs on interventions' effectiveness" (p. 584), further justifying the importance of researching writers' mindsets.

In the next section, I will describe trends in writing centers researchers' efforts to assess the effectiveness of tutoring. By describing the most common methods of assessment and synthesizing recent appeals from writing center scholars for more empirical proof of tutoring outcomes, I aim to demonstrate that the field would benefit from investigating tutees' mindsets. Such thorough investigations are missing from the literature, and calls from writing center scholars for more outcomes-based assessment (Huang, 2011; Lerner, 2001; Thompson, 2006) validate my decision to study internal factors like mindset in the context of an embedded tutoring program.

## Literature on Writing Center Research

Writing center professionals have been assessing the effectiveness of tutorials for decades (Davis, 1988; Neuleib, 1984; Stay, 1983). These assessments take many different forms, with the most prevalent methods being satisfaction surveys, usage counts, interviews, focus groups, and correlation studies. A review of the literature suggests assessment efforts have typically fallen into one of four general categories:

1. Counting "beans" (Lerner, 1997) by gathering usage data and demographic information;
2. Gauging student satisfaction rates through surveys, interviews, and focus groups (Bell, 2000);

3. Analyzing correlations between writing center attendance and improved grades, university retention, and graduation rates (Bell & Frost, 2012; Lerner, 1997); and
4. Recording and transcribing tutoring sessions to describe and evaluate tutoring techniques (Thompson, 2006).

The prevalence of these methods demonstrates the need for more data that describe tutors' impacts on students as writers by showing tutoring outcomes that go beyond surface-level effects. The shortage of studies that demonstrate "effects with far more impact than course or paper grades" (Lerner, 2001, p. 3) is one of the primary catalysts for my interest in studying tutees' internal factors, particularly through quantitative research methods that yield "stronger data" that are persuasive to powerful stakeholders (Gofine, 2012, p. 47).

Only a handful of studies employ quantitative assessment to collect more than usage statistics (e.g., Bell, 2002; Henson & Stephenson, 2009; Huang, 2011; Lerner, 1997; Niiler, 2005). Schendel and Macauley (2012) refer to quantitative methods as "the field's blind spot" (p. 3), a critique Jones (2001) develops in his comprehensive literature review. He writes, "Missing from this roster [of typical writing center assessment] is the type of 'formal' research common to physical and social sciences, and most notably absent are evaluation studies utilizing quantitative methodologies" (p. 13). Early attempts at quantitative assessment relied primarily on counting errors in students' essays or administering grammar tests, but Neuleib argued in 1984 that writing center directors could not "simply pre- and post-test every student who came into the center in order to show the world that students improved after a few tutoring sessions" (p. 11). She calls for more "meaningful research" (p. 11)—a recently familiar call—such as case studies, surveys, and composing-aloud protocols. Researchers have responded to Neuleib's challenge by correlating grades with writing center usage (Lerner, 1997), examining textual changes in

revisions based on tutors' suggestions (Bell, 2002), using statistical analysis to compare student essays written before and after being tutored (Huang, 2011; Niiler, 2005), and comparing student essays written by writing center users and non-users (Henson & Stephenson, 2009). However, the field is still pushing for more and better quantitative assessments (Huang, 2011; Jones, 2001; Lerner, 2001; Niiler, 2005; Thompson, 2006), specifically outcomes-based assessment, which Huang (2011) argues is "often missing or lacking in writing-center research" (p. 14).

Over a decade ago, Bell (2000) also made a case for objectives-oriented evaluation, which "specifies objectives and determines the extent to which the objectives have been met" (p. 14), calling such an approach "the best type of evaluation for writing centers" (p. 15). In his frequently cited article, Bell (2000) lays the groundwork for outcomes-based assessment by urging writing center directors to identify specific goals for their center and creating summative assessments that determine whether these goals are met. Thompson (2006) builds on this work by demonstrating why and how writing center directors should conduct student learning outcomes assessment "to demonstrate that students who use our services improve as writers" (p. 38). Thompson describes how to identify "intended educational outcomes" based in a writing center's articulated mission statement (p. 43). Further, by using case sampling and other quantitative methods, Thompson demonstrates how centers may "evaluate the quality of the services the students received" (p. 43). Lerner (2001) also endorses outcomes-based assessment, beseeching writing center directors to assess "much more meaningful effects than most of us have examined in the past" (p. 3). Lerner acknowledges that measuring such outcomes is difficult, but he argues that writing center directors can avoid the reductive nature of outcomes if

they think broadly about their center's goals, particularly those that align with university-wide educational goals and disciplinary values.

The literature demonstrates that researchers need to employ both qualitative and quantitative measures, with methods complementing each other to create triangulation (Huang, 2011; Niiler, 2005; Schendel & Macauley, 2012; Thompson, 2006). For instance, Niiler (2005) cautions, "Using numbers alone can be misleading; I would suggest that quantitative forms of analysis be used within a richer framework of qualitative analysis" (p. 13). Scholars are committed to representing writing center work in detail and in complexity. For this reason, my study employs elements from both quantitative and qualitative research to provide descriptive and inferential statistics that capture aggregable data alongside rich descriptions of students' individual experiences captured through interviews.

Reviewing writing center literature not only reveals a gap in terms of empirical research but also a shortage of studies that assess students' internal states. Only small pockets of writing center research have examined the writing center's influence on students' internal factors, such as tutees' levels of engagement (Bell & Frost, 2012; Brittenham et al., 2003; McCourt & Carr, 2010), persistence (Huntly & Donovan, 2010), and metacognition (Regaignon & Bromley, 2011). A few studies have examined tutees' help-seeking behavior and self-efficacy (Williams & Takaku, 2011), procrastination behavior (Young & Fritzsche, 2002), and attitudes (Davis, 1988; Huang, 2011), but none of these researchers explore tutees' mindsets, which psychologists have shown influence factors like students' attitudes and behaviors (Blackwell, Trzesniewski, & Dweck, 2007). However, the small samples of research concerning tutees' habits of mind, like their engagement, persistence, and metacognition, suggest writing center researchers value and wish to study students' internal factors.

Several writing center researchers who have shown interest in assessing tutees' attitudes and behaviors have used questionnaires and surveys as their primary research method, establishing precedence in the literature for using self-reports to assess students' internal states. For example, Henson and Stephenson (2009) administered the *Daly-Miller Writing Apprehension Test* as a pre-test and post-test (before and after a writing center intervention) to determine whether the writing center "helped alleviate clients' writing anxiety" (p. 3). Unfortunately, their results were inconclusive. Davis (1988) used Reigstad and McAndrew's (1984) *Writing Attitude Scale*, which poses statements on a Likert scale to determine students' writing preferences, confidence levels, fears, and beliefs about writing. He found students who used the writing center improved their attitudes by significantly greater degrees than students who did not work with a tutor. Young and Fritzsche (2002) have also assessed students' anxiety levels using Spielberger's *State-Trait Anxiety Inventory* to evaluate "participants' general tendency to experience anxiety (trait anxiety) and their current level of anxiety (state anxiety)" (p. 48). They modified the measure slightly to suit their study's goals, and they asked their participants to complete Solomon and Rothblum's (1984) *Procrastination Assessment Scale*. This measure relies entirely on participants to rate their own procrastination tendencies and resulting psychological stress (p. 47-8). They found that students who visited the writing center procrastinated less.

All three of these studies' interest in students' mindsets and behaviors suggests researchers believe tutors influence students' internal factors (Davis, 1988; Henson & Stephenson, 2009; Young & Fritzsche, 2002). For instance, Young and Fritzsche's (2002) findings—that lower procrastination behavior was correlated with writing center usage among students with high procrastination tendencies—suggest that writing centers can influence

students psychologically, even unintentionally or unknowingly. Young and Fritzsche explain, "Not only did the writing center not try to treat procrastination, analysis of writing center records suggests that procrastination was rarely (if ever) explicitly addressed" (p. 55). In other words, tutors did not intentionally help students avoid procrastinating, but the act of meeting with a tutor influenced students' behavior. It is logical to hypothesize, then, that a tutor's influence, especially through multiple "treatments," can extend beyond behavioral effects to psychological effects by helping tutees adopt a new mindset toward writing.

**Research on Course-Embedded Tutoring**

Course-embedded tutoring programs are another tutoring model that provide a context for studying mindset. Since the early 1980s (for an extended history, see Soven, 2001), when Haring-Smith developed an embedded tutoring program at Brown University, these primarily North American programs have had similar goals throughout the country: To enhance teaching and learning by supporting writing instruction, to share responsibility for students' writing development with faculty outside of composition, to create a space for peer feedback, and "to make writing an integral part of the curriculum, not a feature of isolated courses" (Haring-Smith, 1992, p. 124). Embedded tutors typically work with students in discipline-specific classes, where they fulfill a variety of responsibilities, such as acting as a liaison between students and faculty, conducting in-class workshops, facilitating peer review, and holding individual writing conferences (Carpenter, Whiddon, & Dvorak, 2014). Embedded tutors can be specialists with discipline-specific content knowledge or generalists "who have no formal expertise in the course material…except by happy coincidence" (Webster & Hansen, 2014, p. 52).

An embedded tutor is not, as Zawacki (2008), Soven (2001), and Haring-Smith (1992) have all insisted, a "faculty clone" (Soven, 2001, p. 206) who assumes inappropriate kinds of

authority. By maintaining an equal status, embedded tutors can help normalize writing challenges and "counteract the popular student myth that good writers never revise" (Haring-Smith, 1992, p. 124). Interestingly, Haring-Smith's statement suggests that embedded tutors can change students' mindsets about writing ability by helping them see that even strong writers invest significant effort in their writing. O'Neill (2008) agrees that embedded tutors act as mentors who share tutees' experiences and model the path toward success. O'Neill writes, "It is surely easier for a beginning student to imagine that they might attain the level of competence of [an embedded tutor] than of a lecturer" (p. 10). This relatable quality is essential to the arrangement: Students need to feel that that their embedded tutor, a peer who is sitting next to them and asking insightful questions, could be them. Importantly, the embedded tutor is trained in tutoring—unlike any other standout student in the class—so he/she can scaffold the way for other students to improve their writing. Spigelman and Grobman (2005) concur that embedded tutors help students achieve more than they could independently: "Prompted by 'knowledgeable peers,' student writers are more likely to invent together and to engage in higher levels of discussion and analysis than they might on their own" (p. 7). This emphasis on "higher levels of discussion" and an embedded tutor's ability to help students "think and write like scholars" (p. 8) implies that embedded tutors influence students cognitively and psychologically. Titus, Scudder, Boyle, and Sudol (2014) also argue that embedded tutors are experts at "heightening the students' metacognitive awareness" (p. 16). The fact that embedded tutors are depicted in the literature as mentors with strong influential power suggests they have the rapport and authority to influence their peers' mindsets, as well as their writing processes and performance.

Embedded tutoring programs are typically evaluated through qualitative measures, self-reports, and anecdotal evidence (Soven, 2011). Coordinators often tally the number of program

participants and communicate with participating faculty to gauge the program's effectiveness. They survey and talk individually with students, instructors, and embedded tutors to learn about successes and pitfalls (Soven, 2011). Embedded tutors may complete self-evaluations to describe what was effective and ineffective about the tutoring arrangement (Haring-Smith, 1992). However, coordinators typically stop short of collecting more objective data, such as assessing writing improvement, "most likely because of the difficulties involved in attributing improvement in writing performance to a single variable" (Soven, 2011, p. 220). Indeed, few studies rigorously investigate the effectiveness of embedded tutoring programs by comparing writing produced in classes with and without embedded tutors (Soven, 2011). Haring-Smith (1992) acknowledges this challenge, saying, "It is difficult, of course, to prove in an empirical sense that any writing program 'works'" (p. 130). However, she believes widespread positive reception to the program, reduced faculty complaints about student writing, and increased attention to peer feedback in other classes all indicate that "something must be happening" (p. 130). Such anecdotal evidence seems to be common among embedded tutoring programs because only a handful of published articles (Regaignon & Bromley, 2011) go beyond theorizing the benefits of embedded tutors to actually studying their impact.

In one empirical study, Regaignon and Bromley (2011) evaluate their embedded tutoring program based on students' development of metacognitive awareness. They sought to assess two embedded tutors' feedback on students' writing by comparing papers that 14 students wrote in a control section of an English class with papers that 10 students wrote in an experimental section that was paired with an embedded tutor. External reviewers used holistic scoring to evaluate students' portfolios, which each contained three essays. Reviewers also compared the three essays within each portfolio and assigned scores of 0-5 to each essay, based on five criteria

("argument, organization, evidence and analysis, use of secondary sources, and style") (p. 47). Finally, reviewers provided qualitative data in the form of "a narrative assessment of their impressions of the student's improvement" (p. 47), although the researchers do not explain how they used this data to assess the embedded tutors.

By comparing the portfolio scores, Regaignon and Bromley (2011) have found that students who worked with embedded tutors had statistically significant improvement on their work, whereas students in the control group did not. Similar to my study, the researchers distributed student surveys at the semester's end to gauge students' perceived abilities, their satisfaction with the embedded tutors, and their perceived learning. From these surveys, the researchers discovered that students who worked with embedded tutors "exhibit a metacognitive understanding of the relationship between the disciplinary mode of analysis they learned that semester and their writing skills" (p. 49). Indeed, they found that "some of these students also exhibited an increased awareness of their own writing processes and a greater sense of their ability to evaluate and improve their own writing" (p. 49). These results may suggest that students experienced mindset changes, although the researchers did not investigate students' mindsets. Since the researchers had a small sample size, they cannot generalize from their findings. However, they express an interest in building on their research on metacognition by stating, "We hope to design a follow-up study to explore the extent to which working with embedded tutors seems to enhance students' metacognitive understandings of writing and critical thinking" (p. 54). In this way, one of the unexpected outcomes of their research is a discovery of the potential for embedded tutors to help students develop their habits of mind, a cognitive effect analogous to mindset.

## Summary and Preview

By reviewing literature from psychology that describes the impact of students' mindsets and the power of interventions that change students' mindsets, I have shown that mindsets matter and can be changed (Aronson, Fried, & Good, 2002; Blackwell, Trzesniewski, & Dweck, 2007; Yeager et al., 2014). Studying mindsets within a tutoring writing context is particularly relevant because it affords writing center researchers an opportunity to assess tutors' influence on students' internal beliefs and behaviors, rather than relying mostly on external indicators of success, like grades, satisfactions rates, and usage data (Thompson, 2006). Writing center scholars have indicated that such measures are inadequate and the field needs more significant demonstrations of tutors' impacts on students and their writing (Lerner, 2001; Schendel & Macauley, 2012; Thompson, 2006). The construct of mindset can fill that role because research in psychology demonstrates that mindsets are possible to study, to change, and to measure (Yeager & Dweck, 2012).

In Chapter 3, I describe my research focus and the dissertation's study in more detail. I begin by describing my researcher positionality to contextualize my interest in this research, and then I explain the context and methodological approaches for my study. My aim is to describe the steps of my research process and to justify my data collection and analysis procedures so that readers will understand why, and how, I studied students' mindsets in the context of an embedded tutoring intervention. These details should help future researchers adapt, replicate, and extend my study.

# CHAPTER THREE

# METHODOLOGICAL APPROACH

The purposes of this dissertation are to explore how students' mindsets affect their writing processes and performance and to investigate an embedded tutor's influence on students' mindsets and their writing. To accomplish these objectives, I trained an embedded tutor in methods of teaching a growth mindset, gathered data from surveys and interviews of engineering students, and rated samples of students' writing (literature review essays). By employing a pre- and post-semester study design, I determined the degree to which students' mindsets changed over the course of the semester. Also, by interviewing students and assessing samples of their writing, I examined the degree to which students' mindsets impacted their writing practices and performance. Since compositionists and writing center researchers have not explored the connection between students' mindsets and their writing, this research fills an important gap. Writing teachers and tutors need to know how students' mindsets help or hinder their growth as writers, since researchers have found that students' mindsets significantly influence their performance in other areas, such as mathematics (Dweck, 2006) and language acquisition (Mercer & Ryan, 2010).

In this chapter, I describe my positionality as a researcher; justify my study's use of a RAD research design; and explain my study's context, research participants, and data sources. I also describe my procedures for data collection and analysis and identify steps I have taken to address ethical considerations. I begin this chapter with a discussion of my positionality as a researcher in order to make my subjectivities explicit (Motha, 2009). By describing my positionality, I intend to help readers understand my research agenda and perspective. As Harding (1987) argues, "introducing this 'subjective' element into the analysis in fact increases

the objectivity of the research and decreases the 'objectivism' which hides this kind of evidence from the public" (p. 14). Before describing my research methods and procedures, I aim to make clear my perspectives and experiences as a researcher and writing center professional, which inform and influence my interest in this topic.

## Researcher Positionality

As a researcher, I seek to study writing center work in both depth and detail, through both words and numbers, in both generalizable and individualized terms. In this way, tenets of both positivism and humanism are necessary, and as the social scientist Bernard (2000) says, "We are all free, of course, to identify ourselves as humanists or as positivists, but it's much more fun to be both" (p. 18). Bringing in both perspectives is appealing because reliable, valid, precise results are important, but everyone's perception of reality is different. The humanist tradition that believes "truth is not absolute but is decided by human judgment" (p. 18) calls for qualitative research methods that explore a symphony of voices and resist generalizations that marginalize minority perspectives. Individual experiences complicate hard facts and challenge researchers to redefine the boundaries of truth. However, some aspects of reality are knowable, and quantitative methods help researchers isolate variables, control conditions, and test theories (Teo, 2013), providing researchers an approximation of reality, even if studies' findings continually need to be reexamined and replicated.

### Professional Experience

I have worked in writing centers for over 12 years. In my current employment at a comprehensive state university in the southern part of the U.S., I have tutored and helped administrate the University Writing Center (UWC) for over 11 years, while also teaching courses in first-year composition, argumentation, and tutor education. Part of my position involves

coordinating the UWC's embedded tutoring program. This program, which I created in 2010, pairs seasoned tutors with courses across campus to help faculty in other disciplines teach writing. These tutors serve as paid embedded tutors, who work with students and faculty in a variety of ways: They deliver mini-lessons in class on writing-related topics and strategies, facilitate writing workshops, consult with students individually, collaborate with faculty on assignment design, and serve as a liaison between the students and the faculty member. As the program's coordinator, I recruit faculty for the program, advise faculty on how to work with the embedded tutor, assign tutors to classes, supervise and mentor tutors, and assess the program's effectiveness. This direct contact with and administration of the program makes me an insider who intimately knows the purpose and execution of the program. I know the kind of work required, hear success stories from participating faculty, listen to embedded tutors' accounts of their interactions with students, assist tutors when they encounter challenges, and have knowledge of upper administration's interests in the program.

**Research Experience**

In addition to this experiential understanding, I have empirical knowledge about the embedded tutoring program. In Spring 2015, I conducted an IRB-approved pilot study to assess the effectiveness of an embedded tutor's instruction. My colleague and I collected 40 literature reviews from students in two sections of the same engineering course. Half of these students worked with an embedded tutor several times throughout the semester, and half of the students received "treatment as usual," meaning their engineering course had a typical design that did not include an embedded tutoring intervention. Students did not know whether their course section would include an embedded tutor before signing up for the course. My colleague and I blindly rated the students' literature reviews, including both first and final drafts, and assessed the essays

using a trait-scoring rubric. In our preliminary results, we found that students who worked with an embedded tutor wrote, on average, higher-scoring essays. Importantly, their final drafts also displayed more frequent attention to higher order revisions, such as better organization and closer adherence to genre conventions. These preliminary results suggest that an embedded tutor can help students improve their writing.

Our pilot study yielded promising findings, suggesting that an embedded tutor could prompt students to make global changes to their drafts. Because more research was needed to validate our findings, this study generated more research questions for me: Would we find similar results if the study were replicated? In what specific ways are students changed by a tutor's instruction? I wanted to interview students about their writing processes, rather than only assessing their performance. Additionally, the pilot study led me to wonder whether a class with an embedded tutor would be an ideal context for studying students' mindset changes. The context provided two groups of research participants that allowed us to compare their writing: an experimental group and a treatment-as-usual comparison group. My experience rating students' literature reviews demonstrated that I could rate a large sample size and collect reliable results. Moreover, the engineering faculty member was interested in our results and wanted to learn more. She was willing to assign an embedded tutor to her class again and to participate in another study, and her experience working with the embedded tutor ensured she could make the most of the arrangement. Overall, this pilot study justified the rationale for conducting another study that assessed an embedded tutoring intervention, it demonstrated that a pre- and post-semester study design was feasible, and it allowed me to test some of the logistics of a similar study.

## Rationale for Research Design

In order to study students' mindsets, I used a replicable, aggregable, data-supported (RAD) research design. The study is replicable because future researchers can adapt the study's writing mindset survey and follow the methodological design. The findings are aggregable in the sense that the reported mindset scores can be compared to those found in other studies, and the conclusions are supported with empirical data. Driscoll and Perdue (2014) assert that "RAD research provides a particularly fruitful model for writing center inquiry" because it enables researchers to "build a base of evidence-supported best practices to establish a tradition of research to both build knowledge and to further legitimize the field" (p. 107). RAD research is marked by clear and systematic methods that can be replicated, data that can be "extended and built upon," and findings that are evidence based. (p. 106). Driscoll and Perdue argue that more writing center researchers should conduct RAD research in order to "provide evidence that tests the efficacy of our practices" and to "test our lore and assumptions" (p. 126). The RAD framework provided an ideal design for my research questions because I sought to build an evidence-based case regarding the efficacy of an intervention and to connect my findings to unfolding discussions about the role mindsets play in learning. By conducting a study that could be replicated by future researchers and that responded to previous research in psychology, this dissertation achieves the goals of RAD research.

A RAD research design allowed me to gather aggregable data for the purposes of comparison across students and across time and to collect more in-depth, individualized descriptions of students' mindsets and writing processes. My purpose was to gather pre- and post-semester survey data that I could compare using statistical analyses and to collect qualitative data that emerged from hearing students' unique, individual perspectives that I might

not have anticipated. The research design allowed me to look *for* certain characteristics identified in the literature (i.e., survey statements that reflected a fixed or growth mindset), while also looking *at* the phenomenon inductively, without expecting specific kinds of interview responses.

Selecting methods that created triangulation was an ideal way to answer my research questions:

1. How do students' mindsets affect their writing processes and writing performance?
2. To what degree do students' mindsets change over the course of the semester?
3. How, and to what degree, does an embedded writing tutor who is trained in mindset theory affect students' mindsets and their writing?

I explored the first research question by conducting interviews. By talking with students, I sought to understand how individual students' mindsets affected them and to investigate critical moments in their writing experience. These goals required an inductive, descriptive, and interpretive approach to studying units of analysis, which allowed me to study holistic data that emerged through inquiry, encouraged multiple voices, and provided a multifaceted representation of reality (Denzin & Lincoln, 2011). Interviewing students enabled me to listen to their experiences and discover the intricacies of their thinking, in order to gain a rich sense of students' lived experiences and thought processes. To further answer the first research question, I blindly rated students' literature review drafts and correlated these ratings with students' mindsets scores, calculated through the survey data. In this way, I was able to see whether growth-minded students revised their drafts more substantially, as the psychology literature would suggest. Triangulating the data in this way provided a more in-depth understanding of students as learners.

The second and third research questions called for data that was observable and numerical, which I could analyze using techniques of statistical analysis. As stated in my research questions, I aimed to assess students' mindsets at the beginning of the course, in order to establish a baseline from which I could compare students' mindsets again at the end of the semester. Gathering survey data allowed me to assess and compare students' mindsets. I was able to compare students' pre- and post-semester scores, and I was able to compare scores from students in the experimental group—those who worked with an embedded tutor—to those in the control and comparison groups who did not work with an embedded tutor. Using a survey similar to those used in other psychological studies (Dweck, 2000) also connects my findings to the larger scholarly discussion regarding mindsets. Since I sought to add to the literature on mindset, it was important that I used measures regarded by scholars conducting similar research as valid and reliable (Dweck, 2000; Limpo & Alves, 2014; Palmquist & Young, 1992).

## The Study's Context

This study occurred in the context of a course-embedded tutoring program within a campus-wide writing center. Tutors who work in the writing center first take a three-credit tutor education course and later have ongoing professional development meetings, which I describe in the next section. Our center assesses tutoring efficacy mainly through tutorial observations and satisfaction surveys, although our writing center's strategic plan includes goals related to assessment that is more formal. Since both our center and the field at large have pushed for assessment methods that go beyond anecdotal findings (Schendel & Macauley, 2012), I developed a pilot study to assess our embedded tutoring program more formally. As mentioned, I found that students who worked with the embedded tutor improved their drafts more than those who did not work with the tutor. This suggests that course-embedded tutors influence writers,

justifying the need for more extensive research that investigated the specific ways tutors influence tutees. Studying the effects of tutoring in a course-embedded context provided an opportunity to assess a tutor's influence on students' mindsets.

**The Institution and the Students**

The context for this study was a southern comprehensive state university with an enrollment of over 20,000 students. Seventy-four percent of the University population is composed of in-state students, many of whom come from affluent areas ("Factsheet," 2015). According to the financial aid office, 62% of students receive financial aid each year. Over 79% of students are White, and less than 500 students are International Students ("Factsheet," 2015). The university consistently maintains a high retention rate (92.4% for Fall 2014 first-year students) and offers many student support services, such as learning centers, career and academic planning services, counseling services, disability services, and so forth ("Factsheet," 2015). In addition to emphasizing academic rigor, the University is committed to engagement, environmental sustainability, diversity, service learning, and "being the change," one of the campus slogans.

**The University Writing Center**

The University Writing Center is housed within academic affairs. Its mission is to "empower students, faculty, and staff to develop writing skills and confidence by providing one-to-one consultations, resources, and programming that support and enhance writing across campus" (University Writing Center, 2015). The Writing Center employs faculty writing consultants, undergraduate tutors, and graduate students, totally a staff of about 40 personnel who hold nearly 4000 appointments per year with students, faculty, and staff during all stages of the writing process. In addition to consulting with writers individually, the staff facilitates

presentations and workshops on writing, creates writing resources that are compiled on the Center's website, coordinates the embedded tutoring program, and consults with faculty on their teaching. Since the university does not have an official Writing Across the Curriculum program, many of these Writing Center programs serve that function. The Writing Center is also a site for writing research, and many of the faculty and tutors present at disciplinary conferences and publish in writing center and composition studies journals. The atmosphere is collegial and professional, where all tutors are expected to maintain a high level of expertise and to work with faculty mentors on campus-wide efforts to enhance writing instruction and to contribute to larger initiatives within writing centers.

**Tutor Education**

Before tutors are eligible to work in the University Writing Center, they are required to take the three-credit Tutoring Writing course that covers writing center theory, genre theory, and tutoring techniques, among other course objectives. The course is taught by Writing Center faculty members, and students take the course as an elective if they wish to become tutors and/or are majoring or minoring in Writing, Rhetoric & Technical Communication. The course has an intensive practicum component that affords students the opportunity to gain experience tutoring in the Writing Center. This unique model, which emphasizes reflection and engagement with writing center theory, is described in Schick et al.'s (2010) article "The idea of a writing center course." During the course practicum, students observe tutoring sessions in the University Writing Center, practice tutoring (with a mentor) in the Writing Center several times, and tutor independently under the supervision of an experienced tutor. While the course prepares tutors to work in the Writing Center, ongoing professional development continues the work of the course. All Writing Center employees complete 15 hours of professional development throughout the

semester to enhance their tutoring expertise and knowledge. The professional development curriculum consists of monthly small groups meetings led by writing center faculty and all-staff meetings devoted to topics like citation practices, diversity, grammatical proficiency, genre awareness, etc. At the end of the year, all tutors report their accomplishments and compose a self-evaluation document that they review with the Associate Director. Tutors who have acquired at least one semester of tutoring experience, and who are identified as exceptional tutors, are eligible for to work as embedded tutor.

**The Embedded Tutoring Program**

Launched in 2010, the University Writing Center's embedded tutoring program supports writing instruction in a variety of courses on campus. The program places advanced writing tutors in a variety of classes, where they consult individually with students on their course writing assignments, deliver in-class lessons on writing-related topics, facilitate workshops and peer review sessions, and collaborate with course instructors on assignment design. Embedded tutors generally act as liaisons between students and faculty by communicating student concerns and questions to faculty and translating faculty expectations to students. Importantly, embedded tutors act as peers, not as authority figures. Their level of involvement during class time varies, with some embedded tutors attending class on a weekly basis and others only attending three to four times throughout the semester. In those latter cases, embedded tutors typically hold office hours to meet with students and maintain regular contact with the course instructor through email and face-to-face meetings.

I have coordinated the embedded tutoring program since its inception and have been responsible for most of its design, policies, and procedures. I created the program based on models described in the literature by Haring-Smith (1992), Soven (2001), and Zawacki (2008),

which position embedded tutors as "change agents" (Zawacki, 2008) who provide writing instruction to students and, by extension, to corresponding faculty who do not identify as writing experts. Embedded tutors oftentimes serve as liaisons between students and faculty and are typically placed in Writing Intensive courses, although their specific objectives are always institutionally specific (Zawacki, 2008). Our program has grown organically by responding to faculty's needs as they arise, rather than by implementing campus-wide Writing Across the Curriculum initiatives. Embedded tutors have supported classes in biology, composition, education, engineering, human resources, literature, new media, nursing, psychology, integrated science and technology, and social work. In these classes, embedded tutors typically consult with students on their writing outside of class and provide the course instructor feedback on student progress. On average, the program places three embedded tutors in classes per semester, with its highest number of embedded tutoring placements in one semester being nine. I mentor each of the embedded tutors to address unique challenges that arise in their placements, and I stay in contact with faculty members who have been assigned embedded tutors to help them make the best use of the arrangement. At the beginning of the semester, I meet with each faculty member to educate them about the program, to brainstorm how they might collaborate with the embedded tutor, to prevent misunderstandings, and to create a contract that outlines everyone's responsibilities.

Although the embedded tutoring program has only been assessed informally for formative assessment purposes, participating faculty, students, and embedded tutors all report overwhelmingly positive evaluations. For instance, a former embedded tutor said that his experience working as an embedded tutor "has been the single best thing to happen to my own writing and tutoring abilities" (University Writing Center, 2015). Faculty consistently report that

the embedded tutor's instruction and involvement in the class helps students significantly and even enriches their pedagogy because they observe new methods of teaching writing. The pilot study that I co-conducted in Spring 2015 lends evidence to these anecdotal reports: Our preliminary results showed that students who worked with an embedded tutor wrote literature reviews that received higher scores than those who did not consult with an embedded tutor. Although these findings were promising, more research was needed to explore the embedded tutor's influence on students' writing processes, beliefs, attitudes, strategies, and performance.

**Participants**

The participants for this research included the embedded tutor who delivered the tutoring intervention in a junior-level engineering class and the students in three sections of this class who volunteered to participate. The embedded tutor, as mentioned, was an experienced University Writing Center tutor. She was selected to participate in the research because I had observed her tutoring over the course of several years and knew she could be trained in mindset theory. The embedded tutor's work in the class consisted of three main tasks: acting as a liaison between the students and the professor, delivering an in-class presentation on mindset theory, and consulting individually with students on their literature review assignment. At the end of the semester, she participated in a post-semester interview to discuss her observations and perceptions of students' mindsets, writing processes, and performance.

In addition to the embedded tutor, research participants included the engineering students who volunteered to participate in the study. These students were taking a required junior-level engineering course and had self-selected into one of three course sections taught by two different instructors. One of the course sections had an embedded tutor, but students did not know this when signing up for the class. Therefore, consenting student participants fell into one of three

groups: (1) the experimental research group, which consisted of students in the course section with an embedded tutor; (2) the treatment-as-usual control group, which consisted of students in the course section without the embedded tutor; and (3) the comparison group, which consisted of students in the course section taught by a different instructor who covered the same course content and followed the same course structure.

Conducting the study with these participants in a course-embedded tutoring context provided access to a wide variety of students, rather than relying solely on students who self-select to use the writing center. Studying writers' mindsets in a course-embedded context rather than a writing center environment reduced selection bias and offered the opportunity to see the effects of tutoring on both growth-minded and fixed-minded students. Dweck's (2006) interviews with students confirm that growth-minded students are more likely to seek learning resources and persist when they feel overwhelmed. On the other hand, fixed-minded students oftentimes avoid challenging tasks and strenuous effort as a face-saving tactic. Therefore, it is possible that writers with a fixed mindset may avoid exposing their weaknesses to a tutor and are thus unlikely to come to a campus writing center for assistance. The embedded tutoring context also facilitated a research design that included an experimental group, a treatment-as-usual control group, and a comparison group, which is the standard methodology in education research.

Classroom-embedded tutoring was also an appropriate context for my study because the embedded tutor could deliver an intervention during class time similar to those conducted in psychological studies. Typically, in these studies' designs, the researcher teaches students about the malleability of intelligence through a series of lessons—thus, promoting a growth mindset—and then studies the effects of that intervention (Aronson, Fried, & Good, 2002; Blackwell,

Trzesniewski, & Dweck, 2007; Yeager et al., 2014). Such instruction may seem forced in the writing center because in a conventional, one-on-one tutoring session, the tutor follows the writer's agenda (Ryan & Zimmerelli, 2015). It is true that writing center tutors likely model growth mindsets and dispel the myth of the naturally born writer. However, it might be less natural for a tutor to impose a mini-lesson on growth mindset during a writing center tutorial. In contrast, embedded tutors in my program often plan lessons to deliver in class, based on the writers' needs and the teacher's recommendations. A lesson in growth mindset was similar to other lessons that embedded tutors provide during class on topics such as writing strategies, research methods, or peer review techniques.

## Data Sources and Research Steps

The three primary means of data collection included surveys, interviews, and essay ratings (see Table 1). I surveyed and interviewed participating students from three sections of the same engineering course, and I blindly rated first and final drafts of their literature reviews. I also interviewed the embedded tutor about the content and frequency of participating students' writing consultations and about their writing performance. As mentioned, triangulating the data enabled me to collect pre- and post-semester data and then to supplement these results with interview findings that described individual students' beliefs and behaviors. In the following sections, I describe my research steps and explain my process of collecting data from surveys, interviews, and writing assessments.

Table 1

*Data Sources With Corresponding Research Questions, Justifications, and Logistics*

| Research Question | Data Sources | Justification | Logistics |
|---|---|---|---|
| #1: How do students' mindsets affect their writing processes and performance? | Interview with five engineering students (post-semester) | I wanted to ask students about their mindsets, experiences, and perceptions. Students also had the opportunity to discuss any changes they experienced in their mindsets and/or behaviors. | I interviewed five consenting students individually at the end of the semester. |
| | Writing assessment | Correlating essay ratings to students' mindset scores demonstrated whether students' mindsets influenced their performance. | I blindly rated all drafts and then triangulated this data with the survey and interview results. |
| #2: To what degree do students' mindsets change over the course of the semester? | Survey (pre- and post-semester) | The survey data established a baseline for students, from which I could compare students' scores again post-semester. | I adapted existing mindset surveys and administered the surveys during the first and last weeks of class. I only collected surveys from consenting students. |
| #3: How, and to what degree, does an embedded writing tutor who is trained in mindset theory affect students' mindsets and their writing? | Survey (pre- and post-semester) | Correlating changes in students' mindset scores to the intervention showed whether students who worked with the tutor experienced changes in their mindsets. | I conducted statistical analyses of students' pre- and post-semester survey results to see whether students' mindset changes were significant, and I correlated changes to the different treatment groups. |
| | Writing assessment | Essay ratings showed whether students who worked with the tutor revised their drafts more substantially and/or scored higher on their final drafts. | I blindly rated all drafts and then identified which treatment groups each writer belonged to, in order to determine which groups had statistically significant improvements across drafts. |

## Research Steps

The research steps undertaken in this project are summarized as follows:

1. I drafted Chapters 1-3 of the dissertation and submitted them to my dissertation advisor.
2. I revised Chapters 1-3 and submitted them to my committee readers.
3. I held the three-chapter defense.
4. I submitted the IRB application and received IRB approval.
5. I selected a seasoned writing tutor to work as an embedded tutor in the engineering class. I had observed her tutoring on many occasions and knew she was capable of learning about and promoting a growth mindset.
6. I trained the embedded tutor in growth mindset theory and in methods for teaching a growth mindset.
    a. We discussed the embedded tutor's beliefs about the nature of writing ability and her experiences developing as a writer, in order to assess her mindset.
    b. I assigned and then we discussed Dweck's (2006) book *Mindset*.
    c. We watched and discussed online videos on mindset theory (Briceño, 2012; Dweck, 2014) and neural plasticity (Khan Academy, 2014).
    d. We discussed psychological studies that model how to teach a growth mindset through an intervention (Aronson, Fried, & Good, 2002; Blackwell, Trzesniewski, & Dweck, 2007; Yeager et al., 2014).
7. I collaborated with the embedded tutor to create a growth-mindset training protocol for her to deliver in a lesson in the engineering class:
    a. The embedded tutor delivered a 30-minute class presentation on growth mindset (Appendix H). This presentation resembled other intervention studies, described

in the psychological literature, that informed students about the expandable nature of intelligence, showed short video clips, and discussed students' past experiences of growth in writing and other areas (Aronson, Fried, & Good, 2002).

8. I collected data in the engineering classes:
    a. I attended two sections of the engineering class to introduce my project and to distribute informed consent forms.
    b. I surveyed engineering students pre-semester.
    c. I surveyed engineering students post-semester.
    d. I interviewed five engineering students post-semester.
    e. I interviewed the embedded tutor post-semester.
    f. I rated 102 first and final drafts of consenting students' literature reviews.
    g. I collected consenting students' final paper grades.
9. I analyzed all data.
10. I revised Chapters 1-3 and composed Chapters 4 and 5.
11. I submitted a full draft of the dissertation to my advisor and made revisions as requested.
12. I submitted a full draft to committee members.
13. I held the final dissertation defense.

## Data Collection Procedures

### Surveys

At the beginning of the semester, I visited all three sections of the engineering course to describe my research project and to invite students to participate. I provided a link to an online self-administered survey to students, which consenting students completed during class and again at the end of the semester (Appendices D & E). Only participating students' data were

collected. The survey instrument was a modified version of three existing surveys that have all been previously validated. (Dweck, 2000; Limpo & Alves, 2014; Palmquist & Young, 1992). Both the pre- and post-semester surveys contained the same eight Likert-scale statements, which students rated on a 6-point scale from "strongly disagree" to "strongly agree":

1. Good writers are born, not made.
2. Hard work, desire, dedication, and enough time are all I need to become a good writer.
3. You have a certain amount of writing ability, and you can't really do much to change it.
4. I believe I was born with the ability to write well.
5. My essays will always have the same quality, no matter how much I try to change them.
6. Good teachers can help me become a better writer.
7. No matter how hard I try, I will never be a great writer.
8. No matter who you are, you can significantly change your writing ability.

The survey also asked students about their perceptions regarding writing improvement and writing success. Before administering the surveys, I tested the survey items on colleagues and on a sample group of writing tutors to see whether the items were clear and whether they accurately conveyed my intended meaning. I then made revisions as necessary.

I expected more students to volunteer to complete the survey than to agree to an interview, since they were able to complete the survey during class. According to Fowler (2014), when researchers administer surveys in classroom settings, the rate of response is near 100%, and my response rates were also high. I also expected students to be more forthright in their responses to survey questions than in interviews since research has shown that "sensitive information is more frequently, and almost certainly more accurately, reported in self-administrated modes than when interviewers ask the questions" (Fowler, 2014, p. 65). I expected

that students might be reluctant to disclose to me any negative perceptions they had of writing if they perceived me as a writing expert who values and enjoys writing. Therefore, it was necessary to collect data in survey form.

**Interviews**

At the end of the survey, I asked students if they would like to participate in a short interview. Then, I e-mailed students who had agreed to participate and suggested several meeting times. Five students replied to my request, and I interviewed them individually at the end of the semester about their mindsets and writing experiences. I selected a semi-structured interview method so that I could use the same set of questions for all participants but also ask follow-up and clarifying questions (Appendix F). The semi-structured format allowed me to "make possible comparisons across interviews," while also giving me the flexibility to probe for more detail and elaboration as needed (Bernard & Ryan, 2010). I used probing techniques that Bernard and Ryan (2010) recommend, which included "echoing" participants' responses while asking for elaboration (p. 31) and directly asking the participant to "tell me more" (p. 32). During the interviews, I listened carefully to participants so that I did not miss or misinterpret significant remarks. Instead of approaching interviews with preconceived ideas of what I expected to hear students say about their beliefs, I remained open-minded and resisted looking *for* certain statements. Rather than judging or evaluating students' interview responses, I looked *at* their responses to find patterns later during data analysis, in order to understand and describe their thought processes and experiences. I transcribed all recorded interviews using a professional transcription service.

At the end of the semester, I conducted a 40-minute interview with the embedded tutor. I asked the embedded tutor about the length and content of tutoring sessions, the dates and

frequency of students' sessions, her observations of students' writing strategies, and her perceptions of students' mindsets. Collecting this data gave me access to the embedded tutor's interactions with participating students and her observations of students' writing performance, which were necessary because I did not want to rely solely on students' self-reports of their behaviors. Triangulating the data in this way was important because Wilson and Linville (1982) discovered that students are not always good at self-reporting their internal states because people "do not always correctly represent the attributions and the states mediating behavior" (p. 376). Thus, the interview illuminated additional reasons for students' writing successes and struggles.

**Writing Assessment**

Finally, I collected 102 literature review drafts from consenting students, and I blindly rated them using a four-point trait-scoring rubric (Appendix G). The rubric contained five traits: purpose, complexity, organization, style, and mechanics. The rubric enabled me to rate students' drafts as "beginning" (1), "developing" (2), "competent" (3), or "advanced" (4) on each of the rubric traits. I had used this rubric in my pilot study of engineering students' writing in 2015, so I was familiar with the rubric's content and I recalled patterns in applying it to engineering students' literature reviews. In the pilot study, my colleague and I had conducted multiple rounds of norming to ensure we were applying the rubric consistently. Before rating drafts for this study, I consulted again with my colleague to discuss lessons we had learned from using the rubric last time. I also consulted my notes from those norming sessions and reviewed previous literature review drafts we had rated. I carefully reread four literature reviews that the engineering professor had characterized as "beginning," "developing," "competent," and "advanced," according to the rubric. My colleague and I discussed key features of the rubric and the markers of "beginning," "developing," "competent," and "advanced" essays within each of the five rubric

traits. We identified markers of essays that fell in between the benchmarks (e.g., 1.5, 2.5, 3.5), and I created descriptions for each of these sub-points on the rubric.

Before rating students' essays, I removed all identifying information and asked a member of my dissertation committee to code the essays for later re-identification. Thus, I was unable to decipher which drafts were first and final drafts, and I did not know whether the writers had consulted with the embedded tutor. I rated the drafts over the course of several weeks, so I frequently re-normed myself to the rubric by reviewing drafts I had previously identified as clear "1's," "2's," "3's," and "4's" in each area. After rating all 102 drafts, I reassessed the first 20 drafts I had rated to ensure that my scoring was still consistent. I reviewed the rubric carefully again for these drafts and made corrections when necessary. After completing all ratings, I consulted the identification key and created a spreadsheet that included students' pseudonyms and corresponding essay scores for first and final drafts.

## Data Analysis Procedures

### Survey Data

Only surveys completed by students who volunteered to participate in the study were collected and analyzed. The survey data ($N$ = 57) yielded both descriptive and inferential statistics. I initially used the survey data to calculate a mindset score for each participant, which I calculated by averaging the Likert-scale items on the survey. To calculate the average, I followed previous researchers' procedures: I assigned a numerical value to each statement (1=strongly agree to 6=strongly disagree, reverse scored for growth-minded statements) and then calculated the average of these scores (Dweck, Chiu, & Hong, 1995). I did not identify cut-off points for growth and fixed mindset scores. Instead, mindset scores fell along a spectrum, with higher scores indicating more of a growth mindset. Then, I compiled descriptive statistics to describe

students' mindset scores at the beginning of the semester ($N$ = 57) and again at the end ($N$ = 36), along with the average mindset scores for each treatment group. The statistics also described how many students perceived writing success as effort-based or talent-based, and they described how many students believed their writing performance and processes improved over the course of the semester. When analyzing this data, I categorized the data according to the different treatment groups.

I calculated basic inferential statistics to compare post-semester mindset scores of students in the intervention group ($N$ = 7) with the mindset scores of students in the control and comparison groups ($N$ = 22).[2] When comparing students' pre- and post-semester scores, the sample size was smaller than the samples for the total data because only 29 students completed both the pre- and post-semester survey. Since the control sample size was especially small, I combined the control and comparison groups to increase the power of the tests. This decision was warranted because the three class sections were nearly identical in class structure and pedagogy. Both instructors used the same syllabus, schedule, lesson plans, video modules, assignments, and grading rubrics. Furthermore, they delivered most of the writing instruction in common lecture sessions. In my initial data analysis, I found insignificant differences in terms of control and comparison group students' mindset scores and grades. Thus, the tests did not show evidence of an instructor effect. To compare students' mindset changes across treatment groups, I conducted an independent samples *t*-test, and I conducted a paired samples *t*-test to measure the significance of students' mindset changes. For students who participated in an interview, I matched their mindset scores with their corresponding interview data to analyze the potential

[2] I consulted a statistician to develop plans for analyzing the data. Then, we worked together to conduct statistical analyses using SPSS software.

reasons for students' mindset scores. I matched students' mindset scores with their essay scores to see whether mindset scores correlated with essay scores, which I will discuss in a later section.

**Interview Data**

I coded interview transcripts inductively to identify emerging codes, categories, and themes. I began the coding process by reading through interview responses and looking for patterns. I initially used in vivo coding (Saldaña, 2016) and process coding to create codes and categories. Saldaña (2016) recommends in vivo coding for researchers who want to "prioritize and honor the participant's voice" (p. 106), and process coding helped me focus on participants' actions and behaviors. Then, I used structural coding to connect the codes to my research questions and to the psychological literature that I operationalized in Chapter 2. I initially coded on paper, using color-coding techniques to highlight "different chunks of text with different colors," as well as underlining and circling words to help me label codes as they emerged (Bernard & Ryan, 2010, p. 90). After coding on paper, I used NVivo software to organize and tag the interview data. I created a codebook with emerging codes, categories, and salient quotations, and I used this codebook to identify and organize major themes in the data. Structural coding initially yielded 28 codes, and I condensed these into seven major categories: Difficulties, failure, improvement, motivation, teachers, performance, and writing process. After creating these categories and rereading the interview transcripts, I identified the three most salient themes: *Teachers influence writers*, *Writing is challenging*, and *Writers need motivation*.

**Writing Assessment**

After rating students' essays, I ran several statistical tests to compare the scores. I conducted a paired samples *t*-test to see whether students' second drafts were significantly better than their first drafts. I repeated the *t*-test for each treatment group to see whether one group had

greater improvement between drafts. The *t*-tests showed changes for each trait on the rubric, which allowed me to see exactly how students improved, in terms of their purpose, development, organization, style, and mechanics. I conducted bivariate correlation tests to see whether traits on the rubric correlated with each other and with students' mindset scores, and to see whether students' mindset scores correlated with their final essay grades. When conducting the tests, I ran Spearman's correlation because my data had a small departure from normality.

## Ethical Considerations

In accordance with ethical research practices, I submitted my research protocol for IRB approval before conducting any empirical research. At the beginning of my study and before collecting any data, I visited all three engineering classes to describe my study and its purposes, to recruit participants, and to distribute surveys. I clearly outlined student participants' responsibilities and time commitments, and I listed their potential benefits and risks in the Informed Consent Form (Appendix B). I emphasized that their participation was voluntary and would not affect their academic standing in the class. In the survey, I listed an option for students to select a pseudonym; if they chose not to do so, I assigned them a pseudonym.

### Participant Protection

I gained informed consent from all participants, and I only collected and analyzed data concerning students who consented to participate. I removed all identifying information from students' data, stored data in a locked office and on a password-protected computer, and used pseudonyms when referring to students. I did not identify students' names when I shared results with the course instructor or anyone else because such information is private and confidential (Folkman, 2010). As Folkman explains, privacy involves participants' "freedom to pick and choose the time and circumstances under which facts about the person and, most importantly, the

extent to which his or her attitudes, beliefs, behavior, and opinions are to be shared with or withheld from others" (p. 49). Since I collected data about students' mindsets and writing performance, it was critical that I kept such findings confidential, especially if students perceived a threat to their grade if the course instructor learned information about their mindsets, writing processes, and meetings with the embedded tutor. Although I share holistic results that I think will benefit the teacher because research findings should benefit participants (Sieber, 2010), I continue to preserve participants' identities by using pseudonyms when referring to specific students.

**Risks and Benefits**

Although no empirical research is entirely without risk, this study involved only minimal risk. Students may have felt uncomfortable expressing their beliefs and experiences with writing. They may have recalled difficult writing experiences, which could have invoked unpleasant memories or feelings. Students may also have felt busy when making time for the interview. They may have felt bored when taking the survey or like their time was wasted. With the exception of these potential emotional consequences, there were no known risks beyond those ordinarily encountered in daily life or during performance of routine physical or psychological examinations or tests.

I informed students about the purposes of my study and explained the benefits to them, which included discovering how mindsets influence writing. I plan to share the results of my study with participating students and the course instructor so that they can benefit from my findings. However, as mentioned, I will not disclose students' identities when referring to research results; I will only refer to students by their pseudonyms. The study's findings could

improve students' approaches to writing in the future and improve tutor education and writing instruction. Therefore, the benefits of this study outweighed any risks.

## Summary and Preview

In Chapter 3, I have explained and outlined my study's methodology and research steps in order to demonstrate the rationale for my approach and the feasibility of my design. By explaining and defending my methodological decisions, I have shown that I was uniquely positioned to study the connections between students' mindsets and their writing, that I selected a research context and research procedures that enabled me to answer my research questions, and that my study was carefully conceived and guided by ethical principles. In Chapter 4, I describe and explain the results of my study.

# CHAPTER FOUR

# RESULTS

The purposes of this dissertation are to explore how students' mindsets affect their writing processes and performance and to investigate an embedded tutor's influence on students' mindsets and their writing. The inspiration for the research and its methodology is based in Dweck's mindset theory, which asserts that students' performance is directly influenced by their mindsets. Since compositionists and writing center scholars have not investigated whether students' mindsets affect their writing, this study has tested this relationship empirically. Using a quasi-experimental design with an experimental group and two comparison groups, the study examines whether students' mindsets changed over the semester, assesses students' first and final drafts of a literature review, explores how students' mindsets affected their writing processes and performance, and considers whether mindset changes and/or writing improvements could be correlated to an embedded writing tutor. Specifically, the study explores the following research questions:

1. How do students' mindsets affect their writing processes and writing performance?
2. To what degree do students' mindsets change over the course of the semester?
3. How, and to what degree, does an embedded writing tutor who is trained in mindset theory affect students' mindsets and their writing?

In Chapter 4, I describe and discuss my findings. First, I describe the results from the pre-semester and post-semester surveys that indicated how many students selected growth- and fixed-minded statements. The survey's Likert-scale items were used to calculate students' mindset scores, which yielded pre- and post-semester comparison data for 29 students. Additionally, the post-semester survey inquired about students' perceived improvement in their

writing processes and writing performance. Second, I provide the writing assessment results and the accompanying statistical analyses. Finally, I summarize major findings from each interview and describe trends across all interviews.

## Results

### Pre-Semester Survey

The pre-semester survey contained eight Likert-scale questions that asked participants to rate the degree to which they agreed with growth- or fixed-minded statements. Participants were also asked whether, and why, they thought effort or talent was more important to writing success. Of 66 total students in the three engineering sections, 57 completed the pre-semester survey (Appendix D), resulting in an 86.4% response rate across all three treatment groups. I categorized students' responses to the survey statements as fixed minded if they expressed slight to strong agreement with fixed-minded statements and slight to strong disagreement with growth-minded statements. In contrast, I categorized students' responses as growth minded if they expressed slight to strong agreement with growth-minded statements and slight to strong disagreement with fixed-minded statements. On average, 15% of students displayed a fixed mindset in response to the survey statements, and 85% displayed a growth mindset. Notably, the highest percentage of students expressed a growth mindset (98.2%) in response to the statement "Good teachers can help me become a better writer." Only one of the 57 participating students disagreed slightly with this statement.

In the survey, three of the eight statements displayed a growth mindset. The majority of students expressed a growth mindset in regard to the growth-minded statements, as seen in Table 2. This was not surprising given previous findings that growth-minded statements "are highly compelling" and tend to prompt agreement, even from fixed-minded students (Dweck, Chiu, &

Hong, 1995, p. 270). None of the students strongly disagreed with any of the growth-minded statements, although many of them agreed only slightly. In the final column, Table 2 shows the percentage of students who expressed a growth or a fixed mindset in response to each statement.

Table 2

*Likert-Scale Responses to Statements That Reflect a Growth Mindset*

| Statements That Reflect a Growth Mindset | Students Who Strongly Disagreed | Students Who Disagreed | Students Who Disagreed Slightly | Students Who Agreed Slightly | Students Who Agreed | Students Who Strongly Agreed | Growth vs. Fixed Mindset |
|---|---|---|---|---|---|---|---|
| No matter who you are, you can significantly change your writing ability. | 0% | 1.8% | 7% | 31.6% | 45.6% | 14% | 8.8% Fixed mindset<br><br>91.2% Growth mindset |
| Hard work, desire, dedication, and enough time are all I need to become a good writer. | 0% | 1.8% | 10.5% | 28% | 42.1% | 17.5% | 12.3% Fixed Mindset<br><br>87.7% Growth mindset |
| Good teachers can help me become a better writer. | 0% | 0% | 1.8% | 24.6% | 54.4% | 19.3% | 1.8% Fixed Mindset<br><br>98.2% Growth mindset |

In the survey, five of the eight statements reflected a fixed mindset, and Table 3 displays students' responses to these fixed-minded statements. More students displayed fixed-minded responses to these statements than they did to the growth-minded statements, although the majority of students continued to endorse a growth mindset. The highest percentage of fixed-mindedness was displayed in response to the statements "Good writers are born, not made" (28.1%) and "I believe I was born with the ability to write well" (36.8%). Both of these

statements assessed students' beliefs regarding the innateness of writing ability, whereas the rest of the statements assessed students' beliefs regarding effort and dedication.

Table 3

*Likert-Scale Responses to Statements That Reflect a Fixed Mindset*

| Statements That Reflect a Fixed Mindset | Strongly Disagree | Disagree | Disagree Slightly | Agree Slightly | Agree | Strongly Agree | Growth vs. Fixed Mindset |
|---|---|---|---|---|---|---|---|
| You have a certain amount of writing ability, and you can't really do much to change it. | 17.5% | 50.9% | 21.1% | 10.5% | 0% | 0% | 10.5% Fixed<br><br>89.5% Growth |
| Good writers are born, not made. | 8.8% | 50.9% | 12.3% | 22.8% | 5.3% | 0% | 28.1% Fixed<br><br>71.9% Growth |
| I believe I was born with the ability to write well. | 12.3% | 28.1% | 22.8% | 28.1% | 8.8% | 0% | 36.8% Fixed<br><br>63.2% Growth |
| My essays will always have the same quality, no matter how much I try to change them. | 15.8% | 54.4% | 14% | 12.3% | 3.5% | 0% | 15.8% Fixed<br><br>84.2% Growth |
| No matter how hard I try, I will never be a great writer. | 33.3% | 35.1% | 22.8% | 8.8% | 0% | 0% | 8.8% Fixed<br><br>91.2% Growth |

In addition to containing Likert-scale items, the survey posed the following question: "When it comes to writing success, which is more important: effort or talent?" Over 87% of students reported that effort was more important. Only seven students indicated that talent was more important, and six students provided the following reasons why talent matters more than effort:

1. “It is the accumulation of skills you have acquired over time.”
2. “Because it takes creativity to write well and that is talent.”
3. “It comes easier to those writers.”
4. “Because at this point in our career our writing abilities are engrained in [our] minds so in order to alter them it will take a lot of effort.”
5. “I feel that people acquire the ability to convene words better than others.”
6. “Some people are left brain creative thinkers. Writing is easier for them.”

**Pre-semester mindset scores**. To calculate students’ mindset scores, the pre-semester survey was scored using a 6-point Likert scale (1=strongly agree and 6=strongly disagree). Growth-minded statements were reverse scored. Low scores indicated a fixed mindset, whereas high scores indicated a growth mindset. The mean score was 4.6 (SD = .52). Students from the experimental group (*N* = 18) had a mean score of 4.7, students from the control group (*N* = 10) had a mean score of 4.4, and students from the comparison group (*N* = 29) had a mean score of 4.6 (see Table 4).

Table 4

*Pre-Semester Mindset Scores*

| | Groups | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pre-Semester Mindset | Control/Comparison | 39 | 4.57692 | .491386 | .078685 |
| | Experimental | 18 | 4.70833 | .601774 | .141840 |

An independent samples *t*-test showed no significant difference between the experimental group and the combined control/comparison groups, in terms of their pre-semester mindset scores (see Table 5).

Table 5

*T-Test Comparing Pre-Semester Mindset Scores*

| | | | | | | | | | 95% Confidence Interval of the Difference | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Mindset | Equal Variances assumed | .003 | .955 | -.873 | 55 | .386 | -.131410 | .150447 | -.432912 | .170092 |
| | Equal Variances not Assumed | | | -.810 | 27.891 | .425 | -.131410 | .162203 | -.463726 | .200905 |

**Post-Semester Survey**

From all three treatment groups, 36 of 66 total students completed the post-semester survey, resulting in a 54.5% response rate. Students from the experimental group had the highest response rate (60.9%), whereas 38.5% of the same-instructor control group responded. The second comparison group was taught by an instructor who did not teach the experimental and control sections, but the course content and structure were the same. Students in this group had a 56.7% response rate. All participants were surveyed about their perceived improvement in two areas: their writing quality and their writing process, defined as "steps and procedures used when writing, such as planning, outlining, revising, editing, and so forth." Nearly half of all students surveyed (47.2%) said that their writing quality improved moderately over the semester, and 41.7% of students reported that their writing quality improved slightly, showing that 88.88% of the students surveyed experienced some degree of improvement. Two students detected no change in their writing quality, and one student reported that his/her writing got worse. Over half (55.6%) of students also saw moderate improvement in their writing process, and 30.6% of

students reported slight improvement. Although 13.9% saw no change, no one reported that their writing process got worse.

Of the students from the experimental group surveyed at the end, 13 of 14 (92.9%) reported that the quality of their writing improved over the course of the semester (see Figure 2). Seven students (50%) reported that their writing improved moderately, five students (35.7%) reported that their writing improved slightly, one student (7.1%) reported "significant" improvement, and one student (7.1%) reported no change. No one in the experimental group said their writing got worse. Most students (65%) attributed their writing improvement to the embedded writing tutor.

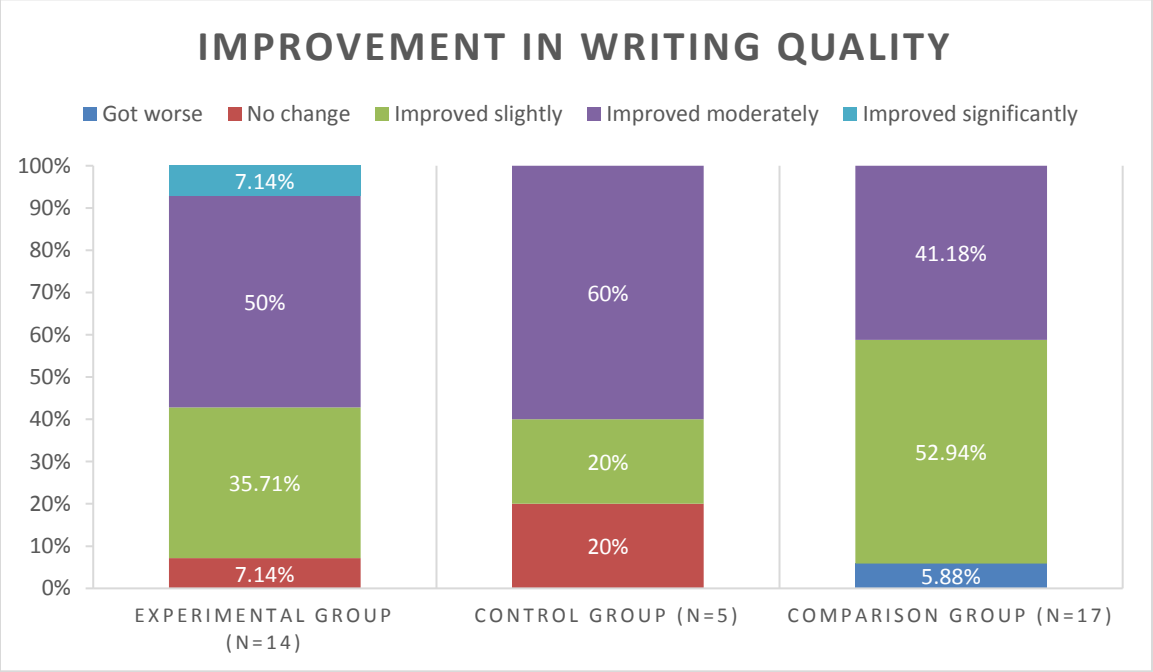


*Figure 1.* Improvement in writing quality.

In comparison, students in the control group reported slight improvement (20%), moderate improvement (60%), or no change (20%) in the quality of their writing. They mostly attributed their perceived improvement to spending more time drafting and/or revising. Students in the comparison group, which was taught by a different instructor and not paired with an

embedded writing tutor, mostly perceived either slight (52.9%) or moderate (41.2%) improvement. Most students attributed their improvement to feedback from the course instructor and to spending more time drafting and/or revising. One student in the comparison group reported that his writing got worse. Importantly, this student also indicated in the survey that talent was more important than effort when it comes to writing success. His pre-semester survey score indicated a fixed mindset (3.9), but his post-semester score did improve slightly (4.1).

Students in the experimental group also saw improvement in their writing processes (see Figure 3). Within this group, seven students (50%) reported moderate improvement, five students (35.7%) reported slight improvement, and two students (14.3%) reported no change. Seven of 14 students (50%) attributed improvement in their writing process to the embedded writing tutor. The second most popular influence was increased time spent drafting and/or revising.

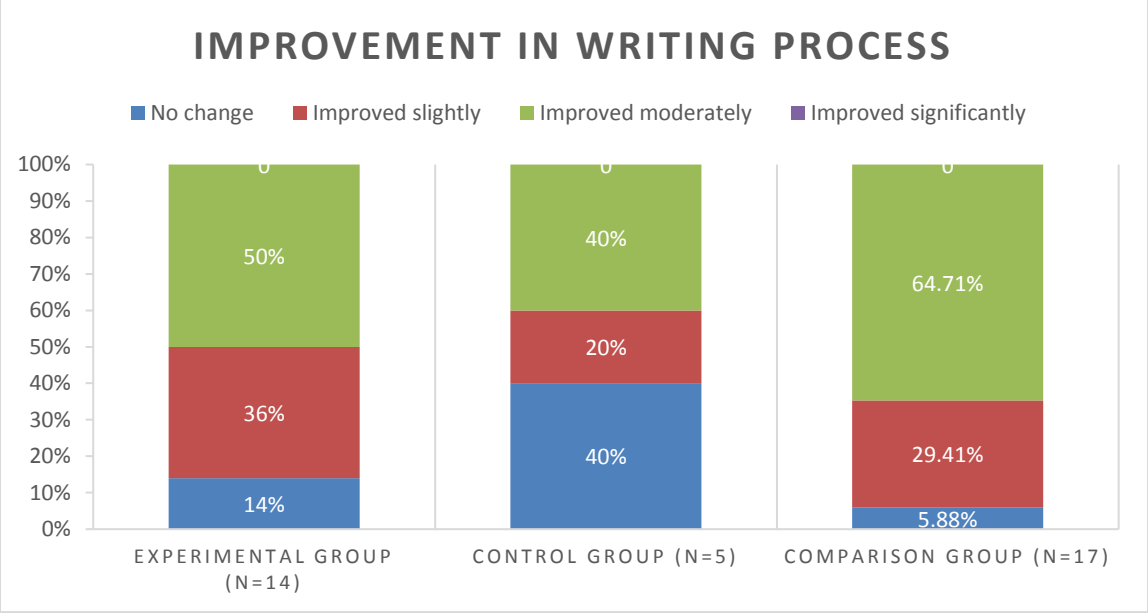


*Figure 2.* Improvement in writing process.

In comparison, two students (40%) in the control group reported moderate improvement in their writing process, one student (20%) reported slight improvement, and two students (40%)

reported no change. Most students in the control group attributed their perceived improvement to feedback from the course instructor and to spending more time drafting and/or revising. Two students in this group said feedback from tutors in the University Writing Center improved their writing processes. Most students in the comparison group reported moderate (64.7%) or slight (29.4%) improvement in their writing processes, but one student saw no change. This was not the same student who saw his writing performance decline. Instead, this student saw slight improvement in his writing performance. However, his post-semester mindset score indicated his mindset had become more fixed (3.8) at the end of the semester, compared to his pre-semester score (4.6). Students in the comparison group attributed their writing process improvement mostly to increased time spent drafting and/or revising and to feedback from the course instructor.

In the post-semester survey, only four students reported that talent was more important than effort when it comes to writing success. They each gave a reason why talent mattered more than effort:

1. "Even with all the effort a natural talent will show to be better in the end."
2. "Because those [who] are talented enjoy writing more. Poor writers (talentless) also enjoy writing less and therefore have difficulty putting in the effort. Often that which you are talented in is also that which you put the most effort into."
3. "Because talent is the catylast [sic] to help writing start."
4. "Because some people know what to say and can process what words to use naturally better than others."

**Post-semester mindset scores**. For the 36 students who completed the post-semester survey, the mean mindset score was 4.5 (SD = .65), which was slightly lower than the pre-

semester mean score (4.6). Students from the experimental group (*N* = 14) had a mean score of 4.6, and students from the control and comparison groups (*N* = 22) had a mean score of 4.5 (see Table 6).

Table 6

*Post-Semester Mindset Scores for Control and Comparison Groups*

| | Treatment | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Post-Semester Mindset | Comparison | 17 | 4.50735 | .624172 | .151384 |
| | Control | 5 | 4.40000 | .858778 | .384057 |

When comparing students' average mindset score changes, students from the control group (*N* = 5) and comparison group (*N* = 17) were combined because an independent samples *t*-test showed that students in those groups did not have significantly different mindset scores. Therefore, the test did not show evidence of an instructor effect (see Table 7).

Table 7

*T-Test Comparing Post-Semester Mindset Scores for Control and Comparison Groups*

| | | | | | | | | | 95% Confidence Interval of the Difference | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Post-Semester Mindset | Equal variances assumed | 1.574 | .224 | .311 | 20 | .759 | .107353 | .344739 | -.611759 | .826465 |
| | Equal variances not assumed | | | .260 | 5.307 | .805 | .107353 | .412816 | -.935597 | 1.150303 |

**Comparing Mindset Scores**

In total, 32 students completed both the pre-semester and the post-semester surveys. The data for these students provided points of comparison for each treatment group. Of the students who completed both surveys, 10 were from the experimental group and 22 were from the control and comparison groups. As mentioned previously, I combined the control and comparison groups because the sample size for the control group was small, and initial data analyses did not show evidence of an instructor effect. When analyzing this data, I conducted *t*-tests rather than an ANOVA because I did not have a balanced sample and one group had a much smaller sample size, making it difficult to check the normality assumptions that are necessary for an ANOVA. When comparing students' mindset scores, I discovered that three students in the experimental group did not attend individual consultations with the embedded tutor. Although the tutorial was a course requirement, the course instructor attributed these students' absences to ineffective time management skills, overconfidence in their writing skills, or apathy. The remaining seven students made up a sub-group of students within the experimental group who received the full embedded-tutoring intervention. They not only attended the in-class lecture on growth mindset theory, but they also consulted with the embedded tutor individually on their literature review assignment. Table 8 shows the mean mindset scores for not only the experimental group and the combined control/comparison groups, but also for this sub-group of seven students who received the full intervention.

Table 8

*Pre- and Post-Semester Mindset Scores for Students Who Completed Both Surveys*

| | Overall Experimental Group's (*N*=10) Mindset Mean | Standard Deviation | Experimental Sub-Group's (*N*=7) Mindset Mean | Standard Deviation | Control and Comparison Groups' (*N*=22) Mindset Mean | Standard Deviation |
|---|---|---|---|---|---|---|
| Pre | 4.6 | 0.75 | 4.4 | 0.68 | 4.6 | 0.50 |
| Post | 4.8 | 0.59 | 4.7 | 0.63 | 4.5 | 0.66 |

In order to test whether the students who received the full embedded-tutoring intervention (*N* = 7) experienced more significant mindset changes than those in the control and comparison groups (*N* = 22), I eliminated the three students from the experimental group who did not receive the full intervention when calculating mindset score changes. The descriptive statistics show that, on average, students in this experimental group who received the full intervention experienced positive change in their mindset scores (see Table 9).

Table 9

*Descriptive Statistics for Students' Mindset Changes*

| | Groups | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Mindset Change | Control/Comparison | 22 | -.0739 | .43243 | .09219 |
| | Experimental | 7 | .3571 | .46451 | .17557 |

I conducted an independent samples *t*-test to determine whether the change in students' mindset scores was significantly different across groups. The test revealed that, on average, students who received the full embedded-tutoring intervention had greater gains in their mindset scores (M = 0.3571, SE = 0.18) than those who did not receive the embedded tutor's intervention (M = -0.0739, SE = .09). This difference, 0.431, 95% CI [0.823, 0.040] was significant $t(27) = 2.259$, $p = 0.032$. It represented a large effect size, $d = 0.96$ (see Table 10).

Table 10

*T-Test Comparing Experimental Group With Control/Comparison Groups*

| | | | | | | | | | 95% Confidence Interval of the Difference | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Mindset Change | Equal variances assumed | .122 | .729 | -2.259 | 27 | .032 | -.43101 | .19083 | -.82256 | -.03945 |
| | Equal variances not assumed | | | -2.173 | 9.557 | .056 | -.43101 | .19830 | -.87564 | .01363 |

As stated, over the course of the semester, experimental group students, on average, became more growth minded. Comparing experimental students' pre-semester mindset scores with their post-semester mindset scores reveals a positive change in their scores (see Table 11).

Table 11

*Experimental Group Students' Mindset Changes*

| | Groups | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | PreMindset | 4.35714 | 7 | .682476 | .257952 |
| | PostMindset | 4.71429 | 7 | .632103 | .238912 |

A paired samples *t*-test determined whether experimental students' post-semester mindset scores were significantly higher than their pre-semester scores. The test revealed that, on average, students who received the full embedded-tutoring intervention had higher scores after the intervention (M = 4.71, SE = 0.24) than they did before (M = 4.36, SE = 0.26). This difference, 0.357, 95% CI [0.787, 0.072] was approaching significance $t(6) = 2.034$, $p = 0.088$. It represented a nearly large effect size, $d = 0.77$ (see Table 12).

Table 12

*Paired Samples T-Test for Comparing Experimental Group Students' Mindset Changes*

| | | | | | 95% Confidence Interval of the Difference | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Deviation | Std. Error Mean | Lower | Upper | t | df | Sig. (2-tailed) |
| Pair 1 | PreMindset - PostMindset | -.357143 | .464515 | .175570 | -.786747 | .072461 | -2.034 | 6 | .088 |

**Writing Assessment**

To assess students' writing performance, I blindly rated 102 literature reviews, which were students' first and final drafts, using a trait-scoring rubric. The results showed that, on average, experimental group students' ($N$ = 17) final drafts earned higher scores than their respective first drafts on four of five rubric traits: development, organization, style, and mechanics (see Table 13).

Table 13

*Experimental Group Students' First and Final Draft Trait Scores*

| | | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | Post Purpose | 2.9412 | 17 | .70450 | .17087 |
| | Purpose | 2.853 | 17 | .6316 | .1532 |
| Pair 2 | Post Development | 2.4118 | 17 | .56556 | .13717 |
| | Development | 2.471 | 17 | .5987 | .1452 |
| Pair 3 | Post Organization | 2.7941 | 17 | .73013 | .17708 |
| | Organization | 2.324 | 17 | .6600 | .1601 |
| Pair 4 | Post Style | 2.5000 | 17 | .39528 | .09587 |
| | Style | 2.206 | 17 | .3976 | .0964 |
| Pair 5 | Post Mechanics | 2.6176 | 17 | .45171 | .10956 |
| | Mechanics | 2.353 | 17 | .5524 | .1340 |

A paired samples $t$-test showed that the difference in organization, 0.47, 95% CI [0.850, 0.090], was significant $t(16) = 2.626$, $p = 0.018$, and represented a medium effect size, $d = 0.64$. The

difference in style, 0.29, 95% CI [0.499, 0.09], was also significant $t(16) = 3.050$, $p = 0.008$, and represented almost a large effect size, $d = 0.74$. Finally, the difference in mechanics, 0.26, 95% CI [0.49, 0.040], was significant $t(16) = 2.465$, $p = 0.024$, and represented a medium effect size, $d = 0.62$. (see Table 14).

Table 14

*Paired Samples T-Test Comparing Experimental Group Students' First and Final Drafts*

| | | | | | 95% Confidence Interval of the Difference | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Deviation | Std. Error Mean | Lower | Upper | t | df | Sig. (2-tailed) |
| Pair 1 | PostPurpose - Purpose | .08824 | .47550 | .11533 | -.15625 | .33272 | .765 | 16 | .455 |
| Pair 2 | PostDev - Development | -.05882 | .49631 | .12037 | -.31400 | .19636 | -.489 | 16 | .632 |
| Pair 3 | PostOrg - Organization | .47059 | .73889 | .17921 | .09069 | .85049 | 2.626 | 16 | .018 |
| Pair 4 | PostStyle - Style | .29412 | .39760 | .09643 | .08969 | .49855 | 3.050 | 16 | .008 |
| Pair 5 | PostMech - Mechanics | .26471 | .43724 | .10605 | .03990 | .48951 | 2.496 | 16 | .024 |

In comparison, students in the control and comparison groups ($N = 34$) improved their drafts on the same four rubric traits, but students' final drafts were not significantly better on most traits (see Table 15).

Table 15

*Control/Comparison Group Students' First and Final Draft Trait Scores*

| | | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | Post Purpose | 2.8235 | 34 | .68404 | .11731 |
| | Purpose | 2.706 | 34 | .6976 | .1196 |
| Pair 2 | Post Development | 2.3676 | 34 | .58139 | .09971 |
| | Development | 2.338 | 34 | .5867 | .1006 |
| Pair 3 | Post Organization | 2.5588 | 34 | .53321 | .09144 |
| | Organization | 2.324 | 34 | .5349 | .0917 |
| Pair 4 | Post Style | 2.3235 | 34 | .34559 | .05927 |
| | Style | 2.250 | 34 | .3941 | .0676 |
| Pair 5 | Post Mechanics | 2.5441 | 34 | .60762 | .10421 |
| | Mechanics | 2.368 | 34 | .6069 | .1041 |

A paired samples *t*-test showed that the difference in organization, 0.24, 95% CI [0.397, 0.073], was significant $t(33) = 2.954$, $p = 0.006$, and represented a medium effect size, $d = 0.50$ (see Table 16).

Table 16

*Paired Samples T-Test Comparing Control/Comparison Group Students' First and Final Drafts*

| | | | | | 95% Confidence Interval of the Difference | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Deviation | Std. Error Mean | Lower | Upper | t | df | Sig. (2-tailed) |
| Pair 1 | PostPurpose - Purpose | .11765 | .55129 | .09455 | -.07471 | .31000 | 1.244 | 33 | .222 |
| Pair 2 | PostDev - Development | .02941 | .63891 | .10957 | -.19351 | .25234 | .268 | 33 | .790 |
| Pair 3 | PostOrg - Organization | .23529 | .46442 | .07965 | .07325 | .39734 | 2.954 | 33 | .006 |
| Pair 4 | PostStyle - Style | .07353 | .41070 | .07043 | -.06977 | .21683 | 1.044 | 33 | .304 |
| Pair 5 | PostMech - Mechanics | .17647 | .54886 | .09413 | -.01504 | .36798 | 1.875 | 33 | .070 |

To see whether students' mindset scores correlated with any traits on the writing rubric, I conducted a bivariate correlation test. When conducting the test, I ran Spearman's correlation to minimize the effect of outliers because my data had a small departure from normality. Table 17 shows that students' mindset scores did not correlate with any rubric traits, although all traits on the rubric correlated significantly with each other.

Table 17

*Correlations Between Rubric Traits and Mindset Scores*

| | | Post Mindset | Post Purpose | Post Development | Post Organization | Post Style | Post Mechanics |
|---|---|---|---|---|---|---|---|
| Post Mindset | Correlation Coefficient | 1.000 | .227 | .104 | .046 | .335 | .249 |
| | Sig. (2-tailed) | . | .236 | .592 | .813 | .076 | .193 |
| | N | 29 | 29 | 29 | 29 | 29 | 29 |
| Post Purpose | Correlation Coefficient | .227 | 1.000 | .803** | .693** | .586** | .490** |
| | Sig. (2-tailed) | .236 | . | .000 | .000 | .000 | .000 |
| | N | 29 | 51 | 51 | 51 | 51 | 51 |
| Post Development | Correlation Coefficient | .104 | .803** | 1.000 | .601** | .511** | .490** |
| | Sig. (2-tailed) | .592 | .000 | . | .000 | .000 | .000 |
| | N | 29 | 51 | 51 | 51 | 51 | 51 |
| Post Organization | Correlation Coefficient | .046 | .693** | .601** | 1.000 | .607** | .471** |
| | Sig. (2-tailed) | .813 | .000 | .000 | . | .000 | .000 |
| | N | 29 | 51 | 51 | 51 | 51 | 51 |
| Post Style | Correlation Coefficient | .335 | .586** | .511** | .607** | 1.000 | .669** |
| | Sig. (2-tailed) | .076 | .000 | .000 | .000 | . | .000 |
| | N | 29 | 51 | 51 | 51 | 51 | 51 |
| Post Mechanics | Correlation Coefficient | .249 | .490** | .490** | .471** | .669** | 1.000 |
| | Sig. (2-tailed) | .193 | .000 | .000 | .000 | .000 | . |
| | N | 29 | 51 | 51 | 51 | 51 | 51 |

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

Importantly, students' mindset scores did correlate with their final paper grades, assigned by their course instructors. A bivariate correlation test showed that students' mindset scores and their final grades correlated moderately, Spearman's $r = 0.481$, $p = .008$ (see Table 18).

Table 18

*Correlations Between Students' Mindset Scores and Paper Grades*

| | | | Paper Grade | Post Mindset |
|---|---|---|---|---|
| Spearman's rho | Paper Grade | Correlation Coefficient | 1.000 | .481** |
| | | Sig. (2-tailed) | . | .008 |
| | | N | 51 | 29 |
| | Post Mindset | Correlation Coefficient | .481** | 1.000 |
| | | Sig. (2-tailed) | .008 | . |
| | | N | 29 | 36 |

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

**Interviews**

Interviews with engineering students primarily sought to answer the first research question: How do students' mindsets affect their writing processes and writing performance? I asked students about their writing experiences, difficulties, and improvements, in order to understand their writing mindsets and to interpret how their mindsets affected their writing. These interviews yielded findings beyond the initial research question, as they provided insight into students' motivations, attitudes toward performance, and beliefs about writing and learning. After coding the interviews using Structural Coding (Saldaña, 2016), I identified seven major categories that emerged: Challenges, failure, improvement, motivation, teachers, performance, and writing process. Table 19 provides an overview of each participant's data with quotations that reflect the interview categories.

Table 19

*Combined Data for Interview Participants*

| Name | Treatment Group | Pre- and Post-Semester Mindset Scores | Final Essay Ratings (Purpose, Development, Organization, Style, Mechanics) | Quotations That Reflect Interview Categories |
|---|---|---|---|---|
| Jenna | Comparison | 5.125 (Pre)<br><br>5.125 (Post) | 4, 3, 3, 2.5, 3 | "I hear a lot of people say 'I can't spell because I'm an engineer' or they just say 'I'm a math person, I'm not a writer.'" (Challenges)<br><br>"If I'm just really getting stuck on something, I'll just kind of take a look back, read over everything, make sure it sounds nice. And then go back to where I was stuck, maybe, and that'll help me a little bit." (Writing process) |
| Elijah | Comparison | 4.75 (Pre)<br><br>5.125 (Post) | 3.5, 3, 2.5, 2.5, 2 | "Constructive feedback is the driving thing that makes me do things better, to learn things more." (Teachers/Motivation)<br><br>"I take from an English class and I use that and apply it in an engineering class." (Improvement) |
| Paula | Control | 4.5 (Pre)<br><br>5.25 (Post) | 3, 2, 2, 2, 2 | "If I am doing it a lot in the semester, I'm getting better." (Improvement)<br><br>"I'm not sure if I did it right." (Performance) |
| Jordan | Control | 5 (Pre)<br><br>4.625 (Post) | 3, 2.5, 2.5, 2.5, 3 | "What did we do on this one that we didn't do on this one; how can we improve?" (Improvement)<br><br>"I like to have built in times of reflection, as that can be a really powerful way to improve one's performance." (Improvement) |

| | | | | |
|---|---|---|---|---|
| Maria | Experimental | 5.125 (Pre)<br><br>5.25 (Post) | 3.5, 2.5, 3, 3, 3 | "That was like a negative experience. Because I did not know exactly what, how it was supposed to be done." (Failure)<br><br>"So I would write different things. Read it over. Take my time to write. Understand. It's just like writing, you just keep writing, writing, writing. You make a mistake. Write. You make sense out of it" (Writing process). |

As shown in Table 19, all participants' mindset scores displayed growth mindsets. The following section summarizes salient points from each interview and provide examples of growth-minded students' writing processes and experiences with writing. After describing each interviewee's responses, I identify common threads in the following section.[3]

**Jenna.** Jenna's interview confirmed her high growth mindset score. Early on, she said, "I definitely have a lot to learn," demonstrating an openness to learning and growth, even though she does not see herself as highly skilled. Jenna believes writing improvement takes effort: "Unless you go out of your way to develop writing skills, you're probably not going to." In addition to intentional practice, Jenna believes reading, receiving specific guidance from teachers, and increased interest in writing were keys to her improvement. She mentioned teacher feedback several times in her interview, reporting that "nitty gritty feedback" from professors who sat down with her, "underlining things that could be improved and then writing examples of maybe how to improve it," helped her most. Receiving such detailed guidance was a turning point in her educational career because prior to taking an AP literature class in high school, she was unsure how to improve her writing. In that class, her teacher helped her focus, and she was able to write about interesting topics. For Jenna, writing is difficult when it involves synthesis,

[3] All names of interview participants are pseudonyms.

abstract questions, and complicated readings and subject matter. She suggested that unfamiliar genres can impede writing performance also, as she attributed her success on her literature review assignment to her earlier exposure to this genre. She said, "I had a bit of a sense what was going on" and therefore "might have struggled a little bit less than some of [her] classmates because they were all like, 'What is a literature review?'" In contrast, her knowledge of the genre conventions helped her know how to approach the assignment. Although specific guidance and feedback from professors have helped Jenna in the past, she does not usually seek it out. On her literature review assignment, she sought feedback only because it was required, even though she felt confident in her work. She also exhibited some preoccupation with performance, as she seemed to equate writing improvement with grades. For instance, she said, "in college, I would get a lot better grades on essays than I did in high school, and I took that as, like, oh, my writing improved."

**Elijah.** In his interview, Elijah demonstrated a growth-minded approach toward writing when he described how he applies his learning from one context to the next and how favorably he responds to criticism and failure. For instance, he said he believes his diverse writing experiences have improved his writing because they were opportunities to learn about different professors' expectations and reactions. For Elijah, even professors' mixed messages regarding writing conventions were helpful because he could take what he learned in one class and apply it to another class. He found that different classes developed his writing ability because "when you write about different things, too, you write in different styles and take different approaches." Most important to his writing improvement were constructive criticism and a sense that the assignment and material matter. Elijah identified times when he was "criticized really harshly" as most influential for his growth. He explained, "If I'm not doing something well and I'm aware of

that or if somebody grades me harshly, then I'm going to try and get better at it." Despite the fact that Elijah valued professors' feedback, he did not seek feedback from peers unless it was required, and he was quite focused on performance. He reported, "Grades push you to do better," especially when the subject matter does not "matter" in the long run. If Elijah did not believe the material was important, he quickly forgot what he learned. The aspects of writing that are most difficult for him include selecting and integrating sources, brainstorming, and writing lengthy papers. Elijah believes everyone can improve in writing, but he also believes one's upbringing plays a crucial role. He explained,

> If I was raised by a family that was in a low-income environment and didn't have a good schooling system and I didn't have a good foundation, then you ask me to put a lot of effort into it in my 20's and learn how to write really well, I think you could put in effort and eventually be a talented writer. But I think it would take a shorter time to do that if you were taught earlier in life and had a better foundation.

In general, Elijah believes that both effort and environment influence writing ability.

**Paula.** Despite her high mindset score, Paula believes she is an average writer. Her interview revealed considerable uncertainty about her writing skills and writing quality. Her writing process, response to feedback, and emphasis on grades illustrated this uncertainty. For instance, she changed her writing process after she was discouraged from writing the introduction and conclusion first, despite the fact that her process previously helped her "not get lost in the middle." When she revises her papers, she does not know whether her revisions improve her drafts. Therefore, when she receives feedback from peers or teachers, she follows their advice uncritically. For instance, when her peer reviewer made suggestions, she followed "just whatever she said." She described a similar response to feedback from her professor: "Then

he would tell me what to do differently and I'll do it that way." It seemed Paula's uncertainty about revision stems from her lack of understanding regarding writing principles. For instance, she described confusion about passive voice: "Ever since someone pointed it out to me I notice it, but I don't really know how to change it. I'm always like 'ah, there's passive voice again,' but I'm just going to keep it." For Paula, grades help gauge her abilities. In fact, the first comment she made about her literature review was "We haven't gotten our grade back so I'm curious to see how I did. But I'm not sure if I did it right." Her linking of grades with accuracy and quality suggested she relies on grades to assess herself. However, even high grades do not convince Paula that she is a skilled writer. Like all the other interviewees, Paula finds research writing difficult, especially because understanding the technical material is challenging. She also finds deadlines daunting, and she has trouble applying feedback from one paper to the next. Despite her feelings of uncertainty, Paula reported that diverse writing experiences, as well as practice, have helped her improve.

**Jordan**. Jordan's interview revealed an emphasis on reflection, an "iterative" writing process, the benefits of challenge, and a positive response to failure—all indicators of a growth mindset. In fact, Jordan used variations of the terms "reflection" and "iteration" 12 times, and he referenced growth mindset theory without any prompting. The following statement describes his growth-minded approach to writing improvement:

> If my capstone team is able to have more of a growth mindset, then, you know, we will go back and like reflect on where we failed and where we succeeded and how we can iterate upon that to be more successful.

For Jordan, failure is an opportunity to reflect on an assignment and compare his performance to previous work. He explained how he reflects on poor performance by recalling past success: He

asks himself, “What did we do on this one that we didn’t do on this one; how can we improve?” Jordan also attributed improvement to diverse writing experiences, his teachers’ guidance, high professional standards, challenging and lengthy assignments, and intentional practice. Like Jenna, Jordan asserted that students must be “intentional about trying to grow your skills or make a change if you feel like you need to become a better writer.” For Jordan, writing is difficult when it is heavily research based because “trying to get all of [his sources] in line” is challenging. In addition to creating such cohesion, Jordan reported that keeping track of citations is difficult. However, even when a task is challenging, he finds the process to “be very rewarding to at the end have a project, a paper at the end, a product that is incredibly well sourced.” Since Jordan responds positively to challenge, he reported, “I really grew as a writer during that [challenging] time.” As other interviewees indicated, feeling motivated is integral to Jordan’s writing process, and his motivation comes from feeling invested, interested, and passionate about the assignment or subject matter. Jordan recalled one writing assignment that he didn’t care about and therefore did not invest considerable effort in. He described the importance of feeling passionate about his work, saying he did not want to

> allot that extra time to go through a solid process to actually create something that [he] can walk away from feeling really proud of. It was more just, okay, let’s get something down and turn it in so that we can go focus on this next assignment that we’re actually more concerned about.

Finally, although Jordan appeared learning-oriented, he still displayed a concern for grades when he indicated that his grades correlate directly to his interest level.

**Maria**. Maria demonstrated a growth mindset in her response to challenge, her consideration for the “learning curve” of new writing tasks, and her desire to apply her learning

to other contexts. For instance, when faced with a difficult writing assignment, she said, "It did not make me feel like I wouldn't work harder or something. It was just more like this thing kind of needs time." Examples of challenges for Maria included broad assignments without concrete instructions and source-based writing that required her to understand the technical content. Maria suggested that understanding writing conventions and applying them to future assignments is important to her. She remarked that future literature reviews were easier after understanding the process of writing one because she "understood what they were asking for. And [she] understood how to do it. [She] didn't just know what to do." This contrast between "how" and "what" implied Maria's desire to gain and apply a deep understanding of the genre. A salient theme that emerged from Maria's interview was the importance of a teacher's confidence in her. She described one particular professor: "She was awesome. She really encouraged me…She made it seem like you can, you actually have something to write about." For Maria, this professor's belief in her potential motivated her to be interested in her project. Although Maria values her professors' input, she typically does not seek feedback on her writing because she views herself as experienced and advanced. She was confident reviewing her own work because she believed she could anticipate her professor's comments and evaluation. Plus, as she said, "I usually get grades I want." This suggested that lower grades might incentivize her to change her writing process, but her process is currently working.

**Synthesized results.** Collectively, the interview data revealed several findings that were consistent across most participants. The three most salient themes that emerged from the categories generated through coding were *Teachers influence writers*, *Writing is challenging*, and *Writers need motivation*. Table 20 provides examples to illustrate these themes, which I

describe in the following section. I elaborate on connections between these themes and the psychological literature in Chapter 5.

***Teachers influence writers***. All participants discussed the influence of teachers in their writing development. They reported comments like, "I had a really good AP Lit teacher in high school, and he was able to kind of focus me more on my writing" or "I feel like just having good teachers throughout my educational experiences has kind of really helped me as a writer and given me that confidence." According to these interviewees, teachers motivated and encouraged students by believing in them, challenging them, and creating interesting assignment prompts. Importantly, for most of these students, teachers were most helpful when they offered concrete, specific instruction and "fine detailed feedback." Additionally, teachers' high standards and constructive criticism were influential. In his interview, Jordan recalled his middle school teacher who was "basically a college professor," saying, "It was like a really challenging time, but I really grew as a writer during that time." Elijah also characterized times when he improved his writing skills as times when he was "criticized the most harshly."

***Writing is challenging***. Across interviews, participants identified three main challenges when writing: research (i.e., source-based) writing, complex disciplinary content, and unfamiliar genres. All five students reported that selecting, understanding, and synthesizing sources is difficult. Part of the trouble is integrating the sources into a cohesive product. A more challenging part of the process is reading and understanding the technical material. For these engineering students, writing from sources when "you're still trying to grasp what they're even saying," is quite difficult. Three students also suggested their lack of genre knowledge was a "learning curve" to overcome. The embedded tutor also reported that many students said during tutoring sessions, "I'm just not sure what a lit review is," despite the fact that the professor had

lectured on the genre and required them to watch instructional videos. Since many students had never written a literature review before, they were unsure what types of sources to select, how much information to include, whether to prioritize quoting or paraphrasing, and how to balance their perspective with the sources. As Maria said, "I know how it should be formatted," but "I did not know exactly what, how it was supposed to be done."

***Writers need motivation***. For these students, writing improvement and success requires motivation, which usually results from students' interest in the material and/or a sense that the assignment matters. Elijah explained why he expended more effort if he interpreted the skill or material as essential:

> Having a foundation in math is important, but when you look at writing, you're never going to stop writing. You're going to do that until the day you can't move your hand anymore. So to me it was more important to learn than it was to write equations and proofs all day that I was going to forget a week later.

Paula also suggested she felt less motivated to improve skills that did not "seem like the focus of [her] major necessarily." Other students equated interest in writing with increased motivation and improvement. For instance, Jordan said, "I think not having a real interest or passion for the work that was being done really kind of removed a lot of the motivation." Although motivation was consistently linked to writing improvement, students also attributed their writing improvement to teachers, effort and practice, reading, feedback, long papers, diverse writing experiences, and reflection.

Table 20

*Themes and Quotations From the Interviews*

| Themes | Example Quotations That Illustrate Top Three Themes | | |
|---|---|---|---|
| Teachers Influence Writers | "I feel like just having good teachers throughout my educational experiences has kind of really helped me as a writer and given me that confidence" (Jordan). | "Nitty gritty detailed feedback as in 'Don't use this too much or don't start your sentences with all the same word" (Jenna). | "And I had a teacher that would just make us write papers, like, once every other week. And to me back then that was a lot" (Elijah). |
| Writing Is Challenging | "Very complicated stuff I'm reading" (Jenna). | "Combining all of that information from different people into one cohesive report" (Elijah). | "I just hate that impending [deadline], like okay this is going to be due in a couple weeks" (Paula). |
| Writers Need Motivation | "I was writing more about things that interested me" (Jenna). | "She made it seem like you can, you actually have something to write about" (Maria). | "I didn't care, so I didn't put my best work in" (Jordan). |

**Interview with the embedded tutor**. Students in the experimental group received an embedded tutoring intervention with an experienced tutor who was trained in mindset theory. The tutor, Sara, gave a class presentation on mindset theory and consulted with students individually on their literature review assignment. Interviewing Sara provided insight into the content of tutoring sessions and into the engineering students' motivations and perceptions. According to Sara, she helped students mostly with in-text citations, transitions, signposting, and paragraph length. She spent considerable time explaining the conventions and purposes of a literature review because many students were unfamiliar with this genre. According to Sara, 95% of students were quite receptive to her feedback. Such a positive response surprised Sara because she thought they were already strong writers and because she thought they might be unengaged in required tutoring sessions. However, she did encounter a few students who were less receptive

to her feedback. For instance, she talked at length about one student who from the start "seemed uninterested in help and was only interested in pointing out how stupid his paper was. He admitted to writing it at 3 a.m. as well as to having already finished what is supposed to be a two-year project." The student's impatience, distraction, and resistance to her guidance made it one of her most frustrating sessions ever. She explained:

> Every time I would start answering [his question], there was a constant shutdown and it was about—it wasn't even always about things that were just suggestions where I was saying, "Well, maybe you should do this." There were times when I would say, "This is what a lit review is. This is how you have to write a lit review." And he would say, "No, no, that doesn't apply to me." And so I mean, I guess, I'm not really supposed to make conjectures but I feel like, you know, he was very closed minded about it, very much like, "It's a terrible paper. There's nothing you can do. This is all a waste of time."

Sara suspected that the student "probably thinks he's an okay writer but that writing in general or this assignment was very dumb," echoing other interviewees' comments about the importance of believing an assignment matters. Importantly, the student whom Sara referenced scored quite low on the mindset survey (3.5), indicating he had a fixed mindset. His post-semester survey results showed that he saw no change in his writing process or performance, and he selected talent as more important than effort when it comes to writing success.

The interview transcript showed that modeling a growth mindset and teaching for transfer were important goals for Sara. Although she did not explicitly use the phrase "growth mindset," she reported she was "really conscious about saying, 'This is a skill, like you can apply this elsewhere. You can do this in other assignments. You could do this in your like business emails.'" Sara tried to help students see how their writing skills extended beyond one particular

assignment or class by "bringing it even broader than just their engineering project or just their school life." According to Sara, this focus on transfer was the way she emphasized a growth mindset because focusing on developing writing skills in general, rather than on performing well on a single assignment, emphasized improvement and growth. In fact, she thought students might have been uncharacteristically open to growth because they had attended her growth mindset lecture. She said "the overarching theme" of the tutoring sessions "was that they did want to improve and change it. It almost felt like more so than in a regular writing center session, they were interested in learning in terms of writing and not just in terms of the assignment." Here, she connected students' desire to improve with transferable writing skills, believing that both may have been inspired by learning about the growth mindset in her class presentation.

## Summary and Preview

Chapter 4 presented survey, interview, and writing assessment results in order to answer the study's primary questions and provide insight into phenomena that extended beyond my initial questions. In sum, the chapter answers the three research questions with the following major findings:

Research Question #1 asked, "How do students' mindsets affect their writing processes and writing performance?" Statistical analyses reveal that students' mindset scores correlated moderately with their final essay grades. Also, the interview results showed that growth-minded writers tended to see effort as meaningful and attributed their success to practice and assistance from others. On average, growth-minded writers responded positively to feedback, they were motivated by challenging assignments, and they used new writing experiences as opportunities to learn. In this way, their mindsets seemed to affect their approach to writing. The most compelling evidence for the answer to this Research Question was found in the interview data.

Research Question #2 asked, "To what degree do students' mindsets change over the course of the semester?" Overall, students' mindsets did not change very much. However, students who received the full embedded-tutoring intervention experienced nearly significant improvements in their mindsets over the course of the semester, as they became more growth minded. Their positive change was significantly higher, on average, than students' changes in the control and comparison groups, and it represented a large effect size. The most convincing evidence for the answer to this Research Question was found in the *t*-tests.

Research Question #3 asked, "How, and to what degree, does an embedded writing tutor who is trained in mindset theory affect students' mindsets and their writing?" On average, final essays written by students in the experimental group had higher scores on every rubric trait than final essays written by students in the control and comparison groups. In addition, on average, experimental group students revised their drafts more. Their final drafts showed significant improvement in terms of organization, style, and mechanics, whereas students in the control and comparison groups only improved their drafts significantly in organization. Although I cannot say the higher scores were a direct result of the embedded tutor, students who were in the embedded tutor class had higher scores, and there is clear evidence that links their interactions with the tutor to these scores. The most persuasive evidence comes from the statistical significance shown in the *t*-tests.

In Chapter 5, I discuss my interpretations of these findings and connect my results to the psychological literature. I also discuss the implications of this research for teachers, tutors, and scholars and conclude by identifying opportunities for future research.

# CHAPTER FIVE

# DISCUSSION AND CONCLUSIONS

The goals of this dissertation are to explore how students' mindsets affect their writing processes and performance and to investigate an embedded tutor's influence on students' mindsets and their writing. To achieve these goals, I surveyed 57 of 66 total students, interviewed five engineering students along with the course-embedded tutor, and assessed 102 literature review drafts. The findings showed that, on average, 15% of students expressed fixed mindsets in their responses on survey statements. Although most students did not change their mindsets significantly, those who worked with the embedded tutor had more significant gains in their mindsets than those who did not consult an embedded tutor. Statistical analyses indicated that the embedded tutoring had a large effect size. Tutored students also wrote final essays that were significantly better than their first drafts in terms of organization, style, and mechanics. For all students, final essay grades correlated moderately to their mindset scores. The data confirmed some of my expectations—by showing that tutored students experienced greater mindset changes and improved their drafts more than those who did not work with an embedded tutor—and the study revealed some surprises.

In this final chapter, first I discuss students' beliefs regarding talent and ability because this is the question that prompted my study, then I link my findings to Dweck's theories, and finally, I discuss implications and opportunities for future research after describing the study's limitations. Overall, my findings suggest that the talent/effort binary does not account for students' nuanced beliefs and the important role that relevant and interesting assignments play in motivating writers. Additionally, the study shows that growth-minded writers demonstrate several common traits, but students may not exhibit all of them. These findings have implications

for mindset theory and, since the study provides evidence of tutoring efficacy, implications for writing center scholars seeking to validate embedded tutoring.

## Students' Beliefs About Talent and Effort

One of my reasons for studying mindsets stemmed from hearing writing center clients refer to themselves as "bad writers." I wondered whether this self-identification implied their belief in the natural born writer. Indeed, it is not uncommon for students to perceive writing ability as innate (Jones, 2001; Palmquist & Young, 1992). Whether or not such a belief is accurate extends beyond the scope of this study because my purpose was to explore the implications of students' beliefs. Still, it is worth noting that the issue concerning innate talent versus effort-to-improve is up for debate in the literature. According to psychologists who study expertise, "the pendulum has swung between nature and nurture—the view that experts are 'born' and the view that they are 'made'" (Hambrick, et al., 2014, p. 34). Until recently, Ericsson, Krampe, and Tesch-Römer (1993) held the predominate view that deliberate practice, not innate talent, leads to success (p. 368). They found that, on average, experts spend at least 10,000 hours conducting "activities that have been specially designed to improve the current level of performance" (p. 368). Engaging in this level of effort separates the master from the novice. Prolific author Stephen King (2001) supports a similar view, suggesting that writing skills are developed over time, not determined at birth. He writes:

> I think that writers are made, not born or created out of dreams of childhood trauma—that becoming a writer (or a painter, actor, director, dancer, and so on) is a direct result of conscious will. Of course there has to be some talent involved, but talent is a dreadfully cheap commodity, cheaper than table salt. What separates the talented individual from the successful one is a lot of hard work and study; a constant process of honing. Talent is a

> dull knife that will cut nothing unless it is wielded with great force—a force so great the knife is not really cutting at all but bludgeoning and breaking (and after two or three of these gargantuan swipes it may succeed in breaking itself…which may be what happened to such disparate writers as Ross Lockridge and Robert E. Howard). Discipline and constant work are the whetstones upon which the dull knife of talent is honed until it becomes sharp enough, hopefully, to cut through even the toughest meat and gristle. No writer, painter, or actor—no artist—is ever handed a sharp knife (although a few are handed almighty big ones; the name we give to the artist with the big knife is "genius"), and we hone with varying degrees of zeal and aptitude.

Although King acknowledges the need for talent, he emphasizes the more substantial role that effort plays in developing ability. Palmquist and Young (1992) observe that writing scholars are undecided on the origin of writing ability. They write, "The question of whether the ability to write with accuracy, grace, and originality is a product of nature or nurturing" is longstanding and still "is left unresolved after centuries of debate" (p. 140).

Recently, a special issue of *Intelligence* journal challenged the long-held belief that deliberate practice is more important than talent when it comes to success in a variety of domains. For instance, in one study, Hambrick, et al., (2014) found that chess players and musicians varied greatly in terms of their deliberate practice time. As a result, the researchers argued that "deliberate practice does not account for all, nearly all, or even most of the variance in performance in these domains" (p. 36). Instead, the psychologists hypothesized that other factors like starting age, intelligence, personality, and genes may play equally important roles. Other experts in this special edition concurred that "people are limited by their abilities" (Detterman, 2014, p. 2) and while "practice is an essential component of expert/elite

performance," it is evident that "not everybody gets to be an elite performer in every (or perhaps any) domain, and it isn't just lack of deliberate practice that explains this fact" (Ackerman, 2014, p. 8-9). This new research suggests that both talent and effort produce expertise. However, what Dweck (2006) makes clear is that people's perception of their abilities as fixed or flexible makes a significant impact on their success. That is, what people believe concerning their abilities determines those abilities, at least to some extent.

When I surveyed students about whether they thought success in writing was attributed mostly to effort or talent, most students endorsed effort; however, the ones who selected talent seemed to confirm the notion that good writers are born, not made. These students said, "some people know what to say and can process what words to use naturally better than others" and it "comes easier to those writers." Their responses emphasized innateness and effortlessness. For example, two participants in my study linked creativity to innate talent, saying, "writing is easier" for these "left brain creative thinkers." Despite believing that some people have an advanced starting point, several students still affirmed the value of effort. For instance, one participant said, "At this point in our career our writing abilities are engrained in [our] minds so in order to alter them it will take a lot of effort." Although this student endorsed natural talent, he acknowledged that substantial effort could make a difference. Another participant attributed writing success to "the accumulation of skills you have acquired over time." His use of the verb "acquired" suggests a lack of agency; however, "over time" suggests a belief in improvement, rather than seeing himself in a fixed state.

The survey responses demonstrate that the effort/talent binary may be oversimplified. Specifically, it appears some students believe writing ability is a talent that can be improved, which is a belief that signifies both a fixed and growth mindset, respectively. This belief is seen

when combining the survey statements that reflect largely a growth mindset (e.g., "Hard work, desire, dedication, and enough time are all I need to become a good writer") with those that reflect more of a fixed mindset ("I believe I was born with the ability to write well" and "Good writers are born, not made"). Interestingly, a large percentage of students (87.9%) expressed a growth mindset regarding the former growth-minded statements but also demonstrated a fixed mindset regarding the latter statements (36.2% and 27.6%, respectively). These two statements that received the most fixed-minded responses ("I believe I was born with the ability to write well" and "Good writers are born, not made") emphasize the innateness of writing ability, as a talent that one is "born with." The statements that most students responded to with growth-minded reactions focused more on effort, persistence, and dedication. Collectively, the survey data reveal a trend toward seeing writing as both a natural talent and as a skill that one can improve. Therefore, even for the students who expressed a fixed mindset regarding the innateness of writing ability, most of them still believe they can improve upon what nature gave them. This belief mirrors current research in cognitive science that asserts a "combination of genetic and environmental factors" leads to expertise in a domain (Ackerman, 2014, p. 15).

In his interview, Elijah voiced this perspective, saying that writing ability comes from "a mix" of effort and talent because there are "limiting factors" in the equation. He complicated the effort/talent binary further by raising important points related to privilege and access. Rather than defining talent as genetic make-up, he encouraged me to "interpret talent as kind of how you're brought up." He identified environmental factors, like access to prestigious schools and livable incomes, that affect students' development as writers. His point that writers without a "good foundation" must exert more effort to "eventually be a talented writer" underscores the political and critical context of writing ability, mindsets, and improvement. Talking with Elijah reminded

me of the myth of meritocracy: The American Dream that promises prosperity for hard workers does not apply to everyone, as evidenced by the deep divisions and unequal allocations of power and resources in the United States (Hurlbert, 2012). For instance, Tough (2012) describes how living in poverty and violence seriously affects children's academic performance: "Children who grow up in stressful environments generally find it harder to concentrate, harder to sit still, harder to rebound from disappointments, harder to follow directions" (p. 17). Yet, although these children begin school from severely disadvantaged positions, Tough asserts many schools and programs help disadvantaged children make remarkable strides in their performance by assuring students they are intelligent and capable and by challenging them to succeed. An important component of this approach is the growth mindset. Tough writes, "Regardless of the facts on the malleability of intelligence, students do much better academically if they *believe* intelligence is malleable" (p. 97). Mercer and Ryan (2010) agree that teachers should promote growth mindsets in the classroom, saying that a growth mindset "tends to encourage learners to persistently exert more effort, cope better with setbacks or failure, and develop a more positive learning attitude" (p. 442). These arguments demonstrate a growth mindset helps students, despite the problematic associations between the growth mindset and meritocracy.

Given the fact that 15% of survey respondents supported fixed-minded statements, it seems especially important for writing teachers and tutors to talk openly about students' beliefs regarding writing improvement. In her class presentation, the embedded tutor engaged students in such a discussion about mindset theory (Appendix H). She encouraged students to think about times when they experienced growth in writing or in other subjects and skills, in order to convince students that abilities are developed, not innate. Through this discussion, she sought to dispel the notion that writers are born, not made. The fact that students who received the full

writing fellow intervention improved their mindset scores more significantly than the control and comparison groups suggests her input made a difference in students' mindset scores. Other studies have found that simply encouraging students to think of their abilities as malleable leads them to do better academically than students who do not hear growth-minded messages (Aronson, Fried, & Good, 2002; Blackwell, Trzesniewski, & Dweck, 2007; Good, Aronson, & Inzlicht, 2003). The potential problems for fixed-minded writers are illustrated in the embedded tutor's account of one student's extreme resistance to her feedback. It is no coincidence that this student displayed a fixed mindset score (3.5), saw no improvement in his writing over the course of the semester, believed writing success is tied mostly to talent, and resisted all attempts from the tutor to help him. According to the tutor, their session was completely unproductive, suggesting that tutors might have a harder time working with fixed-minded writers. In addition, this writer, who believed his paper was "terrible" but was unwilling to receive assistance, is most likely not going to improve as substantially as his growth-minded peers will. His resistance stands in stark contrast to the tutor's account of a writer who was "super-interested because he did want to improve as a writer." In their tutoring session, this writer "asked questions that were broader and reflected an interest in learning as a writer, not just for this assignment." Importantly, data from this student displayed a high growth mindset score (5), and he reported seeing moderate improvement in his writing process and performance. These two example cases suggest that a relationship exists among mindset, writing process (including response to feedback), and performance, quite similar to the pathways that psychologists identified from students' mindsets to their beliefs and behaviors and then to their learning strategies and performance (Blackwell, Trzesniewski, & Dweck, 2007). Future research is necessary to determine whether a similar causal link exists between mindsets and writing.

## Comparing the Results With the Psychological Literature

In Chapter 2, I operationalized the construct of mindset to theorize how student writers' mindsets may affect their approach to writing. I hypothesized that students' mindsets influence their writing behaviors and performance, especially when confronted with challenging assignments. By applying Dweck's (2006) mindset research as a theoretical framework, I hypothesized that mindsets influence writers' willingness to revise, their response to feedback, and their reaction to challenge and failure. In the following section, I will discuss my results in light of these hypotheses, which are based in psychologists' findings.

### How Do Students' Mindsets Affect Their Writing Processes?

**Hypothesis #1: Growth-minded writers are more willing to draft and revise**. I hypothesized that students who have a fixed mindset believe that revising is a marker of incompetence because they subscribe to the notion of the natural-born writer who can compose a successful paper in one sitting. Mercer and Ryan (2010) contend that belief in "natural talent" is "particularly widespread" in fields where people believe innate ability predicts success, like sports and the arts (p. 436). Since fixed-minded students tend to avoid effort (Dweck, 2006), I thought that growth-minded writers would be willing to invest in revision. My interview findings confirm this hypothesis. For example, Jordan's description of his writing process underscored a willingness to revise and to embrace the "iterative process," as he called it. When given an assignment, he typically starts by gathering information from sources and synthesizing them into a "ten-page document" that is "just a mess." Once he collects the major parts of his paper, he begins writing, "and as that grows, the mess that's underneath kind of shrinks and becomes more organized." Jordan's belief that "the natural disorganized nature" of his writing process will turn into a cohesive final product reflects a belief in growth and improvement. In this way, his

process seems directly correlated to his mindset. Jenna provided evidence of a growth-minded approach, too, when she described her drafting process: "If I'm just really getting stuck on something, I'll just take a look back, read over everything, make sure it sounds nice. And then, go back to where I was stuck, maybe, and that'll help me a bit." She suggests not being discouraged by writer's block but instead believing that the obstacle will pass and she will find her way forward. Comments from other interviewees reflected growth-minded approaches toward drafting and revision as well: "The second time it came out a little better"; "Usually I finish papers in one or two or three sittings"; "The whole process…was like a learning curve."

Before data collection, I had assumed that fixed-minded writers might avoid revision to save face, especially if they see effort as futile, which is characteristic of fixed-minded students (Dweck, 2006). However, I found that growth-minded writers sometimes also resist effort, when they believe the assignment or subject is insignificant. Elijah expressed this view when he described a math class that was both difficult and seemingly unimportant. He said, "The chance that I'm going to use one of the four calculus classes that I took is slim to none." This belief in the subject matter's irrelevance caused Elijah to take calculus "at a community college where it was easier." Rather than exerting the necessary effort, he "took the path around it." He chose the easier route. Yeager and Dweck (2012) suggest growth-minded students are motivated to put effort into anything that affords learning and development because growth-minded students see "everything (challenges, effort, setbacks) as being helpful to learn and grown." However, Elijah's story shows that relevance matters, too.

Elijah's comment initially helped me recognize that motivation and a growth mindset are two equally important ingredients for writers. While my interview subjects were motivated for different reasons, subject matter interest and a belief in their work's relevance emerged as

patterns in the data. These findings complement Eodice, Geller, and Lerner's (2016) conclusions from *The Meaningful Writing Project*. Their research sought to identify the features of meaningful writing assignments, based in students' experiences as described through surveys and interviews. They identify three main qualities that meaningful writing projects display: agency, engagement, and learning for transfer. Their first criterion, agency, is most relevant to my findings. They found that meaningful writing projects gave students "the satisfaction of knowing the work they produced could be applicable, relevant, and real world" (p. 5). Such projects gave students "freedom to pursue topics of interest, to connect those topics to what they had passion for or had experienced" (p. 33). My interview subjects have confirmed these findings. Students identified periods of growth as times when they were "writing more about things that interested [them]", when they felt "passionate," and when the "prompts in class would be more interesting." Jordan explained why interest and passion are so important:

> Not having a real interest or passion for the work that was being done really kind of removed a lot of the motivation that I have to kind of allot that extra time to go through a solid process to actually create something that I can walk away from feeling really proud of.

Here, Jordan connects three important pieces: interest, effort, and pride. These features align closely with the categories that Eodice et al. (2016) present, as interest creates agency, and effort and pride promote engagement. These findings not only reinforce Eodice et al.'s work, but they also help explain the relationships among agency, engagement, and motivation. The linear sequence Jordan implies suggests that agency (interest) creates motivation, which leads to increased engagement (effort and pride). Jordan's comment helps explain why motivation is so integral to a successful outcome: It prompts effort and success. While a growth mindset might

influence students to work hard, these findings suggest that interest or agency is just as powerful at promoting effort and generating success. With that being said, these observations come from growth-minded writers, so the necessity of a growth mindset might be unstated but fundamental to their approach.

**Hypothesis #2: Growth-minded writers welcome constructive criticism**. Interview subjects confirmed that they see feedback as an opportunity to improve. Elijah expressed this view fervently, identifying moments when he improved most as the times when he was "criticized most harshly." He acknowledged that not everyone would respond to criticism positively, saying, "There's some people who would just sit there and cry." This distinction between himself and others suggests that a positive response to criticism is characteristic of growth-minded students. None of the interview subjects described negative experiences with feedback, but most of them admitted they do not typically ask peers for feedback, an unexpected response I will discuss later. Several students emphasized the role that concrete feedback and instruction have had on their writing development. They talked about "nitty gritty feedback," "reworded…sentences," and times when professors explained exactly how an assignment "was supposed to be done." Students' desires for such concrete guidance surprised me because I had assumed growth-minded writers would be more concerned with learning than following prescribed directions. Students' preference for specific feedback seems at odds with the field's prevailing writing pedagogies that resist prescriptive approaches and stress higher order over lower order concerns when it comes to responding to student writing (Brooks, 1991; Sommers, 1982).

**How Do Students' Mindsets Affect Their Writing Performance?**

**Hypothesis #3: Growth-minded writers are more learning-oriented than performance-oriented**. Although Dweck (2006) has found that growth-minded students tend to be more learning-oriented, my interview subjects' growth mindsets did not prevent them from caring about grades. They were still somewhat performance-oriented, as evidenced by the fact that all participants mentioned grades in their interviews. While they expressed interest in learning about genres, conventions, and writing processes, their comments showed that grades were a motivating factor. As Elijah said, "Grades kind of push you to do better." He also used rubrics as a guide for revision, saying "If a rubric said I did a perfect score on one section, I wouldn't go back and touch it; I'd leave it. But if there was something that was sticking out, I'd go back." Grades came up frequently in the interviews: The term appears 29 times in the transcripts. Most often, students referred to grades as evidence of their success, rather than as primary sources of motivation. This distinction is important because Dweck (2006) classifies students as performance-oriented when they are more motivated to prove their abilities than they are to learn. Performance-oriented students have goals "that reflect a concern with competency," whereas learning-oriented students are focused on "goals that reflect a concern with skill acquisition" (Dweck, Chiu, & Hong, 1995, p. 282). The fact that my participants talked much more about their difficulties developing research skills and genre competence—focusing on skills acquisition—than they did about external judgements of competency indicates a potential problem with the binary posed by Dweck et al. in that my participants showed they were still invested in learning, despite their desire to earn high grades.

**Hypothesis #4: Growth-minded writers welcome challenge and are unshaken by failure**. Challenging writing situations did not deter these growth-minded students. In fact,

several of them linked challenge to improvement. For instance, Jordan said, "It was a really challenging time, but I really grew as a writer during that time." Elijah expressed a similar sentiment: "I feel like negative feedback or constructive feedback is like the driving thing that makes me do things better, to learn things more." For these growth-minded writers, failure is as an opportunity to learn and do better next time. Elijah explained the connection between failure, effort, and success: "If I get a D on a paper, an F on a paper, I'm going to go back and spend a bit more time on that, and I'll probably get better at it because I spent a little more time on it." Here, Elijah's growth mindset correlates directly to his response to failure: He responds by emphasizing the value of effort rather than interpreting the failure as indicative of innate deficiencies. Importantly, none of my interview participants said their sense of themselves or their abilities was shaken by failure, which is characteristic of fixed-minded students (Dweck, 2006). These findings extend Dweck's (2006) theory on growth-minded responses to failure and suggest growth-minded writers are more likely to bounce back from failure. By extension, Dweck's theory would imply that growth-minded writers are more willing to take risks in their writing assignments, but none of the participants talked explicitly about risk-taking. Their desire for high grades complicates this issue, and I wonder whether grades interfere with risk-taking for these students, despite their growth mindsets.

Although Dweck (2006) is careful to describe mindset as a continuum that students fall along, she and her coauthor assert that mindsets "create different psychological worlds for students" (Yeager & Dweck, 2012, p. 304). These opposing worlds can sometimes sound all-encompassing in the literature when they are described as either "a world of threats and defenses" or "a world of opportunities to improve" (p. 304). My findings suggest that student writers can experience aspects of both worlds at the same time, when they care about both grades

and learning or when they are both resilient and risk-averse, for instance. These findings challenge the notion of separate "worlds" and suggest that students' mindsets are not always congruent, even within the same domain. Yeager and Dweck (2012) acknowledge that students can have different mindsets regarding different subjects, but they do not consider students who simultaneously display features of both mindsets. It may be that writers accumulate growth- or fixed-minded traits over time and eventually become more fully situated in one world or another. However, the students in my study demonstrate that mindsets may have a fluidity not described in Dweck's research.

**Hypothesis #5. Growth-minded writers seek opportunities for improvement, such as feedback from others**. Although most interview subjects spoke positively about times they received feedback, four of five students explicitly reported hesitancy to ask for help. Instead, they seemed either already confident in their work or capable of revising on their own. For instance, Jenna said, "I'm good with what I wrote," so "I don't really need much feedback." Elijah expressed similar confidence: "I'll write it and then I'll go back and look over it, but I'm not going to, like, hand it to somebody else and ask them to revise it extensively." His desire not to "hand it to somebody else" suggests he wants to maintain agency because he feels capable of revising on his own. Maria also sounded self-reliant when she said feedback is unnecessary because she has "grown as a writer" and can "read through the eyes of who's going to be grading." Therefore, she knows "what they will like." For Maria, feedback is necessary only if the assignment is "really, really big" or, as Paula said, "a big assignment like a final or something." These comments suggest a preoccupation with performance over learning, and it reinforces the notion that even growth-minded writers might not always be concerned about

growth. This finding reinforces the importance of scrutinizing the dichotomies that sometimes take hold in the field.

While I had expected growth-minded writers to express confidence and self-reliance, I was surprised to hear they would not seek more avenues for improvement. Jordan, however, did say he regularly invites his roommate, a writing center tutor, to offer feedback. This interviewee, who was so committed to reflection and an "iterative" writing process, seemed to defy the norm. He stood out as emblematic of the growth-minded writer: He had faced and benefited from challenges, he had failed but saw it as an opportunity to reflect and improve, and he told me "If I continually practice my writing ability because I have the motivation and rationale to do so, then [I] can certainly become a stronger writer." Contrasting him to the other growth-minded students reinforces the idea of a mindset continuum. That is, there are common traits to look for in growth- and fixed-minded writers, but students may not present all of them.

This study has broken ground in understanding what a growth mindset looks like in writers. Growth-minded writers are characterized by their willingness to revise, their prioritizing of learning over performance, their positive response to feedback and failure, and their reflective stance. Questions remain concerning the potency and effects of these individual traits. Future research might examine which traits are most influential to writing improvement. For instance, is it more important for writers to be reflective (on their own) than to seek feedback (from others)? Is concern with performance less important than overcoming failure? Which of the growth-minded traits make the most impact on writers, and how do writers like Jordan acquire the whole growth-mindset package?

## Additional Considerations

**The growth mindset is not a cure-all**. As researchers have noted, having a growth mindset is not a panacea for all difficulties students face (Dweck, 2006; Mercer & Ryan, 2010), and my data confirm this. In the interviews, growth-minded students expressed difficulties with writing assignments, moments of failure, and uncertainty about their abilities. Simply having a growth mindset was not enough for them to succeed. Many of the interviewees emphasized how important instruction and experience have been in their learning. They underscored the value of clear and concrete instruction along with exposure to a variety of genres. I am reminded especially of Paula, who repeatedly expressed uncertainty regarding writing conventions and her ability. Her interview displayed many comments like, "I'm not sure if I did it right," "I don't really know how to change it," "I don't know if I would be able to catch that on my own," "I don't know if what I'm saying is better necessarily," and "I don't really know what my skills are doing." She had a high growth mindset but low self-efficacy.

Findings from my study raise the question of whether a growth mindset, for students like Paula, might actually make them more aware of their need for improvement. That is, if they see themselves capable of improving, they might be more aware of their shortcomings, as Paula seemed to be. Boden et al. (2015) discovered a similar phenomenon occurred in patients who increased their emotional awareness through mindfulness training. They reported increased anxiety and depression after engaging in mindfulness training, most likely because they had become more aware of these thoughts and feelings (Boden et al., 2015). Similarly, Paula's growth mindset might simply make her more aware of growing pains. It is possible, too, that Paula's uncertainty reflects her need for external validation, a characteristic of millennial learners, according to business researchers. Stein (2016) writes, "One of this generation's most

distinctive features is the need for others' approval." This known generational trait could also explain why the growth-minded writers in my study still highly valued grades and exhibited performance-oriented tendencies.

Surprisingly, my data show that some students earned high scores on their literature reviews even if their survey results indicated a fixed mindset. In many of these cases, the survey results showed that these students believed they were born with writing talent. In this way, their fixed mindset reflected a fixed self-assurance, which one might think is helpful. However, Dweck (2006) has warned that a fixed mindset can be just as harmful for successful students if they avoid taking productive risks in their learning or if they attempt to save face by avoiding challenges that could ultimately help them grow. More research into fixed-minded, talented writers is needed to understand exactly how their mindsets affect them.

**Diverse writing experiences help**. Several interviewees mentioned that "writing for different classes" has helped them improve, and Elijah described it best: "When you write about different things, too, you write in different styles and take different approaches. When I'm in a religion class, I'm taking a different approach to talk about a religion than I am when I'm in a lab class and I'm talking about how a chemical is made." Learning different genres, conventions, and styles has helped these students develop their writing repertoire. Hearing professors' "different viewpoints" has helped, too, because they give students insight into different audiences' responses to their work. It is important to note that this emphasis on variety came from growth-minded students. I suspect that fixed-minded students would not respond so positively to conflicting messages about writing because adapting to different writing situations requires flexibility, openness, and a willingness to change one's approach. If it is true that fixed-minded writers do not thrive in diverse writing situations, then their ability to develop rhetorical

dexterity could be at stake. Such a potential finding is important, given my interviewees' emphasis on the positive influence that diverse writing experiences have had on their development as writers.

**Mindsets affect transfer**. The interview data suggest students with a growth mindset are more likely to transfer their learning. That is, they can "transport [their] knowledge from place to place" (Bromley, Northway, & Schonberg, 2016). Although this study did not intentionally investigate transfer, several interview participants referred to times when they accessed previous knowledge, implying that growth-minded students are attuned to transfer. For instance, Elijah said he will "take from an English class and use that and apply that in an engineering class and see how my professor kind of reacts to that." Applying his learning from one context to the next has helped him improve: "I think what's helped me a lot is writing for different classes, not just writing on one kind of style, having to write for a bunch." Elijah's growth mindset, displayed when he said he can navigate the "conflicting" messages he receives about writing, seemed to help him apply his learning to different contexts. Maria also indicated she could apply her genre knowledge to another assignment:

> It was like a learning curve kind of thing. But at the end I was like, so in the future I could actually do it this way…So my next literature review after that was really good. It was not a critical review. It was just a literature review. But that was really good because I think I understood what they were asking for. And I understood how to do it. I didn't just know what to do.

Here, Maria expresses an ability to apply her knowledge of one genre to another similar genre, an example of near transfer. It is also important to note her emphasis on learning "how" to write in a specific genre, versus simply knowing about a genre. Knowing "how" to do something is

important to Maria, and this emphasis on the process seems to influence her ability to transfer her learning successfully because she can adapt the process for other writing occasions. Jenna also attributed her success writing a literature review to her previous experience with the genre. She said she was "confident in it just because" she had written one before and therefore "had a bit of a sense what was going on." Jenna's unprompted discussion of transferring her learning from a previous class shows she applies her previous knowledge to new situations.

A recent article on adult cognition theorizes that a growth mindset could "promote far transfer" (Wu, Rebok, & Lin, 2017, p. 349); however, currently no published studies have demonstrated that growth mindsets promote transfer. Since work by Driscoll and Wells (2012) and Bromley, Northway, and Schonberg (2016) has shown that dispositions affect transfer, mindsets likely influence transfer, too. Importantly, Bromley et al. (2016) argue that writing center tutors help students "develop dispositions that facilitate the transfer of writing knowledge" ("Results and Discussion," para. 1). For instance, they found that tutors developed students' metacognitive awareness, self-awareness, self-efficacy, and "problem-solving dispositions" ("Conclusions," para. 4). They theorize that these dispositions help students transfer their writing knowledge. Although they cite scholars who investigate how writers' beliefs influence their performance (White & Bruning, 2005), Bromley et al. do not consider the role writers' mindsets might play in helping to facilitate transfer. Surely, mindsets are essential to the "problem-exploring dispositions" that tutors help writers develop ("Conclusions," para. 4) because students' mindsets directly influence how they respond to problems (Dweck, 2006). Since my findings suggest growth-minded students are highly aware of transfer, compositionists studying the connections between dispositions and transfer should examine the impact of mindsets on transfer, too.

**The embedded tutoring was successful**. Several possibilities explain why students who worked with the embedded tutor had significantly greater mindset gains and improved their drafts more significantly than those in the control and comparison groups. First, the embedded tutor had several years of experience tutoring, and she was quite accomplished in her own academic career. From all accounts, she was a focused, clear, and insightful tutor. Also, as a double major in writing and design, she knew the value of hard work and she was dedicated to her studies and to writing center work. These qualities likely helped her to model a growth mindset and endorse the value of effort. Since she was both experienced and growth-minded, it is unclear which of these qualities made the most difference for tutees. However, I instructed her to talk explicitly about mindset in her consultations with students if the topic seemed appropriate. The fact that she knew one of her goals was to model a growth mindset suggests that the correlation between mindset improvement and tutoring is not coincidental. Furthermore, her class presentation on mindset theory contained several fundamental components of previous studies' interventions (Aronson, Fried, & Good, 2002; Blackwell, Trzesniewski, & Dweck, 2007; Good, Aronson, and Inzlicht, 2003): Instruction in mindset theory, discussion about neural plasticity, and reflection on students' experiences. Since comparable interventions have successfully changed students' mindsets, I am confident similar outcomes occurred in this study. Plus, writing center tutors can even unintentionally influence writers, as Young and Fritzsche (2002) argue. In their study of tutors' influences on students' procrastination behavior, they explain that their tutors "did not specifically try to 'treat' procrastination," but use of the writing center correlated with decreased procrastination (p. 55). Therefore, they conclude, "Writing centers are already helping procrastinators in their normal course of operations" (p. 55).

Similarly, it is reasonable to expect that growth-minded tutors model growth mindsets without even being told to do so.

This study cannot pinpoint exactly why students in the experimental group revised their drafts more significantly than those in the control and comparison groups. It is probable that students who received tutoring improved their drafts more than those who did not because they received helpful suggestions from the embedded tutor. Another explanation is that they became more growth minded and therefore expended more effort on revision. It is also possible that both of these variables—or another one—influenced students' final drafts. I did not conduct linear regression modeling, and I am unable to say with certainty what kind of relationship existed among the tutoring, mindset changes, and writing improvement. My statistical analyses showed significant relationships between the tutoring intervention and mindset changes, and between the tutoring intervention and draft improvements. Future research is needed to investigate the exact pathways of these relationships. The fact that previous research has found that students who work with embedded tutors earn higher grades (Dvorak, Bruce, & Lutkewitte, 2012; Titus, Scudder, Boyle, & Sudol, 2014) and improve their drafts (Pagnac, Bradfield, Boertje, McMahon, & Teets, 2014; Regaignon & Bromley, 2011) confirms my findings and gives me confidence that the tutor made a difference in these students' work.

## Limitations

Despite breaking new ground in mindset research, the generalizability of this study is limited due to the small sample sizes. I surveyed 57 students at the beginning of the semester, but the post-semester survey data was less, especially for the control group. To some extent, I was able to address this problem by combining the control and comparison groups, since statistical analyses revealed insufficient evidence to show an instructor effect. Although the number of

students who completed both surveys was also small, the writing assessment data was plentiful and rich. I recognize, too, that the interview sample was limited to only growth-minded students. Since none of the subjects on the fixed end of the mindset spectrum volunteered to participate in an interview, I was unable to gain insight into fixed-minded students' writing processes and perceptions of their performance. Therefore, it is difficult to draw conclusions about the interview data without making comparisons to fixed-minded writers. Despite limited sample sizes, the methodology is replicable and can be used in future studies of larger and different groups.

The survey itself could also have affected the results. For instance, the statement "I believe I was born with the ability to write well" could be interpreted in different ways. If students agreed with the statement, they could be expressing a fixed mindset about writing ability. However, they could also be expressing confidence in their potential as writers, rather than endorsing a fixed mindset. Conversely, students who disagreed with the statement may be endorsing a growth mindset, or they might just have little confidence in themselves as writers. For instance, one of the few students who saw no change in his writing quality or writing process over the course of the semester—and who believed that talent affects writing success more than effort—strongly disagreed with this statement. It is unlikely that his disagreement indicates a growth mindset, as the Likert-scale scoring reflects, because he leaned toward a fixed mindset on the other statements in the survey. For instance, he disagreed with the statement that "Hard work, desire, dedication, and enough time are all I need to become a good writer." Most important, he agreed slightly with the statement "No matter how hard I try, I will never be a great writer." His mindset score was 3.5, toward the fixed end of the mindset spectrum. Examined together, these fixed-minded statements suggest that he does not feel confident in his writing abilities. However,

his mindset score would have been even lower if the statement "I believe I was born with the ability to write well" had been removed from the survey. This statement created a similar problem at the other end of the spectrum: Students who expressed a growth mindset in response to other statements tended to agree with this fixed-minded statement, which lowered their overall mindset score. Despite this potential problem, many other students' responses to this statement were consistent with their responses to other statements, so I ultimately decided to keep this survey item. However, future research might consider removing the statement due to its potential for yielding unreliable responses.

The survey was also general in nature and did not define "writing" for participants. Students may have considered only their beliefs concerning creative writing or, conversely, technical writing. Their different conceptions of writing genres may have influenced their answers, raising the question of the role that genre and disciplinarity plays in influencing students' writing mindsets. An underlying assumption of the dissertation was that engineering students' views toward writing are worth exploring because their disciplinary choice may imply an indifference or disfavor toward the humanities. Thus, attention to disciplinarity influenced the study's main questions. Future researchers might adapt the survey to include specific writing terms, depending on the researchers' interests in students' beliefs concerning specific genres.

Another potential limitation was the data's small diversion from normality. Although this diversion was not severe enough to prevent me from running normal statistical analyses, it raised two questions. First, was the survey flawed? One could speculate that students were able to predict the "right" response and/or wanted to project a sense of themselves as growth minded. The survey was based primarily on Dweck's (2000) scale, which has been previously validated, and modifying the scale could have affected validity and reliability. A second question to

consider: Is this group of students unusually oriented toward growth and development? In his interview, Jordan reported that discussions about mindset have "been thrown in a couple of times to [the engineering] curriculum in different ways." This information might explain why so many students exhibited a growth mindset in the surveys—they may have been predisposed toward growth-minded statements because they had received instruction in mindset theory. The embedded tutor also reported that students she tutored were already "very strong writers" and they "did want to improve and change," perhaps even "more so than in a regular writing center session." Such an unusually high attention to learning and growth may have affected the results. Thus, future researchers might discover even greater gains in tutored students' mindset scores if their baseline mindset scores are lower than these students' pre-semester scores.

## Implications

My findings suggest that embedded tutoring programs are worth their cost because they improve students' writing skills. On average, students in the class section with the embedded tutor significantly improved their literature reviews in terms of organization, style, and mechanics. They also had nearly significant mindset changes, which were significantly higher gains than those experienced by the non-tutored students. The exact outcomes of these mindset changes are unknown, but literature in psychology suggests that these growth-minded students will perform better academically (Good, Aronson, & Inzlicht, 2003), persist and overcome failure (Blackwell, Trzesniewski, & Dweck, 2007), exhibit less hostility toward others (Yeager, Miu, Powers, & Dweck, 2013), and even feel healthier (Yeager et al., 2014). Clearly, if a tutor influenced students to develop more growth-minded approaches to writing, these students have been changed by that interaction. Thus, with the ability to affect such important outcomes that

extend beyond writing skills, embedded tutoring programs should be seen as "change agents" that are worth their investment (Zawacki, 2008).

Course-embedded models are particularly useful for students who might not seek assistance from a writing center tutor on their own. As Yeager and Dweck (2016) assert, "Sometimes the forces in a system are adequate to support learning, but students have mindsets that prevent them from fully taking advantage of those forces" (p. 310). In the case of writing centers, fixed-minded students might avoid seeking help, but required meetings with an embedded tutor trained in mindset theory could make a difference for these students who might otherwise never consult a tutor. Young and Fritzsche (2002) also assert that required tutoring sessions are a useful pedagogical practice. In their study, they found that students with high procrastination tendencies procrastinated less if they went to the writing center. One implication of this finding is that required writing center visits might benefit students who would not normally use the writing center. They argue, "If a requirement adds the necessary extra motivation for procrastinators to drag themselves into the writing center, required writing center visits would help writing centers achieve their missions" (p. 54). Like procrastinators, fixed-minded writers might benefit from similar requirements if growth-minded tutors could convince these students to think differently about their writing potential. It is important to note, though, that sessions with fixed-minded writers can be difficult, as demonstrated by the embedded tutor's experience with her most resistant student. Talking explicitly about students' perceptions of their writing potential and encouraging students to think of the brain as a muscle that can grow (Dweck, 2006) are tactics that tutors might find successful with resistant, fixed-minded writers.

My research also suggests embedded tutoring programs are most successful when they offer one-on-one consultations. This finding emerged when I discovered statistical significance

only after I limited the mindset data to experimental group students who had attended individual tutoring sessions. The experimental group included students who were part of the embedded tutor's section and had attended the lesson on growth mindset theory but did not attend any writing consultations. When I removed these students from the data set, I found that, on average, students who received the full "treatment" exhibited significant gains in their mindset scores. This finding underscores the value of one-on-one tutoring, the bread and butter of most writing center work. It also suggests that my findings might be replicable in a typical writing center context. That is, if one-on-one consultations are the treatment that made the most difference for writers, then students would likely experience similar results with general writing tutors. It is worth noting, too, that students might not need multiple consultations in order to benefit from a tutor's assistance. In this study, the embedded tutor met with students only once. I was surprised that such a small intervention worked because I had assumed students would need several interactions with the tutor, in order to internalize and apply her feedback. The fact that students significantly improved their drafts on three of five rubric traits after one tutoring session is powerful proof of the impact of a one-time interaction. Bromley, Northway, and Schonberg (2016) also found that "students who visited [the writing center] one time" reported acquiring "knowledge about writing tasks" that they could apply to future assignments ("Breakthroughs," para. 6 & 1). Combined, these studies suggest that single sessions can help writers significantly.

Overall, this study suggests mindsets are moderately correlated with writing performance, and tutors can improve students' mindsets. This conclusion shows that mindsets should matter to writing teachers and tutors, especially because growth mindsets help writers respond well to challenge and seek opportunities for improvement, according to the interview results. The findings of this study argue in support of writing center administrators educating tutors on

mindset theory, facilitating conversations with tutors about their own mindsets, encouraging tutors to pay attention to tutees' mindsets, and discussing ways that mindsets might influence tutoring sessions and outcomes. Such discussions are important because even seemingly helpful praise can trigger a fixed mindset (Yeager & Dweck, 2016) if tutors tell students they *are* good writers. The educational materials I describe in Chapter 3 offer a useful starting point for these discussions and points of instruction.

## Future Research

This study inspires many opportunities for future research. Future researchers might validate the writing mindset survey and then replicate the study in other course-embedded contexts. Classes such as first-year composition would be especially appropriate if the course aims to improve students' habits of mind, as advised by the WPA's *Framework*. Classes with first generation college students may also be appropriate contexts to study mindset changes, especially if students have not been encouraged to see their abilities as malleable. Scholars might also investigate the degree to which a professor's mindset changes after collaborating with an embedded tutor. Rattan, Good, and Dweck (2012) found that teachers' mindsets affect their assumptions about students' abilities and, consequently, affect students' perceptions of themselves. Gentile (2014) argues that course-embedded tutoring programs have a "contagious" quality that enables them to influence teaching practices and even the discipline-specific programs in which tutors are placed (p. 37). Specifically, researchers have found that embedded tutors influence faculty's future writing pedagogy by helping them learn new writing response techniques and enlightening them about students' difficulties with assignments (Webster & Hansen, 2014). Researching the impact of the embedded tutor on both students and participating faculty members could further demonstrate the efficacy of an embedded tutoring model.

Additionally, researchers could adapt this study's methodology to investigate the degree to which tutors influence students' mindsets in the writing center. To study mindsets in a writing center context, researchers could administer the writing mindset survey before and after a series of tutoring sessions and then collect students' drafts to assess improvement. Again, such research could demonstrate the value of tutoring for stakeholders. Still, it remains to be seen whether tutoring interventions have lasting effects on students' mindsets and writing. Future longitudinal studies could assess students' mindsets before and after a tutoring intervention and then re-assess their mindsets again several years later. There is evidence in the literature to suggest that mindset changes positively influence students years later, as previous longitudinal studies have shown that students who are exposed to mindset interventions have later higher standardized test scores (Good, Aronson, & Inzlicht, 2003) and higher grades (Blackwell, Trzesniewski, & Dweck, 2007), compared to control groups.

Extending the research to a writing center context would provide an opportunity to crystalize the tutor education materials needed to train a group of tutors on mindset theory. For this dissertation, I trained only one tutor in mindset theory, enabling me to talk in depth with her about her mindset, her experiences, and previous research on mindset. She also read Dweck's book, one that I would recommend for all writing center tutors. Since I knew the tutor well, I was able to gauge her mindset through conversations and years of observing her tutoring, but it is unlikely that writing center administrators would have that insider knowledge of a new tutor's mindset. To assess new tutors' mindsets, writing center administrators could administer Dweck's online mindset scale and discuss with tutors specific ways their mindsets may need to change. Future researchers could also identify additional training materials, beyond those recommended in this dissertation, for fostering growth mindsets in tutors.

While this study demonstrates that students' mindsets correlate moderately with their writing performance, whether there is also a causal relationship has not been established. If there is a causal relationship, exactly why it exists will require future research that includes collaboration with psychologists who have "deep knowledge of the underlying psychology that the interventions are trying to instill" (Yeager & Dweck, 2012, p. 312). Yeager and Dweck endorse this kind of collaboration, saying, "Collaborative partnerships between researchers, practitioners, and students may be necessary to engineer interventions that will work at scale" and affect greater populations (p. 312). Compositionists and psychologists should work together to understand more fully how students' mindsets affect their writing and to identify best practices for helping college students change their writing mindsets. Since this study sought to break ground in this research area, the many variables that affect students' mindsets extend beyond the scope of my study. Future researchers might ask: How do students' demographics and backgrounds influence their writing mindsets? How much, and what kind of, influence do teachers have? What pedagogical practices are most influential in changing students' writing mindsets? In addition, future research should investigate how fixed mindsets affect writers. Since this study primarily identified how growth mindsets affect writers, future researchers should interview students with fixed mindsets to compare and contrast their responses to growth-minded interview responses. Additionally, surveying a more normally distributed sample (in the statistical sense) would provide greater insight into fixed-minded responses to survey items, since this study had abnormally high percentages of students on the growth end of the mindset spectrum.

In addition to studying writers' mindsets in greater depth, future research could explore the impact of mindsets on revision practices. Researchers could compare students' first and final

drafts to identify patterns in changes, and then correlate these patterns to mindset differences. Comparing drafts might show that growth- and fixed-minded students tend to revise differently. Researchers might ask: Do fixed-minded students make more surface-level changes? Do growth-minded students make larger-scale changes? Are growth-minded students more likely to change their thesis or purpose more substantially? Understanding the nuances of different revision tendencies, depending on students' mindsets, could help teachers and tutors detect evidence of mindset interferences in students' writing practices. Although such research should avoid essentializing revision practices according to mindsets, the findings could help teachers and tutors identify underlying mindset interferences in order to understand potential sources of students' problems with revision.

## Conclusions

By building on seminal studies in psychology, this dissertation offers further evidence to demonstrate that mindsets matter. Psychologists have shown that mindsets have long-term implications because they are significantly correlated to academic performance, persistence, resilience, and health (Aronson, Fried, & Good, 2002; Blackwell, Trzesniewski, & Dweck, 2007; Good, Aronson, & Inzlicht, 2003; Yeager et al., 2014). Findings from this study suggest that writers' mindsets have immediate implications because they are moderately correlated to grades and they influence students' writing processes. Since mindsets matter and this study has demonstrated that tutors can influence both writers' mindsets and their performance, writing center scholars now have more evidence to validate the efficacy and value of tutoring. Although this dissertation has broken ground in demonstrating that both mindsets and tutoring are powerful factors for learning to write, future research should extend these findings to understand the extent to which fixed mindsets affect writers. Indeed, Yeager and Dweck (2012) assert, "It is

crucial that researchers and educators continue to pay attention to unproductive mindsets" (p. 312). More work is needed to understand the degree to which writers can change their fixed mindsets and the degree to which tutors can help. In the meantime, writing center and composition scholars should also identify best practices for intervening when students' mindsets seem to be hindering them. Since compositionists are increasingly aware of the role internal factors play in learning, writing experts are well positioned to contribute to unfolding interdisciplinary discussions about the connections among mindsets, writing, and tutoring.

Important gaps remain in mindset theory—particularly regarding the efficacy of pedagogical interventions—and tutors and teachers working closely with student writers should be at the forefront of these conversations. In particular, future researchers should investigate the connections between mindsets and transfer because although scholars know that students' dispositions affect transfer (Bromley, Northway, & Schonberg, 2016; Driscoll & Wells, 2012), studies have not investigated the role that mindsets play. This dissertation has identified a possible relationship between growth mindsets and successful transfer, and future research can build on this finding to contribute to evolving understandings about the best conditions for transfer. Collaborating on research projects with psychologists who are currently leading the efforts to understand mindset may be the best way to identify pedagogical interventions that help students develop growth mindsets that can influence their writing processes, performance, and likelihood of transfer.

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Appendix A

IRB Approval Letter

Indiana University of Pennsylvania
www.iup.edu

**Institutional Review Board for the**
**Protection of Human Subjects**
**School of Graduate Studies and Research**
Stright Hall, Room 113
210 South Tenth Street
Indiana, Pennsylvania 15705-1048

**P** 724-357-7730
**F** 724-357-2715
irb-research@iup.edu
www.iup.edu/irb

September 9, 2016

Laura K. Schubert
1134 Woodleigh Ct.
Harrisonburg, VA 22802

Dear Ms. Schubert:

Thank you for submitting your research site approval from James Madison University for your proposed research project "Exploring the Connections between Students' Mindsets and Their Writing,"(Log No. 16-190). On behalf of the IRB, I have approved your project. In accordance with 45CFR46.101 and IUP Policy, your project is exempt from continuing review. This approval does not supersede or obviate compliance with any other University requirements, including, but not limited to, enrollment, degree completion deadlines, topic approval, and conduct of university-affiliated activities.

Please forward additional letters of research site approval as you receive them so they can be added to your IRB file. As you know, data can only be collected and analyzed from sites with official research site approval on file. You must send the approvals to the IRB office and receive a formal letter of IRB approval for each site before you initiate data collection.

You should read all of this letter, as it contains important information about conducting your study.

Now that your project has been approved by the IRB, there are elements of the Federal Regulations to which you must attend. IUP adheres to these regulations strictly:

1. You must conduct your study exactly as it was approved by the IRB.
2. Any additions or changes in procedures must be approved by the IRB before they are implemented.
3. You must notify the IRB promptly of any events that affect the safety or well-being of subjects.
4. You must notify the IRB promptly of any modifications of your study or other responses that are necessitated by any events reported in items 2 or 3.

The IRB may review or audit your project at random *or* for cause. In accordance with IUP Policy and Federal Regulation (45CFR46.113), the Board may suspend

or terminate your project if your project has not been conducted as approved or if other difficulties are detected.

Although your human subjects review process is complete, the School of Graduate Studies and Research requires submission and approval of a Research Topic Approval Form (RTAF) before you can begin your research. If you have not yet submitted your RTAF, the form can be found at http://www.iup.edu/page.aspx?id=91683 .

While not under the purview of the IRB, researchers are responsible for adhering to US copyright law when using existing scales, survey items, or other works in the conduct of research. Information regarding copyright law and compliance at IUP, including links to sample permission request letters, can be found at http://www.iup.edu/page.aspx?id=165526.

I wish you success as you pursue this important endeavor.

Sincerely,

Jennifer Roberts, Ph.D.
Chairperson, Institutional Review Board for the Protection of Human Subjects
Professor of Criminology

JLR:jeb

Cc: Dr. Ben Rafoth, Dissertation Advisor
Dr. Sharon Deckert, Graduate Coordinator
Ms. Brenda Boal, Secretary

Appendix B

Informed Consent Form for Students

Indiana University of Pennsylvania
GRADUATE STUDIES IN COMPOSITION AND TESOL

Leonard Hall, Room 111
421 North Walk
Indiana, PA 15705-1015
www.iup.edu/english

P 724-357-2263
F 724-357-3056
grad-eng@iup.edu

**Informed Consent Form**

I am a writing instructor at JMU and a doctoral student at Indiana University of Pennsylvania, where I am studying English. As part of my doctoral studies, I am conducting research on students' mindsets and writing practices. You are invited to participate in this research study because you are a student in Engineering Design III (ENGR 331). I am providing the following information in order to help you make an informed decision about whether or not to participate. If you have any questions, please do not hesitate to ask.

The purpose of this study is to explore how students' mindsets affect their writing processes and writing performance. This study may help us identify productive writing mindsets and understand how mindsets change, which can help us improve writing instruction. Participation in this study will require approximately 30 to 90 minutes of your time and is not considered a part of ENGR 331. Participation or non-participation will not affect your grade in this or any other course. Your instructor will not know who did/did not participate in this study. First, you will take a brief survey at the beginning and end of the semester. Then, you will be interviewed about your writing. Finally, I will review your grades and a copy of your writing assignments. You may participate in only parts of the study, such as only the survey or the interview.

Your participation in this study is voluntary. You may withdraw at any time without affecting your relationship with me or with JMU. Your decision will not result in any loss of benefits to which you are otherwise entitled. There are no known risks beyond those ordinarily encountered in daily life. If you choose to participate, you may withdraw at any time by notifying my faculty sponsor or me. Upon your request to withdraw, all information pertaining to you will be destroyed. If you choose to participate, all information will be held in strict confidence and will not affect your academic standing or services you receive from the University. The information obtained in the study may be published in academic journals or presented at conferences, but your identity will be kept confidential. All data will be kept confidential and stored securely in a locked office, and identifiable data will be shredded after the study has been completed.

Indiana University of Pennsylvania
GRADUATE STUDIES IN COMPOSITION AND TESOL

Leonard Hall, Room 111
421 North Walk
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P 724-357-2263
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If you are willing to participate in this study, please indicate your agreement in the question on the survey that asks whether you agree to participate in this study. Later survey questions will ask if you would like to be interviewed, if you agree to be audio-recorded, and if you will allow me to look at your grades and writing assignments.

| | |
|---|---|
| Investigator: | Ms. Laura Schubert |
| Rank/Position: | Doctoral Candidate |
| Department/Affiliation: | English—Composition & TESOL |
| Campus Address: | Humanities and Social Sciences Building, 5th floor Indiana, PA 15705 |
| Phone: | (540) 568-1926 |
| Email address: | grlt@iup.edu |

| | |
|---|---|
| Faculty Sponsor: | Dr. Ben Rafoth |
| Rank/Position: | Professor |
| Department Affiliation: | English |
| Campus Address: | 217 Eicher Hall Indiana, PA 15705 |
| Phone: | (724) 357-3029 |
| Email: | brafoth@iup.edu |

This project has been approved by the Indiana University of Pennsylvania Institutional Review Board for the Protection of Human Subjects (Phone: 724.357.7730).

Appendix C

Informed Consent Form for Tutor

Indiana University of Pennsylvania
GRADUATE STUDIES IN COMPOSITION AND TESOL

Leonard Hall, Room 111
421 North Walk
Indiana, PA 15705-1015
www.iup.edu/english

P 724-357-2263
F 724-357-3056
grad-eng@iup.edu

You are invited to participate in this research study. The following information is provided in order to help you make an informed decision about whether or not to participate. If you have any questions, please do not hesitate to ask. You are eligible to participate because you are a writing fellow for Engineering Design III (ENGR 331). The purpose of this study is to explore how students' mindsets affect their writing processes and writing performance, and to investigate changes in students' mindsets and writing. The information gained from this study may help us identify productive writing mindsets and understand how mindsets change. The study's findings could also improve writing instruction. Participation in this study will require approximately 90 minutes of your time. Participation or non-participation will not affect your employment standing in the University Writing Center or your academic standing. You will be interviewed about your observations of the engineering students' mindsets and performance. I will ask you about the length and content of tutoring sessions, the frequency of participating students' sessions, your observations of students' writing processes, and your perceptions of students' mindsets.

Your participation in this study is voluntary. You are free to decide not to participate in this study or to withdraw at any time without adversely affecting your relationship with the investigator or JMU. Your decision will not result in any loss of benefits to which you are otherwise entitled. There are no known risks beyond those ordinarily encountered in daily life or during performance of routine physical or psychological examinations or tests. If you choose to participate, you may withdraw at any time by notifying the investigator or the faculty sponsor. Upon your request to withdraw, all information pertaining to you will be destroyed. If you choose to participate, all information will be held in strict confidence and will have no bearing on your academic standing or services you receive from the University. The information obtained in the study may be published in scholarly journals or presented at scholarly conferences, but your identity will be kept strictly confidential. All data will be kept confidential and stored in a locked office and/or password-protected computer.

| | |
|---|---|
| Investigator: | Ms. Laura Schubert |
| Rank/Position: | Doctoral Candidate |
| Department Affiliation: | English – Composition & TESOL |
| Campus Address: | Humanities and Social Sciences building, 5th floor<br>Indiana, PA 15705 |
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| | |
| Faculty Sponsor: | Dr. Ben Rafoth |
| Rank/Position: | Professor |
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**Informed Consent Form (continued)**

This project has been approved by the Indiana University of Pennsylvania Institutional Review Board for the Protection of Human Subjects (Phone: 724.357.7730).

**My signature means that I agree to participate in this study.**

Participant's signature: _____ Date: __/__/____

Name (please print): _____

I, Laura Schubert, have explained the purpose and nature of this research to _____ (Participant's name). She/he has had the opportunity to discuss it with me in detail. I have answered her/his questions and she/he agrees to participate in this research.

Investigator's signature: _____Date: __/__/____

Appendix D

Pre-Semester Survey

Do you agree to take this brief survey?

❍ Yes

❍ No

Thank you for participating in the following survey! The results of the survey will help us improve writing instruction. Your identity will be kept confidential, and your instructor will not know who has participated in this survey.

What is your first and last name? _____

What pseudonym or anonymous identifier would you like to use? (Recommendation: Use your first pet's name and two numbers.) _____

Please indicate the degree to which you agree or disagree with the following statement:

| | Strongly disagree | Disagree | Disagree slightly | Agree slightly | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| Good writers are born, not made. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

Please indicate the degree to which you agree or disagree with the following statement:

| | Strongly disagree | Disagree | Disagree slightly | Agree slightly | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| Hard work, desire, dedication, and enough time are all I need to become a good writer. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

Please indicate the degree to which you agree or disagree with the following statement:

| | Strongly disagree | Disagree | Disagree slightly | Agree slightly | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| You have a certain amount of writing ability, and you can't really do much to change it. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

Please indicate the degree to which you agree or disagree with the following statement:

| | Strongly disagree | Disagree | Disagree slightly | Agree slightly | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| I believe I was born with the ability to write well. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

Please indicate the degree to which you agree or disagree with the following statement:

| | Strongly disagree | Disagree | Disagree slightly | Agree slightly | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| My essays will always have the same quality, no matter how much I try to change them. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

Please indicate the degree to which you agree or disagree with the following statement:

| | Strongly disagree | Disagree | Disagree slightly | Agree slightly | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| Good teachers can help me become a better writer. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

Please indicate the degree to which you agree or disagree with the following statement:

| | Strongly disagree | Disagree | Disagree slightly | Agree slightly | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| No matter how hard I try, I will never be a great writer. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

Please indicate the degree to which you agree or disagree with the following statement:

| | Strongly disagree | Disagree | Disagree slightly | Agree slightly | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| No matter who you are, you can significantly change your writing ability. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

When it comes to writing success, which is more important?

❍ Effort

❍ Talent

Why is effort more important? _____

Why is talent more important? _____

Do you agree to allow Laura Schubert (the researcher) to look at copies of your writing and assignment grades?

- ❍ Yes
- ❍ No

Would you be willing to participate in an informal interview to discuss your writing?

- ❍ Yes
- ❍ No

Appendix E

Post-Semester Survey

Do you agree to take this confidential, brief survey?

❍ Yes

❍ No

Thank you for participating in the following survey! The results of the survey will help us improve writing instruction. Your identity will be kept confidential, and your instructor will not know who has participated in this survey.

What is your first and last name? _____

What pseudonym or anonymous identifier would you like to use? If possible, please use the same pseudonym you used in the first survey. (Recommendation: Use your first pet's name and two numbers.) _____

To what degree has the quality of your writing improved over the course of the semester?

| | Gotten worse | No change | Improved slightly | Improved moderately | Improved significantly |
|---|---|---|---|---|---|
| To what degree has the quality of your writing improved over the course of the semester? | ❍ | ❍ | ❍ | ❍ | ❍ |

What factors have improved your writing quality (if applicable)? Drag and drop to indicate order of impact, with #1 being most important.

| Prompted improvement |
|---|
| _____ Feedback from the course instructor |
| _____ Feedback from friends or family |
| _____ Feedback from Maya, the embedded tutor |
| _____ Feedback from tutors in the University Writing Center |
| _____ Spending more time drafting and/or revising |
| _____ Writing instruction in other courses |
| _____ Other: |

To what degree has your writing process improved over the course of the semester? "Writing process" refers to the steps and procedures used when writing, such as planning, outlining, revising, editing, and so forth.

| | Gotten worse | No change | Improved slightly | Improved moderately | Improved significantly |
|---|---|---|---|---|---|
| To what degree has your writing process improved over the course of the semester? | ❍ | ❍ | ❍ | ❍ | ❍ |

What factors have improved your writing process (if applicable)? Drag and drop to indicate order of impact, with #1 being most important.

| Prompted improvement |
|---|
| _____ Feedback from the course instructor |
| _____ Feedback from friends or family |
| _____ Feedback from Maya, the embedded tutor |
| _____ Feedback from tutors in the University Writing Center |
| _____ Spending more time drafting and/or revising |
| _____ Writing instruction in other courses |
| _____ Other: |

Please indicate the degree to which you agree or disagree with the following statement:

| | Strongly disagree | Disagree | Disagree slightly | Agree slightly | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| Good writers are born, not made. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

Please indicate the degree to which you agree or disagree with the following statement:

| | Strongly disagree | Disagree | Disagree slightly | Agree slightly | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| Hard work, desire, dedication, and enough time are all I need to become a good writer. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

Please indicate the degree to which you agree or disagree with the following statement:

| | Strongly disagree | Disagree | Disagree slightly | Agree slightly | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| You have a certain amount of writing ability, and you can't really do much to change it. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

Please indicate the degree to which you agree or disagree with the following statement:

| | Strongly disagree | Disagree | Disagree slightly | Agree slightly | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| I believe I was born with the ability to write well. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

Please indicate the degree to which you agree or disagree with the following statement:

| | Strongly disagree | Disagree | Disagree slightly | Agree slightly | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| My essays will always have the same quality, no matter how much I try to change them. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

Please indicate the degree to which you agree or disagree with the following statement:

| | Strongly disagree | Disagree | Disagree slightly | Agree slightly | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| Good teachers can help me become a better writer. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

Please indicate the degree to which you agree or disagree with the following statement:

| | Strongly disagree | Disagree | Disagree slightly | Agree slightly | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| No matter how hard I try, I will never be a great writer. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

Please indicate the degree to which you agree or disagree with the following statement:

| | Strongly disagree | Disagree | Disagree slightly | Agree slightly | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| No matter who you are, you can significantly change your writing ability. | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

When it comes to writing success, which is more important?

❍ Effort
❍ Talent

Why is effort more important? _____

Why is talent more important? _____

Would you be willing to participate in an informal interview to discuss your writing?

❍ Yes
❍ No

## Appendix F

## Interview Questions

- Tell me about your experiences writing this semester. What did you write? What was your writing process like? What was hard, what was easy?
- Have you always felt like a strong writer?
- Have you had a time when you experienced growth in your writing?
- To what extent do you think people can improve their writing ability?
- What do you think is more important when it comes to writing success: effort or talent?
    - Why do you think [effort or talent] is more important?
- How do you think people become good writers? What does it take to become a better writer?
- Can everyone become better writers? Can everyone achieve the same level of competency?
- Do you think there's a limit to how skilled someone can become at writing?
    - What determines that limit?
- How confident are you in your writing ability?
- How satisfied are you with your writing assignments when you turn them in for a grade?
- How much effort do you put into your writing assignments?
- What steps do you take to complete a writing assignment?
- How do you think your mindset affects your writing ability and your writing process?

# Appendix G

## Trait-Scoring Rubric for Rating Students' Literature Reviews

**Purpose**

| Trait | Beginning=1 | Developing=2 | Competent=3 | Advanced=4 |
|---|---|---|---|---|
| Generally refers to conveying a message appropriate to its audience.<br>Features may include a thesis or central idea, topic selection, relevance, clarity, and focus.<br>Assignment specific: Provides a historical overview of a project topic(s) as well as a review of the state of the art in the area of the capstone design project. Goal is to review significant literature and explain complex technical topics. | Inappropriate for the audience, or intended audience unclear.<br>Lacks a central idea, thesis, or goal, or these elements are unfocused, random or confusing. | Occasionally appropriate for the audience or intended audience somewhat clear.<br>Central idea, thesis, or goal emerges but may lack focus or consistency. | Mostly appropriate for a defined audience.<br>Exhibits a generally clear and consistent central idea, thesis, or goal. | Clearly appropriate for a well-defined audience.<br>Consistently exhibits a focused central idea, thesis or goal. |

**Complexity**

| Trait | Beginning=1 | Developing=2 | Competent=3 | Advanced=4 |
|---|---|---|---|---|
| Generally refers to depth or sophistication of thoughts and ideas.<br>Features may include research, reasoning, evidence, detail, development, creativity, originality, integration and perspective.<br>Assignment specific: Provides a description, summary, and critical evaluation of current research by INTEGRATING the information from multiple sources. Must be properly cited in text and in bibliography using a consistent citation style. Surveys verifiable sources (scholarly articles, books, patents, government reports/websites, codes/standards) relevant to a specific issue. | Evaluation is uncritical, illogical, superficial, or simplistic.<br>No evidence or inaccurate and/or inappropriate evidence. Fails to cite or utilize sources. Fails to consider alternative viewpoints.<br>Perspective is one-dimensional, offering only generalizations and stereotypical points. | Reasoning may be faulty or inconsistent.<br>Evidence may be overly general, misinterpreted or misapplied. Insufficient use of sources. Limited consideration of alternative viewpoints.<br>Tends to borrow or simply summarize the perspectives or arguments of others without integration. | Reasoning is logical and consistent.<br>Evidence is appropriate and, for the most part, effective. Moderate support from acceptable sources. Some consideration of alternative viewpoints.<br>Clearly understands and integrates perspective or arguments of others. | Reasoning demonstrates depth and sophistication of thought.<br>Point of view or argument well-reasoned, balanced, and supported with specific details, facts, and evidence synthesized from well-chosen sources.<br>Perspective or analysis is fresh, original, or insightful. |

**Organization**

| Trait | Beginning=1 | Developing=2 | Competent=3 | Advanced=4 |
|---|---|---|---|---|
| Generally refers to the coherence of the writing.<br>Features may include appropriate format, balance and ordering of ideas, flow, and transitions. | Lacks a sense of overall structure; no sense of beginning, middle, or end.<br>No paragraphs or division into paragraphs lacks logic. Lacks transitional words, phrases, and | Contains an overall sense of beginning, middle and end, but paragraph sequence may be confusing. The order or balance of ideas within paragraphs is | Effective structure and arrangement of ideas.<br>Order of paragraphs may, occasionally, appear mechanical or awkward.<br>Order or balance of ideas within paragraphs is | Rational, sensible, and deliberate structure that enhances and clarifies meaning. Transitions show relationships among ideas. |
| | sentences between or within paragraphs. | inconsistent. Little or inappropriate use of transitions. | generally consistent and cohesive. Transitions present but may be cumbersome or repetitive. | |

**Style**

| Trait | Beginning=1 | Developing=2 | Competent=3 | Advanced=4 |
|---|---|---|---|---|
| Generally refers to the choices the writer makes for specific audiences. This may include features like tone, sentence length and structure, phrasing, and word choice.<br>Assignment Specific: Tone in technical writing should be impersonal (i.e., 3rd person only) and formal (no jargon or figurative language, no contractions), predominant use of active voice (and not passive voice), professional tone and language (no figurative language or jargon, no contractions), precise use of technical terms. | Writing has an inappropriate tone.<br>The sentences and phrases are simplistic, unvaried, or wordy.<br>Writing is stiff, awkward, and difficult to follow.<br>Unclear or incorrect use of terminology or vocabulary. | Writing has an inconsistent or occasionally inappropriate tone.<br>Some sentences and phrases are repetitive, bland, or awkward.<br>Writing is occasionally difficult to follow.<br>Some misused terminology or vocabulary. Word choice may be ineffective. | Writing has a consistent and appropriate tone.<br>Sentences and phrases are typically concise and effective but may be somewhat mechanical.<br>Writing is easy to follow.<br>Terminology or vocabulary is appropriate and sensible but may be predictable. | Tone contributes to reader comprehension.<br>Uses varied sentence structure and phrases to convey meaning and to create interest and engagement.<br>Vocabulary is sophisticated, precise, and varied. |

**Usage and Mechanics**

| Trait | Beginning=1 | Developing=2 | Competent=3 | Advanced=4 |
|---|---|---|---|---|
| Generally includes issues dealing with writing conventions.<br>Features considered may include clarity, sentence structure, grammar, spelling, punctuation, and capitalization. | Contains pervasive errors in mechanics, usage, grammar, or sentence structure.<br>Problems interfere with meaning or distract the reader. | Contains some errors in mechanics, usage, grammar, or sentence structure.<br>Problems may, on occasion, compromise meaning or distract the reader. | Is generally free of errors in mechanics, usage, grammar, or sentence structure.<br>Reads smoothly. Problems do not compromise meaning. | Demonstrates mastery of spelling, punctuation, usage, and mechanics.<br>May use language and punctuation to enhance meaning. |

Appendix H

Embedded Tutor's Lesson Notes

1. Basic introductions.
    - Name, Year, Majors
    - UWC Tutor
    - Published in Lexia, Editor for Lexia
    - Edited 3+ years for UWC, published there too
    - ARCD Work
    - But, I'm mostly here as an Embedded tutor
2. Embedded Tutor Role
    - Writing tutor paired with course
    - Work one-on-one, and later as groups
    - Also have a video lesson planned about collaborative writing (coming later)
    - Work with them over time
    - Big focus: improving as writers!
    - One way we do this is by changing the way you think about writing, or how you improve at writing…
3. The Growth Mindset
    - This is an idea we value at the writing center
    - That is that your mindset—the way you think about ability and skill—alone can impact your performance
    - Two categories:
        - Fixed Mindset: intelligence and talent are mostly unchangeable, permanent characteristics
        - Growth Mindset: intelligence and ability are not fixed, but instead can be improved through effort
    - That's not to say that there are no limits (we can't all be Einstein), but it means that growth is possible
    - Can even see it in the language "talent" vs. "ability"

- The growth- and fixed-minded positions can impact success and growth: Obstacles, Criticism, Success of Others

- That brings me to the video I had you watch last night (https://www.youtube.com/watch?v=wCBlTX3quzs)
- To make sure we're on the same page, we'll watch about a minute and a half of it.
- Main idea here is that there is science backing up this idea that the brain can grow and change
- He even goes on to say that this does apply to adults as well
- More connections has been shown to indicate more intelligence; develop more connections through stimulating the brain
- Gives great metaphor of gym: lifting; struggling, confronting challenges can lead to growth

- So by now you're probably wondering, okay, but how does this relate to writing?
- I want to dispel the notion that writing is an innate talent that can't be changed
- Try to encourage you to take on a growth mindset, to believe that change is possible but that it requires practice and effort and time (which is again, why I'm here to help you put in that practice over time in a beneficial way)
- It's all well and good for me to say "you can get better," because I'm someone who identifies as "good writer." As a tutor, I've been able to see people improve over time.
    - I had a student who came in claiming to be terrible writer
    - Over several sessions, he became very different; first time he came in with no prep, but he learned a better process (as a skill)
    - Preparation, in particular
- I also want to remind you that we aren't all writing to the same standard; as engineers you don't need to write like Shakespeare, or Jane Austen, or Hemingway
- "This is hard" does not mean "I'm bad at this"—it might actually mean "I'm improving at this"

4. Discussion

- I had you answer a few questions last night, so let's start with the first one.

- Can you think of a time when you experienced growth or improvement in an activity or with a skill?
    - Research in psychology that has found that it's not only for you to put in the effort but BELIEVE that you can improve -- get better more
    - These examples might help you start believing this
    - That's what I'm encouraging you to think; not just that you improved through practice, but that it is POSSIBLE to improve with effort
    - All about mindset!!!
- My example about drawing: Drawing isn't really a skill you'd think people can learn, but I realized this wasn't the case—I approached art differently after that
- (if not very talkative) Who has played a sport or an instrument? Is that something you improved at over time? How?
    - Practice! Although music *is* something we'd consider a talent, it's not fixed; of course not everyone can become a virtuoso, but it's not about that.