THE EFFECT OF OUT-OF-CLASS EXPERIENCES ON CRITICAL THINKING DISPOSITION AMONG COLLEGE STUDENTS

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ABSTRACT

Institutions of higher education have long been regarded as centers of knowledge creation and dissemination. Although, more recently, colleges and universities are facing greater accountability for student learning as a result of crippling student loan debt projections and staggering retention rates. Critical thinking is in the company of many skills found to be deficient in college graduates. Simultaneously, critical thinking is among the most sought-after qualities among employers (National Association of Colleges & Employers, 2017). This problematic dichotomy presents a need to better understand how critical thinking is being taught in college. Much of the literature focuses on critical thinking as an outcome of classroom instruction while the impact of out-of-class experiences is largely neglected. This survey-based study employed the California Critical Thinking Disposition Inventory (CCTDI) to identify which out-of-classroom experiences have a singular and collective effect on critical thinking dispositions among graduating seniors at a public 4-year institution. Participation in internships, study abroad, service-learning, living-learning communities, club leadership, club membership, and employment was studied.

The study offers promising data that suggest seniors are, in fact, disposed to critical thinking upon graduation. Correlation and multiple regression analyses revealed that several out-of-classroom activities had a positive effect on at least one critical thinking disposition. Among them were research with faculty, club membership, and employment. Interestingly, studying abroad was found to have a negative effect on students' disposition toward intellectual curiosity. Only two out-of-classroom experiences were found to have a combined effect on critical thinking disposition—

conducting research with faculty and holding employment for more than 20 hours per week. Findings of this study have implications for faculty, staff, and administrators alike. Looking ahead, institutions are encouraged to enhance students' learning opportunities by leveraging student employment, incentivizing faculty-student research, and partnering with local employers.

DEDICATION

I dedicate this dissertation to my late grandmother, Dr. Bela Mukhoti. If not for your encouragement, the prospect of a doctoral degree would be nothing more than a fantasy. Although you were not physically present for this journey, your spirit kept me motivated through the writing process and continues to inform the integrity with which I approach my work. Thank you for relentlessly encouraging my education and embodying what it means to be an academic.

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CHAPTER 1

INTRODUCTION

Critical thinking has been a topic of research interest for nearly eighty years although, it was not until the early 1980s when critical thinking received national attention. The *Rockefeller Commission's Report on the Humanities* (Commission on the Humanities, 1980) drafted the inclusion of critical thinking as a broad goal for higher education. Following its publication, the pivotal report sparked scholarly interest in critical thinking and ushered the concept onto the higher education scene. The nebulous topics of critical thinking skills and dispositions quickly became the concern of philosophers, cognitive psychologists, and educators alike. Scholarly attention to critical thinking was reinvigorated with the *Goals 2000: Educate America Act* (Goals 2000: Educate America Act, 1994), which established college-level critical thinking as a national education priority (Facione, Facione, & Sanchez, 1994; Facione, 2000).

Shortly following the No Child Left Behind Act of 2001, which placed greater accountability for student learning on K-12 schools, higher education began to receive similar attention. As a result, "…the picture of good practices in undergraduate education has become more nuanced" (Seifert, Gillig, Hanson, Pascarella, & Blaich, 2014). A combination of national reports, publications and assessments generated a compelling call to action for postsecondary institutions to focus on their accountability for student learning. *A Test of Leadership: Charting the Future of U.S. Higher Education* (U.S. Department of Education, 2006) was arguably the most influential change agent that brought national attention to the issue of student learning in higher education. The report is otherwise known as the *Spellings Report* for the then-Secretary of Education, Margaret

Spellings, who commissioned it. Arguing that Americans were not getting the education that they need or deserve, the report found that students who earn college degrees did not actually master the reading, writing, and thinking skills expected of college graduates (U.S. Department of Education, 2006). Shavelson (2010) critiques that the report did not focus on teaching and learning, but rather, "the external or summative function of accountability" (p. 4). Nevertheless, Shavelson acknowledges that the Spellings Report sparked a national conversation on issues pertaining to declining student learning, lack of data transparency, and barriers to investment and innovation. Shortly following the pivotal report, the Association of American Colleges & Universities and the Council for Higher Education Accreditation (CHEA) issued a joint report reinforcing the need to ensure graduates are well-prepared to succeed as active citizens post-graduation (2008). Despite the immense scholarly attention that has since been directed toward issues of higher education accountability for student learning (King, Brown, Lindsay, & VanHecke, 2007; McPherson & Shulenburger, 2008; Shavelson, 2010) and critical thinking in higher education (Abrami et al., 2008; Davies, 2015; Dunne, 2015; Facione, 1990; Facione, Sanchez, Facione, & Gainen; 1995; Fahim & Masouleh; 2012; Gellin, 2003; Niu, Behar-Horenstein, & Garvan, 2013), data continue to paint a grim picture of institutional efforts.

Statement of the Problem

The approach to the design and assessment of general education, and de facto critical thinking instructional efforts, has been largely limited to the classroom. Contrary to this conventional method, out-of-the-classroom experiences hold valuable, yet disputed, potential for teaching critical thinking. It was not until the mid-1970s that the effects of undergraduate involvement on critical thinking were studied (Gellin, 2003). Most recently, Gellin (2003) conducted a meta-analysis focused on involvement and critical thinking studies done between 1991 and 2000 to find that out-of-class experiences *do* have a positive effect on critical thinking. Specifically, Greek life, clubs and organizations, faculty interaction, peer interaction, living on campus, and employment had significant effects. However, of the eighteen studies included in the meta-analysis, few of them target other types of involvement such as study abroad, internships, and leadership in clubs and organizations. In fact, Gellin notes the insufficient number of studies as a limitation of his meta-analysis.

In the years since Gellin's study, research on the relationship between out-of-classroom experiences and critical thinking continued to surface. The effects of service-learning on critical thinking is a particularly well-researched subject (Campbell & Oswald, 2018; Colakoglu & Sledge, 2013; Nokes, Nickitas, Keida, & Neville, 2005; Sedlak, Dohemy, & Panthofer, 2003). Additionally, the impact of participation in internships (McCormick, 1993; Routon & Walker, 2019; Schumacher, 2014) and living-learning communities (Borst, 2011; Inkelas & Soldner, 2011; Inkelas, Vogt, Longerbeam, Owen, & Johnson, 2006; Kohl, 2009) has received scholarly attention. However, there exist several promising out-of-classroom experiences that have remained underexplored through the lens of critical thinking. Such include study abroad, student leadership, faculty-student research, and employment. As divisions of student affairs continue to adopt outcomes-driven missions that are focused on student learning, it is imperative that we understand the singular and collective effects of out-of-classroom experiences on critical thinking.

Purpose of the Study

Much of the aforementioned legislation and research has focused on critical thinking more broadly, although critical thinking can be further stratified into critical thinking *skills* and critical thinking *dispositions*. Expansive research on critical thinking has yielded a combination of dispositions (Abrami et al., 2008, Ennis, 1985b; Ennis, 1991; Facione, 1990) that can be measured via numerous inventories. Students' *dispositions* toward critical thinking have become increasingly relevant as their *ability* to critically think is contingent on their willingness to do so (Huber & Kuncel, 2016). Thus, the focus of this study will be on critical thinking dispositions.

Critical thinking continues to be a topic of interest among educators and employers alike. Yet, with ambiguous definitions of the concept and conflicting research on instructional effectiveness, colleges and universities lack clarity on which experiences influence the development of critical thinking dispositions. The extant literature largely centers on teacher perceptions, employer perceptions, or data from critical thinking assessments, and neglects the role of several out-of-classroom experiences.

The purpose of this correlational study is to explore the relationship between participation in out-of-classroom experiences and critical thinking disposition among graduating undergraduate college students. Critical thinking disposition will be measured using the California Critical Thinking Disposition Inventory (CCTDI). The CCTDI seeks to measure the test taker's overall critical thinking disposition via seven subscales. This study, specifically, will compare the CCTDI scores of graduating seniors who participated in at least one out-of-classroom experience with those who did not participate in any out-of-classroom experiences.

Research Question

This study aimed to address gaps in the research by examining the following research question: *Which out-of-classroom experiences, singly and in combination, correlate most strongly with students' critical thinking disposition as measured by the CCTDI?* I hypothesized that students who participated in internships, study abroad, and service-learning will have higher CCTDI scores than those who participated in no out-of-classroom activities. Seeing as the length of exposure to instruction has an impact in the classroom (Niu et al., 2013), I suspected that these three experiences would be impactful given the length of time during which students typically participate in them. I also suspected that a combination of curricular and out-of-classroom experiences would more strongly predict CCTDI scores than an individual experience. The literature review that follows suggests that certain experiences have an individual impact, thus it is reasonable that a collective impact exists.

Significance of the Study

Colleges and universities have a vested interest in better understanding critical thinking as it is in the company of many skills found to be deficient in college graduates. Simultaneously, critical thinking is among the most sought-after qualities among employers (National Association of Colleges & Employers, 2017). This problematic dichotomy places greater accountability on institutions of higher education to teach critical thinking; however, institutional efforts are questionable.

Deficiencies in the Workforce

Career preparation is arguably the primary function of colleges and universities, yet efforts seem to fall short. In their study, Flores, Matkin, Burbach, Quinn, and Harding (2012) examined students who lacked the ability to “integrate multiple perspectives with a multiplicity of facts and determine the best course of action” (p.214). They connect critical thinking to education and leadership within a constructivist framework as they assert that an absence of critical thinking skills will leave college graduates with an inability to “make meaning in the workforce” (p. 213). On a macro level, Flores et al. (2012) go further to suggest that a graduate’s ability to critically think and successfully lead will ultimately drive the economy. Beyond empirical research, critical thinking continues to be a desired skillset among employers. In fact, problem solving skills were the *most* desired resume attribute among 82.9% of employers who responded to the most recent Job Outlook Survey (National Association of Colleges & Employers, 2017). Yet, upon review of employers’ ranking of the proficiency of their candidates, it is clear that there is still work to be done. Competency among candidates for hire was ranked between “somewhat proficient” and “very proficient”, on average (National Association of Colleges & Employers, 2017).

The American Council for Colleges & Universities (AAC&U) funded a similar study through which 501 business executives and 500 hiring managers were surveyed on their beliefs about the readiness of recent college graduates, among other objectives (Association of American Colleges & Universities, 2018). *Fulfilling the American Dream: Liberal Education and the Future of Work* documents key findings of the study that further emphasize college graduates’ deficiencies in the work force. Interestingly, while high proportions of both executives and hiring managers believe recent graduates have the skills to succeed in entry-level positions, fewer believe the same individuals have the skills to be promoted. In fact, confidence in the readiness of recent graduates has dropped since 2014. Only 57% of executives believe college graduates are prepared for entry-level positions as compared to 67% in 2014. Attitudes about college graduates' readiness for promotion follow a similar trend with only 44% believing college graduates have the skills necessary for promotion in 2014 to a staggering 34% today. Among the many skills ranked highly by both business executives and hiring managers is critical thinking, yet there still exists a preparedness gap. While 78% of business executives believe critical thinking is an important quality, only 34% believe recent college graduates are well-prepared in the skill. A similar gap exists among the attitudes of hiring managers, with 84% valuing critical thinking, but only 41% feeling as though graduates fully possess it (Association of American Colleges & Universities, 2018).

The deficiency in critical thinking skills among college graduates is not new. The Conference Board Report (2006) took a more in-depth look at employer expectations as it compares the skill level of high school graduates, two-year college graduates, and four-year college graduates in several areas. Among over 400 employers surveyed, critical thinking/problem solving was among the top four most important skills. Yet, 22.8% of employers rank two-year college graduates as deficient in critical thinking and problem-solving skills as compared to 9% of employers ranking four-year college graduates deficient. While these data are more promising than the 2018 Job Outlook Survey, they demonstrate that critical thinking demands even greater attention in college.

Colleges Lack Impact on Critical Thinking

Arum and Roska's (2011) *Academically Adrift* emphasizes the daunting reality of student learning in higher education. In their book, they aggregated data from the *performance task* component of the Collegiate Learning Assessment (CLA) to find that nearly half of students did not make statistically significant gains in critical thinking after two years of college, among other findings. They assert several important lessons: undergraduate education is rarely prioritized at four-year institutions, gains in student performance are disturbingly low, and individual learning is characterized by persistent and/or growing inequality. In addition, they note the considerable variation that existed within and among institutions, stressing the need for further attention. The national visibility of Arum and Roska's publication reinvigorated interest in accountability for student learning, and also drew skepticism. For instance, Pascarella, Blaich, Martin, and Hanson's (2011) immediate replication of the study using data from the Wabash National Study of Liberal Education (WNS). Considering the WNS mirrors the CLA, it was used to test the generalizability of *Academically Adrift* with findings among a different sample of institutions and students. They too found deficits among graduating seniors; 33% of graduates did not make significant gains in critical thinking (Pascarella, Blaich, Martin & Hanson, 2011). In short, they supported Arum and Roska's (2011) argument and urged institutions to take it seriously.

This study aimed to equip college educators and administrators with knowledge in their effort to further develop critical thinking among college graduates. An understanding of the relationship between out-of-classroom experiences and critical thinking dispositions will allow leadership to best allocate resources and broaden learning assessment initiatives beyond the classroom. In addition, divisions of student affairs will be better positioned to assert their impact on student learning and negotiate stronger collaboration with academic affairs. Finally, institutions will be able to couple the effects of out-of-classroom experiences with those of classroom experiences to further assert their relevance and prepare graduates for the workforce.

Definition of Key Terms

Upon exploring the problem of interest, two key terms must be defined. First, for the purposes of this study*, critical thinking* was defined using Niu, Behar-Horenstein, and Garvan's (2013) definition:

> Generally, critical thinking is considered to be intellectually engaged, skillful and responsible thinking. It facilitates good judgement that requires the application of assumptions, knowledge, competence, and the ability to challenge one's own thinking. Critical thinking skills require self-correction, monitoring the reasonableness of thinking, and reflexivity. One characteristic that uniquely defines critical thinking is that individuals are capable of stepping back and reflecting on the quality of their thinking. (Niu, et al., 2013, p.116)

This verbose definition is informed by several conflicting definitions, all of which will be discussed in the next chapter. However, it is significant as it clearly delineates dispositions as separate from skills. This is an important distinction as this study focuses on dispositions, not skills.

Given the broad array of out-of-classroom experiences that exist on college campuses, it is also necessary to define *out-of-classroom experience*. For the purposes of this study, out-of-classroom experiences was defined as "[experiences] that do not comprise regular courses, but are possibly related to or part of such courses, that occur outside of the classroom, and that are conducted under the auspices of the institution"

(Bae, Jeon, & Han, 2018, p. 81). This definition allows for the inclusion of several out-of-class experiences, some of which are cocurricular. Moreover, it limits the scope of out-of-class experiences to those sanctioned by the institution. Work on-campus and off-campus, including work study, was one exception to the definition. Even though it takes place outside of the classroom, it is often not sanctioned by the institution, and lacks connection to academic outcomes. Nevertheless, hours worked (on-campus and off-campus) was a variable in this study.

CHAPTER 2

REVIEW OF THE LITERATURE

Introduction

The subject of critical thinking continues to remain equivocal. While significant theoretical contributions have been made, they too have muddled our understanding of what critical thinking is and how it is achieved. Moreover, general education efforts remain the primary vehicle for teaching critical thinking dispositions and skills in higher education; yet, the effectiveness of classroom instruction efforts is still unclear. As student affairs divisions across the country assert their contributions toward students' cognitive development, out-of-classroom experiences hold immense potential for complementing the curriculum. This literature review will offer a historical background of critical thinking, synthesize the extant critical thinking frameworks, and report the state of critical thinking development efforts across the higher education landscape.

Critical Thinking

Even though critical thinking has received scholarly attention for the past four decades, the concept remains elusive (Davies, 2015). Characterized by a fluctuating list of skills and dispositions, even the definition of critical thinking is contested.

Defining Critical Thinking

A universal definition of *critical thinking* does not exist. In their meta-analysis of instructional interventions' influence on critical thinking, Niu et al. (2013) provide a rich history of many definitions of critical thinking dating back to that of E.M. Glaser (1942) who defined critical thinking as "an attitude and logical application of skills in problem-solving contexts" (p. 115). Since Glaser's broad definition, critical thinking has evolved to include a variety of cognitive attitudes and abilities. There is now general consensus that critical thinking is not limited to skills in argument and reason. In fact, the 1990 American Philosophical Association Delphi identified six skills, 16 subskills, and 19 dispositions that are associated with critical thinking (Abrami et al., 2008).

Bailin, Case, Coombs, and Daniels (1999) posit that as definitions become more specific, they will inevitably conflict: "…as soon as they *interpret* the term in such a way as to provide a clear *conception* of critical thinking, agreement evaporates" (p. 285). While scholars can agree that critical thinking is defined by more than baseline cognitive abilities, there exists a divide in the outcomes of critical thinking. For instance, in studying the deficiencies in critical thinking among college graduates, Flores et al. (2012) demonstrate how incongruence can stem from a concise definition. They define critical thinking simply as "…the application of knowledge in more complex ways" (p. 214). In doing so, they juxtapose the *technicist* critical thinking viewpoint with that of the *rationalist*. The technicist emphasizes task accomplishment and effectiveness while the rationalist focuses more on logic and evidence-forming as a basis for critical thinking. With a slightly different interpretation, Dunne (2015) considers rationality to be the common thread among the many definitions of critical thinking. Although, short of implying that rationality constitutes thought *and* action, he does not expound on the concept (i.e. what rationality is, what beliefs are rational, etc.).

For some time, the definition that was generally accepted characterized critical thinking as "reflective and reasonable thinking that is focused on deciding what to believe or do" (Ennis, 1985b, p.45). Niu et al. (2013) have attempted to summarize the overlap between the various, often conflicting, definitions:

> Generally, critical thinking is considered to be intellectually engaged, skillful and responsible thinking. It facilitates good judgement that requires the application of assumptions, knowledge, competence, and the ability to challenge one's own thinking. Critical thinking skills require self-correction, monitoring the reasonableness of thinking, and reflexivity. One characteristic that uniquely defines critical thinking is that individuals are capable of stepping back and reflecting on the quality of their thinking. (Niu et al., 2013, p.116)

A vast improvement from Glaser's (1942) definition, this summary gives credence to cognitive skills, while also recognizing the importance of purposeful reflection and logic. It is also informed by decades of research through which critical thinking *dispositions* became increasingly unique, and separate, from critical thinking skills. As such, it will be the definition of *critical thinking* used for the purposes of this study.

A Focus on Critical Thinking Dispositions

Dispositions have more recently been regarded as the "precursor to doing any critical thinking at all" (Davies, 2015, p.55). Unlike critical thinking skills, dispositions are not arguments or judgements, but rather states of mind or attitudes (Davies, 2015). Students' dispositions toward critical thinking have become increasingly relevant as their ability to critically think has been found to be contingent on their willingness to do so (Huber & Kuncel, 2016). Much like the general concept of critical thinking, our understanding of critical thinking dispositions is informed by a theoretical history, albeit shorter and restricted to a select few scholars.

Among the most prominent critical thinking researchers is Robert H. Ennis whose early work challenged the ability-focused Bloom's Taxonomy and introduced thirteen dispositions including one's attitude toward being openminded, trying to be well-informed, and seeking reasons (1985b). Ennis offered a slight modification to his list of dispositions, narrowing the list to twelve, in his later conception of critical thinking (1991). Peter Facione's (1990) Delphi Report further distinguished critical thinking dispositions as independent of critical thinking skills. Moreover, he provided a stronger empirical approach to understanding critical thinking than Ennis's theoretical conception. Drawing from the conclusions of a forty-six expert interactive panel, Facione asserted that "…each cognitive skill, if it is to be exercised appropriately, can be correlated with the cognitive disposition to do so" (1990, p. 20). While pivotal, both Ennis and Facione's work fail to address the continued disagreement about if and how dispositions inform skills. Must one be disposed to critically think to actually do so? This question was the subject of debate until the turn of the century when dispositions were able to be measured and empirical research began to surface.

The preeminent disposition inventory, the California Critical Thinking Disposition Inventory (CCTDI), is a product of the early findings of Facione (1990). Prior to the Delphi Report, critical thinking assessments were being developed in Connecticut and California; however, they did not assess dispositions (Ennis, 1985b). Acknowledging that most of the research on critical thinking dispositions was "within the realm of theoretical speculations, working assumptions, anecdotal observations and pedagogical discussions" (Facione et al., 1995, p.4), he embarked on one of the first studies to explore critical thinking dispositions among college freshmen. Facione and Associates' sample was comprised of 587 freshmen who completed the CCTDI, only 13% of whom scored positively on the seven subscales of the assessment (truthseeking, open-mindedness, analyticity, systematicity, confidence in reasoning, inquisitiveness, and maturity). As a result of their study, Facione et al. present three interactionist possibilities between critical thinking dispositions and skills: (a) there is a one-to-one match between a disposition and a skill; (b) combinations of dispositions can lead to development of other dispositions or; (c) overall disposition is the basis for which one decides to attempt to use skills. Thus, there still existed debate over whether one must be disposed to critical thinking before they can do so.

Yang and Chou (2008) acknowledge that the field of research on critical thinking dispositions remains limited. Although, the advent of the CCTDI, along with the California Critical Thinking Skills Test (CCTST), made it possible to examine the correlational relationship between critical thinking skills and critical thinking dispositions. Employing a pre-test and post-test design using these instruments, Yang and Chou (2008) found a strong correlational relationship ($r = 0.63$, $p < 0.01$) between scores on the CCTDI and the CCTST. In other words, 40% of the variance in scores can be attributed to the relationship between skills and dispositions. Although only students with high CCTST and medium CCTDI scores possessed a significant correlation. Beyond the work of Yang and Chou, much of the research correlating CCTDI and CCTST scores stems from the field of nursing. For example, both Colucciello (1997) and McCarthy, Schuster, Zeher, and McDougal (1999) administered the CCTDI and the CCTST to undergraduate nursing students to also find that there were significant, albeit smaller, relationships between the scores ($r= 0.32$, $p < 0.01$ and $r= 0.24$, $p < 0.01$, respectively). Considering the much smaller percentage of the variance accounted for in these studies, it is evident that the predictive relationship between critical thinking skills and dispositions is still unclear.

In 2000, Facione offered additional insight into the relationship between critical thinking skills and dispositions. In his study on a varied population of 10th graders, accounting and nursing professionals, and college students, Facione (2000) found that nearly all dispositions were significantly correlated with critical thinking skills, disproving the one-to-one disposition-to-skill hypothesis (Facione et al., 1995). Through his findings, Facione offers a more concrete definition of critical thinking dispositions as "a person's consistent internal motivation to act toward, or to respond to, persons, events, or circumstances in habitual, and yet potentially malleable, ways" (2000, p. 64). Since, expansive research on critical thinking has yielded a combination of dispositions (Abrami et al., 2008) that can be measured via numerous inventories. The work of Ennis, Facione and recent others (Davies, 2015; Dunne, 2015; Fahim & Masouleh, 2012; Huber & Kuncel, 2016) is informed by the theoretical frameworks of the 1980s and 1990s that attempt to conceptualize the ambiguous topic of critical thinking.

Approaches to Conceptualizing Critical Thinking

Theorizing around critical thinking primarily stems from the fields of philosophy, psychology, and education (Lai, 2011; Sternberg, 1986). Both Lai (2011) and Sternberg (1986) delineate the three different approaches in an attempt to present a theoretical background of critical thinking. It is nearly impossible to fully represent the countless conceptualizations and frameworks that are informed by each approach. Instead, this section will provide a brief description of each approach, critiques pertaining to them, and one representative illustration. While each approach is presented separately, it is important to note that there is not necessarily a *right* way to conceptualize critical thinking. The amorphous nature of the topic lends itself to multiple approaches that both complement and compete with each other.

The Philosophical Approach

The Delphi Report presented a description of the "ideal critical thinker" (Facione, 1990, p.3). Among the 15 attributes of the ideal critical thinker are being flexible, fair-minded, and habitually inquisitive. In essence, the philosophical approach to conceptualizing critical thinking is concerned with standards and rules of logic of which people are capable (Lai, 2011). In other words, scholars consider critical thinking skills and abilities in isolation, independent of environmental influences. Lai (2011) emphasizes the diminishment of "how people actually think" (p. 5) as one of the most prominent critiques of the philosophical approach. Sternberg adds that this approach neglects to recognize the many limitations that impede one's ability to critically think, such as limited motivation, limited time and limited information. Ennis (1985) offers a prime example of a philosophical approach as he presents four general critical thinking principles that bridge disciplines. The first principle suggests that if a person has a conflict of interest, there is "ground for regarding that person's claim with greater suspicion than would otherwise be appropriate" (p. 43). Second, Ennis cautions against misrepresenting a person's position and then using it against them. The third principle is characterized by the classic if-then statement. The fourth and final principle suggests that "the ability of a hypothesis to explain or help explain the facts lends support to the hypothesis…" (p.43). These principles are deeply rooted in rules of logic. Ennis suggests that these general principles be incorporated into the many disciplines taught in secondary school. Moreover, he calls for a dedicated class to teach critical thinking skills in college, in addition to infusion across the curriculum. Indeed, the principles are written to be intentionally general and applicable to multiple disciplines.

The Cognitive Psychological Approach

Lai (2011) distinguishes the cognitive psychological approach from the philosophical approach. First, cognitive psychologists are more interested in “how people actually think versus how they could or should think under ideal conditions” (p. 7). Second, critical thinking is defined by “the types of actions and behaviors critical thinkers can do” (p. 7). Critiqued as reducing critical thinking to discrete steps or skills, the cognitive psychological approach is often characterized by lists of skills or abilities associated with critical thinking. In short, this approach allows us to understand critical thinking in the absence of full information, unlimited time, and so on (Sternberg, 1986). Halpern’s (1998) four-part model for teaching and learning critical thinking is one example. Rather than hypothesizing general standards of critical thinking, Halpern reinforces the need to separate critical thinking dispositions from critical thinking skills. In fact, the first part of her model focuses exclusively on developing critical thinking dispositions. The second part encourages the instruction of *specific* skills such as argument analysis, hypothesis testing and verbal reasoning. Finally, Halpern includes structure-training activities and a metacognitive component as the latter two parts of her overall recommendation for teaching critical thinking. Although Halpern offers one of many frameworks for teaching critical thinking, she neglects to outline an order or hierarchy of dispositions and skills. Moreover, Halpern’s model is not based on empirical research, nor does it specifically address critical thinking *in college*. A limited number of educational approaches to conceptualizing critical thinking fill this gap.

The Educational Approach

Perhaps the least utilized among the conceptual approaches is the educational approach. This approach is unique in that it is informed by classroom experience and observation of student learning (Lai, 2011). Sternberg (1986) critiques educational theories, arguing that they are more difficult to apply and evaluate. Among the most notable educational approaches is Bloom's Taxonomy of Educational Objectives (1956), through which Bloom, Engelhart, Furst, Hill, and Krathwohl present six major categories of learning: knowledge, comprehension, application, analysis, synthesis, and evaluation. Bloom et al. uniquely define each educational outcome and suggest that they have a hierarchical relationship. In other words, certain outcomes demonstrate higher levels of learning (e.g. synthesis and evaluation). It is widely accepted that the latter three educational outcomes (analysis, synthesis and evaluation) require skills that align with critical thinking (Lai. 2011). Ennis (1985b) applies a similar critique to Bloom's Taxonomy, suggesting that the objectives are too vague and absent of assessible criteria.

While the different theoretical strands vary greatly in their approach to conceptualizing critical thinking, the value of critical thinking skills and dispositions is certain. In the words of Ennis (1985), "the current emphasis in critical thinking is one educational trend that we need to preserve" (p.48). Indeed, theoretical and empirical research on critical thinking has persisted. Although, despite the mounting research on critical thinking, there continues to be a disconnect between skill-development in college and application in the work place.

Conceptual Framework

In addition to the landmark recognition of critical thinking dispositions, the Delphi Report (Facione, 1990) made several other philosophical contributions that guide this study. Primarily, the report extends the applicability of critical thinking skills beyond a specific discipline to all areas of life and learning. Moreover, the expert panel concluded that critical thinking instruction can occur through programs that are discipline-specific *or* programs that infuse everyday life (Facione, 1990). These deductions arguably suggest that experiences outside of the classroom hold immense potential for critical thinking instruction. The first true conceptual framework that grounds this study builds off of the work of Facione and others to present a model of critical thinking that is specific to higher education.

Martin Davies's Model of Critical Thinking in Higher Education (2015) expands on earlier philosophical models which focus on educating for critical thinking. In fact, Davies critiques Facione's (1990) definition of critical thinking as he asserts that it is not easily transferrable to educational decision-making. Davies' concentric circle model (see Figure 1) places the individual's skills and dispositions at the center, making clear that more advanced foci of critical thinking (i.e. focus on the social context) radiate out from these characteristics. Perhaps most unique about Davies's Model is its incorporation of the socio-cultural dimension of critical thinking in higher education. This study will focus on the out-of-classroom experiences through which students more commonly participate in the world by practicing *criticality*, or thinking, reflecting, and acting (Davies, 2015).

Finally, this study draws from the foundational Experiential Learning Cycle in which Ronald Fry and David Kolb (1979) connect personal experiences and practical

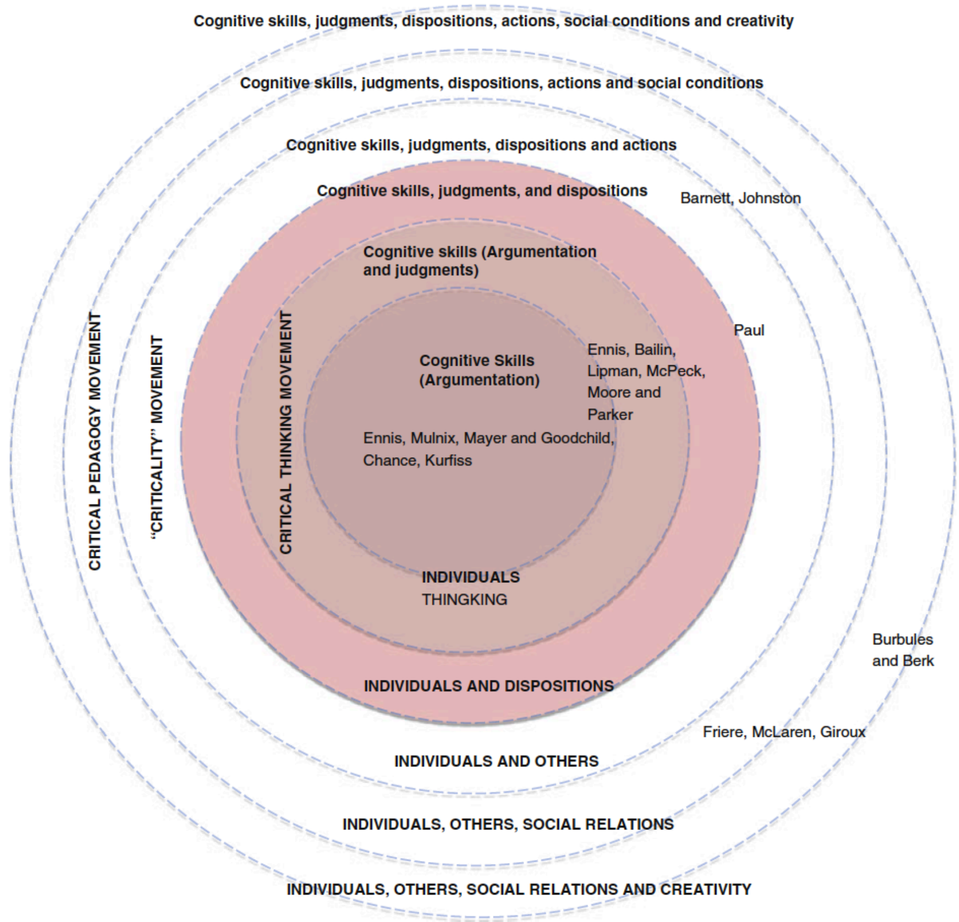

Figure 1. Martin Davies's model of critical thinking in higher education. From "A Model of Critical Thinking in Higher Education," by M. Davies, in M.B. Paulsen (Ed.), *Higher Education: Handbook of Theory and Research*, (p.85), 2015, Switzerland: Springer International Publishing.

application with the understanding of concepts. Even though the cycle does not specifically address critical thinking, the four stages in the cycle (see Figure 2) closely align with skills commonly associated with critical thinking. In the first stage, *Concrete Experience*, observations inform ideas which, in turn, have implications for action. The second stage of *Reflective Orientation* involves a reflection upon and interpretation of these experiences to inform different perspectives. New knowledge is then created as learners integrate observations into sound theories in the third stage, *Abstract*

Conceptualization. Finally, newly-formed theories are then used to make decisions and solve problems in stage four, *Active Experimentation*. Fry and Kolb (1979) associate different learning environments (p. 81) with each stage. Even though the descriptions of each learning environment are framed within the classroom, much of the descriptors also apply to out-of-class environments. For example, internships or executive board positions on student clubs could qualify as a *behavioral environment* in which learners act with real consequences.

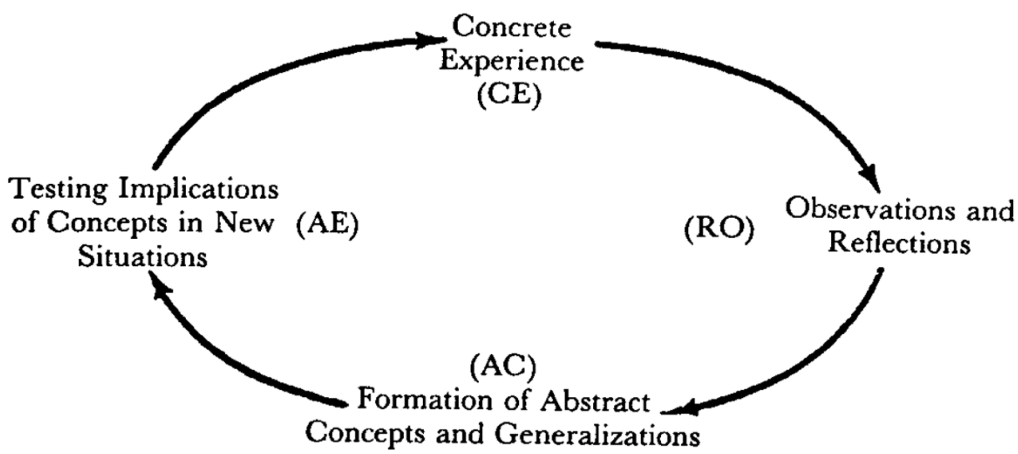

Figure 2. The experiential learning model. From "Experiential learning theory and learning experiences in liberal arts education," by R. Fry and D. Kolb, in M.B, 1979, *New directions for experiential learning*, *6*, p.81.

As we shift away from conceptual approaches that undergird the concept of critical thinking, an overview of the prevalence of critical thinking development efforts in higher education is necessary as it will inform the topic of interest.

Critical Thinking in Higher Education

During the late 1970s and into the 1980s, American higher education found itself under attack for failing to develop students as "generally educated people" (Gaff, 1989, p.11). In response to the aforementioned Rockefeller Commission's Report on the Humanities which drafted the inclusion of critical thinking as a broad goal for higher education (Commission on the Humanities, 1980), institutions sought a more holistic curriculum that exposed *all* students to a broad range of competencies through the implementation of general education. While outcomes differ among institutions, critical thinking has become a "crucial component" (p. 431) of general education (Huber & Kuncel, 2016).

Years later, the issue of unifying general education outcomes still exists. DeBoer (2016) eloquently states, "the lack of standardization among universities both makes it difficult to assess college learning and harder to coordinate and standardize such assessments" (p.2). As part of his publication, DeBoer offers a summary of the major extant tests of college learning. Beyond the Scholastic Aptitude Test (SAT), which is administered in high school, DeBoer highlights the Collegiate Learning Assessment of Academic Proficiency (CLA+), the Proficiency Profile, developed by ETS, and the Collegiate Assessment of Academic Proficiency (CAAP), developed by ACT. Unlike the SAT, the CLA+ measures students' broad skills in critical thinking and other cognitive abilities rather than proficiency in a subject matter. In contrast, the Proficiency Profile measures critical thinking skills in addition to the standard writing, reading, and mathematics foci of other assessments. Similarly, the CAAP measures critical thinking, reading, writing, mathematics, as well as science. Much like the SAT, the CAAP is directed toward high school students who are college aspirants. While these assessments succeed in measuring critical thinking outcomes, or readiness to achieve them, among individual students, DeBoer asserts that there is a lack of comparative assessments of universities and their programs (2016). Nevertheless, given the national focus on critical thinking—and the prioritization of the skill among testing agencies—institutions are challenged with identifying the most effective approach to developing the associated dispositions and skills among students.

Teaching Critical Thinking

Much like the countless definitions of critical thinking, there too exists variability in how critical thinking skills are acquired. One school of thought asserts that pre-existing traits can largely affect one's ability to develop critical thinking skills, while others believe that "critical thinking skills can be taught and learned" (Niu et al., 2013, p. 116). The latter has prompted educators to operationalize critical thinking.

Critical thinking instructional efforts have been largely limited to the classroom; however, the effectiveness of these efforts is questionable. In their meta-analysis of the effectiveness of instructional interventions on critical thinking, Niu et al. (2013) acknowledge that empirical studies have generated mixed results. Some have been effective while others have yielded non-significant results. In their analysis of 31 empirical, quantitative studies, they found that instructional methods have a significant impact that is mediated by student discipline and the length of exposure to the instructional intervention. Similarly, Huber and Kuncel's (2016) meta-analysis of 88 studies support the claim that critical thinking improves substantially during college. However, not all research paints college-level efforts in a positive light. For example, Perry, Paulsen, and Retallick (2018) recently compared agriculture students' performance on the Critical Thinking Assessment Test (CAT) to find that there was no significant difference between students entering from high school and students entering from community college.

Given the inconclusive evidence of effective instructional methods, the ability for colleges to teach critical thinking has been brought into question. In their meta-analysis, Huber and Kuncel (2016) challenge the extent to which critical thinking skills can be learned in college:

> Large gains [in critical thinking skills] due to short-term interventions may not be sustained or expanded indefinitely. In other words, there is probably an upper limit to the amount of critical thinking skills that will be learned and retained in college, even if critical thinking instruction is explicitly infused into the curriculum. (Huber & Kuncel, 2016, p.433)

Huber and Kuncel's analysis suggest that short-term exposure to critical thinking via classroom instruction has limited impact. Moreover, gains in critical thinking can occur in absence of formal instruction. A major criticism of critical thinking instructional efforts comes from the work of Abrami et al. (2008). Through their meta-analysis of 117 critical thinking instruction studies, they found that students cannot be expected to improve their critical thinking skills implicitly. Rather, educators must make critical thinking efforts more explicit. Unfortunately, educators themselves are not consistent in their instruction of critical thinking.

Efforts have been made to develop a framework for teaching critical thinking. Already discussed was Halpern's four stage model (1988). Duron, Limbach and Waugh (2006) propose another framework that is informed by extant literature. Much like Halpern's (1998) model, they assert the importance of utilizing questioning and activities to teach critical thinking. The addition of providing feedback to students differentiates their 5-stage model. Similarly, Duron et al. (2006) focus solely on in-classroom learning, leaving a dearth of understanding about the impact of out-of-classroom activities.

Choy and Cheah (2009) challenge the long-standing assumption that students cannot learn a skill or topic unless a teacher covers it. In their study of teacher perceptions of how students learn, they find that the teacher's role is still unclear; are they disseminators of information or are they mediating student learning? While informative, this study was conducted in Malaysia where cultural norms and perceptions of student learning could differ from those among teachers in the United States. Further, the study was qualitative and involved 30 participants, which makes the findings difficult to generalize. Nevertheless, it is clear that the reliance on curriculum as the primary vehicle for teaching critical thinking has rendered college efforts ineffective, but not hopeless. The vast majority of general education models are designed and assessed by faculty while student affairs operate from their separate, yet similar, outcomes. Limited research has found that out-of-classroom experiences can also positively influence critical thinking.

The Value of Out-of-Classroom Learning

Students' experiences outside of the classroom are a critical aspect of their overall college experience, and arguably more important than attributes of their program of study (Inman & Pascarella, 1998). Data from the National Study of Student Engagement (NSSE) Institutional Report (2018) revealed that 62% of students participate in service-learning, 49% participate in internships, 23% participate in research with faculty, as well as living-learning communities, and 14% participate in study abroad. These data suggest that out-of-classroom experiences are becoming increasingly popular, and as such, they present an opportunity to extend institutional efforts to develop critical thinking among students beyond the classroom. Considering most of these experiences involve collaboration with student affairs, a brief overview of the history and background of student affairs would behoove the discussion.

History and Background of Student Affairs

Two decades after the broad implementation of general education, the purpose of student affairs began to evolve from an elementary caretaker definition of *in loco parentis* to a more committed, intentional approach to learning beyond the classroom. This shift was initiated by the publication of *The Student Learning Imperative: Implications for Student Affairs* (American College Personnel Association, 1994) in which the authors asserted that academic curriculum can be mediated by out-of-classroom activities. The publication goes further to suggest that curriculum is focused on "conventional categories that are meaningful to the academy", but often neglects students' learning needs (2004, p. 8). This isolated approach to the design of learning opportunities is recognized across the literature. For instance, in their discussion of curricular infusion strategies, Levy and Polnariev (2016) acknowledge that singular student programs are designed and implemented with little connection to other academic or cocurricular programs on campus. More recently, *Learning Reconsidered* (NASPA—Student Affairs Administrators in Higher Education & American College Personnel Association, 2004) reestablished that experiences outside of the classroom can, and do, complement the curriculum. An important theme can be drawn from these publications: the academic curriculum is strengthened by learning that occurs outside of the classroom as learning cannot be separated.

Students spend the majority of their undergraduate career amongst peers and faculty outside of the classroom. These interactions have an undeniable effect of cognitive development. Among the more positive findings are Pascarella and Terenzini's (1991) results in their book, *How College Affects Students: Findings and Insights from 20 years of Research*. Pascarella and Terenzini synthesize the research to ultimately assert that interaction with faculty and peers has a positive impact on critical thinking skills. This is a broad finding that lacks focus on specific out-of-class experiences; however, it is a well-supported concept. Twale and Sanders (1999) also found that peer discussions outside of class positively contributed to the critical thinking of juniors and seniors. The number of cultural events attended was also positively correlated with critical thinking scores on the Critical Thinking section of the Collegiate Assessment of Academic Proficiency (CAAP) Test. While these findings are significant considering the large sample size of 223 full-time juniors and seniors that represent a variety of disciplines, the demographic is dated; 88% of the participants were white and 80% were traditional students. This hardly represents the current landscape of higher education. Another limitation of the study is the choice of factors it examines. Six of the nine non-classroom experience factors are academic activities (e.g. hours spent tutoring other students, hours spent using the library).

The Role of Out-of-Classroom Experiences

There also exists copious research on the effects of specific types of out-of-classroom activities on cognitive development and critical thinking. The out-of-class experiences of interest in this study are residential living-learning communities, service-learning, study abroad, faculty-student research, internships, holding an executive board position in a student club or organization, and employment. Much of the research that connects these activities with critical thinking outcomes is rooted in student perception data—lacking objective measure. Even still, a brief discussion of the extant research on each of these activities provides valuable insight into the effect of out-of-classroom activities on critical thinking.

Living-Learning Communities

Dunn and Dean (2013) define living-learning communities (LLCs) as "structured programmatic interventions that bring students and faculty together in meaningful ways and include students living together" (p.12). This definition connotes a strong connection between LLCs and the academic mission, and while typologies of LLCs continue to evolve (Inkelas & Soldner, 2011), engagement of academic affairs is typically a requisite. Thus, there exists considerable, albeit conflicting, research on the relationship between LLC participation and cognitive outcomes. Much of the research is informed by the National Study of Living Learning Programs (NSLLP)—a nationwide study conducted in 2004 and 2007. For example, Inkelas, Vogt, Longerbeam, Owen and Johnson (2006) used data from the NSLLP pilot study to find that critical thinking and analysis ability was one of four intellectual outcomes of participating in an LLC. Students in LLCs were statistically more likely to feel competent in their critical thinking skills than students living in traditional housing. Although, when their results are disaggregated by race, there remained considerable difference in students' confidence in critical thinking. It is possible that the high-achieving sample of this study skewed the results; 92% of students who lived in a residence hall had a B+ average or higher in high school. Expanding on this and other studies, Inkelas and Soldner (2011) synthesize empirical research focused on student outcomes from LLC participation and reinforce the effect of LLC participation on intellectual outcomes as well as academic performance, persistence, degree attainment, faculty and peer interactions, and college transition (Inkelas & Soldner, 2011). Even though Inkelas and Soldner present a compelling argument, many of the studies discussed are single-institution studies that heavily relied upon student perception data.

Much like the effect of classroom instructional efforts, the impact of LLCs on critical thinking is disputed. Using 2004 NSSLP data, Kohl (2009) explored the effects of participation in honors and civic engagement LLC to find that only honors LLCs had a significant effect on higher critical thinking scores. Kohl’s findings suggest that specific types of LLCs have an impact on critical thinking. However, data collected by Kohl and other previously discussed researchers are limited to large-scale assessments. In other words, little research employs an objective measurement of critical thinking with the purpose of studying the correlation between LLC participation and critical thinking, specifically. Borst’s (2011) dissertation study offers an exception. In fact, he challenges the validity of previous studies that may have rejected the null hypothesis when there was actually no significant effect of LLCs. Using data from WNS, Borst conducted a longitudinal pretest/post-test study on first year students to find that LLC participation did not significantly influence end-of-year critical thinking among students, as measured by the Collegiate Measure of Academic Proficiency (CAAP) test. While students perceived that LLCs positively affected their growth in critical thinking, their actual growth was essentially the same as those who lived in traditional housing (Borst, 2011).

Borst's findings yield a valid caution against the validity of perception data that are offered in absence of standardized measures.

Service-Learning

Similar to living-learning communities, service-learning experiences are often associated with curricular efforts of academic affairs. Institutions may also engage students in community service, or volunteerism. While this study recognizes community service as a promising practice, Sedlak, Doheny, and Panthofer (2003) distinguish service-learning as "a balance between learning goals and service outcomes" (p.2). Given the specificity of service-learning experience, much of the literature focuses on a particular class or group of majors. Sedlak and Associate's (2003) study, for example, analyzed the journal entries and lab discussions of 94 nursing students to find that the students developed critical thinking skills through reflections about their service-learning experiences and decisions made about those experiences. Qualitative analysis seems to be a common approach to assessing the impact of service-learning on critical thinking. Colakoglu and Sledge (2013) also employed qualitative methods to analyze the reflections and peer evaluations of entrepreneurship students. Student feedback suggested that students engaged in critical thinking and creative skills, among other outcomes. While this study examined a service-learning course that was intentionally designed to enhance critical thinking, the service-learning component of the course was not nearly as immersive as the experience in Sedlak and Associates' study and others. Rather than engaging in a community setting, students in Colakoglu and Sledge's (2013) study conducted all service from campus. Campbell and Oswald (2018) offer another current example of a focused analysis of an intentionally designed course. Utilizing a mixed methods approach, Campbell and Oswald analyzed the class discussions, journal entries, and student essays of graduate students enrolled in a human development psychology course with an embedded service-learning component. Interestingly, while analysis of class discussions suggested critical thinking gains among most students, only some students experienced an increase in critical thinking across the semester. Their findings may further support the notion that quantitative data provide a more accurate picture of student learning.

There does exist some attempt to assess the impact of service-learning using quantitative methods. Nokes, Nickitas, Keida, and Neville (2005) used the CCTDI to measure the critical thinking of a small sample of 14 graduate nursing students who participated in a service-learning intervention. After participating, critical thinking scores actually went down, along with students' cultural competence as measured by the Inventory for Assessing the Process of Cultural Competence (IAPCC). However, civic engagement scores significantly increased. The small sample of Nokes and Associates' study affects its generalizability although, the study serves as a model for quantitative analysis of critical thinking, cultural competence, and civic engagement. Other quantitative methods have come in the form of meta-analyses. In fact, the meta-analysis conducted by Novak, Markey, and Allen (2007) was an effort to clarify the otherwise mixed results of research on service-learning and cognitive outcomes. With respect to the positive findings of Novak and Associate's meta-analysis of nine studies, Warren (2012) critiqued their exclusion of unpublished literature and moderator analysis. In response, Warren conducted another meta-analysis with eleven studies, including Novak and Associates' nine studies. She too found that service-learning is linked with a number of positive effects including higher-order thinking, cultural awareness, and interpersonal development. Both meta-analyses reinforce the value of service-learning initiatives and the promise they have for the development of critical thinking; however, the dearth of quantitative research in this area is evident.

Somewhat related to service-learning is volunteerism. Unlike service-learning, volunteerism is not connected with a course. Although, structured volunteerism efforts on college campuses (e.g. alternative spring breaks, community clean-up days) are becoming more prevalent and often centralized within volunteerism offices. Dey (1991) offers one of the only studies that examines the effects of community service on critical thinking. His study carries considerable validity and reliability as he uses information from a variety of admissions tests (e.g. Scholastic Aptitude Test), graduate exams (e.g. Graduate Management Admission Test), and the freshmen-administered Student Information Form. Moreover, his study assesses a large sample of nearly 25,000 students and accounts for the entirety of a students' college career, rather than one semester or one year. While participation in community service had strong correlations with leadership abilities, cultural awareness, and appreciation of people from different races/cultures, changes in critical thinking were negligible. Students who participated in community service were only 2% more likely to report stronger problem-solving skills.

Study Abroad

Naturally, study abroad is associated with gains in intercultural competence, cultural benefits, and linguistic benefits. Additionally, philosophical and empirical evidence suggests that these immersive experiences also have implications for critical thinking. Nguyen (2012) juxtaposes critical thinking and creativity to argue that creativity requires criticality, and vice versa. Moreover, study abroad builds intellectual humility and intellectual empathy. Nguyen posits that since study abroad enhances all intellectual traits associated with critical thinking, it enhances critical thinking itself. Nguyen also makes two timely observations at the conclusion of the article: (1) study abroad is inaccessible to many students due to associated costs, and (2) the scholarly attention received by other out-of-classroom initiatives is absent from our understanding of study abroad. Following Nguyen's publication, empirical evidence on the impact of study abroad began to surface.

Similar to the other out-of-classroom activities discussed, extant empirical research on study abroad is primarily rooted in perception data and qualitative analysis. Savage and Wehman (2014) studied students who participated in both short-term (2-3 rinweeks) and long-term (one semester or longer) study abroad *and* service-learning experiences. Following their analysis of 147 students' responses on a survey questionnaire, Savage and Wehman found that 76% of students believed that their international experience enhanced their critical thinking skills. Furthermore, they attributed their critical thinking skills with an increased ability to engage in problem solving, an expansion of their perspectives of the world, improved communication skills, and the unique opportunity to adapt and acclimate to unfamiliar surroundings.

More recent studies have affirmed Savage and Wehman's (2014) findings. Roberts, Raulerson, Teig, Harder, and Stedman (2018) explored the impact of a short-term study abroad experience on critical thinking among agriculture students. Students' reflective journals were indicative of an expression of critical thinking although, they did not demonstrate all types of critical thinking. Rather, the journal entries demonstrated skills in analysis, inference, and self-regulation. Skills in interpretation, evaluation, and exploration were rarely, if ever, present. Roberts and Associates' study is limited by its small sample size of eight undergraduates. Moreover, questions were provided to students for each journal entry, thus it is possible that the wording of the questions elicited certain types of responses. Coker, Heiser, and Taylor (2018) offer a much different approach to understanding the effects of study abroad programs. Their five-year study used NSSE data from 1,858 graduating seniors who participated in short-term or semester-long programs. Students who participated in semester long programs reported better outcomes in critical thinking, in addition to several other intellectual and behavioral outcomes. Their findings suggest that there is value to the length of exposure to an experience, much like the positive effect of longer exposure to instructional efforts in the classroom (Huber & Kuncel, 2016; Niu et al., 2013).

Faculty-Student Research

Following the 1998 Boyer Commission Report on Reinventing Undergraduate Education, university faculty began to more heavily promote and evaluate undergraduate research initiatives (Fechheimer, Webber, & Kleiber, 2011; Zydney, Bennett, Shahid, & Bauer, 2013). Research initiatives vary and include undergraduate research courses and seminars, facilitating faculty-student research, and hosting campus-wide student research symposiums. Countless studies have affirmed the positive impact that faculty can have on the student experience; however, much of the extant literature on undergraduate research is focused on the broader concept of undergraduate research rather than faculty-student research specifically. Thus, this study will focus on faculty-student research, otherwise known as student-faculty collaborative research. In their effort to establish guidelines for student-faculty collaborative research, Stith, Jester, and Linn offer the following definition of the experience:

> Student-faculty collaborative research promotes the professional development of both graduate students and faculty. Collaborative research allows students to learn one-on-one from faculty about research and publication, providing an invaluable supplement to classroom learning. Collaboration provides faculty with a rich source of labor and new ideas during the time-consuming research process. IN addition, publications generated from collaborative research can lead to career advancement for both students and faculty. (1992, p. 470)

While this definition speaks to the graduate student collaborative research experience, it also accurately represents the undergraduate-focused faculty-student research. In addition to some insight into the benefits of undergraduate research, these studies offer a profile of the students who are more likely to engage in research. Juniors and seniors in the Science, Technology, Engineering, and Mathematics (STEM) fields are more likely to engage in undergraduate research (Russell, Hancock, & McCullough, 2007). Moreover, undergraduate researchers are more likely to be graduate program aspirants (Russell et al., 2007; Zydney et al., 2013).

While there exists copious research on faculty-student interactions, there is virtually no research specific to faculty-student research. In fact, formal assessment of learning outcomes achieved through undergraduate research is limited (Zydney et al., 2013). Russell, Hancock, and McCullough (2007) offer one of the more comprehensive studies on the benefits of undergraduate research experiences. Using a web-based survey design with nearly 15,000 respondents, they found that engaging in undergraduate research increases understanding of the research process, confidence in how to conduct research, and awareness of what graduate school is like. Even though the study does not examine faculty-student research, students did identify more faculty guidance as a means of improving undergraduate research opportunities (Russell et al., 2007). Fechheimer, Webber, and Kleiber (2011) echo similar findings in their analysis of the Center for Undergraduate Research Opportunity (CURO) at the University of Georgia. One of the more significant themes from their research is the correlation between length of exposure and outcomes. Engagement in research for more than one semester was correlated with an increased GPA. Zydney, Bennett, Shahid, and Bauer (2013) took a different approach by surveying 245 alumni of the University of Delaware College of Engineering, some of whom did not participate in undergraduate research. Alumni who participated in research considered their experience to be very important and connected it to cognitive outcomes such as the ability to carry out research and understanding mathematical concepts. Alumni who specifically participated in the undergraduate research program reported enhancement of their ability to understand scientific findings and analyze literature critically (Zydney et al., 2013)—skills that undoubtedly require critical thinking. Again, those who participated in more research opportunities reported higher perceived benefits.

Aside from the research discussed, there exists little research on the relationship between faculty-student research and critical thinking outcomes. Moreover, extant research relies heavily on self-reported data, as is the case with data on other out-of-the-classroom experiences.

Internships

During a time when critical thinking and experiential learning remained separate, McCormick (1993) questioned if the two topics could ever be integrated. Of particular interest to him were internships for management students. McCormick argued that "it is easier to be a critical thinker when contemplating information or perspectives from a distance" (p.261). In other words, it is difficult to develop critical thinking while doing an internship, but the challenge must be overcome as, often, it is in applied settings when critical thinking will need to be utilized most (McCormick, 1993). To conclude his article, McCormick offered two recommendations that were innovative for his time; the pairing of daily journaling and analytical writing assignments with internship experiences. Indeed, McCormick represented an optimistic, unconventional ideology. Yet, unfortunately, it was never fully actualized.

Since McCormick's publication, internships have become more prevalent among academic programs. In fact, Routon and Walker (2019) reported that internship participation increased from 29% in 1994 to 44% in 2006. However, efforts to measure critical thinking as an outcome of internships are limited, and often program-specific. For example, Schumacher (2014) measured the critical thinking dispositions of 12 dietetic interns enrolled in their final semester prior to completing their program. After administering the CCTDI, she found that results were surprisingly low. While most interns were strong in inquisitiveness scale, many had weaknesses in truth-seeking. Her findings reaffirm the ever-present concern of a lack of preparedness among graduates (Arum & Roska, 2011; Flores et al., 2012; National Association of Colleges & Employers, 2018). Schumacher's sample size is very small, which effects the generalizability of her study; however, she is one of few to employ a standardized measure to assess critical thinking in internships. On a larger scale, Routon and Walker (2019) connects gaps in college attendance with internship outcomes. Using data from The Freshmen Survey (TFS) and the College Senior Survey (CSS) administered by the

Higher Education Research Institute, Routon and Walker merged data from internship participants who earned their Bachelor's degree between 1994 and 2006. They found that internships positively affect problem-solving, among other significant results. Routon and Walker (2019) acknowledge that there continue to be few studies focused on internships and future outcomes. As is the case with survey designs, their results are limited by the self-reported data that was collected. Twenty-five years following McCormick's (1993) article, his sentiment still rings true. The relationship between internships and critical thinking remains underexplored.

Club Leadership and Participation

Leadership in a student group is one of the least researched out-of-classroom experiences, as it pertains to critical thinking. Yet, there exists a wealth of research on the general topics of student leadership and student leadership programs. On the contrary, research on student leadership has been conducted for decades. Extant literature often takes one of three directions: (1) research on the development and assessment of leadership programs; (2) research on conditions for getting involved; or (3) research on outcomes of a specific type of student leadership. In absence of dedicated research on critical thinking outcomes of student leadership, research on specific types of leadership can garner some insight into the potential impact of student leadership in college. Before continuing, it is important to clarify that student leadership, as used in this study, specifically refers to holding a leadership position in a club or student group.

Student government and Greek life are among the two most researched student leadership experiences. In their book chapter, Kuh and Lund (1994) build upon the extant literature which finds that students attribute the greatest impact of their leadership roles to the development of skills such as decision making. The second half of the chapter synthesizes findings from 149 seniors who were interviewed as part of the College Experiences Study, and all of whom held some elected student government position. Interestingly, the only significant relationship was with “practical competence” (p.8), meaning that holding an elected position in student government seemed to yield skills that are desirable among employers, including decision-making, communication, and leadership.

Research on Greek life provides some of the only data on the effect of club participation and critical thinking. Even though Greek life functions differently than a student club, and the studies that follow focus on participation rather than leadership, the research can inform our understanding of critical thinking outcomes. The effect of Greek life involvement is undetermined with studies yielding conflicting results (Pascarella, 2001; Pike, 2000). Pike (2000) studied the relationships between academic involvement, entering ability, social involvement, integration, gains in general ability, and gains in math and science reasoning among 827 freshmen to compare means of Greek vs. non-Greek students. He found that Greek students had higher levels of general ability and involvement than non-Greek students. Albeit, general ability does not specifically measure critical thinking. Rather, it is an aggregate of the skills that graduates should acquire in their time in college. This study is also limited to freshmen data and other class years are neglected. In disagreement with Pike is the work of Pascarella (2001). Following up on his finding that first-year Greek involvement had negative effects on cognitive development (Pascarella, Edison, Whitt, Nora, Hagedorn, & Terenzini, 1996), Pascarella later found that the negative effects, while still present, were much less in the second and third years of college (2001). Participants of this study were much more diverse and included students who represented 18 colleges and universities on the National Study of Student Learning (NSSL).

Much of the research on student involvement is informed by the Multi-Institutional Study of Leadership (MSL). The national survey just completed its seventh administration in 2018. While national results of the study are not easily accessible, and much of the research informed by the MSL does not examine critical thinking, this study presents an opportunity for further research on the effect of student leadership on critical thinking.

On-Campus and Off-Campus Employment

This study intentionally included on-campus and off-campus work as an exception to the aforementioned definition of *out-of-classroom experiences*. Employment often conflicts with students' ability to engage in other out-of-classroom experiences. Even though the percentage of employed undergraduates is lower than in years past, 43% of full-time and 86% of part-time college students are still holding employment (U.S. Department of Commerce, 2018). In fact, the majority of students who are employed are working from 20-34 hours per week. Interestingly enough, the U.S. Department of Commerce report suggests that there is little difference between hours worked among men and women, as well as various races/ethnicities. For instance, 45% of White students, 39% of black students, and 46% of Hispanic students hold employment while attending college. Asian students are the exception with only 29% being employed (2018).

The relationship between employment and critical thinking has not been researched. In fact, empirical research on college employment variables, at large, is quite limited. One such study conducted by Gleason (1993) explores the benefits of employment. They include building a professional network, career exploration that could lead to graduate school, and quicker employment post-graduation. Contrary to perception, little research supports a negative correlation between employment and grades (Gleason, 1993). While students are more likely to dropout, those who do graduate are more likely to do better in the labor market. A major critique of Gleason's work is the data set off of which it is informed. He uses data from the High School and Beyond study which was funded by the Department of Education between 1980-1984, nearly ten years prior to his publication. Thus, his findings may not accurately represent the year of publication. Moreover, the present-day effects of employment are likely much different as twenty-five years have passed since Gleanson's study. Nevertheless, the prevalence of employment among students warrants inclusion in this study.

Conclusion

In light of the growing complexity of critical thinking, the concept has garnered national attention that continues to have implications for institutions across the country. Colleges and universities have an undeniable responsibility to develop critical thinking skills among their students and a focus on critical thinking dispositions is the first step. While instructional efforts have been moderately effective, there exists debate over the effectiveness of classroom strategies for teaching critical thinking skills and dispositions. Moreover, even though the educational potential of a few functional areas of student affairs have been studied, out-of-classroom activities have received little attention. The research that does exist is largely perception-based and lacks quantitative, objective methodology. Moreover, very few employ standardized assessments to measure critical thinking. Finally, only one out-of-classroom activity is the focus of the existing studies, neglecting the collective impact of several out-of-classroom experiences. Many scholars have solidified the potential for out-of-classroom activities to hone cognitive skills although, targeted attention to the relationship between critical thinking dispositions and participation in out-of-classroom activities remains absent from the extant literature.

CHAPTER 3

METHODOLOGY

Restatement of Research Question

This study aimed to address gaps in the research by examining the following research question: *Which out-of-classroom experiences, singly and in combination, correlate most strongly with students' critical thinking disposition as measured by the CCTDI?* Informed by the extant literature, I hypothesized that students who participated in living-learning communities, study abroad, and service-learning will have higher CCTDI scores than those who participated in no out-of-classroom activities. Moreover, a combination of curricular and out-of-classroom experiences would more strongly predict CCTDI scores than an individual activity.

Setting and Participants

This study employed a survey-based design. As research continues to mount, critical thinking dispositions have also become largely objective. Thus, a quantitative research design best aligns with the postpositivist framework that informs it. The cross-sectional survey approach uniquely allowed data collection among a larger sample of different groups (Mertens, 2015). The study took place at a public, liberal arts institution in the northeastern United States. At the time of the study, assessment of cognitive outcomes within the Division of Student Life was very limited. While an assessment committee was in place, they primarily relied on the National Study of Student Engagement to assess outcomes of out-of-classroom experiences. I was employed at the site during data collection, giving me access to the sample for the study. Students with senior standing who applied to graduate were the target population for this study as they were most likely to have been involved in multiple out-of-classroom activities. They were also new entrants into a workforce in which critical thinking dispositions would become vitally important. To be eligible to participate in the study, participants must have officially applied to graduate in the spring or summer 2019 terms with the Registrar's office, and completed the presurvey. All students involved were over 18 years of age.

A presurvey was emailed to 3,155 students with senior standing who applied to graduate in spring or summer 2019 terms to recruit a sample of 150 participants to then take the CCTDI. The intent of the presurvey was to allow me to engage in proportional stratified sampling (Mertens, 2015) by gathering information to attempt to build proportional subgroups of students. In addition to asking respondents to declare their interest in the study, the presurvey collected information on race/ethnicity, sex, major, and out-of-classroom involvement. The presurvey yielded 247 responses from a diverse group of students who represented a multitude of races/ethnicities, majors, and involvement levels.

At first, I purposefully stratified the population into a sample of 150 participants who represented a mixture of sexes, races/ethnicities, majors, and involvement levels as proportional sampling would aide in avoiding an overrepresentation of a particular group (e.g. students who did internships, white females). The sample of 150 participants was driven by sample size research, as well as results of a power analysis. First, the recommended sample size for survey research is 100 participants (Mertens, 2015). Moreover, Gall, Gall, and Burg (2007) recommend 100 responses for each major subgroup. However, these estimations are not specific to the use of multiple regression analyses. This study seeks to identify which predictors, or out-of-classroom activities, are significant contributors to the multiple regression equation. With a desired medium effect size (R^2) of approximately .15, conventional statistical power of 80% and a .05 significance level, the regression analysis would require a sample size of approximately 108 when eight predictors and three demographic variables are included. This calculation is supported by Green's (1991) simple equation of 104 + 11 (number of independent variables) = 115, given a medium effect size. Due to low response on the CCTDI, all students who completed the presurvey were ultimately sent a code to the inventory. A total of 95 students who completed the CCTDI served as the sample for this study.

Any student who did not apply to graduate in the aforementioned terms were ineligible to participate in this study. By limitation of the number of CCTDIs purchased, participation was further limited to 150 participants. Otherwise, since response rate on the CCTDI was low, any student who completed the presurvey was eligible to complete the CCTDI.

Data Collection

A Qualtrics presurvey was emailed to all seniors who applied to graduate in the spring and summer 2019 terms. In addition to asking respondents to declare their interest in the study via an electronic consent statement, the presurvey requested information on out-of-classroom involvement, sex, race/ethnicity and major. As previously mentioned, this information was initially used to select 150 participants for the study. A unique CCTDI code was ultimately emailed to any student who completed the presurvey.

Students who completed the CCTDI were included in a random drawing for one of twenty free official academic transcripts. I purchased the transcripts.

Variables

This study aimed to examine the effect of participation in out-of-classroom activities on critical thinking disposition. The critical thinking outcome variable was measured using the web-based California Critical Thinking Disposition Inventory (CCTDI) and the out-of-classroom activity predictor variables, as well as demographic data, was collected using a series of questions included with the CCTDI as an addendum (see Appendix A).

Critical Thinking

Originally developed in 1992 by Peter A. Facione and Noreen C. Facione (Facione et al., 1994), the current CCTDI is distributed by the California-based assessment distributer, Insight Assessment. With high internal consistency (Cronbach's Alpha exceeding .91 for the overall measure and 0.71 to 0.80 on each subscale), the CCTDI is a valid and reliable measure for the study. Moreover, an average completion time of 10-15 minutes encouraged response among students. The CCTDI is a 75-item survey that required respondents to declare the extent of their agreement with each statement on a scale with the following options: "agree strongly", "agree", "somewhat agree", "somewhat disagree", and "disagree". The full inventory is unable to be shared per terms of use although, examples of statements are, "Studying new things all my life would be wonderful" and "The best argument for an idea is how you feel about it at the moment". Combined, the items measure seven subscales: *truthseeking, open-mindedness,* *analyticity, systematicity, confidence in reasoning, inquisitiveness, and maturity*, defined in Table 3.1.

Table 3.1

Definitions of Critical Thinking Dispositions

Disposition	Definition
Truthseeking	Truthseeking is the habit of always desiring the best possible understanding of any given situation; it is following reasons and evidence where ever they may lead, even if they lead one to question cherished beliefs.
Open-mindedness	Open-mindedness is the tendency to allow others to voice views with which one may not agree.
Analyticity	Analyticity is the tendency to be alert to what happens next. This is the habit of striving to anticipate both the good and the bad potential consequences or outcomes of situations, choices, proposals, and plans.
Systematicity	Systematicity is the tendency or habit of striving to approach problems in a disciplined, orderly, and systematic way. The habit of being disorganized is the opposite tendency.
Confidence in Reasoning	Confidence in reasoning is the habitual tendency to trust reflective thinking to solve problems and to make decisions. As with the other attributes measured here, confidence in reasoning applies to individuals and to groups. A family, team, office, community, or society can be trustful of reasoned judgment as the means of solving problems and reaching goals.
Inquisitiveness	Inquisitiveness is intellectual curiosity. It is the tendency to want to know things, even if they are not immediately or obviously useful. It is being curious and eager to acquire new knowledge and to learn the explanations for things even when the applications of that new learning are not immediately apparent.
Maturity of Judgment	Maturity of judgment is the habit of seeing the complexity of issues and yet striving to make timely decisions. A person with maturity of judgment understands that multiple solutions may be acceptable while yet appreciating the need to reach closure at times even in the absence of complete knowledge.

(Facione, Facione, & Sanchez, 1990)

Each subscale represents aspects of one's disposition toward using critical thinking to form judgements. The aggregate score can range from 10 to 60, 10 being the most negative disposition and 60 being the most positive disposition. A score between 30-40 indicates ambivalence toward critical thinking disposition.

Out-of-Classroom Experience Involvement

On the presurvey, participants were asked to self-report their level of involvement in any of the following out-of-classroom activities: leadership in an executive board position, residential living-learning community, internship, off-campus work, on-campus work, study abroad, faculty-student research, and service-learning. Descriptions of each out-of-classroom experience were included to avoid subjectivity in response. Participation in a sample of three courses that are mapped to the institution's critical thinking outcomes (Logic of Everyday Reasoning, Contemporary Mathematics, and Introduction to U.S. Literature) was also collected.

I added ten additional questions to the inventory that measure out-of-classroom involvement. Embedding the questions in the CCTDI allowed for statistical comparison during analysis of the data. The ten additional questions are listed below. Questions and response options can be found in Appendix A.

1. How many internships, co-ops, field experiences, student teaching assignments, or clinical placements did you complete while in college?
2. How many short-term (1-4 week) or long-term (entire semester or summer term) study abroad experiences did you participate in while in college?
3. Which of the following classes did you take at Rowan University?
4. If you took *Contemporary Mathematics, Introduction to U.S. Literature, or Logic of Everyday Reasoning* at Rowan University, what was the average grade among the classes you took?

5. How many hours, on average, did you work (on- and off-campus), while in college?
6. How long were you a member of a student club, honor society, fraternity or sorority while in college?
7. How long did you <u>hold an executive board position</u> (president, vice-president, treasurer, etc.) in any student club, honor society, fraternity or sorority while in college?
8. How many years did you live in on campus in a living-learning community or themed housing (i.e. Honors, Engineering Learning Community, ASCEND) while at Rowan?
9. How many hours did you spend working with a faculty member on research (paid or unpaid) while in college?
10. How many service-learning courses or community-based projects did you participate in while in college (Engineers Without Borders, Habitat for Humanity, Alternative Spring Break trip)?

These questions informed participation and performance in the three general education classes, as well as the following out-of-classroom variables: internships, study abroad, working on-campus or off-campus, participating in a club, leading a club, living in a living-learning community, conducting research with a faculty member, and participating in service-learning.

Demographic Variables

The presurvey collected three demographic variables: sex, race/ethnicity, and major. Students self-selected their major(s) given a complete list of the institution's degree offerings. The National Center for Education Statistics' (NCES) nine race/ethnicity categories informed the options for race/ethnicity (white, black or African American, Hispanic/Latino, Asian, American Indian or Alaskan Native, Native Hawaiian or other Pacific islander, two or more races, race/ethnicity unknown, and non-resident alien) on the presurvey. On the CCTDI, students were required to self-report demographic information that was correlated with the variables of interest. Demographic information included age, sex, and ethnicity. Standard CCTDI categories for sex (female, male, I choose not to provide this information) and ethnicity (Black, African American; White, Caucasian, Anglo American; Asian, Asian American, Pacific Islander; Hispanic, Latino, Mexican American; American Indian, Native American; Other, I choose not to provide this information) were used for analysis.

Handling Data

All data collection took place electronically. The presurvey was conducted using Qualtrics, thus all presurvey data was held in a protected Qualtrics account to which only I have access. Similarly, the CCTDI data was secure on the password-protected Insight Assessment platform. While student email addresses were collected for the purpose of sending unique CCTDI codes and distributing incentives, they were redacted before any electronic submission of data was conducted. Moreover, no identifiable information is included in the publication of results. When any information was downloaded from either

Qualtrics or the CCTDI platform, it was stored on the local desktop of an employee-issued computer. The desktop is not accessible from any other open drives or remote access. Data will be destroyed six years after the conclusion of the study. All questions from participants or prospective participants were fielded via an email account that is password-protected. Similarly, all emails will be deleted six years following completion of the study. No personal health identifiers were collected.

Timeline

Recruitment took place in two phases over the course of six months. First, recruitment of spring 2019 graduation applicants via the presurvey took place shortly after the Institutional Review Board approval date. Students were given two weeks to submit the presurvey, which took approximately two minutes to complete. Once proportional sampling was conducted, selected participants were given a unique code to complete the 10-15 minute CCTDI during a two-week timeframe. Summer graduates were then recruited in mid-June after summer graduation applications were due. The timeline for completion of the CCTDI was identical to the spring graduate recruitment timeline. Following recruitment, data was analyzed until mid-October.

Data Analysis

Davies' (2015) concentric circle model places the individual's skills and dispositions at the center, making clear that more advanced foci of critical thinking (i.e. focus on the social context) radiate out from these characteristics. Perhaps most unique about Davies's Model is its incorporation of the socio-cultural dimension of critical thinking in higher education. Data analysis intentionally focused on the out-of-classroom opportunities through which students more commonly participate in the world by practicing *criticality*, or thinking, reflecting, and acting (Davies, 2015). Such activities included internships, study abroad and service-learning.

Statistical Package of the Social Sciences (SPSS) version 25 was used to conduct all statistical analyses. Due to lower subgroup numbers, most out-of-classroom involvement variables were recoded into two groups—students who did participate in the out-of-classroom experience and students who did not. Recoding generated larger subgroups for the purposes of data analyses. The recoding process is outlined in more detail in Chapter 4. The following descriptive statistics were provided to describe the sample: (a) percentages of sex and race/ethnicity, (b) distribution of overall and subscale CCTDI scores, (c) percentage of involvement in each out-of-classroom activity, and (d) mean CCTDI scores. All data is presented in Chapter 4.

For the purpose of data analysis, the out-of-classroom experiences served as the predictor variables while the CCTDI scores served as the outcome (or criterion) variables. First, a Pearson correlation was used to identify which dichotomous out-of-classroom variables were significantly correlated with CCTDI scores. The correlation is a basic statistic that provides the foundation for the more advanced measures that follow. Most simply, calculation of the Pearson product-moment correlation (r) revealed the strength and direction of the relationship between participation in each of the eight activities and the CCTDI score (Chen & Popovich, 2011). SPSS output tables including the Pearson correlation (r) and significance levels (p) are provided in Chapter 4 and Appendix C. ANOVA analyses was used to measure the relationship between the variables with multiple subgroups and each CCTDI score.

Finally, a multiple regression was conducted to explore which combination of curricular and out-of-classroom experiences most strongly predict CCTDI scores. The multiple regression analysis is useful in discovering which combination of predictor variables explain the greatest proportion of the variance in the variable of interest and the value of those proportions (Cramer, 2003). Again, the eight out-of-classroom activities served as the predictors and the CCTDI scores served as the criterion variables. Model summaries and correlational SPSS outputs, including the step, Beta weights, and variance explained (R^2) for each variable, are included in Appendix D.

Role of the Researcher

I am an Assistant Dean at the research site; however, I do not directly advise any out-of-classroom activities although, it is plausible that students knew me in my administrative role. Thus, it was important to safeguard the study against any bias of the auspices. All communication with participants was facilitated via my institutional email account with no signature in the email other than my name, student status and graduate school affiliation. Recruitment was limited to email messages with no recruitment taking place in formal or informal interactions with students. Thus, my position at the institution was not affiliated with the study. I did, however, pull a list of graduating seniors as I could easily do so as an employee of the University.

Procedural Limitations of the Study

It is important to recognize the design limitations inherent to this study. Perhaps most importantly, it must be reiterated that critical thinking *disposition* is measured in this study—not critical thinking *ability*. The decision to use the CCTDI was driven primarily by its shorter length and online accessibility. Inventories that measure critical thinking ability, such as the California Critical Thinking Skills Test (CCTST) or the Critical Thinking Assessment Test (CAT), take nearly twice the time to complete and, in some cases, require proctoring. While critical thinking ability necessitates a disposition to do so (Huber & Kuncel, 2016), we cannot draw conclusions about critical thinking ability.

Additionally, only three classes were included in this study—Logic of Everyday Reasoning, Contemporary Mathematics, and Introduction to U.S. Literature. Even though the courses were intentionally chosen to represent a variety of disciplines, they certainly do not represent the wealth of courses that are often associated with critical thinking outcomes. Thus, we cannot claim that out-of-classroom activities are more effective than classroom experiences, in general.

The proportional sampling technique employed in this study was intended to facilitate a diverse sample of participants who represent the landscape of student enrollment at colleges and universities nationwide. The desired sample size as informed by a power analysis would imply generalizability of the study, yet the smaller sample of 95 students makes generalizing the results more difficult. And while the research site is representative of student demographics nationwide, my recruitment efforts did not yield a sample that can be generalized to *every* higher education institution.

Finally, the study faced some methodological limitations. As with most survey research, participants in this study were subject to self-selection bias. For example, a student may have confused a living-learning community with living on campus. I included examples to accompany some of the questions associated with more ambiguous activities (e.g. living-learning communities, service-learning, club involvement);

however, the self-selection bias can never be truly eliminated. Moreover, as previously discussed, my role at the institution presented the threat of bias of the auspices. Due to the smaller size of the institution, it is plausible that a student participated in the study based on their prior knowledge of my role as Assistant Dean.

CHAPTER 4

RESULTS

Introduction

This study was designed to answer the following research question: *Which out-of-classroom experiences, singly and in combination, correlate most strongly with students' critical thinking disposition as measured by the CCTDI?* This research question was analyzed in three parts. First, Pearson correlations were used to identify which dichotomous out-of-classroom variables singly correlate with students' CCTDI scores. Next, an ANOVA was computed for the three out-of-classroom variables that were comprised of multiple subgroups. After variables with significant differences among subgroups were identified, results were followed up with Tukey tests, when appropriate, to compare the means of the subgroups. Finally, regression analysis was used to determine which variables, *in combination*, correlate with the CCTDI scores.

Characteristics of the Sample

A total of 248 students expressed interest in the study by completing a presurvey through which they self-reported their sex, race/ethnicity, major, and involvement in out-of-classroom activities. Presurvey respondents were then sent a unique code to complete the CCTDI and 95 students did so. Even through the 95 students who completed the CCTDI will comprise the sample for data analysis purposes, it is helpful to first report demographics of the presurvey respondents.

Presurvey Demographics

Much in line with the population, White students compromised a majority of the respondents (66%). Other race/ethnicity categories were much less represented: Black or African American (11%), two or more races/ethnicities (9%), Hispanic or Latino (7%), Asian (5%), and other (1%). A large percentage of the respondents to the presurvey were female (62%) and males comprised the remaining 38%. The response among majors was proportional to major counts at the university. For instance, the largest percentage of respondents (30%) were pursuing a degree in the College of Science & Mathematics, the university's largest academic college. The second largest percentage of students (21%) identified with the second largest college at the university, the College of Humanities & Social Sciences—and so on. As mentioned previously, participation in federal work study was intentionally excluded from this study; however, hours worked was measured. A majority of presurvey respondents worked off-campus (68%) and several others worked on-campus (39%). Participation in an internship, co-op, or field experience was the most common out-of-classroom involvement with 54% of respondents participating. Involvement in other out-of-classroom activities was considerably lower: holding an executive board position (34%), conducting research with faculty (25%), living in a living-learning community (24%), participating in service-learning (20%), and studying abroad (9%). Very few students (6%) reported not engaging in any out-of-classroom activity. Reported involvement levels were consistent with the population. In other words, those who reported involvement in a given experience on the presurvey mirrored the approximate number of graduating seniors who were involved in that experience at the study site.

Sample Demographics

Any student who completed the CCTDI was included in the data analyses that follow. The CCTDI collected demographic data on sex, ethnicity, and age. Demographic data are presented in full in Table 4.1.

Table 4.1

Demographic Data of the Sample

Sex	Frequency	Percent
Male	33	34.7
Female	61	64.2
Chose not to provide this information	1	1.1
Ethnicity	Frequency	Percent
Asian American, Pacific Islander	4	4.2
Black, African American	15	15.8
Hispanic, Latino, Mexican American	10	10.5
White, Caucasian, Anglo American	58	61.1
Chose not to provide this information	1	1.1
Other	7	7.4
Age	Frequency	Percent
20	1	1.1
21	19	20.0
22	41	43.2
23	8	8.4
24	6	6.3
25	3	3.2
26	1	1.1
28	2	2.1
29	1	1.1
30	3	3.2
31	1	1.1
32	1	1.1
34	2	2.1
38	2	2.1
39	3	3.2
49	1	1.1

Surprisingly, nearly two-thirds of the sample were female. Females accounted for only 47.5% of the graduation applicant population; thus, female participation in the study was disproportionately high. Ethnicity categories were prescribed by Insight Assessment. The majority of the students were White/Caucasian/Anglo American, Black/African American, or Hispanic/Latino/Mexican American. This is consistent with the population as these ethnic categories comprised 89.9% of graduation applicants. The age composition of the sample was much more similar to that of the graduating student population. As expected, a large majority of the sample were "traditional" college students falling below generally-accepted definition of 24 years old or younger.

Out-of-Classroom Experience Involvement

Students' participation in eight out-of-classroom experiences was collected using the additional 10 questions included in the CCTDI (Appendix A). Experiences included club membership (*ClubMember*), club leadership (*ClubLeader*), internship (*Internship*), living-learning community (*LLC*), research with faculty (*Research*), service-learning (*ServiceLearning*), and study abroad (*StudyAbroad*). The number of hours worked on-campus or off-campus (*HoursWorked*) was also collected and incorporated into the analyses that follow. Participation in each experience varied greatly and is presented Table 4.2.

Table 4.2

Involvement in Out-of-Classroom Experiences

ClubMember	Frequency	Percent
1 semester	6	6.3
1 year	9	9.5
2 years	18	18.9
More than 2 years	40	42.1

Table 4.2

(continued)

ClubMember	Frequency	Percent
Did not participate in a club	22	23.2
ClubLeader	Frequency	Percent
1 semester	4	4.2
1 year	16	16.8
2 years	6	6.3
More than 2 years	9	9.5
Did not participate in a club	60	63.2
Internship	Frequency	Percent
1 internship	29	30.5
2 internships	17	17.9
More than 2 internships	25	26.3
Did not participate in an internship	24	25.3
LLC	Frequency	Percent
1 year	8	8.4
2 years	10	10.5
More than 2 years	8	8.4
Lived on campus, but not in a LLC	24	25.3
Did not live on campus	45	47.4
Research	Frequency	Percent
1 semester	6	6.3
2 semesters	5	5.3
3 semesters	1	1.1
More than 3 semesters	19	20.0
Did not conduct research with a faculty member	64	67.4
ServiceLearning	Frequency	Percent
1 course or project	13	13.7
2 courses or projects	2	2.1
More than 2 courses or projects	12	12.6

Table 4.2

(continued)

StudyAbroad	Frequency	Percent
1 study abroad trip	15	15.8
2 study abroad trips	3	3.2
More than 2 study abroad trips	1	1.1
Did not study abroad	76	80.0
HoursWorked	Frequency	Percent
1-10 hours	15	15.8
11-20 hours	23	24.2
21-30 hours	25	26.3
More than 30 hours	21	22.1
Did not work on-campus or off-campus	11	11.6

The most common activity was participation in on-campus or off-campus work, with 88.4% of students working at least 1-10 hours a week. Even though this variable is not an *out-of-classroom activity* as defined by the guiding definition used in Chapter 1, its prevalence prompts curiosity and warrants inclusion in the data analysis. Moreover, socioeconomic status (SES) was not collected and the *HoursWorked* variable could serve as a proxy. In other words, it is reasonable to deduce that the more hours a student worked, the lower their SES. Participation as a member of a club was the next most common out-of-classroom experience (76.8% participated), closely followed by internship (74.7% participated). The other out-of-classroom experiences were not nearly as common among students, with only 20%-36.8% of the sample participating in each one.

For purposes of comparison unrelated to the research question, students were also asked if they completed any of three courses that are mapped with the institution's general education critical thinking outcome. The classes were Contemporary

Mathematics, Introduction to U.S. Literature, and Logic of Everyday Reasoning. These classes were only a small sampling of the courses that students could take to fulfill their general education requirements, which may explain why the percentage of students who completed at least one of these classes was relatively low (34.7%). Table 4.3 illustrates how many students took each course, and what their self-reported average was in the courses that they took. These variables are not included in the analysis that follows.

Table 4.3

Participation in General Education Courses Connected with Critical Thinking

Course(s) Taken	Frequency	Percent
Contemporary Mathematics	10	10.5
Introduction to U.S. Literature	9	9.5
Logic of Everyday Reasoning	8	8.4
Took two of three classes	5	5.3
Took all three classes	1	1.1
Did not take any of the classes*	62	65.3

Grade Average in Course(s) Taken	Frequency	Percent
An A average	11	11.6
A B average	17	17.9
A C average	5	5.3
Less than a C average	1	1.1
Did not take any of these classes[a]	61	64.2

[a] The number of students who reported not taking any of these classes differed between questions. When asked to report which classes they took, 62 students reported not taking any. However, when asked for their grade average in the course(s) taken, 61 students reported not taking any. Thus, one student responded inconsistently on these two questions.

Recoding Variables

Due to the smaller sample size, subgroup numbers within most out-of-classroom variables were relatively low. For instance, only one student participated in more than two study abroad trips. For the purposes of data analysis, most of the out-of-classroom variables and *HoursWorked* were recoded in SPSS as whether a student participated in the experience or not. Table 4.4 will show that some out-of-classroom variables are still not proportional; however, the data are much more suitable for analysis. Subgroups within the *HoursWorked*, *ClubMember* and *LLC* variables were already relatively proportional; thus, they were coded slightly differently (see Table 4.5).

Table 4.4

Out-of-Classroom Experience Involvement Recoded

Out-of-Classroom Variable	Participated		Did not Participate	
	Frequency	Percent	Frequency	Percent
Internship	71	74.0	24	25.0
StudyAbroad	19	19.8	76	79.2
ClubLeader	35	36.5	60	62.5
Research	31	32.3	64	66.7
ServiceLearning	27	28.1	68	70.8

Table 4.5

HoursWorked, ClubMember and LLC Involvement Recoded

HoursWorked	Frequency	Percent
1-20 hours	38	40.0
More than 20 hours	46	48.4
Did not work on-campus or off-campus	11	11.6
ClubMember	Frequency	Percent
One year or less	15	15.6
2 years	18	18.8
More than 2 years	40	41.7
Did not participate in a club	22	22.9
LLC	Frequency	Percent
Lived in an LLC for at least one year	26	27.1
Lived on campus, but not in LLC	24	25.0
Did not live on campus	45	46.9

Demographic variables of ethnicity and age were also recoded to create more proportional subgroups (see Table 4.6).

Table 4.6

Demographic Variables Recoded

Ethnicity	Frequency	Percent
Black, African American	15	15.8
Hispanic, Latino, Mexican American	10	10.5
White, Caucasian, Anglo American	58	61.1
Other	12	12.6
Age	Frequency	Percent
24 years old and below	75	78.9
25 years old and above	20	21.1

California Critical Thinking Disposition Inventory (CCTDI) Score

Insight Assessment provides the total CCTDI score for the test-taker, as well as the score for each of the seven disposition subscales: Truthseeking, Openmindedness, Analyticity, Systematicity, Confidence in Reasoning (*Confidence*), Inquisitiveness, and Maturity of Judgement (Maturity). Subscale scores can range from strong negative (10-19) to strong positive (50-60). A more detailed description of how to interpret each score category is provided in Appendix B.

The data in Table 4.7 are encouraging. With the exception of Truthseeking, the sample scored positively (between 40-49) on all of the dispositions. In other words, on average, students consistently demonstrated each of those dispositions. The mean score for Truthseeking; however, is considered “Inconsistent/Ambivalent” (Facione et al., 1994) as the score falls between 30-39. Thus, it is unclear if students in the sample achieved truthseeking skills upon graduation.

Table 4.8 offers more insight into the distribution within each disposition. Norming means for the CCTDI are not available for comparative purposes; the concept of norm is not generally applied to measures of disposition. However, it is evident that

Table 4.7

Mean CCTDI Score by Disposition

Disposition	Mean	Standard Deviation
Overall CCTDI Truthseeking	310.8 38.4	31.8 6.8
Openmindedness	43.6	6.0
Inquisitiveness	49.1	6.2
Analyticity	46.2	5.1
Systematicity	42.5	6.8
Confidence	47.4	6.3
Maturity	43.5	6.5

very few students scored negatively on the seven dispositions. In fact, a majority of students scored positively on all subscales except Truthseeking. The data suggest that a majority of students who applied to graduate in spring and summer 2019 developed a number of critical thinking dispositions: (a) a tendency to allow others to voice opposing viewpoints; (b) an ability to anticipate the positive and negative outcomes of decisions; (c) a tendency to approach problems in systematic way; (d) a confidence to make decisions and solve problems; (e) an intellectual curiosity to know things; and (f) a habit of making timely decisions, and seeing their complexity. These same students are not consistent in their effort to follow reasons and evidence wherever they may lead, even if the conclusions conflict with their own values.

Table 4.8

Distribution and Mean Scores of CCTDI Dispositions

Disposition	Strong Positive		Positive		Inconsistent		Negative		Strong Negative	
	N	%	*N*	%	*N*	%	*N*	%	*N*	%
Truthseeking	4	4.2	41	43.1	40	42.1	9	9.5	1	1.5
Openmindedness	18	18.9	50	52.6	26	27.4	1	1.5	0	0
Inquisitiveness	53	55.8	35	36.8	7	7.4	0	0	0	0

Table 4.8 *(continued)*										
Disposition	Strong Positive		Positive		Inconsistent		Negative		Strong Negative	
Analyticity	24	25.3	62	65.3	9	9.5	0	0	0	0
Systematicity	17	17.9	44	46.3	31	32.6	3	3.2	0	0
Confidence in Reasoning	41	43.2	43	45.3	11	11.6	0	0	0	0
Maturity of Judgement	13	13.7	57	60.0	21	22.1	4	4.2	0	0

Inferential Statistics

Various inferential statistical analyses were employed to fully answer the research question. First, Pearson correlations were conducted to identify which dichotomous variables had a singular effect on CCTDI scores. ANOVA analyses were then used to identify which variables with multiple subgroups had an effect. Finally, multiple linear regression analyses were employed to identify which out-of-classroom experience, in combination, had an effect on critical thinking dispositions.

Pearson Correlations

Five of the eight out-of-classroom variables were dichotomous, and they were correlated with the overall CCTDI score and each disposition score. The dichotomous variables were *Internship, StudyAbroad, ClubLeader, Research,* and *ServiceLearning*. Dichotomous demographic variables of *Age* and *Sex* were also included in the correlation. To simplify the presentation, only significant correlations are presented in Table 4.9. A full table of correlations is included in Appendix C.

Surprisingly, only two out-of-classroom variables showed a significant correlation with at least one of the critical thinking dispositions. Research with faculty was the most

Table 4.9

Significant Correlations Between Out-of-Classroom Variables and CCTDI Scores

Variable	Statistic	Truthseeking	Inquisitiveness	Analyticity	Systematicity
StudyAbroad	Pearson Correlation	--	-.297**	--	--
	Sig. (2-tailed)	--	.003	--	--
Research	Pearson Correlation	.213*	--	--	.207*
	Sig. (2-tailed)	.038	--	--	.044
Age	Pearson Correlation	.205*	--	--	--
	Sig. (2-tailed)	.046	--	--	--
Sex	Pearson Correlation	--	--	-.234*	--
	Sig. (2-tailed)	--	--	.023	--

*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

significantly correlated variable among the dichotomous variables, showing a positive correlation, albeit weak, with the Truthseeking and Systematicity dispositions. In other words, research with faculty may strengthen students' tendency to desire the best possible understanding of any situation, and approach problems in a systematic way. The correlations with Truthseeking and Systematicity both have small effect sizes of .045 and .043, respectively. In contrast, studying abroad shows a negative correlation with the disposition toward Inquisitiveness, with medium effect size (r^2=.088). Students who study abroad may be less likely to want to know things that are not immediately useful. This finding is contrary to much of the extant quantitative and qualitative research, and partly informs the discussion that follows. Participation in internships, service-learning and club membership did not show any significant correlation with the CCTDI scores.

While not part of the research question, the effects of age and sex were also analyzed. Not surprisingly, students older than 24 years old have significantly higher Truthseeking scores. In light of the correlation's small effect (r^2=.042), it is surprising that older students did not score significantly higher for other dispositions given their extended opportunity for cognitive development. The data show that females tend to have a stronger disposition toward Analyticity. With a small effect (r^2=.055), females are more likely to anticipate both good and bad outcomes of situations. This finding is not terribly meaningful as the extant research does not consistently suggest that gender is a significant factor in achieving cognitive outcomes (Bae et al., 2018; Borst, 2011; Inkelas et al., 2006; Kohl, 2009, Pascarella et al., 2005; Perry et al., 2018)In summary, the original hypothesis that students who participated in internships, study abroad and service-learning would have higher CCTDI scores has been disproven. Instead, none of these variables have a positive effect on critical thinking dispositions, and study abroad has an adverse effect. To fully answer the research question, we must also analyze the out-of-classroom and demographic variables that have multiple subgroups.

ANOVA Analyses

ANOVA tests were run to make comparisons for each CCTDI score as a function of *HoursWorked, ClubMember, LLC*, and the ethnicity variable. Overall the CCTDI score and each disposition subscale (truthseeking, open-mindedness, analyticity, systematicity, confidence in reasoning, inquisitiveness, and maturity) are continuous variables and served as dependent variables for the ANOVA analyses. While the four aforementioned variables were compared, only *HoursWorked* and *ClubMember* showed significance with at least one CCTDI score. Means and standard deviations for both variable's subgroups are presented in Table 4.10 and 4.11.

HoursWorked showed to be one of the most impactful activities, albeit with small effect sizes. In addition to being significantly correlated with the overall CCTDI score

Table 4.10

Mean and Standard Deviations of CCTDI scores as a function of HoursWorked

Variable		Overall CCTDI		Truthseeking		Inquisitiveness		Systematicity	
HoursWorked	N	Mean	SD	Mean	SD	Mean	SD	Mean	SD
1-20 Hours	38	298.3	26.7	36.1	6.0	46.6	5.9	40.0	5.9
More than 20 hours	46	320.1	34.6	40.1	7.2	51.2	5.8	44.7	7.1
Did not work on-campus or off-campus	11	312.7	22.76	39.3	5.5	49.0	5.5	41.7	5.2

Table 4.11

Mean and Standard Deviations of CCTDI scores as a function of ClubMember

Variable		Truthseeking	
ClubMember	N	Mean	SD
Not a club member	22	36.6	6.8
1 year or less	15	42.5	6.5
2 years	18	37.1	5.4
More than 2 years	40	38.5	6.9

(r^2=.104), *HoursWorked* was also correlated with the Truthseeking (r^2=.080), Inquisitiveness (r^2=.127), and Systematicty (r^2=.112) dispositions (Table 4.12). A Tukey follow-up test found that students who worked more than 20 hours per week had significantly higher overall CCTDI, Truthseeking, Inquisitiveness, and Systematicity scores than students who worked 1-20 hours per week. *ClubMember* also showed significance with the Truthseeking disposition (r^2=.083) as represented in Table 4.13. More specifically, a Tukey follow-up found that students who were a member of a club for one year or less had significantly higher Truthseeking scores than those who did not participate in a club at all. Living in a LLC and ethnicity did not have a significant effect on any CCTDI score.

Table 4.12

ANOVA Table for CCTDI Scores as a Function of HoursWorked

Disposition	Variation	Sum of Squares	df	Mean Square	F	Sig.
OverallCCTDI	Between Groups	9972.545	2	4986.272	5.375	.006
	Within Groups	85343.202	92	927.644		
	Total	95315.747	94			
Truthseeking	Between Groups	349.224	2	174.612	4.024	.021
	Within Groups	3991.765	92	43.389		
	Total	4340.989	94			
Inquisitiveness	Between Groups	452.094	2	226.047	6.679	.002
	Within Groups	3113.633	92	33.844		
	Total	3565.726	94			
Systematicity	Between Groups	489.807	2	244.903	5.792	.004
	Within Groups	3889.815	92	42.281		
	Total	4379.621	94			

Table 4.13

ANOVA Table for Truthseeking as a Function of ClubMember

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	358.260	3	119.420	2.729	.049
Within Groups	3982.729	91	43.766		
Total	4340.989	94			

Multiple Linear Regression Analyses

The second part of the research question asks which out-of-classroom variables, in combination, have an effect on critical thinking dispositions as measured by the CCTDI. A multiple regression was conducted to explore which combination of out-of-classroom experiences most strongly predict CCTDI scores. Very few analyses yielded significant results; however, there did exist one significant equation. While analyzing Systematicity as the dependent variable; *Research* and *HoursWorked* were found to be significant predictors of this equation. After running a second linear regression to predict Systematicity scores based on *Research* and *HoursWorked*. A significant regression equation was found ($F(2,92) = 5.499$, $p = .006$), with an R^2 of .107. Participants' predicted Systematicity score was equal to 38.01 + 2.930 (Research) + 2.519 (HoursWorked) = 43.46. In other words, participants' Systematicity scores increased 2.930 points if they conducted research with faculty, and 2.519 when working more hours on-campus or off-campus. Tables 4.14, 4.15 and 4.16 presents regression results.

Table 4.14

Regression Analysis Model Summary for Systematicity based on Research and HoursWorked

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.327[a]	.107	.087	6.521

[a]Predictors: (Constant), Research, HoursWorked

Table 4.15

ANOVA Table for Systematicity based on Research and HoursWorked

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	467.617	2	233.809	5.499	.006[a]
	Residual	3912.004	92	42.522		
	Total	4379.621	94			

[a]Predictors: (Constant), Research, HoursWorked

Table 4.16

Coefficients Table for Systematicity based on Research and HoursWorked

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	38.060	1.564		24.333	.000
	HoursWorked	2.519	.982	.253	2.565	.012
	Research	2.930	1.427	.202	2.053	.043

The regression analyses found that, all other things equal, the presence of *Research* and *HoursWorked* adds 5.45 points to students' Systematicity scores. Multicollinearity among the factors was a valid concern. Using the Variance Inflation Factor (VIF), which assesses how much the variance of an estimated regression coefficient increases if the predictors are correlated, it was found that the VIF = 1 and no multicollinearity among the factors existed. Thus, conducting research with faculty and working more hours on-campus or off-campus may enhance students' disposition toward approaching problems in an orderly and systematic way. These findings are consistent with the correlation and ANOVA analyses that found individual relationships between HoursWorked and Research with Systematicity. With respect to the research question, research with faculty and working on-campus or off-campus are the only two variables that, in combination, effect CCTDI scores—specifically the Systematicity score. Model summaries and regression coefficient tables for all regression analyses can be found in Appendix D.

Conclusion

In summary, the correlation and ANOVA analyses suggest that several variables have a singular effect on critical thinking disposition as measured by the CCTDI. Research with faculty was also an impactful experience, as students who conducted research with faculty had significantly higher Truthseeking and Systematicity scores than those who did not. Participating in a club also had an impact on Truthseeking with students who participated in a club for one year or less scoring significantly higher on the Truthseeking subscale. Finally, study abroad had a negative effect on inquisitiveness. Additionally, students who work more than 20 hours seem to be most disposed to critical thinking as those students had significantly higher overall CCTDI scores, as well as Truthseeking, Inquisitiveness, and Systematicity scores. Thus, three out-of-classroom variables had a singular effect on critical thinking dispositions, albeit with small effect sizes, and working on-campus or off-campus had an effect. Only *HoursWorked* and *Research* had a combined effect on critical thinking dispositions, specifically Systematicity. No other out-of-classroom experiences jointly impacted CCTDI scores.

CHAPTER 5

DISCUSSION

The study yielded several interesting findings that inform professional practice and prompt further research. Insignificant findings also warrant discussion. Many of the findings align with the theoretical framework that undergirds the study although, there exist some contradictions between the data and extant research. Nevertheless, the study and its findings have implications for teaching, learning and assessment in academic and student affairs. This chapter will acknowledge the limitations of the study which, in combination with the findings, present opportunities for further research.

Discussion of Findings

Overall, graduating seniors were strongly disposed to all but one of the critical thinking dispositions. The findings suggest that participation in faculty-student research and student clubs have an effect on critical thinking dispositions among college students. Conversely, study abroad had a negative effect on Inquisitiveness. Participation in living-learning communities, internships, service-learning and club leadership showed to have no effect on critical thinking dispositions. Oddly enough, the number of hours worked showed to be one of the most strongly-correlated variables, having a significant relationship with the overall CCTDI score and three disposition scores. Moreover, if students held employment and conducted research with a faculty member, they were more likely to have stronger Systematicity scores. Finally, there exists some trends in which critical thinking dispositions were correlated with out-of-classroom activities, with a few showing no correlation. These findings are independently and collectively interesting, and will be discussed separately.

Finding 1: Employment Most Strongly Affects Critical Thinking Dispositions

Much in line with national data (U.S. Department of Commerce, 2018), a majority of the students in the study worked on-campus or off-campus. Even though there was not a linear relationship between employment and critical thinking dispositions, it is evident that working more than 20 hours per week is more impactful than working 1-20 hours per week. Students who held employment for more than 20 hours per week scored significantly higher on the CCTDI overall, as well as in the Truthseeking, Inquisitiveness, and Systematicity subscales. Arguably, these findings support Gleason's (1993) claim that employment during college does not impact grades. On the contrary, the workplace could foster learning. Revisiting Fry and Kolb's Experiential Learning Model (1979), a behaviorally oriented environment affords learners the opportunity to apply knowledge and skills to solve real-life problems. The job place could easily offer such opportunities as employment often requires autonomy—a characteristic of the behaviorally-oriented environment. Moreover, the workplace is conducive to Kolb and Fry's (1979) highest stage of experiential learning—Active Experimentation—where students can apply theories learned to solve problems.

Foundational to this study, Davies's Model for Critical Thinking in Higher Education (2015) coins the term *criticality*, which is the pinnacle of the critical thinking development journey through which students can think, reflect, and act. The dispositions found to have a significant relationship with employment are, by definition, dispositions that could support criticality and be developed through the applied experiences that employment has to offer. For instance, a job provides students an opportunity to solve problems, and if done in an orderly way, they are developing their disposition toward

Systematicity. Similarly, most employment requires the acquisition of new knowledge and, those who show initiative in acquiring new knowledge (e.g. information, skills) may be more likely to be promoted. There is an inherent motive to be more inquisitive in the workplace, which may explain the higher Inquisitiveness scores among employed students. The effect on Truthseeking is a bit more surprising as this disposition is much more philosophical rather than applied. It is unclear how employment encourages students to develop a habit of always designing the best possible understanding of a situation, even if it conflicts with their own beliefs.

Facione's Delphi Report (1990) concluded that critical thinking instruction can occur in programs that infuse everyday life. Employment *is* everyday life, and affords students real-world experience. Thus, students who work more could be more exposed to critical thinking instruction. This study found that students working more than 20 hours per week had the highest mean Overall CCTDI, Truthseeking, Inquisitiveness, and Systematicity scores, and scored significantly higher than students who worked less. Much of the extant research on teaching and learning suggests that greater length of exposure to instruction yields stronger outcomes (Huber & Kuncel, 2016; Niu et al., 2013). Knowing that employment may have a significant effect on critical thinking dispositions, it follows that students who are more exposed to employment experience greater outcomes. Unfortunately, the data does not indicate the type of work the students are doing—information that could further explain the results.

Socioeconomic status (SES) was not collected from participants in this study. However, hours worked could be a proxy for SES as students who worked may have done so as a result of a greater financial need, and students who worked more hours were in greater financial need. Even though the data in this study does not allow us to make the claim that students who worked more were of lower SES, it is intriguing to consider that students with lower SES are more disposed to critically think.

Finding 2: Faculty Continue to have an Impact

Faculty interactions have shown to have a positive effect on critical thinking skills (Pascarella & Terenzini, 1991), however, the effectiveness of faculty in the classroom remains unclear (Choy & Cheah, 2009). Even more, the effect of faculty-student research on critical thinking was not researched. The findings of the study suggest that faculty-student research has a positive effect on Truthseeking and Systematicity dispositions. Defined as the habit of always desiring the best possible understanding of any given situation, it is not surprising that faculty-student research results in a greater disposition toward Truthseeking. After all, students are required to be objective when conducting research. Likewise, the process of conducting research with faculty requires a systematic, organized approach to writing and data collection, further honing a disposition in Systematicity. In short, the research process may hone students' individual skills in argumentation and judgement—dispositions that are at the heart of Davies's Model of Critical Thinking in Higher Education (2015).

The experience of conducting research with faculty simulates multiple environments that are conducive to learning, as defined by Kolb and Fry (1979). First students are immersed in an affectively oriented environment, where they can develop personal attitudes toward a field of research. Moreover, they begin to understand the relationship between events, and explore new ways of thinking. It is surprising that research with faculty did not yield greater inquisitiveness scores, given the exploratory nature of research. Perhaps students are not being introduced to the research question until the research question has been established and/or methods have been identified. In summary, faculty-student research is also a much more intentional process, as compared to the other out-of-classroom experiences, which may explain its significance in the study. Even though the correlations between faculty-student research and the Truthseeking and Systematicity scores had a small effect, the findings contribute to the dearth of research on this out-of-classroom experience.

Finding 3: Employment and Research have a Combined Effect

The study aimed to understand if any combination of out-of-classroom variables have any effect on critical thinking dispositions. Surprisingly, many of the out-of-classroom variables did not combine to have an effect. Employment and faculty-student research were the only two variables to have a collective effect on Systematicity. For the reasons outlined prior, both employment and faculty-student research could reasonably provide an environment that fosters organized and systematic decision-making. These variables were also individually correlated with Systematicity, thus, the finding that the combine to have an effect on Systematicity was expected.

Finding 4: Club Membership Yields Diminishing Returns

Participating in a club for one year or less showed to have the most significant impact on Truthseeking. While Truthseeking scores were significantly higher among students who participated in a club for one year or less as compared to students who did not participate at all; participating for more than one year had no effect. Even more, club leadership did not have any effect on critical thinking dispositions. It has been established that peer discussions outside of class have a positive impact on critical thinking skills

(Pascarella & Terenzini, 1991; Twale & Sanders, 1999), so it is encouraging to find that peer interactions taking place in a club may have a similar effect. However, there is little explanation as to why the significant relationship was with Truthseeking, devoid of any relationship with other dispositions. Perhaps the findings align more strongly with the extant literature on participation in Student Government Association (Kuh & Lund, 1994) and Greek Life (Pike, 2000), which finds that participation in campus groups does not have an effect on cognitive outcomes. Nevertheless, club membership had a minor effect on one disposition and did not have a negative impact on the others, which suggests that this out-of-class experience should continue to be encouraged.

Finding 5: Studying Abroad may Impede Intellectual Curiosity

Perhaps the most surprising finding of the study was the negative effect that studying abroad had on the Inquisitiveness disposition. This finding is in direct contradiction with much of the extant research. For example, Twale and Sanders (1999) found that the number of cultural events attended was positively correlated with critical thinking on the Collegiate Assessment of Academic Proficiency. Thus, it would be expected that studying abroad, and the many cultural experiences that accompany it, would have an effect. Much of the extant research is grounded in qualitative methods, drawing upon reflections from students who may inflate the impact of their study abroad experiences. The quantitative nature of this study provides an alternative perspective that suggests that studying abroad mirrors the inconclusive effects of domestic experiences.

The study essentially finds that students who study abroad are less disposed to want to know things, even if they are not immediately necessary or useful. Several factors may be attributed to this negative effect. First, while study abroad takes place away from the students' main campus, instruction is still primarily in the classroom. Thus, the findings may mirror the inconclusive effects of classroom instruction on critical thinking such as those found by Perry et al. (2018). Students' attitudes toward studying abroad may also influence their learning. Some students may be studying abroad with the sole intention of tourism rather than learning about differences, diminishing their disposition toward learning new things. Instead of learning about and appreciating other cultures, students may otherwise regard other people, places, and cultures as a spectacle to be observed. Students may also have negative experiences while abroad, which then narrow their intellectual curiosity and willingness to take cognitive risks.

Finding 6: A Majority of Experiences have Little Impact

This study adds to the dearth of quantitative studies that assess the cognitive outcomes of out-of-classroom experiences. However, in doing so, several experiences were found to have little impact. Participation in internships, service-learning, club leadership, and LLCs have no singular or joint effect on critical thinking scores. Some of these findings are less surprising than others. For example, the majority of the extant research on cognitive outcomes of LLCs is largely perception-based (Borst, 2011; Inkelas & Soldner, 2011; Inkelas et al., 2006). Therefore, the finding that LLCs have no effect on critical thinking dispositions is quite probable as no research with quantitative methods has said otherwise.

Similarly, research on service-learning has generated conflicting results suggesting that the experience either has a negative (Nokes et al., 2005) or negligible effect (Dey, 1991) on critical thinking. Thus, I could not fully expect a strong correlation with critical thinking dispositions.

Conversely, I was very surprised to find that, contrary to my hypothesis, internships did not have an effect similar to those of faculty-student research and employment. Internships often take place over an extended period of time and follow similar structure of a faculty-student research project. Additionally, responsibilities of an internship often mirror those of a job. Moreover, prior research has found that internships do have a positive effect on critical thinking skills (Routon & Walker, 2019; Schumacher, 2014). Similarly, while there is limited research on club leadership, it was odd to see an effect for club membership, but not club leadership. Students who are leading clubs are arguably adopting more critical thinking dispositions in their leadership capacity. Davies's Model of Critical Thinking in Higher Education (2015) asserted that individual skills were central to the development of critical thinking.

I can suspect that the collective nature of some of these experiences impeded the development of critical thinking skills. Perhaps experiences that involve more peer interaction, like living in a LLC, club leadership, and service-learning fail to develop critical thinking dispositions. Even though, peers have shown to have a positive effect on critical thinking skills (Pascarella and Terenzini, 1991), the acquisition of critical thinking dispositions may be a more individual process. After all, Davies (2015) conceptualizes critical thinking dispositions as a precursor to the socio-cultural application of critical thinking. A second interpretation suggests that these experiences develop critical thinking skills, rather than dispositions. The applied nature of these experiences may afford students an opportunity to develop skills in evaluation, inference, and reasoning rather than critical thinking dispositions. In other words, perhaps out-of-classroom experiences should not have an impact on dispositions.

Regardless, I am not prepared to discount the impact of these activities; there exist many limitations to this study which prevents me from doing so. Instead, these results present opportunities for future research, which will soon be discussed. First, the significant and insignificant results have implications for teaching, learning, and assessment in higher education.

Implications for Practice

The findings of this study yield several implications for policy and practice among faculty, staff, and administrators alike. Most importantly, out-of-classroom experiences add value to the academic mission of the university. This study reinforces the work of Gellin (2003) and others in emphasizing that some out-of-classroom experiences *do* have an impact on critical thinking dispositions. As learning environments continue to evolve, teaching and learning becomes everyone's work. Rather than restricting the teaching and assessment of critical thinking to academic affairs, collaboration between student affairs and academic affairs would benefit student learning. Among the most obvious opportunities for collaboration is the university's general education program. Academic administrators are encouraged to invite student affairs practitioners to the general education conversation to avoid separate outcomes within the two divisions. In this effort, out-of-classroom experiences should be intentionally designed to align with the cognitive outcomes of general education program. In doing so, institutions can enhance the effectiveness of these experiences rather than inconsistently achieving the goals by chance. Moreover, assessment of general education should not be limited to the classroom. Instead, institutions should incorporate strategies to assess the effects of club membership, faculty-student research, and on-campus work on critical thinking and other common general education outcomes. As out-of-classroom involvement becomes increasingly popular (National Study of Student Engagement Institutional Report, 2018), it is imperative that campus administrators better understand the effect of these experiences, and appropriately disseminate data pertaining thereto.

Employment was most strongly correlated with critical thinking dispositions. While it is not ideal for students to work while taking classes, this study and others support the cognitive effects of employment. Understanding that nearly half of full-time students work (U.S. Department of Commerce, 2018), institutions should consider better leveraging employment to complement the curriculum rather than viewing it as being in competition with student learning. For example, administrators and staff can structure federal and institutional work study opportunities to become learning moments for students. By incorporating a culminating reflection assignment submitted to their supervisor or requiring an online orientation which emphasizes best practices for capitalizing on their campus employment, students can begin to think more critically about their employment. Off-campus employment is more difficult. However, faculty may incorporate reflective assignments or field-based projects for which students can draw from their employment to support classroom lessons.

Research with faculty was another influential out-of-classroom experience. However, over 67% of students in the study did not do any research with faculty members. It is likely that certain disciplines, such as engineering and the hard sciences, promote faculty-student research more heavily as more students are likely interested as they see the experience as integral to their education. Yet, these students comprise a small percentage of the university population. Institutions are encouraged to be creative in promoting faculty-student research in business, education, liberal arts, and the fine and performing arts. Simultaneously, institutions may need to incentivize faculty to work with students on research. Faculty may regard student recruitment and collaboration as more of a burden than a support. Such incentive could come in the form of a centralized recruitment and placement process for faculty volunteers to receive an undergraduate research assistant, adjusted load for research, and funding for research assistants.

Finally, a broader implication. The findings of the Conference Board (2006) are still very much salient. We, as institutions of higher learning, continue to be responsible to employers and have a vested interest in addressing the deficiencies in our graduates. While deans, administrators, and career services staff can gain insight from national data sets such as the Job Outlook Survey (National Association of Colleges & Employers, 2017), there is value to engaging local employers who often hire the institution's graduates. Critical thinking, along with many other desired outcomes, are ambiguous and will look different to various employers. Inviting employers to sit on advisory boards or serve in employer-in-residence capacities could add valuable insight into the job market and provide students real-world advice on career preparation, interviewing, and the like.

Limitations of the Study

This study is subject to two major limitations. Procedural limitations were discussed in Chapter 3; the limitations presented here are much broader. This study is most limited by the correlational analysis that informs it. The study was not designed to assess critical thinking before and after participation in a given activity, and as such, causation cannot be claimed. For experiences that showed to have an impact on critical thinking (e.g. faculty-student research, employment), is it quite likely that students who are better critical thinkers are more likely to get involved with those activities. In other words, the students who were both involved in the out-of-classroom experience and scored highly on the CCTDI may have inherently been more disposed to critical thinking. This study does not capture *why* students decided to get involved in the out-of-classroom activities. However, it does show that the students who scored more highly on the CCTDI were more likely to be involved in select experiences.

Another limitation of the study is the sample size. Even though the sample was adequate for statistical analyses, it was not representative of the involvement in the various experiences. For example, data from the National Study of Student Engagement (NSSE) Institutional Report (2018) suggest that 62% of students participate in service-learning; however, only 28.4% of this sample reported participating in service-learning. Moreover, the small subgroups within each out-of-classroom variable make it difficult to generalize the findings to other institutions.

Opportunities for Future Research

The field of higher education would benefit from further discovery into this topic; the aforementioned limitations inform opportunities for immediate and long-term future research. Most evident is the opportunity to study the effect of out-of-classroom experiences more intentionally. In doing so, a design that studies two populations (e.g. freshmen and seniors) or incorporates and pretest and posttest could inform a causation claim. Additionally, a targeted study that focuses on one out-of-classroom experience of interest could provide a more in-depth analysis of the chosen experience. This study drew upon data from one institution. A multi-institutional study could be much more generalizable and reveal trends among institutions. This study assessed critical thinking dispositions. Research on critical thinking skills is equally important to ascertain an understanding of the full impact of out-of-classroom activities. The California Critical Thinking Skills Test (CCTST) could be a helpful tool in this effort. Beyond critical thinking, the assessment of out-of-classroom experiences' effect on other cognitive outcomes (e.g. global awareness, ethical reasoning) would further inform their holistic impact.

There also exist opportunities for research that will either involve more time, or require other factors to be met. First, longitudinal data offers insight into trends over time. A five-year study, for example, of a given out-of-classroom experience would suggest if the chosen experience is having a consistent impact. This strategy could also be used to assess the effect of different instructional variables that may be infused into the experience. Other opportunities for research are predicated on the inclusion of out-of-classroom experiences in general education. Should this be achieved, research on best practices in doing so would equip other institutions in their effort to develop and adopt a more inclusive general education model. Finally, when both out-of-classroom and in-classroom experiences are mapped to the same outcomes, the field would benefit from a comparative study that compares the effects of both experiences. The intent is not to suggest one is more effective than the other, but rather to identify where the various touchpoints for student learning intersect.

Conclusion

As institutions of higher education strive to assess learning and communicate their worth, it is imperative that out-of-classroom activities be considered as learning opportunities. This study sought to complement the extant research by providing further understanding of critical thinking and bringing more clarity the otherwise ambiguous relationship between out-of-classroom experiences and critical thinking dispositions. Despite its limitations, the study suggests that particular out-of-classroom experiences do positively affect critical thinking dispositions—namely faculty-student research and employment. These findings usher in additional opportunities to further research, and leverage, out-of-classroom experiences as a tool for student learning across the landscape of higher education.

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APPENDIX A
Additional Questions to the CCTDI

1. **How many internships, co-ops, field experiences, student teaching assignments, or clinical placements did you complete while in college?**
    a. 1
    b. 2
    c. More than 2
    d. I did not participate in an internship

2. **How many short-term (1-4 week) or long-term (entire semester or summer term) study abroad experiences did you participate in while in college?**
    a. 1
    b. 2
    c. More than 2
    d. I did not participate in study abroad

3. **Which of the following classes did you take while at <u>this college</u>?**
    a. Contemporary Mathematics
    b. Introduction to U.S. Literature
    c. Logic of Everyday Reasoning
    d. I took two of the three classes
    e. I took all three of these classes
    f. I did not take any of those classes

4. **If you took *Contemporary Mathematics, Introduction to U.S. Literature, or Logic of Everyday Reasoning* at <u>this college</u>, what was the average grade among the classes you took?**
    a. An A average
    b. A B average
    c. A C average
    d. Less than a C average
    e. I did not take any of those classes

5. **How many hours, on average, did you work (on- and off-campus), while in college?**
    a. 1-10 hours
    b. 11-20 hours
    c. 20-30 hours
    d. 30+ hours
    e. I did not work on campus

6. **How long were you a member of a student club, honor society, fraternity or sorority while in college?**
    a. 1 semester

b. 1 year
c. 2 years
d. More than 2 years
e. I was not a member of a student club while in college

7. **How long did you <u>hold an executive board position</u> (president, vice-president, treasurer, etc.) in any student club, honor society, fraternity or sorority while in college?**
    a. 1 semester
    b. 1 year
    c. 2 years
    d. More than 2 years
    e. I did not hold any executive board positions while in college

8. **How many years did you live in on campus in a living-learning community or themed housing (i.e. Honors, Engineering Learning Community, ASCEND) while at <u>this college</u>?**
    a. 1 year
    b. 2 years
    c. More than 2 years
    d. I lived on-campus, but not in a living-learning community
    e. I did not live in on-campus housing

9. **How many hours did you spend working with a faculty member on research (paid or unpaid) while in college?**
    a. 1 semester
    b. 2 semesters
    c. 3 semesters
    d. More than 3 semesters
    e. I did not conduct any research with a faculty member

10. **How many service-learning courses or community-based projects did you participate in while in college (Engineers Without Borders, Habitat for Humanity, Alternative Spring Break trip)?**
    a. 1
    b. 2
    c. More than 2
    d. I did not participate in service-learning or community-based projects

Note: Institution name was redacted from several questions to protect the identity of the study site and the anonymity of the participants.

APPENDIX B

Interpretation of CCTDI Score Ranges

CCTDI Numerical Score Range	CCTDI Qualitative Category	Recommended CCTDI Attribute Interpretation
Scores from 50 to 60	Strong Positive	Scores in this range indicate that the attribute or attitude is a positive habit of mind and likely to factor into the individual's approach to all higher order thinking (reflective problem definition and problem solving), particularly when the situation is of high consequence.
Scores from 40 to 49	Positive	These scores indicate consistent endorsement and valuation of the attitude or attribute being measured. Individuals scoring in this range typically demonstrate this mindset attribute with reliability.
Scores from 30 to 39	Inconsistent/ Ambivalent	These scores are indicative of ambivalent or inconsistent endorsement of the attitude or attribute being measured. Individual test takers are frequently seen to move from this score category to a higher range score as a result of completing an educational or training program aimed at developing this mindset attribute. More rarely, such efforts also result in some individuals regressing to a more adverse or hostile range at second assessment. This movement toward aversion or hostility is consistent with other observations of attitude formation. Having the habit of mind of engaging life and work problems with one's higher order thinking skills in order to determine what to believe and what to do (critical thinking), requires courage, persistence, honesty, and organization. It is reasonable that some individuals may reject the challenge or find this path too fearful or difficult. Many of these fall into non-reflective strategies to address life and work problems.
Scores from 20 to 29	Negative	These scores are indicative of poor valuation or aversion toward the attribute being measured. Scores in this range indicate negative habits of mind, and approaches to reasoning and problem solving that are likely to limit the quality of thinking and decision-making, and diminish the fair-minded and willing engagement of problems in many situations. While movement from this level of score to one demonstrating strength on the attribute has been seen in some individuals after participation in an educational opportunity aimed at the specific attribute in question, it is more common to see an individual express at most an ambivalent valuation of the measure at the second assessment date.
Scores from 10 to 19	Strong Negative	These scores are indicative of strong negativity or hostility toward the attribute being measured. Scores in this range indicate that the individual may systematically avoid situations requiring thinking and decision making or work to disrupt or destroy decision processes where others seek to make strong judgments. Movement from this score range to positive score ranges after participation in an educational opportunity aimed at strengthening the specific attribute in question is rarely observed.

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APPENDIX C

Pearson Correlation of Dichotomous Out-of-Classroom Variables with CCTDI Scores

Table C1

Correlations of Dichotomous Out-of-Classroom and Demographic Variables with CCTDI Scores

Out-of-Classroom Variable		OverallCCTDI	Truthseeking	Openmindedness	Inquisitiveness	Analyticity	Systematicity	Confidence	Maturity
Internship	Pearson Correlation	.045	.017	.160	.003	-.021	.015	.057	.021
	Sig. (2-tailed)	.663	.867	.122	.976	.838	.888	.584	.839
StudyAbroad	Pearson Correlation	-.149	-.069	-.015	-.297**	-.090	-.092	-.104	-.093
	Sig. (2-tailed)	.149	.505	.885	.003	.384	.374	.315	.368
ClubLeader	Pearson Correlation	-.018	.044	.113	-.118	-.082	-.071	-.034	.063
	Sig. (2-tailed)	.865	.672	.275	.256	.428	.492	.742	.547
Research	Pearson Correlation	.160	.213*	.095	.078	.039	.207*	.002	.151
	Sig. (2-tailed)	.122	.038	.358	.450	.707	.044	.984	.143
ServiceLearning	Pearson Correlation	.064	.041	.023	.026	.045	-.019	.089	.118
	Sig. (2-tailed)	.540	.692	.827	.801	.666	.856	.392	.254
Age	Pearson Correlation	.134	.205*	.065	.201	-.075	.067	.084	.078
	Sig. (2-tailed)	.197	.046	.533	.051	.473	.516	.416	.455
Sex	Pearson Correlation	-.068	-.075	.033	-.067	-.234*	-.060	-.122	.144
	Sig. (2-tailed)	.510	.469	.752	.519	.023	.563	.238	.164

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

*. Correlation is significant at the 0.05 level (2-tailed).

APPENDIX D
Regression Tables

Table D1

Regression Analysis Model Summary for Out-of-Classroom Experiences with Overall CCTDI

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.308	.095	.011	31.674

Table D2

Coefficients Table for Out-of-Classroom Experiences with Overall CCTDI

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	292.107	11.502		25.395	.000
	Internship	5.287	8.232	.073	.642	.522
	StudyAbroad	-13.277	8.592	-.168	-1.545	.126
	HoursWorked	9.203	5.128	.198	1.795	.076
	ClubMember	.300	3.293	.011	.091	.928
	ClubLeader	-3.413	8.207	-.052	-.416	.679
	LLC	1.011	4.334	.026	.233	.816
	Research	9.325	7.094	.138	1.315	.192
	ServiceLearning	4.909	8.057	.070	.609	.544

Table D3

Regression Analysis Model Summary for Out-of-Classroom Experiences with Truthseeking

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.271	.073	-.013	6.839

Table D4

Coefficients Table for Out-of-Classroom Experiences with Truthseeking

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	35.480	2.484		14.285	.000

Table D4

(continued)

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	Internship	.045	1.777	.003	.025	.980
	StudyAbroad	-1.062	1.855	-.063	-.573	.568
	HoursWorked	1.492	1.107	.150	1.348	.181
	ClubMember	-.106	.711	-.019	-.149	.882
	ClubLeader	.619	1.772	.044	.349	.728
	LLC	-.016	.936	-.002	-.017	.986
	Research	2.924	1.532	.203	1.909	.060
	ServiceLearning	.310	1.740	.021	.178	.859

Table D5

Regression Analysis Model Summary for Out-of-Classroom Experiences with Openmindedness

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.204	.042	-.047	6.147

Table D6

Coefficients Table for Out-of-Classroom Experiences with Openmindedness

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	42.484	2.232		19.033	.000
	Internship	1.909	1.597	.139	1.195	.235
	StudyAbroad	-.528	1.667	-.035	-.317	.752
	HoursWorked	-.137	.995	-.016	-.138	.891
	ClubMember	-.242	.639	-.049	-.379	.706
	ClubLeader	1.217	1.593	.098	.764	.447
	LLC	-.466	.841	-.064	-.554	.581
	Research	.972	1.377	.076	.706	.482
	ServiceLearning	.052	1.564	.004	.033	.974

Table D7

Regression Analysis Model Summary for Out-of-Classroom Experiences with Inquisitiveness

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.428	.183	.107	5.821

Table D8

Coefficients Table for Out-of-Classroom Experiences with Inquisitiveness

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	45.516	2.114		21.532	.000
	Internship	1.071	1.513	.076	.708	.481
	StudyAbroad	-5.039	1.579	-.329	-3.191	.002
	HoursWorked	2.168	.942	.241	2.301	.024
	ClubMember	.582	.605	.115	.962	.339
	ClubLeader	-2.155	1.508	-.170	-1.429	.157
	LLC	.194	.797	.026	.244	.808
	Research	.541	1.304	.041	.415	.679
	ServiceLearning	.910	1.481	.067	.615	.540

Table D9

Regression Analysis Model Summary for Out-of-Classroom Experiences with Analyticity

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.167	.028	-.063	5.251

Table D10

Coefficients Table for Out-of-Classroom Experiences with Analyticity

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	45.568	1.907		23.899	.000

Table D10

(continued)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	Internship	.289	1.365	.025	.212	.833
	StudyAbroad	-1.277	1.424	-.101	-.896	.373
	HoursWorked	.403	.850	.054	.474	.637
	ClubMember	-.087	.546	-.021	-.159	.874
	ClubLeader	-1.128	1.360	-.107	-.829	.409
	LLC	.377	.718	.061	.524	.601
	Research	.435	1.176	.040	.370	.712
	ServiceLearning	1.013	1.336	.090	.759	.450

Table D11

Regression Analysis Model Summary for Out-of-Classroom Experiences with Systematicity

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.353	.125	.043	6.676

Table D12

Coefficient Tables for Out-of-Classroom Experiences with Systematicity

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	37.492	2.425		15.463	.000
	Internship	.889	1.735	.057	.512	.610
	StudyAbroad	-1.146	1.811	-.068	-.633	.528
	HoursWorked	2.748	1.081	.276	2.542	.013
	ClubMember	-.023	.694	-.004	-.033	.974
	ClubLeader	-1.274	1.730	-.091	-.736	.463
	LLC	.611	.914	.074	.669	.505
	Research	2.984	1.495	.206	1.996	.049
	ServiceLearning	-.578	1.698	-.038	-.340	.735

Table D13

Regression Analysis Model Summary for Out-of-Classroom Experiences with Confidence

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.254	.064	-.023	6.418

Table D14

Coefficient Tables for Out-of-Classroom Experiences with Confidence

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	43.777	2.331		18.783	.000
	Internship	1.452	1.668	.100	.870	.387
	StudyAbroad	-2.293	1.741	-.145	-1.317	.191
	HoursWorked	1.636	1.039	.177	1.574	.119
	ClubMember	.177	.667	.034	.265	.792
	ClubLeader	-1.306	1.663	-.100	-.786	.434
	LLC	.748	.878	.098	.852	.397
	Research	-.267	1.437	-.020	-.186	.853
	ServiceLearning	1.388	1.633	.099	.850	.398

Table D15

Regression Analysis Model Summary for Out-of-Classroom Experiences with Maturity

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.252	.063	-.024	6.589

Table D16

Coefficients Table for Out-of-Classroom Experiences with Maturity

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	41.700	2.393		17.428	.000

Table D16

(continued)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	Internship	-.055	1.712	-.004	-.032	.974
	StudyAbroad	-1.971	1.787	-.122	-1.103	.273
	HoursWorked	.904	1.067	.095	.848	.399
	ClubMember	.001	.685	.000	.002	.999
	ClubLeader	.732	1.707	.054	.429	.669
	LLC	-.396	.902	-.050	-.439	.662
	Research	1.768	1.476	.128	1.198	.234
	ServiceLearning	1.703	1.676	.119	1.016	.313