

COLLEGE TEACHING AT THE INTERSECTIONS OF INSTITUTIONAL AND
DISCIPLINARY CULTURES AND FACULTY IDENTITIES

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For my dad, Gary L. Hiller,

1956 – 2019

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Stephen Craig Hiller

COLLEGE TEACHING AT THE INTERSECTIONS OF INSTITUTIONAL AND
DISCIPLINARY CULTURES AND FACULTY IDENTITIES

Despite an understanding amongst scholars for several decades that research must explore the contexts and cultures of institutions and disciplines if efforts to improve faculty teaching are to be successful, much of the interrelationships between these two cultures and faculty identities were little explored. In this exploratory study, I addressed this gap in the literature by applying a cultural framework of faculty teaching and using a cross-classified multilevel design, with approximately 30,000 faculty from 322 U.S. institutions and 121 academic disciplines who participated in the Faculty Survey of Student Engagement (FSSE). I concluded that a) disciplines are far more important than institutions in explaining faculty teaching practices related to deep approaches to learning and collaborative learning; b) while institutional and disciplinary cultures do appear to interact, the interactions are limited in scope; and, c) faculty identities interact with institutional and disciplinary cultures in limited yet meaningful, if non-systematic, ways. These findings supported multiple implications for research and practice and suggest ways that future research can dig deeper to better understand the scope and nature of the interactions between institutional and disciplinary cultures and faculty identities as they relate to faculty teaching practices. This exploratory study provides clear empirical evidence that examining faculty teaching through the lens of faculty cultures and using cross-classified multilevel designs offers a valuable way to connect and examine multiple aspects of the teaching-learning environment to better understand how faculty teach and what influences their teaching.

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Chapter 1: Introduction

Following increased attention since the 1980's by higher education stakeholders on the quality of teaching, researchers, faculty, and educational developers have devoted considerable effort to understanding and improving faculty teaching (Smart & Ethington, 1995). Such efforts increasingly focused on broadly effective active, student-centered teaching approaches and practices that create more engaging classroom learning experiences (e.g., Chickering & Gamson, 1987; Kuh, 2008; Marton et al., 2005; Trigwell & Prosser, 1996a). These active, student-centered approaches were underscored by research that argued that teaching must necessarily take into account how students learn and that improving the quality of teaching in higher education must give greater attention to student learning and engagement (Coates, 2005; Kuh, 2001). Thus, the teaching approaches and practices that became increasingly prominent largely focused on students, what students do in the classroom, and how students engage with learning activities designed and facilitated by faculty.

Among the many student-focused teaching practices that developed and gained attention in recent decades are those that arose from two areas of research that paralleled efforts to improve teaching and learning – collaborative learning and deep approaches to learning. Collaborative learning, broadly defined, involves any activities designed for students to work with others to learn, and is based on the principle that students should be actively engaged in constructing knowledge (Goodsell et al., 1992). In their highly-cited seven principles for good teaching practice, Chickering and Gamson (1987) made an early, clear argument for engaging students in collaborative activities in order to strengthen student involvement in their own learning and deepen their understanding of what they learn. Collaborative learning has broadly been related to significant positive student outcomes (e.g., Astin, 1993; Cabrera et al., 2002;

Loes et al., 2017), and Tinto (1997) highlighted it as a critical experience that influenced the effort students put into learning.

What Chickering and Gamson (1987) and Tinto (1997) saw as the result of collaborative learning echoes another prominent line of research that promotes student development and use of deep approaches to learning. Deep approaches to learning are characterized by students' effort and intent to understand the underlying meanings and connections between ideas, rather than simple memorization (Biggs, 1987; Marton & Säljö, 1976a). Early work on student approaches to learning highlighted the connection of deep approaches with better student learning outcomes on retention and transfer of learning (Biggs, 1987; Entwistle & Ramsden, 1983). Research on student approaches to learning has also established that the structure of learning tasks can directly influence the approaches students adopt, with more student-focused approaches to learning tasks relating to students' use of deep approaches (Marton & Säljö, 1976b; Trigwell et al., 1999).

However, general understandings of the broad impacts and outcomes of teaching practices, such as those geared toward collaborative learning and deep approaches to learning, can obscure the complexity of teaching in different contexts (Hutchings et al., 2011). For example, students' use of deep approaches to learning has been known to be context-specific, with numerous contextual factors influencing the approaches students adopt, including academic disciplinary and institutional characteristics, various aspects of teaching practice, and how students experience and perceive teaching practices (Baeten et al., 2010; Entwistle & Ramsden, 1983). Teaching, in turn, is also naturally affected by context. For example, faculty use of student-focused approaches to teaching, which help to encourage students to interact with one another in their learning, can be influenced by contextual factors such as class size, support for

teaching, discipline, and teaching context (Lindblom-Ylänne et al., 2006; Prosser & Trigwell, 1997). The contextual complexities of teaching and the teaching-learning environment suggest that even broadly effective teaching practices, such as those centered around collaborative learning and students' deep approaches to learning, can vary in their implementation and impact.

While identifying and researching broadly applicable and effective teaching practices helps to advance and improve faculty teaching, it is necessary to further understand the contexts within which faculty teach and how those contexts shape their teaching practices. Certainly, further research on faculty teaching in diverse contexts is necessary to allow faculty and educational developers to “reflect more deeply on their practice – not just on the knowledge being taught” (Entwistle, 2009, p. 6).

Problem Statement

With disciplines and institutions generally considered the most dominant contexts in faculty work, there is a necessity to move beyond generalized understandings of effective teaching practices, such as deep approaches to learning and collaborative learning, toward understanding the nuances and differences in teaching across these contexts (Clark, 1987; Neumann, 2001; Neumann et al., 2002; Smart & Ethington, 1995). Disciplines have been a significant focus of such work as content knowledge itself and the ways faculty think about it form core aspects of disciplines (Becher & Trowler, 2001). Significant work has focused on understanding teaching within individual disciplines or across a small number of disciplines (Hutchings et al., 2011) and less commonly focused on systematic studies of a large number of disciplines (e.g., Nelson Laird et al., 2008, Umbach & Wawrzynski, 2005). For instance, examining dozens of disciplines, one of Nelson Laird and colleagues' (2008) findings was that faculty in Soft disciplines emphasize deep approaches to learning significantly more than in hard

disciplines. Meanwhile, focused more on student use of deep approaches to learning, Mayhew et al. (2012) did not find any significant differences across two broad disciplinary groups, STEM/health sciences or humanities/social sciences/education/business. Alternatively, Tierney (1991) argued that institutions hold greater influence over teaching than disciplines. While less common, research has identified some broad institutional differences in faculty teaching (e.g., Smart & Ethington, 1995; Umbach & Wawrzynski, 2005). Despite this, scholars do not understand well how disciplinary and institutional contexts interact to affect teaching, including practices related to deep approaches to learning or collaborative learning.

These diverse disciplinary and institutional contexts have been more crucially thought of as complex cultures influencing the roles, practices, values, and beliefs of their faculty (Clark, 1962; Kuh & Whitt, 1988; Becher & Trowler, 2001). Cultural frameworks, as applied to faculty, recognize the socially-constructed nature of faculty cultures, with members' values, beliefs, and practices being historically developed, and constantly (if slowly) evolving over time as new faculty enter these cultures and engage in research, teaching, and other faculty work (Kuh & Whitt, 1988). However, with the complexity of these cultures, scholars have differed in how they conceptualize the ways in which cultures interrelate. Perhaps unsurprisingly, disciplinary and institutional cultures have often been examined separately by scholars (e.g., Becher, 1987; Tierney, 1991; Smart et al., 2000). Such scholars, along with scholars that examine both cultures but largely as distinct from each other (e.g., Clark, 1984, 1987), implicitly or explicitly acknowledge the interrelations between the two cultures without fully exploring how those connections influence faculty and their teaching. Alternatively, Kuh and Whitt (1988) argued that every institution is unique in the ways that all faculty cultures, including disciplinary cultures, are enacted – a perspective that situates disciplinary cultures within institutional

cultures, constraining disciplinary cultures as the expression of the interplay between disciplines and institutions rather than as a culture that also exists outside the boundaries of institutions. This framing would seem to preclude, for example, the possibility of disciplinary influence in the form of faculty learning about how to effectively apply collaborative learning techniques at a disciplinary association conference and applying it to their teaching.

Austin (1990, 1996) would seem to argue for a position somewhere between these two, holding that disciplinary and institutional cultures are distinct, but overlapping. Austin then proposed departmental cultures as the intersectional culture of disciplines and institutions. However, as departmental administration is ultimately controlled by institutions, this framing arguably appears more similar to Kuh and Whitt's (1988) subordination of disciplinary cultures to institutional cultures, rather than a true representation of the intersection of distinct disciplinary and institutional cultures. Umbach (2007a) similarly adopted the view of disciplinary and institutional cultures as distinct but overlapping in conceptualizing how multiple faculty cultures influence faculty teaching, though he did not define the intersection of these two cultures as departmental culture. This framing of disciplinary and institutional cultures as distinct yet intersecting has been little explored.

Studying faculty teaching from a cultural perspective further requires a consideration of faculty identities. Scholars examining faculty cultures have remarked on how faculty members' race, gender, and other identities and cultures affect the ways in which faculty engage with disciplinary and institutional cultures (Austin, 1990; Clark, 1984; Kuh & Whitt, 1988; Tierney & Rhoads, 1993). The importance of faculty identities in disciplinary and institutional cultures is underscored by the definitions of culture used by many scholars which suggest that it is the practices, values, beliefs, etc., of dominant cultural group members that largely define cultures

and are passed on to new members (Kuh & Whitt, 1988). While the potential role of faculty identities in disciplinary and institutional cultures has long been acknowledged by scholars, a synthesis of research on how faculty identities relate to their teaching (Umbach, 2007a) suggests little is understood about how faculty identities interact with disciplinary and institutional cultures and affect faculty teaching.

Purpose Statement

If efforts to improve faculty teaching are to succeed in meeting the needs of diverse faculty and educational developers, research must continue to explore the contexts and cultures of disciplines and institutions as they relate to teaching (Lattuca & Stark, 1995). To this end, I address several gaps in the literature in this large-scale exploratory study. While the relationships between disciplines, institutions, and faculty teaching have been examined to some extent, the ways in which the disciplinary and institutional cultures overlap, interact, and affect teaching are yet unclear. In examining teaching, scholars have long applied cultural frameworks to understand the ways different aspects of disciplinary and institutional cultures influence how faculty approach and practice teaching, however, scholars disagree in their frameworks on how disciplinary and institutional cultures interrelate. Framing these cultures as distinct but capable of forming unique intersecting cultures has been less explored in relation to faculty teaching. Lastly, scholars have long agreed that from cultural perspectives faculty identities play a significant role in how faculty socialize, teach, and otherwise engage with their jobs, but the ways in which identities relate to institutional and disciplinary cultures to affect faculty teaching has been unknown.

I address these gaps in the literature through a large-scale exploratory study focused on faculty teaching practices. In this study, I apply a cultural framework of faculty teaching to

examine whether and the extent to which faculty teaching practices vary across disciplinary and institutional cultures, and particularly how those cultures interact in how they relate to teaching. As efforts to improve teaching practice are often focused on student engagement, so too should those examined in this study. While there are numerous forms of engagement, such as emotional, behavioral, or cultural (Trowler, 2010), I focus on two core forms of engagement in a classroom, academic and social engagement (Coates, 2005), as represented by teaching practices aligned with student collaborative learning and deep approaches to learning.

Importantly, in this study I will further consider the extent to which faculty identities relate to their teaching practices in these two areas within these intersecting cultures. In doing so, the findings of this study will inform the work of faculty and educational developers as they seek to improve teaching, particularly in the broad areas of practice related to deep approaches to learning and collaborative learning, and reflect on how broadly effective teaching practices might vary across cultural contexts. This work additionally provides richer context for efforts to understand and improve diversity and equity among faculty with regard to teaching.

Research Questions

In this study, I recognize and engage with the complexities of faculty cultures, identities, and teaching by applying Umbach's (2007a) cultural framework of faculty teaching, as exemplified by deep approaches to learning and collaborative learning. Through this framework Umbach recognized faculty cultures, including disciplinary and institutional cultures, as distinct yet overlapping, with the distinct cultures and their intersections all potentially influencing faculty teaching. Umbach further recognized that faculty identities may interrelate with these cultures to influence teaching. To apply this framework to consider the contextual influences of

faculty cultures and identities on their teaching with regard to collaborative learning and deep approaches to learning, I examine the following research questions:

- 1) To what extent do faculty teaching practices around collaborative learning and deep approaches to learning vary by institutional and disciplinary cultures?
- 2) To what extent do faculty teaching practices around collaborative learning and deep approaches to learning vary by the interaction of institutional and disciplinary cultures?
- 3) To what extent do the relationships between faculty identities and teaching practices around collaborative learning and deep approaches to learning vary by disciplinary and institutional cultures?

Significance of the Study

In describing the academic work of faculty, and particularly the ways in which institutions and disciplines constrain and differentiate research and teaching, Clark (1987) remarked on the “endless variety” (p. 102) that can be found in academic work. This study represents an exploratory step to make sense of whether and in what ways patterns exist in how disciplinary cultures, institutional cultures, and faculty identities interact in how they influence faculty teaching. In doing so the findings of this study will contribute to the literature in three ways.

First, theoretically, in this study I synthesize the literature in higher education on disciplinary and institutional cultures, faculty identities, and faculty teaching and will contribute evidence for the efficacy of using Umbach’s (2007a) theoretical framework of faculty culture and teaching to understand these issues. While Umbach’s work has been discussed in research on faculty teaching and cultures, Umbach’s cultural framework of faculty teaching itself has not yet

been utilized¹ to understand the relationships between faculty cultures and teaching practice. Given the complex contexts in which faculty teach, it would be valuable for researchers to understand if Umbach's cultural framework of faculty teaching allows for clearer understandings of the relationships between faculty cultures and their teaching.

Second, empirically, by examining the relationships between these cultures, identities, and teaching, this study is among the first to explore these relationships in interaction with one another. While past research has empirically examined how institutional cultures or disciplinary cultures relate to teaching (Umbach, 2007a), if significant interactions between these two cultural contexts exist, then it is unclear how applicable such findings are in practice. By examining these two cultural contexts and their interrelationships together, this study can help to better understand how these cultures influence faculty teaching practices. Additionally, scholars have critiqued past research, which often typologize cultures to some extent, for being unable to grapple with individual variation that may exist with these cultural categories (Ferrare & Hora, 2014). By examining how faculty identities relate to institutional and disciplinary cultures in how they relate to teaching practices, this study offers greater depth of understanding about faculty cultures.

Third, practically, the findings of this work can inform the teaching practice of faculty and the work of educational developers by allowing them to better understand how disciplinary and institutional cultures and faculty identities interact as they relate to the ways that faculty teach, particularly in how they emphasize deep approaches to learning or encourage collaborative learning. If faculty, and by extension the educational developers who work with faculty to improve teaching and student learning, are to "reflect more deeply on their practice – not just on

¹ Based on a review of articles citing Umbach (2007a), as compiled by Google Scholar.

the knowledge being taught” (Entwistle, 2009, p. 6), then they must be able to make sense of the contexts in which faculty teach. It is known that teaching practices to some extent depend on almost innumerable factors, including faculty members’ own identities and characteristics and the institutional and disciplinary cultures in which they practice (Umbach, 2007a). This study contributes to faculty and educational developers’ more nuanced understandings of teaching, allowing them to better understand how different faculty in different disciplines and different institutions tend to teach. This, for example, could potentially allow faculty and educational developers to identify potential barriers in applying certain teaching practices, such as around deep approaches to learning and collaborative learning. Additionally, for educational developers or administrators whose goal is to improve teaching broadly across an institution, the findings of this study may help to clarify how to better target development activities and resources.

Overview of Theoretical Framework

For over fifty years scholars have used culture as a lens to understand faculty work, with institutional and disciplinary cultures being understood early on as two of the most prominent cultures that influence faculty (Clark, 1962). Highlighting how past research, though, tended to engage with these cultures in isolation, lacked empirical evidence, or did not directly engage with faculty teaching, Umbach (2007a) proposed an integrated framework of faculty cultures as they regard college teaching. I offer here a brief overview of Umbach’s framework and how it frames this study, with greater detail found in Chapter 2.

From a sociocultural perspective where cultures help to shape, and are shaped by, the practices, norms, and values of individuals and groups, Umbach (2007a) asserted that the multiple cultures faculty are a part of will “serve as a guide for faculty in the ways in which they

interpret and making meaning of their roles as teachers” (p. 266). Umbach highlighted in his framework disciplinary, institutional, and professional cultures as key cultural influences on faculty teaching, with disciplinary and institutional cultures being focused on in this study due to their prominence in the higher education literature. In addition to these three cultures, Umbach further acknowledged and included faculty members’ identities and other cultures for the influences they may have on faculty teaching.

Importantly, as noted previously, Umbach (2007a) proposed that institutional, disciplinary, and professional cultures and faculty identities and other cultures are overlapping and interacting cultural influences on teaching. This means that not only can these cultures and identities have a direct influence on teaching, but they may interact with each other to differentially influence teaching. For example, an institutional culture may influence teaching differently depending on the disciplinary culture or personal identities of a faculty member, and vice versa. A Black or White faculty member, or a faculty member in biology or Italian, may experience and be influenced by the same institutional culture differently with regard to their teaching. This interactional influence of cultures and identities on faculty teaching is one way in which using Umbach’s framework helps to more deeply and wholistically understand the cultures that faculty are situated in when they teach. In Chapter 2, I provide greater detail on the framework and how it frames this study.

Key Terms

Several terms and key concepts related to faculty, teaching, and culture are used throughout this proposal. In this section, I define concepts for which there may be multiple or ambiguous definitions as well as operationally define terms that are used as a shorthand

reference to broader concepts. Terms are listed alphabetically and not in order of use or importance.

Culture. It has been commonly noted by scholars across various disciplines that “culture” has an almost impossibly varied array of definitions (Baldwin et al, 2006). As this study is framed by Umbach’s (2007a) culture and college teaching framework, it must also subscribe to the definition of culture that underlies the framework. Umbach utilizes Kuh and Whitt’s (1988) definition of culture which states that culture in higher education is “the collective, mutually shaping patterns of norms, values, practices, beliefs, and assumptions that guide the behavior of individuals and groups...and provides a frame of reference within which to interpret meaning of events and actions” (pp. 12-13).

Institutions and academic disciplines are two types of groups that are guided by these collective patterns. These patterns of “norms, values, practices, beliefs, and assumptions” (Kuh & Whitt, 1988, pp. 12-13) that guide the behavior of individuals within institutions and disciplines can then be defined as *institutional culture* and *disciplinary culture*, respectively. Though Umbach (2007a) referred to these as “subcultures”, Kuh and Whitt (1988) defined subcultures as existing within a broader cultural unit. Though subcultures may exist in the intersections of the institutional cultures and disciplinary cultures in Umbach’s framework, it is more appropriate to label them as “cultures” in their own right as he framed them as distinct yet overlapping cultures.

Faculty. As used in this study, “faculty” or “faculty member” include those hired by higher education institutions for instructional activities, regardless of academic rank or title (i.e., instructional staff). This definition aligns with the Integrated Postsecondary Education Data System (IPEDS) definition of faculty as people “conducting instruction, research or public

service as a principal activity (or activities)” (IPEDS, n.d.a). This definition of faculty includes not only people with academic ranks or titles of Professor, Associate Professor, and Assistant Professor, but also includes people of other instructional ranks or titles, such as Instructor or Lecturer.

Teaching practice. Teaching, as a central activity of faculty, can naturally be described by “patterns of norms, values, practices, beliefs, and assumptions” (Kuh & Whitt, 1988, p. 12) associated with disciplinary and institutional cultures. Furthermore, in this study I subscribe to a view of teaching that is not limited solely to the teacher, but one that must necessarily take into consideration the activity and engagement of all participants in a teaching and learning setting. This perspective, as befitting a cultural perspective, considers teaching as highly contextual and inextricably linked to the students being taught and how their learning occurs in context (Entwistle, 2009; Marton, 2007). Thus, it is valuable to consider how practices are distinguished from norms, values, beliefs, or other cultural aspects of teaching.

Given the highly contextual nature of teaching and learning, in this study, “teaching practice” is limited to a course context where a faculty member teaches a planned syllabus of material to students. Within this context, practice can be thought of as the active interplay between a faculty member and their students or how a faculty member facilitates student achievement of learning goals. This includes not only the activities that occur in a course (e.g., lecture, small group discussion), but also the manner in which they occur. For example, in a small group discussion, does the teacher design or conduct the experience in a way that requires students to draw on multiple perspectives or their own prior experiences? In an activity or project, does the teacher design it in a way that students must work together or explain material to one another? While such practices may directly regard the students and student activity, they

nonetheless can be prompted and encouraged by faculty as ways to shape and tailor teaching to the contexts in which teaching and learning occur.

Overview of Dissertation

As a core function of higher education and a core responsibility of faculty, continued research is necessary to better understand the roles of context in how faculty teach. In this chapter, I provided an overview of key literature that has examined disciplinary and institutional differences in teaching, disciplinary and institutional cultures, and of questions this literature has yet to answer. Based on this literature, I proposed an exploratory study to examine the relationships between faculty teaching practices, the institutional and disciplinary cultures faculty are situated within, and faculty members' identities.

In Chapter 2, I provide a review of relevant literature that informs this study, including greater detail on Umbach's (2007a) cultural framework of college teaching, current understandings of what constitutes institutional and disciplinary cultures, and how those cultures, along with faculty identities, affect college teaching. In Chapter 3, I detail the quantitative methodological approach and procedures that I will use to examine the proposed research questions, including detail on key measures, the sample, and the cross-classified multilevel analytic procedures that will be used.

In Chapter 4, I present the findings and results from the cross-classified multilevel models conducted to examine the research questions. In Chapter 5, I interpret and situate the findings and results presented in Chapter 4 within the broader literature. Putting the findings in discussion with the literature, I consider the ways in which the findings complement or expand on current understandings of faculty teaching, cultures, and identities. I further discuss in

Chapter 5 the implications of these findings for researchers, faculty, and educational developers, and identify future areas of research.

Chapter 2: Review of the Literature

In this study, I build upon the extant literature that has examined faculty cultures, disciplinary and institutional differences in faculty teaching, and how faculty identities influence teaching. This literature is discussed with the purpose of laying the foundation for studying from a cultural perspective the intersections of disciplines, institutions, and identities as they relate to teaching. This foundation includes understandings of the concepts drawn on for this study as well as the relevant problems scholars have previously addressed and the ways in which they addressed those problems. Discussion of this literature will inform not only methodological choices but will help situate this study within the broader literature on faculty cultures and teaching.

I organize this discussion into three sections. First, a discussion of Umbach's (2007a) framework of culture and college teaching introduces and frames examination of the concepts at the heart of this study, including, disciplinary cultures, institutional cultures, faculty identities, and faculty teaching. Second, empirical literature that has examined the ways that these cultures and identities influenced teaching is considered. Third, I synthesize this literature to discuss the ways in which gaps in past literature are addressed to help advance research in this area.

Culture and College Teaching Framework

Studying the influences of institutional and disciplinary contexts and identities on faculty teaching suggests the need for a framework that can flexibly take into account multiple, often overlapping, social and cultural environments. A cultural lens has been applied to the study of faculty for over half a century, with Clark's (1962) application of a cultural lens to understanding faculty work as a prominent, and frequently cited, early work. However, Umbach (2007a) noted that much of the research that used culture to study faculty either lacked empirical evidence or

focused solely on one dimension of culture (e.g., disciplinary or institutional). To integrate much of this work, Umbach proposed a cultural framework of college teaching which integrates diverse frameworks that have been used to understand how disciplinary, institutional, and other cultures relate to faculty and college teaching. For researchers, applying a cultural perspective can allow for a more comprehensive, holistic understanding of the complex relationships that underlie faculty teaching and how they affect student engagement and learning. Without such a perspective, studying differences in teaching across disciplines and institutions risks yielding few answers for how or why differences in context impact teaching and learning. For administrators, faculty, and other practitioners, applying a cultural perspective may allow for more informed decision-making as they seek to promote more effective teaching practices and improve student learning.

Prior to examining Umbach's framework, it is beneficial to consider how the framework, and the literature on faculty cultures, is situated within an even broader literature on culture in higher education. In many ways, the literature on cultures in higher education is so varied and, often implicitly, overlapping, that it is impossible to fully disentangle and map the sub-areas within this literature. Yet, several important distinctions can be made here. One of, if not the most, prominent area of literature pertains to organizational cultures. This literature, which often grapples with sociological and business literature, focuses on organizational structures whether big, such as statewide or national higher education systems, or small, such as offices/departments within an institution and how those structures interact with or respond to internal and external environmental factors (Kuh, 2003; Manning, 2013). Literature on faculty cultures focuses on the work and contexts of individual or groups of faculty. Further work on disciplinary cultures

exists, examining how faculty work is differentiated by or related across areas of knowledge and inquiry.

There is often overlap across these areas, though the ways in which they conceptualize the other areas of literature are not uniform. For instance, one of the most common perspectives in organizational culture literature is that faculty and disciplines are in some form subcultures within an organizational culture. Though the literature is too substantial and varied to fully discuss here, Smerek's (2010) framework of cultural complexity offers a common organization view of how disciplines are treated within the academic profession, which itself is mostly considered within the contexts of an organizational culture. Scholarship on disciplinary cultures, on the other hand, is largely unconcerned with the literature on organizational cultures or even on institutions themselves. For example, Becher's (1989; and as in the second edition, Becher & Trowler, 2001) widely cited work on academic disciplines only briefly discusses institutions as a final consideration for how disciplines themselves may differ depending on the contexts of faculty. Finally, scholarship on faculty cultures concerns both institutional and/or disciplinary cultures, depending on the aspect of faculty work or perspective in focus. This scholarship draws directly on scholarship on disciplinary cultures, when in focus, and yet, does not typically draw on the organizational culture literature when focusing on institutional cultures (however, the organizational culture literature does sometimes engage with works that are also prominent in the faculty culture literature such as the works of Burton Clark, several of which are cited in this study).

This study, then, is primarily situated within the literature on faculty cultures due to these scholars' specific focus on the work of faculty and how that work is influenced by their institutional and disciplinary contexts. By centering faculty this literature offers clearer

understandings of how institutional and disciplinary cultures relate to faculty work and teaching. While scholarship on organizational cultures may be useful in understanding faculty institutional cultures, it is referenced here sparingly as organizational perspectives tend to only consider disciplines as subordinate subcultures rather than permitting a consideration of disciplinary as distinct cultures that interact with institutions and faculty work. This perspective of disciplines through an organizational lens is arguably encapsulated by Dill's (1982) characterization of greater faculty orientation toward their disciplines as a "loss of meaning" for institutions and their cultures (p. 311).

Conceptualizing Culture within Umbach's Framework

Prior to examining Umbach's (2007a) framework, a brief discussion of how culture is conceptualized within the framework is useful. Noting that earlier scholars employing cultural lens to study faculty have used a variety of interconnected definitions, Umbach situated his framework within Kuh and Whitt's (1988) definition of culture within higher education as "the collective, mutually shaping patterns of norms, values, practices, beliefs, and assumptions that guide the behavior of individuals and groups" (pp. 12-13). As this definition suggests, culture can be vastly complex, with defining qualities falling in a range from the fully explicit – those qualities a person entirely outside of the culture could observe – to the fully implicit – those qualities that a member of the culture might not even be fully conscious of. Umbach (2007a), based on the work of Schein (1992) and Peterson and Spencer (1990), defined explicit and implicit qualities as "manifestations of culture," which include artifacts, behavioral patterns, espoused values and beliefs, and underlying assumptions (also referred to as embedded values and beliefs). Artifacts include fully explicit indicators that could be directly observable to an outsider, including both physical manifestations such as architecture, published statements about

values, and nonphysical such as myths or representation of groups. Umbach (2007a) identified behavior patterns, arguably considered a form of artifact (Kuh & Whitt, 1988; Schein, 1992), as those practices that are sustained and repeated, rather than occurring in isolated or specific instances. Peterson and Spencer (1990) suggested these are relatively standardized practices that can be either formally defined, and thus more explicit, or informally developed and more implicit such as classroom emphases, as suggested by Umbach (2007a). However, Kuh and Whitt (1988) cautioned that patterns of behavior may not be indicators of culture but rather due to circumstances of noncultural context. Values and beliefs encompass the final two manifestations based on whether they are espoused – explicitly stated such as in mission statements – or underlying or embedded – implicit and generally unconscious.

Importantly, these manifestations are not discrete and Schein (1992) argued that the less explicit a manifestation the more meaningful it is to understanding the culture it represents. Teaching practices related to collaborative learning, for example, could be considered an artifact when they take the form of structuring a capstone course around a group project or they could be considered a behavioral pattern when they take the form of a faculty member encouraging or emphasizing small group discussions or exercises in a course. Similarly, as an indicator of institutional culture, the promotion and tenure process can serve as both a behavior pattern, where faculty accumulate and organize their work to submit, or as an artifact of the kinds of faculty work an institution values. In both cases, the behavior pattern framing arguably allows for a deeper understanding of broader cultures by focusing more on the interactions between individuals and groups.

Not discussed by Umbach (2007a) but implicit in his characterization of cultures as socially constructed, is the notion that cultures are not just products but also processes, and thus

not static (Faulkner et al., 2006; Kuh & Whitt, 1988). Though focused more on organizational cultures, Tierney (2016) similarly characterized cultures as a constant process of interpretation (or reinterpretation) and reconstruction as members engage with cultural understandings through their own individual lenses. Kuh and Whitt (1988) also viewed culture as continually evolving through the interactions of individuals and communities with their environments and experiences, with dominant cultural understandings transmitted to new members of the culture. In light of efforts to improve diversity, equity, and inclusion in teaching and learning, this transmission of dominant cultural understandings inherent in many definitions of culture requires particular attention. Certainly, White faculty are the dominant racial group of a vast majority of institutions and disciplines. Thus, by following traditional definitions of culture, dominant cultural understandings will be determined and transmitted through the lens of White faculty experiences. Indeed, the socialization that is inherent in Kuh and Whitt's (1988) and others' definition of culture as it pertains to faculty generally perpetuates a dominant White male experience in faculty cultures which poses challenges to women faculty and faculty of color (Tierney & Rhoads, 1993). What this suggests for researchers using a cultural lens is the importance of intentionality in understanding who is represented when examining the definitions and influences of faculty cultures.

Components of Umbach's Framework

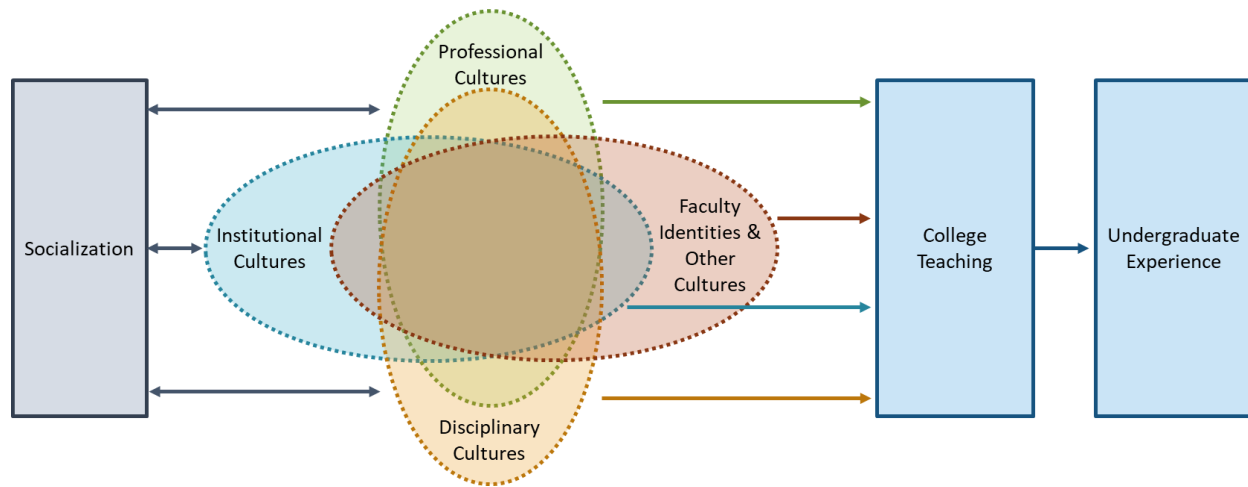
Umbach (2007a) applied this understanding of culture to three faculty subcultures (henceforth, simply identified as "cultures"²): professional culture, disciplinary culture, and institutional culture (see Figure 2.1). The cultures of the institutions in which faculty work most

² Though Umbach (2007a) refers to these as subcultures, I follow Kuh and Whitt's (1988) definition of subcultures which indicates that they exist within a broader cultural unit. Though subcultures may exist in the intersections of the cultures in Umbach's framework, it is more appropriate to label them as "cultures" in their own right.

directly exert influence over faculty careers, for instance, through institutional missions, faculty recruitment, and reward structures which may affect the value faculty place on different job functions (e.g., focusing on teaching over research or vice versa) as well as the resources and support available to faculty to carry out their responsibilities (Austin, 1990; Clark 1962, 1970; Kuh & Whitt, 1988). Disciplinary cultures, often considered as having even greater influence over faculty members, shape the content knowledge and inquiry of faculty members (Ruscio, 1987). Though faculty may work closely with disciplinary colleagues within their institutions and disciplines are generally the basis for departmental organization within institutions, disciplinary cultures exist outside of institutions' direct control, for instance as evidenced by the academic and professional associations that disciplines form. Faculty are divided amongst numerous institutions and disciplines, however, professional culture to some extent unifies faculty around similar values and norms, particularly around the importance of teaching (Leslie, 2002). For example, discussing professional cultures, Clark (1987) identified core professional values as academic freedom and honesty, the pursuit of knowledge (research and inquiry), and dissemination of knowledge (teaching) – values that are likely understood and held to some extent by faculty no matter their institution or discipline.

Figure 2.1

Culture and College Teaching Framework



(adapted from Umbach, 2007a)

While Austin (1990) treated these as separate, though sometimes conflicting, cultures (plus a fourth culture for “the academy”), and Kuh and Whitt (1988) situated the professional and disciplinary as subcultures of the institutional, Umbach (2007a) importantly framed these as three distinct yet overlapping and interrelating cultures. Kuh and Whitt’s (1988) framing, by subordinating profession and discipline to the institution, conceptually limits the ability to study and discuss those cultures on their own terms across institutions or outside of institutional culture altogether. Austin’s (1990) framing of these cultures does not suffer from this limitation, but instead, frames the interaction of multiple cultures as conflict. This acknowledges that these cultures exist separately from each other as well as interact but framing these interactions as conflicts presupposes that the values, assumptions, practices, etc., of the cultures are opposed to each other and that aspects of one culture may negate or lessen aspects of the other culture. This denies the possibility that cultures may be meaningfully and constructively reshaped when individuals interact with overlapping cultures, as suggested by Kuh and Whitt (1988). For instance, it could be possible that a disciplinary culture emphasizes teaching and an institutional

culture emphasizes teaching such that the interaction of those cultures creates a stronger and more supportive culture around teaching than otherwise found, for example, in other disciplines at that institution. Indeed, Umbach's (2007a) framing allows a much greater range of possible interactions between cultures.

Between disciplinary, institutional, professional, and other cultures in which faculty work, it is perhaps no surprise that the disciplinary and institutional cultures are often viewed as or suggested to be most central to faculty members' identities and practice (Austin, 1996; Clark, 1987). Early work by Clark (1962) focused in part on these two cultures, connecting them to Gouldner's (1957, 1958) identification of cosmopolitan and local social roles or identities in organizations, with cosmopolitans more loyal to their expertise and profession (thus oriented toward their disciplines) and locals more loyal to their institutions. Indeed, scholarship less often focuses on professional cultures, perhaps because scholars often view faculty professional cultures as more of a unifying influence, particularly around the importance of teaching (Bowen & Schuster, 1986; Clark, 1987; Leslie, 2002; Umbach, 2007a). This situates professional cultures somewhat differently from institutional and disciplinary cultures which are commonly understood to be more varied and often have a diversifying effect on faculty. While various scholars have considered other cultures in the intervening decades, the centrality of institutions and disciplines has always been clear. This emphasis in the scholarship along with their diversifying influences on faculty are a core reason for their focus in this study. Disciplinary and institutional cultures are further examined in the next two sections.

In addition to interacting with each other, disciplinary and institutional cultures relate to other elements in Umbach's (2007a) framework as well. While Umbach's operating definition of culture – and Kuh and Whitt's (1988) understanding upon which the definition is based – would

suggest that socialization is a constant process, Umbach identified it as a distinct element through which the cultures are transmitted to new members of those cultures, thus making it an important influence on teaching and students' experiences. Additional influences on college teaching that interact with disciplinary and institutional cultures are the identities, attributes, and other cultures of faculty members. Given that disciplinary and institutional cultural understandings are likely to be dominated by the experiences of White faculty, this aspect of Umbach's model takes on great importance in understanding faculty. Indeed, Smart and Umbach's (2007) imperative "not to consider faculty as a monolithic entity, but as a diverse collective with varying professional interests, attitudes, and values" (p. 191) suggests that scholars who examine disciplinary and institutional faculty cultures have a responsibility to consider how faculty identities relate to those cultures.

Together, all of these elements directly or indirectly affect how faculty teach, which the framework views broadly to include, for instance, pedagogy, classroom practices and emphases, or how faculty interact with students. Teaching in turn affects the undergraduate experience, which though undefined by Umbach (2007a), is noted to include both learning itself as well as engagement. This framing of teaching and learning is largely consonant with views of teaching as inherently tied to learning (Coates, 2005; Kuh, 2001), where teaching is not simply concerned with the methods of conveying content but also the how teaching does and does not stimulate student engagement.

Disciplinary Cultures

It has been noted that disciplinary cultures are often the more dominant among faculty, compared to institutional cultures (Clark, 1987), and that disciplines largely shape the content and methods of teaching (Umbach, 2007a). Disciplinary cultures have been argued to be formed,

in part, by how faculty engage with their disciplines and the narratives they form about their disciplinary engagement (Becher & Trowler, 2001). Becher and Trowler indicated that these two features – engagement and narratives about engagement – “lend coherence and relative permanence to academics’ social practices, values and attitudes across time and places” (p. 23). Though some scholars have argued that institutional cultures are the primary driver of knowledge production (Tierney, 1991), disciplinary cultures, centered on fundamental concerns about areas of knowledge and how to address questions about that knowledge, are more often credited as the primary drivers of knowledge production (Becher & Trowler, 2001). Clark (1997) argued that, historically, knowledge production spurs greater disciplinary differentiation, as faculty seek recognition and status within their disciplines through research, encouraging faculty to engage in more specialized work. Though the current study is focused on teaching, and not research, that disciplinary cultures are so strongly oriented toward research and knowledge production suggests that other faculty work that is influenced by disciplinary cultures will be influenced by cultural norms and practices related to research.

The literature has also indicated that socialization, amongst faculty and with new members, serves to affirm and transmit a discipline’s culture in relation to teaching and research (Becher & Trowler, 2001; Clark, 1987; Umbach 2007a). Due to the dominance of White faculty, and particularly White male faculty, Tierney and Rhoads (1993) argued that socialization processes for women faculty and faculty of color had instead often become an acculturation process, though they advocated that socialization processes could and should reflect the more pluralistic and multicultural identities of faculty. With regard to disciplinary cultures, this distinction between acculturation and a more pluralistic socialization underscores the importance

of considering faculty identities in relation to disciplinary cultures as a means of understanding which faculty experiences, attitudes, values, and beliefs are represented by the dominant culture.

Given that cultures are vastly complex, examining how scholars understand differences between disciplines further helps to understand what constitutes disciplinary cultures. Notably, disciplinary cultures have often been engaged with less as structuring frameworks in past research and more as a lens to discuss disciplinary differences in research findings (Välilmaa, 2008). Two frameworks that Umbach (2007a) described as having dominated current studies are Biglan's (1973a, 1973b) dimensions and the application of Holland's (1966, 1973, 1985, 1997) theory of career choice to academic environments (Smart et al., 2000). Notably, some scholars have examined disciplines through an organizational lens, focusing on how institutional actors divide and set disciplinary boundaries, for instance between schools or departments (Becher & Trowler, 2001), and some scholars consider these to be distinct "departmental cultures" which represent the intersection of the institutional and disciplinary (Austin, 1996; Smart & Umbach, 2007). However, it is precisely this intersection with institutional cultures that makes organizational lenses on disciplines a less than ideal way to understand broader features of disciplinary cultures. Furthermore, it could be argued that departments function more as an administrative structure through which institutional culture is mediated, rather than being a true intersection of disciplinary and institutional cultures.

Biglan's (1973a, 1973b) three empirically-derived dimensions distinguish amongst disciplines by a) the degree to which there is a strong paradigm, or consensus about the nature of knowledge and inquiry, with hard disciplines (versus soft disciplines) having strong paradigms and a high degree of consensus, b) whether study focuses on practical applications of knowledge, and c) whether study focuses on life systems. Though empirically derived, multiple scholars

have offered evidence of their validity in differentiating between disciplines on a variety of measures (Simpson, 2015; Smart & Elton, 1982; Stoecker, 1993). Becher (1989) extended Biglan's work by arranging the first two dimensions into four distinct categories of disciplines (hard-pure, hard-applied, soft-pure, soft-applied). Becher (1989) considered these dimensions to address more cognitive aspects of disciplinary cultures, given their direct connection to knowledge and inquiry, and supplemented them with two of his own dimensions which capture more social aspects of disciplinary culture, urban vs. rural (addressing the competition in research and concentration of scholars on specific topics or issues) and convergent vs. divergent (addressing the extent to which a discipline encourages uniformity through socialization). Even if Biglan's hard/soft, pure/applied, and life/nonlife dimensions are viewed as cognitively oriented, it is important to distinguish that these dimensions inherently represent socially-constructed views of knowledge and inquiry as they relate to faculty practices.

This cultural perspective on Biglan's dimensions is evident from how they are defined. For instance, the hard/soft dimension reflects, arguably, the most knowledge-oriented of the dimensions, but a key aspect of its definition regards consensus among discipline members around paradigms, consensus that must be socially and historically developed. Indeed, Kuhn (1996), whose work Biglan (1973a) viewed his own work as empirically supporting, described the social aspects of how paradigms develop and how they are carried forward themselves through socialization processes. The pure/applied dimension is even more indicative of a socially-established definition of how and to what ends disciplinary knowledge is employed. For instance, knowledge of how people learn does not dictate whether the field of education is pure or applied; it is the scholars who individually and collectively shape the purpose of study and how different purposes are valued. Notably, while Becher and Trowler (2001) regarded these

dimensions as the cognitive aspects of disciplines, their discussion suggests the socially-constructed nature of the disciplines, for example, by noting that it is possible for hard disciplines to become soft as disciplinary communities' values and practices evolve. It is precisely this more cultural view of Biglan's dimensions that Umbach (2007a) employed, that the dimensions reflect "disciplinary values, norms, and beliefs as they relate to teaching" (p. 274).

The application of Holland's theory (1966, 1973, 1985, 1997) to higher education has grown more popular in the past two decades to examine disciplinary differences, possibly as an alternative to the atheoretical and empirical nature of Biglan's work (Umbach, 2007a). The core of this theory is that individuals' personalities can be categorized into one of six types – Realistic, Investigative, Artistic, Social, Enterprising, and Conventional. Applied to higher education, the theory includes three central premises: 1) self-selection – that students (and thus future faculty) tend to choose majors that align with their personality type, 2) socialization – that major disciplines promote and encourage attitudes, behaviors, and practices among students that are consistent with the discipline, and 3) congruence – that students whose personalities better align with the discipline will have better outcomes (Pike et al., 2012). Stemming from the self-selection premise is that disciplines can be characterized by the dominant personality type of its members (e.g., a realistic discipline, such as electrical engineering, will be dominated by members with a realistic personality type).

Though the theory is based on individuals' personalities, it is this socialization that characterizes disciplines and makes it a useful lens for understanding disciplinary differences, particularly from a cultural perspective. If disciplinary cultures are characterized by the "patterns of norms, values, practices, beliefs, and assumptions that guide the behavior of individuals and

groups” (Kuh & Whitt, 1988, pp. 12-13), then Holland’s theory is one means of examining and understanding how the socialization of individuals results in the formation of a culture, or at least certain aspects of disciplinary cultures. In the same way that this socialization encourages and promotes certain student values and behaviors, it also encourages and promotes the disciplinary culture among faculty members (Lattuca et al., 2010; Smart et al., 2000; Umbach, 2007a).

Institutional Cultures

While disciplines influence the content and practice of research and teaching, institutions influence multiple aspects of faculty careers including their duties and responsibilities, career opportunities (e.g., tenure, promotion), and potentially even the relationship to one’s discipline (Austin, 1990). Kuh and Whitt (1988) further indicated that institutions’ ability to enforce cultural norms in these areas, among others, may vary depending on their reputation with regard to other aspects of the institution’s culture. This suggests that institutional cultures are not uniformly strong in controlling or directing faculty values or behaviors. Smerek (2010) argued that when institutional cultures are sufficiently strong and are the dominant influence on behavior it is likely related to institutional size and history. However, Silver (2003), in examining organizational cultures from the perspective of academic staff, argued that organizational, or institutional, cultures may not even be applicable to faculty work because, though faculty are situated within both institutional and disciplinary contexts, their identities are much more tied to their disciplines. Given Silver’s work, which could be framed as a “fragmented” perspective of organizational culture, Smerek (2010) suggested that administrators may lack clarity in institutional improvement processes, a key suggestion given the notion that an institutional culture may or may not be strong in influencing faculty behavior.

Echoing this disciplinary socialization process, institutional cultures are likewise shaped by the ways in which institutions socialize their faculty, from hiring faculty that hold similar values and attitudes as others at the institution to socializing members toward the mission and goals of the institution (Umbach, 2007a). Notably, Tierney and Rhoads' (1993) discussion of socialization suggests it is the control institutions have over many aspects of faculty careers that contributes to the challenges often faced by women faculty and faculty of color, especially in the tenure process as faculty manage the balance of research, teaching, and service duties. In some ways, the control institutions have over faculty careers often results in viewing institutional cultures as having assimilationist socialization process, where faculty are expected to learn a correct way of being a faculty member in a given institution (Tierney, 2016).

While there are numerous aspects of institutional cultures and how they can influence faculty teaching, institutions' missions are especially important and broadly guide much of the institutional socialization faculty experience (Austin, 1990; Kuh & Whitt, 1988; Ruscio, 1987). Indeed, the mission of the institution greatly shapes the structure of the institution, providing purpose and direction to its activities (Ruscio, 1987; Tierney, 2008, 2016), suggesting that missions directly and indirectly influence a considerable number of aspects of institutional cultures as they regard faculty work – for instance, institutions with a strong research focus might dedicate more funds to departments that are strong research producers or place priority in tenure and promotion on grant awards and research publications. Austin (1990) gave particular emphasis to the balance of the traditional missions of research, teaching, and service, across different types of institutions. This balance of these core missions relates to how faculty experience their work and thus also how they experience their disciplinary cultures. The mission

of an institution and how it is enacted may aid or hinder faculty members from engaging or connecting with their disciplinary communities and cultures (Austin, 1990; Ruscio, 1987).

Perhaps unsurprisingly, scholars have largely focused on categorizing and understanding institutional cultures through institutional missions, such as by using common institutional types (e.g., research universities or liberal arts colleges) or using the Carnegie Classifications, to examine institutional differences in relation to faculty teaching (Umbach, 2007a). Institutional types often capture the most salient feature of an institution's culture to identify it, and these often represent commonly understood distinctions. Asked to identify a "research institution" or a "liberal arts college" most people could likely quickly identify one or more examples. While institution types are thus useful for identifying broader differences between institutions, they may obscure more nuanced differences in how mission impacts institutional processes. For example, the broad type of "research institution" could comprise a wide variety of institutions, large and small, public and private, institutions with substantial proportions of revenue from research and those whose research dollars are more balanced with student tuition or other sources of revenue.

The use of the Carnegie Classifications has been another common means of exploring differences by institutional mission. While in some ways aligning with broader institutional types, the classifications are drawn from an analysis of institutional variables, arguably providing more empirical and nuanced categorizations than the above broad institution types. While using a variety of variables, the basic categories in the Carnegie Classifications are framed around highest degree offered, student enrollment size and nature, and research expenditures (The Carnegie Classification of Institutions of Higher Education, n.d.). The classifications include seven broad categories (Doctoral Universities, Master's Colleges and Universities, Baccalaureate

Colleges, Baccalaureate/Associate's Colleges, Associate's Colleges, Special-Focus Institutions, and Tribal Colleges), with nearly three dozen subcategories amongst them. However, as with institutional types, the Carnegie Classifications bear limitations in studying institutional cultures. For example, the classifications do not distinguish certain institutional missions, such as those serving under-represented students (e.g., historically Black colleges and universities [HBCUs], Hispanic-serving institutions, etc.), which have missions unique from similarly-situated non-minority serving institutions. As minority-serving institutions are more likely to have diverse faculty representation (Schmidt, 2022) and their cultures thus be less-dominated by White cultural values and practices, the use of Carnegie Classifications to examine institutional cultures obscures how racial and ethnic identities interact with institutional cultures.

The limitations of the Carnegie Classifications in representing institutional cultures represents an area with which the literature on institutional cultures has not sufficiently grappled. In examining the relationship between institutional structures and student engagement, Porter (2006) argued that other measures to examine institutional differences were needed. He proposed measures such as institutional density to replace measures of size (e.g., enrollment) to address how often students and faculty may interact with each other or the percentage of Ph.D. students to replace the overall percentage of graduate students to reflect institutional missions, arguing that Ph.D. students are more reflective of a research mission. While these particular proposals may not appear especially relevant to examining faculty teaching, a similar approach may be fruitful. For instance, if institutional missions are likely to impact how faculty spend their time (Austin, 1990), then analyzing institutional differences using the percentage of faculty time spent teaching would be important. Similarly, with a research focus on faculty teaching, then examining institutional structures such as how institutions direct funding to research and

teaching or the composition of faculty in terms of employment status or tenure would also provide valuable insights.

Faculty Identities

Umbach (2007a) acknowledged and incorporated into his cultural framework the fact that faculty members' identities and other non-higher education-related cultures they are a part of are likely to influence their teaching. Prior work on faculty cultures has likewise acknowledged, albeit often only briefly, that faculty members' identities relate to how they experience faculty work. Austin (1990) only mentioned without further explanation that identities such as race, gender, and class interact with institutional, disciplinary, and other cultures in faculty work. Kuh and Whitt (1988) discussed how identities such as gender, race, and employment status (e.g., part-time, full-time) create subcultures within academic cultures (e.g., disciplinary, institutional), though they do not offer further explanation of how these identities relate to faculty work or disciplinary and institutional cultures. Still, though, these scholars acknowledged the importance of faculty identities far more than Clark (1987, 1997) who cited faculty members' identities only to explain that disciplinary and institutional cultures have far greater influence over faculty work.

It is certain, though, that faculty members' identities matter in their work and teaching. Indeed, from a sociological perspective, identity and culture intrinsically affect each other, as for example, identity shapes how one experiences the cultures present in their lives and those cultures, in turn influence one's identity development to some extent (Kidd & Teagle, 2012). Regarding faculty cultures, racial and gender identities have been the most frequently considered, when identity is considered at all. Gappa and Austin (2010) argued for a need to rethink faculty work, in part due to the growing gender and racial diversity of faculty (as well as diversity in terms of employment and faculty statuses) that has increasingly called attention to

how traditional models of faculty work too often disadvantage or deprioritize the needs of women faculty and faculty of color. Exemplifying Gappa and Austin's (2010) point, faculty women of color interviewed by Turner et al. (2011) described having their work devalued by department chairs or tenure committees as well as described cultural conflicts between their personal and social cultures and academic cultures.

Villalpando and Delgado Bernal (2002) used critical race theory to examine the representation of faculty of color across institutions and disciplines, noting that though diversity of faculty has increased, representation is often skewed across institutions and departments with faculty of color best represented among institutions and disciplines that are viewed as less prestigious and with fewer resources, such as public two-year institutions, ethnic studies, or education. Turner (2022), discussing the lived experiences of Women faculty and faculty of color, further explained that while increasing diversity provides these faculty with access to the academy, they are often still denied validation, legitimacy, and institutional power. In this way, Turner described these faculty as in many ways still being *guests* in the academy, expected to be polite and follow the rules, but being denied ownership. However, Shields (2012) suggested, from her experience, that White Women have achieved great enough representation in the academy that they are able to exercise power where Women faculty of color are still denied such agency. What this discussion of diverse representation and power suggests, culturally, is that despite greater diversity, it is reasonable to assume that institutional and disciplinary cultures are still dominated by the practices, values, and norms of White Men faculty.

Another frequent observation of the obstacles faced by many women faculty and faculty of color are the disproportionate workloads compared to men and White faculty. Women and faculty of color often spend more of their time on teaching, mentoring, advising, and service

work (Allen et al., 2002; O'Meara et al., 2017). For instance, Trinh Võ (2012), as a Woman faculty of color, described the additional emotional and mental effort required to teach certain material, such as content controversial or identity-related material or theories, to White majority students. This balance of work limits their opportunities to produce research or publish in prestigious venues most valued for tenure or by more prestigious institutions (Allen et al., 2002; Trinh Võ, 2012). O'Meara et al. (2017) further noted that women tended to receive a disproportionate number of requests for work activities compared to men faculty and that these requests tended to favor teaching and advising or research or service. Turner (2022) likewise noted the disproportionate diversity-related service work that Women faculty and faculty of color are often expected to take on. Despite the disproportionate workloads, Allen et al. (2002) further found that women faculty and faculty of color tended to be satisfied with their institutions, though they tend to be dissatisfied with resources available to them and with institutional leadership.

Notably, literature on faculty cultures has not considered the role that faculty members' sexual orientations may have in faculty work or in relationship to disciplinary or institutional cultures. This is perhaps not surprising given that Renn (2010), in a literature review of LGBT research, noted that studies on the identities and experiences of LGBT faculty "have been nearly absent" (p. 136) and where they did exist, they were situated in specific fields such as sociology, psychology, and education. Among the three studies cited by Renn, the focus was generally on the experiences of LGBT faculty in these disciplines in relation to the climate of their campuses. Common threads across these three studies suggested that LGBT faculty tended to face some of the same challenges as women faculty and faculty of color, including devaluation of their work and concerns, challenges, or bias with tenure, promotion, and hiring, and isolation or exclusion

(Liddle et al., 1998; Taylor & Raeburn, 1995). Sears (2002) further noted that LGBT faculty members' perceptions of climates depended far more on interpersonal relationships and experiences than on the presence of positive or supportive institutional policies.

Research since Renn's (2010) review describes the experiences of LGBTQ+ faculty largely in similar ways as those of Women faculty and faculty of color. Suggested to be indicative of institutional climates, BrckaLorenz and colleagues (2019) found LGBTQ+ faculty were overrepresented in public, liberal arts, and institutions with very large student enrollments. A more recent qualitative study similarly found LGBT faculty feeling their work was devalued and that positive institutional policies had limited impacts on the overall climate for these faculty (Vaccaro, 2012). Although at least one of Vaccaro's research participants noted a welcoming departmental climate due to a greater presence of lesbian faculty, indicating the power of representation in the academy. In a literature review of the experiences of transgender faculty and students, Siegel (2019) described experiences of transgender faculty that often echo those of other minoritized faculty members such as increased service workloads – e.g., either in a tokenized way or to provide a “trans” perspective on an issue – or devaluing of their work. This is similarly suggested by Vaccaro (2012), who noted they had only one transgender research participants but that the themes coming from their lived experiences largely aligned with those of lesbian and gay faculty in their study. While climates, being focused on the perceptions of the environment in which subjects live or work, do not necessarily equate to faculty cultures, these studies nonetheless highlight similarities across experiences and the challenges faced by women faculty, faculty of color, and LGBT faculty.

Beyond these more intrinsically personal identities, social identities may also be relevant to consider in faculty members' experiences in the academy. For instance, it is not hard to

imagine that faculty members' religious or political identities relating to similar experiences as described above, whether broadly or in localized contexts. However, little research appears to have addressed how faculty work is affected by such social identities. Research on these social identities in higher education often focuses on either student experiences or on faculty in international contexts.

Some final consideration is warranted of identities related to faculty members' employment. In Umbach's (2007a) framework characteristics of employment, such as whether faculty are part-time or full-time or whether they are tenured or tenure-track (versus non-tenure track), are framed as faculty identities that may interact with institutional and disciplinary cultures (or professional cultures, which are not in focus in this study). Certainly, part-time and non-tenure track faculty (often called contingent faculty) are important to consider when examining faculty teaching as the proportion of contingent faculty has increased substantially in recent decades (Ehrenberg, 2012). Notably, full-time faculty increasingly hold doctoral or professional degrees (e.g., M.D., J.D.), while part-time faculty are substantially less likely to hold these degrees (Ehrenberg, 2012; Monks, 2009). Furthermore, Ehrenberg (2012) highlighted that even among full-time faculty with doctoral or terminal professional degrees, the percentage who are not tenured or tenure-track has increased substantially. Monks (2009) further described part-time faculty as being immensely diverse in terms of their backgrounds and motivations for pursuing part-time faculty work. For instance, 65% of part-time faculty surveyed did not want full-time positions at their institutions, and 72% of these faculty (approximately 47% of all part-time faculty) indicated their reason was because the faculty position was not their primary employment.

However, when compared to faculty identities such as race, gender, and sexual orientation, employment characteristics may not rise to the same level of being personally-held identities, particularly as these characteristics are largely controlled at the institutional level (Austin, 1990). The diversity of motivations (Monks, 2009) in particular suggests a lack of a definable identity, or at least substantial difficulty in defining a cohesive identity, around part-time or non-tenure track status. While this difficulty does not negate the value in considering how employment status (part-time or tenure) relates as a personal characteristic with institutional and disciplinary cultures and faculty teaching, in this study I will consider faculty identities as more personally intrinsic and instead treat employment characteristics as a possible expression of institutional culture.

Faculty Teaching (and the Student Experience)

As previously defined, faculty members' teaching is dependent on the contexts in which they teach and necessarily is connected to the students being taught and how students learn (Entwistle, 2009; Marton, 2007). Entwistle (2009) highlighted how teaching can affect learning directly – by presenting content and modeling thinking – or indirectly – by influencing the ways that students approach their learning. This indirect influence of teaching on learning has been the particular focus of institutional efforts in recent decades to improve teaching through a focus on student engagement (Harper & Quaye, 2009; Kuh, 2001). Indeed, failure by educators to tend to teaching's indirect influence on learning can hinder student learning and lead to inequitable outcomes (Harper & Quaye, 2009). Given this understanding of teaching and the sheer breadth of literature on teaching and learning, it is useful to first examine student engagement and the aspects focused on in this study. A discussion of how faculty teaching relates to and influences these aspects of engagement follows.

Student Engagement. In the past few decades, student engagement has come to be conceptualized broadly, with a multitude of definitions. Coates (2006) acknowledged that rather than being a singularly definable concept, student engagement is a broad construct that encompasses a wide array of connotations. However, even the broadest outlines of student engagement hold a core idea that it exists in the interaction between “individuals and things that are critical for their learning” (Coates, 2006, p. 17). In this sense, engagement is not an outcome, per se, but is the mediator of learning, the means through which students’ interactions and experiences result in learning. In a literature review on student engagement, Trowler (2010) noted that two perspectives developed around this conception of student engagement, that of the participation and effort that students put forth (Hu & Kuh, 2002; Kuh et al., 2007) and that of institutions creating the conditions and opportunities to involve students in their learning (Little et al., 2009). Coupling these perspectives, Kuh (2009) defined student engagement as “the time and effort students devote to activities that are empirically linked to desired outcomes of college and what institutions do to induce students to participate in these activities” (p. 683).

Unsurprisingly, there are a wide number of focuses within student engagement, such as on the behavioral, emotional, or cognitive aspects of engagement (Trowler, 2010). While any of these could be a valid focus for examining the how faculty teach for student engagement through a cultural lens, an empirically-derived model by Coates (2006), depicting engagement in learning environments as having related academic and social dimensions, arguably represents key conceptual aspects of engagement in a cultural model of teaching. Per Coates, the academic dimension – acknowledging that learning is the central goal of teaching – reflects the degree that students are actively involved in their learning and see themselves as “legitimate participants in university knowledge communities” that foster and promote their learning (p. 97). Coates’ social

dimension encapsulates the interpersonal aspects of students' communication with others in the learning community and their participation in learning activities.

While Coates (2006) does not necessarily situate these dimensions of engagement within a cultural framework, it is clear that these dimensions are at least compatible with a cultural perspective of teaching and engagement. The academic dimension does not simply view students in isolation but acknowledges and affirms the ways that their environments relate to their academic engagement and learning. In fact, Coates acknowledged the potential importance of socialization in cultural environments, noting that "In addition to becoming more connected with an institutional culture or field of inquiry, having their position in a community recognized may help students validate and value their knowledge, and enhance their confidence and motivation to deal with the uncertainties associated with learning" (p. 133). Such a view makes an intrinsic connection between academic and social dimensions of engagement in a learning environment from a cultural perspective.

Faculty Teaching for Student Engagement. Understanding student engagement in this way offers a way of conceptualizing faculty teaching to focus on the faculty practices, and related cultural norms and attitudes that significantly connect to student engagement and consequently learning. Through such teaching faculty would seek to create classroom cultures that actively engage students in the disciplinary knowledge and practices that represent those disciplinary communities and seek to do so in ways that allow students to meaningfully communicate and interact with faculty, as disciplinary experts, and with fellow students. Such teaching would be meaningfully influenced by the cultures to which faculty belong, and Coates (2006) acknowledged that "different fields of study would evoke different opportunities for and patterns of engagement" (p. 115). While Coates focused on such variation across disciplinary

cultures, applying Umbach's (2007a) cultural framework would likewise imply that different institutional cultures would to some extent affect teaching and student experiences similarly.

The approaches to teaching framework and the similar conceptions of teaching are two ways that scholarship on teaching has identified how faculty teaching does or does not create cultures conducive to this framing of student engagement. The approaches to teaching framework, as developed from the qualitative, phenomenographic work of Trigwell et al. (1994) and Trigwell and Prosser (1996a), indicates that faculty adopt one of five approaches in their teaching, consisting of their intentions, strategies, and practices, which can be generalized as teacher-focused approaches, student-focused approaches, or a blend of the two. A core feature of teacher-focused approaches is that faculty assume students do not need to be active in the learning environment, and that it is sufficient for student learning for the teacher to transmit disciplinary knowledge and practices (with or without the connections between them) by telling students about them. Student-focused approaches assume that students must be actively involved in constructing their learning, and place emphasis on students communicating with each other rather than only listening to the teacher. In a parallel framework, Kember and Gow (1994) described two broad conceptions of teaching that relate to how faculty teach: knowledge transmission and learning facilitation. Though not conceptually the same as the teacher-focused and student-focused approaches, respectively, they largely align. Conceptually, faculty adopting a learning facilitation conception, which focuses on guiding and motivating student involvement in their own learning, would be likely to adopt student-focused approaches to teaching.

As Umbach's (2007a) framework does not offer a particular conceptualization of teaching or how it relates to students' experience in the classroom, these framings of teaching offer a pathway to understanding that relationship. Important benefits of applying these or

similar framings of teaching to Umbach's framework are that they are particularly focused on the underpinnings of teachers' classroom practices (e.g., a faculty member with a teacher-focused approach is likely to engage teaching practices that are significantly different from those of a faculty member with a student-focused approach) and that they make clear connections to intended student actions or practices in the classroom. A potential drawback of these frameworks is that by being focused on interactions and practices, they may overlook other potential ways that cultures influence teaching, and in turn student learning.

Research on approaches to and conceptions of teaching further connects these frameworks to student engagement in approaches to learning, which arguably represents Coates' (2006) academic dimension of engagement. The approaches to learning framework, which has been argued or considered to be an aspect of student engagement (Nelson Laird et al., 2005; Trowler, 2010), identifies several approaches by which students engage in the process of learning, the two most commonly identified being deep and surface approaches (Biggs, 1987; Entwistle, 2018; Marton & Säljö, 1976a, 1976b). These deep approaches, where students seek to understand deeper conceptual meanings and connections between ideas rather than simply memorizing surface-level details, have been positively linked to improved student learning. The learning facilitation conception of teaching and student-focused approaches to teaching have both been linked to students' use of deep approaches to learning (Kember & Gow, 1994; Trigwell & Prosser, 1996b; Trigwell et al. 1999). As faculty focus on making students active in the learning process, they structure their teaching practices, course interactions, activities, assignments, and assessments in a way that encourages students to move beyond simple memorization and repetition.

It is clear that approaches to and conceptions of teaching further align with Coates' social dimension of engagement, which could be represented by collaborative learning. When defined broadly as learning that requires students to actively work with others (Goodsell et al., 1992), then student-centered approaches to teaching are likely to involve some degree of collaborative learning as these approaches place greater weight on student-to-student interactions and making students key actors in classroom interactions, rather than having communication directed at or through the teacher (Trigwell et al., 1994; Trigwell & Prosser, 1996a). Falcione et al (2019), in an autoethnographic study, found that the ways in which faculty emphasized collaborative learning related to how students then perceived their experiences with collaborative learning, similarly to how Trigwell and colleagues (1999) found that faculty members' use of different approaches to teaching aligned with how students perceived their learning experiences.

While the frameworks for understanding faculty teaching were not developed from a cultural perspective, there is some evidence to suggest that they can be culturally-influenced. For instance, Prosser and Trigwell's (1997) qualitative study, examining what faculty thought affected their teaching, revealed that faculty perceptions of their teaching environment, such as how much control faculty believed they had over what and how to teach, whether their institution or department valued teaching, and even class sizes, related to the approaches to teaching they adopted. Such aspects of the teaching environment can clearly vary across disciplinary and institutional cultures. Some faculty may feel that their disciplinary norms give them little flexibility in the content of their courses, and institutions have clear control over class sizes. While these two frameworks are certainly not the only way to conceptualize teaching, nor how teaching relates to student engagement, they offer a useful framing for understanding how

teaching can meaningfully influence student engagement, as represented by deep approaches to learning and collaborative learning.

Examining the Influences of Cultures and Identity on Faculty Teaching

Having laid out the theoretical and conceptual basis of this study, it is further important to consider the available empirical literature that has examined how institutional and disciplinary cultures and faculty identities relate to faculty teaching. Given the discussion above about the close links between teaching and learning, the following sections include empirical literature, where available, that examines both faculty teaching and student engagement in deep approaches to learning and collaborative learning. Notably this literature is often limited, both in the number of empirical studies that have examined these issues as well as in the scope of studies.

Disciplinary Cultures and Teaching

Commensurate with the literature noting that disciplinary cultures are often the more dominant among faculty (Clark, 1987), a fair amount of research has examined disciplinary differences in teaching and student engagement. As noted by Umbach (2007a), this research most commonly examines such variations using either Holland's theory or using Biglan's dimensions (or Becher's, 1989, categorization using Biglan's dimensions). While this research is in focus here, it is useful to also consider several studies that have examined disciplinary differences in teaching and student engagement by other means.

Scholars not using Holland or Biglan to examine disciplinary differences generally have used no framework at all, assessing differences directly across different subjects (or groups of subjects, e.g., humanities, STEM), departments, or school/faculties. Mayhew et al. (2012) grouped disciplines into either STEM/health sciences or humanities/social sciences/education/business to examine the impact of deep approaches to learning on students'

moral reasoning but did not find any significant differences across the disciplinary groups. Parpala et al. (2010) studied differences across schools/faculties in students' approaches to learning, finding that, for instance the Faculties of Social and of Behavioral Sciences had students who most prevalently exhibited deep approaches to learning. Interestingly, while Parpala and colleagues did not draw on a disciplinary framework, they did interpret their findings using Biglan's hard/soft dimension. Hativa and Birenbaum (2000) considered disciplinary differences in students' preferences of teaching approaches, sampling students in education and engineering, who tend to experience student-focused or teacher-focused approaches, respectively. They found that students tended to prefer teaching approaches that they were less exposed to (e.g., education student preferring more teacher-focused approaches), but that these differences were still small. Norton et al. (2005) considered differences in teaching intentions and beliefs across arts, sciences, and social sciences, finding broad differences in teaching beliefs.

Studies of this nature are suggestive of the difficulty in not using a framework to examine disciplinary cultures, whether student engagement or teaching is in focus. Though Parpala et al. (2010) were able to partially apply Biglan's dimensions in interpreting the potential cultural effects of soft disciplines, it appears that not integrating the framework into the study prevented a fuller understanding of the cultural effects on student engagement. Not using a framework, such as in Mayhew et al. (2012) or Hativa and Birenbaum (2000) also leads to the possibility that disciplines are compared in ways that are not especially meaningful or in ways that may obscure potential cultural effects. For instance, while Hativa and Birenbaum found some differences between education and engineering students in their preferred teaching approaches, they ultimately concluded that the differences were not especially meaningful. Though none of these

studies explicitly applied a cultural perspective, Norton et al. (2005) attempted to connect the disciplinary differences they found across arts, sciences, and social sciences to literature suggesting cultural differences in how disciplines conceive of teaching.

As suggested by Umbach (2007a), higher education literature has only more recently adopted Holland's theory as a means of examining disciplinary cultures, though several older studies are worth considering here. Peters (1974) and Morstain and Stark (1976) both examined faculty teaching orientations using Holland's theory, finding similar differences. Peters (1974) found that faculty in Artistic and Social disciplines more often utilized student-centered approaches and activities, and Morstain and Stark (1976) found that faculty in these same disciplines sought to facilitate student learning by creating a more collegial environment in which students could work more independently. Both of these studies found that faculty in Realistic and Investigative disciplines preferred more structured, teacher-centered approaches. A consideration of Realistic and Investigative disciplinary cultures suggests that among other possible explanations, these cultures tend to avoid or at least do not emphasize social or interpersonal activities (Pike et al., 2012), which aligns with their emphasis on teacher-focused teaching approaches.

Additional scholars have used Holland's theory to examine disciplinary differences using the Faculty Survey of Student Engagement (FSSE) in faculty emphases on multiple areas of student engagement (Umbach, 2006; Umbach, 2007b³, as discussed in Umbach 2007a), and in course teaching objectives (Smart & Umbach, 2007). In two studies, Umbach (2006, 2007b) found multiple similar disciplinary variations in faculty-student interactions and how faculty

³ Umbach (2007b) included Holland disciplinary environments in full statistical models included as an appendix on the article but did not discuss these results in text. Umbach (2007a) discussed these discipline-related results. In discussion of these results, I will cite the original study (Umbach, 2007b).

employed or emphasized active and collaborative learning, higher-order cognitive activities, diversity-related activities, and time spent on course preparation. For instance, considering academic and social dimensions of engagement, faculty in Realistic, Investigative, and Conventional disciplines employ active and collaborative learning the least, while faculty in the latter two disciplines also emphasize higher-order cognitive activities the least. While these two studies included disciplinary differences, their primary purposes were to examine the teaching of faculty of color (Umbach, 2006) and contingent faculty (Umbach, 2007b); however, their statistical analyses did not examine disciplinary differences amongst these groups of faculty, thus conclusions about how these faculty identities interact with disciplinary cultures cannot be made. Smart and Umbach (2007) also observed significant differences in how faculty structure course teaching objectives, in particular finding that objectives in Artistic, Social, and Enterprising disciplines place greater focus on understanding people, faculty in Enterprising disciplines focus on career and communication skills, and that Investigative faculty emphasize quantitative analysis.

Pike et al. (2012) similarly used Holland disciplinary environments to investigate how student engagement mediates between disciplines and student learning outcomes. While their findings showed multiple significant relationships between disciplines, areas of engagement, and outcomes that Holland's theory suggests should be congruent (e.g., students in Investigative disciplines should show stronger positive relationships with Investigative outcomes), only for students in Enterprising disciplines did student engagement mediate between the disciplinary environment and outcomes. Despite this mix of results and the limited ability to make true causal inferences, the authors noted the significance of the findings in affirming the socializing effect of Holland academic environments.

Taken together, though these scholars did not explicitly employ a cultural perspective, their findings suggest that Holland's theory significantly differentiates disciplinary cultures as they relate to faculty teaching and student engagement. Interestingly, given that Holland's theory indicates that disciplinary cultures are shaped by the dominant personality types of their members, these findings possibly suggest that disciplinary cultures are self-reinforcing. Faculty teach in ways that align with their disciplinary cultures which are shaped by those cultures' dominant personalities, this teaching in turn shapes the engagement of students, some of whom will continue on to become future faculty. While on its face this seems to contradict accepted understandings of cultures as constantly evolving (e.g., Kuh & Whitt, 1988), it is more indicative of the fact that cultural change is often slow. Given the general dominance of White faculty (particularly White men faculty) in institutions and disciplines, the implication here is that the socialization of women faculty and faculty of color may more often than not resemble acculturation to White male disciplinary cultures, as suggested by Tierney and Rhoads (1993). Taken together, it is reasonable that disciplines that have for longer had more diverse faculty may have cultures less dominated by White male values, practices, and attitudes, compared with disciplines whose faculty have only more recently diversified. While this evidence aligns with Umbach's (2007a) cultural model of teaching, it is important to remember that Holland's theory can only offer insights into cultural influences to the extent that culture is reflective of individuals' personalities, presenting a potentially narrow conceptualization of culture.

A greater amount of work has studied disciplinary cultures with regard to teaching and engagement using one or more of Biglan's dimensions or using Becher's (1989) categorization using Biglan's hard/soft and pure/applied dimensions. Lattuca and Stark (1995) framed their analysis of reports from disciplinary task forces charged by the American Association of

Colleges to develop more coherent curricula using Biglan's hard/soft dimension (they note all disciplines included were pure disciplines and none were applied). Their analysis indicates that hard-pure disciplinary curricula were largely uniform, featuring little discussion and learning focused on facts, principles, and concepts. Soft-pure curricula, on the other hand, tended to be diverse, feature significant discussion and moved beyond learning facts and concepts to developing higher thinking skills. Smart and Ethington (1995) examined differences in undergraduate education goals (categorized as knowledge acquisition, application, or integration) using all three of Biglan's dimensions. While they found no significant differences on the life/non-life dimension, multiple other differences emerged. They found that hard disciplines emphasized knowledge application, while soft disciplines focused on acquisition and integration, which they believed may relate to hard disciplines having more highly developed paradigms around knowledge and inquiry. Additionally, Smart and Ethington found that pure disciplines emphasized knowledge acquisition, while applied disciplines valued knowledge integration and application – relationships they believed indicative of notion that pure disciplines value knowledge in itself.

Braxton's work (1993, 1995; Braxton et al., 1998) largely centered on the paradigmatic development captured by Biglan's hard/soft dimension. Braxton (1993) examined the relationship between admissions selectivity and the academic rigor of course exams, finding that faculty in soft disciplines tend to require higher levels of thinking on exams, though their method of considering disciplinary differences is perhaps limited by using only four disciplines (two hard, two soft). Synthesizing the research on disciplinary differences, Braxton (1995) concluded that soft disciplines, tending toward discursive, active, student-centered learning, are more likely to demonstrate success in improving student learning. Braxton et al. (1998) tested this "affinity

discipline” hypothesis on Chickering and Gamson’s (1987) seven principles of good practice, concluding that faculty in soft disciplines are significantly more likely to promote student-faculty contact and active learning, to communicate high expectations of student work, and to show respect for diverse ways of knowing.

Several scholars have also examined disciplinary differences in faculty approaches to teaching and faculty teaching practices. Lindblom-Ylänne et al. (2006) analyzed disciplines using Biglan’s hard/soft and pure/applied dimensions, finding that faculty in soft disciplines (pure or applied) were more likely than faculty in hard disciplines (pure or applied) to use student-focused approaches. Their analysis also suggested that the majority of variation was seen on the hard/soft dimension, with the pure/applied dimension showing little to no differences. Nelson Laird et al. (2008) and Nelson Laird and Garver (2010) explored disciplinary differences in how faculty emphasize deep approaches to learning in their courses using all three of Biglan’s dimensions, and in both studies researchers broadly found that faculty in soft disciplines emphasize deep approaches significantly more than in hard disciplines. Nelson Laird et al. (2008) found, and Nelson Laird and Garver’s (2010) findings suggested, that the hard/soft dimension had the greatest explanatory power compared to the pure/applied and life/non-life dimensions. Nelson Laird and Garver (2010) further considered the interaction of discipline with whether courses met a General Education requirement, suggesting an additional cultural aspect, and found that faculty teaching General Education courses tend to place greater emphasis on deep approaches, and though disciplinary cultures appear to moderate this effect, it is consistent across disciplines. Nelson Laird et al. (2008) also considered how faculty emphasis on deep approaches compared to disciplinary differences in student use of deep approaches, with

differences tending to be (though not always) consistent across disciplines for faculty and students.

While much of this literature on disciplinary differences does not explicitly use a cultural perspective to understanding disciplines and their effects on teaching and student engagement, many of these findings can be broadly interpreted using Umbach's (2007a) cultural framework. These findings tend to indicate that using a framework to understanding disciplinary cultures, whether Biglan's, Holland's or presumably another, allows for a clearer understanding of what aspects of disciplinary cultures affect teaching and engagement and allow for interpretations or hypotheses of how. Studies that do not use a framework (e.g., using individual subjects such as English or groups such as STEM) may allow for the identification of differences, but must rely on interpreting the findings through additional literature to consider why differences exist. Even when such interpretations seem probable (e.g., Parpala et al., 2010), they fail to add much to the literature on disciplinary cultures. Not only does using a framework allow for more direct consideration of different aspects of disciplinary cultures, but taken together, these studies logically demonstrate, for instance, that using all three Biglan dimensions results in greater nuance in understanding the relationships between disciplinary cultures and teaching and engagement.

In terms of college teaching and learning, this literature indicates that certain cultural beliefs and practices, such as having low consensus about the scope, boundaries, and methods of knowledge and inquiry, fairly consistently relate to more active, student-centered, and collaborative classrooms and courses that tend to value and emphasize higher-order, more meaningful ways of thinking. Though Holland's environments reflect different cultural values, beliefs, and practices, a comparison of how research has commonly categorized disciplines using

Biglan and Holland (Biglan, 1973b; Malaney, 1986; Nelson Laird et al., 2008; Pike, 2006), reveals substantial overlap in categories (e.g., Investigative disciplines are predominantly hard-pure, while Social disciplines are most commonly soft-applied). By relying on Biglan and Holland, this literature has largely confined study of disciplinary cultures to those cultural beliefs, values, and practices captured in those frameworks; however, they have been applied to a variety of aspects of teaching and student engagement or applied to similar aspects in different ways.

Institutional Cultures and Teaching

Attention has also been given to relationships between institutional cultures, college teaching, and student engagement, though, arguably less empirical attention than has been given to disciplinary cultures. As noted previously, the literature has most commonly understood institutional cultures through the missions and goals of the institutions, which are seen as significantly shaping the cultures of institutions in ways that impact faculty teaching (Austin, 1990). As such, the overwhelming majority of this literature distinguishes between institutional cultures by using the Carnegie Classifications or broader types of institutions (e.g. research, liberal arts, etc.).

Perhaps among the broadest impacts of culture on teaching is the way that institutional missions influence the balance between research and teaching, as arguably the two most dominant missions of higher education institutions. Multiple early scholars made the clear connection that institutions which emphasize teaching will tend to provide faculty greater time and resources for teaching and reward teaching over other tasks (Austin, 1990, 1996; Clark, 1962, 1987; Kuh & Whitt, 1988). These scholars identified this mission and its cultural effects with liberal arts colleges. Scholars have found that faculty at liberal arts colleges engage in

teaching and student-faculty interactions that are oriented toward good practices in undergraduate education (Pascarella & Terenzini, 2005; Pascarella et al., 2005). Oppositely, scholars have indicated that institutions that place greater emphasis on research activities, research universities being at this end of the teaching-research balance, have faculty who more often tend to identify with their discipline over the institution and who have lighter overall teaching loads (with teaching often focusing on graduate students) (Austin, 1990, 1996; Clark, 1962, 1987; Kuh & Whitt, 1988).

Beyond these logical connections, Clark (1962) suggested that state schools and community colleges align closer to liberal arts colleges with heavy emphases on teaching, and to a lesser extent service missions. Certainly, though, all of these institutional types are likely to have some degree of variation within them, as for instance state colleges and universities would span a wide range of missions that variably focus on teaching over research or vice versa. For instance, Perry et al. (1997) and Perry et al. (2000) have found that faculty at state universities and colleges often bear competing emphases in research and teaching, creating cultures that result in high teaching loads and increased expectations for research productivity. Indeed, Kezar and Kinzie (2006), in examining how institutional missions create environments for student engagement, found that though institutional differences are observable across broad institutional types (e.g., finding that active and collaborative learning tends to be enacted at research universities through learning communities vs. via service learning at liberal arts schools), closer observation of the unique missions of schools reveals even richer differences.

Scholars have also examined institutional cultures by using the Carnegie Classifications to distinguish mission. Looking at undergraduate education goals, Smart and Ethington (1995) found that faculty in liberal arts colleges emphasized knowledge acquisition and integration more

than faculty in research, comprehensive, or two-year institutions, and that faculty at two-year institutions emphasized knowledge application more than faculty at the other institutions. Faculty at liberal arts colleges also demonstrated behaviors and attitudes that promoted student engagement in active and collaborative learning, higher-order activities, and other areas of student engagement significantly more than faculty at other Carnegie type institutions (Umbach & Wawrzynski, 2005). However, Umbach and Wawrzynski also demonstrated that after adding additional institutional variables such as sector (public/private), location, selectivity, and size, many of these relationships were either no longer significant or were reduced, except for those on higher-order activities. This is particularly notable. If these additional variables are construed as additional facets of institutional culture or otherwise indicative of culture, these findings highlight that institutional cultures may not impact all teaching practices, behaviors, attitudes, etc., or aspects of engagement in the same way.

Umbach (2007b) also examined institutional differences in contingent faculty practices using Carnegie Classifications, with findings generally aligning with other research on institutional differences, and by examining the proportion of contingent faculty as an institution-level characteristic. Umbach found little evidence to suggest that the proportion of contingent faculty (defined as part- or full-time faculty who were tenure-ineligible) influenced faculty teaching on average across institutions. Umbach further found that faculty at liberal arts colleges interact with students more frequently than at most other institution types (except Baccalaureate-General). Faculty at liberal arts colleges also emphasized active and collaborative learning and greater academic challenge than faculty at most other institution types. A notable exception is that faculty at minority-serving institutions emphasized these good practices more so than faculty

at liberal arts colleges or differences between the two institution types were not significant (Umbach, 2007b).

In a study that examined the practices of faculty of color, Umbach (2006) demonstrated similar findings for faculty emphasis on active and collaborative learning and higher-order thinking using Carnegie Classifications (although minority-serving institutions are included in statistical models with “other institution types”). Despite this methodological limitation, coupled with evidence in Umbach’s (2006) work that faculty of color tend to emphasize these practices more so than White faculty, this evidence suggests that the cultures of minority-serving institutions reflect the practices of their faculty. This would also align with Umbach’s (2007a) definition of culture based on Kuh and Whitt (1988) which suggests that cultures evolve and develop from the socialization of their members and from their experiences. If faculty of color emphasize teaching practices that align with student engagement, it follows that institutions where faculty of color are the dominant cultural members (or at least are not marginalized) – i.e. minority-serving institutions – would adopt these cultural values of effective teaching. Examining institutional cultures, then, may benefit from considering their overall faculty characteristics and diversity.

Institutional differences in student engagement are examined in two additional studies, with McCormick et al. (2009) using two versions (2000 and 2005) of the Carnegie Classifications and Porter (2006) using variables aligning with those used in the Carnegie Classifications as well as variables he theorizes to be more appropriate for examining student engagement. McCormick et al.’s (2009) findings suggested that both versions of Carnegie Classifications have relatively similar explanatory power in distinguishing between types of institutions. In particular, findings generally aligned with prior research on faculty practices, with

students at liberal arts colleges tending to be most engaged in indicators of academic challenge, active and collaborative learning (though in McCormick et al.'s work, liberal arts schools are not significantly different than Baccalaureate-General/Diverse Fields schools), with more frequent student-faculty interactions. Porter (2006) argued that the variables used for the Carnegie Classifications make them a poor fit for understanding institutional differences in student engagement, offering more appropriate alternatives (see prior discussion). Notably, statistical models using variables aligned with those in the Carnegie Classifications (e.g., student enrollment size, student-faculty ratio) explained approximately the same proportion of variance as Porter's proposed variables (e.g., faculty per acre, number of majors). The significance of Porter's proposed variables likewise broadly aligns with prior research. For instance, greater faculty density positively relating to increased student engagement may align with findings of better engagement at liberal arts colleges, while greater numbers of majors and greater proportions of Ph.D. students being negatively related to students' engagement aligning with findings that students at research institutions have generally lower levels of engagement.

While Porter's (2006) purpose was to explicitly investigate alternatives to defining institutional mission by the Carnegie Classification, other research also implicitly provides some evidence of cultural indicators that do not distinguish institutions very well in terms of faculty teaching. Pascarella et al. (2006) examined the relationship between institutional selectivity and student engagement in good practices for undergraduate education, finding that though higher selectivity was often significantly related (positively or negatively) with student engagement in good practices, the effects were not particularly strong. For instance, the strongest relationship between several indicators of selectivity was with having high academic expectations, but even this only accounted for 1-3% of variation. If selectivity is a good proxy measure of institutional

quality (or a cultural emphasis on quality), as the authors argue, their work suggests that other aspects of institutional and other cultures may play a greater role. Cox et al. (2011) investigated whether institutional policies served to create cultures that valued teaching and whether such cultures then related to faculty using effective teaching practices. However, perhaps related to limitations in how they measure institutional policies and a culture of teaching, cultures of teaching did not appear related to institutional policies that might be intended to create such cultures, and evidence that either of these positively related to faculty use of effective practices was mixed.

As with research on disciplinary differences, scholars researching institutional differences have not explicitly applied a cultural perspective, however, their findings can be understood as distinguishing to some degree between institutional cultures. As discussed previously, the use of Carnegie Classifications is often used in research to identify differences by institutional mission. The literature presented here offers fairly consistent evidence that the missions, as represented by the Carnegie Classifications, of liberal arts colleges are significantly distinct from the missions of research institutions and that these missions tend to have opposite effects on faculty teaching practice and student engagement. However, the use of the Carnegie Classifications potentially obscures how institutional cultures relate to faculty teaching as some variables used to create the classifications may have unclear conceptual connections to teaching. For instance, the balance between research and teaching is a common focal point, but Porter (2006) suggested that, in terms of teaching and engagement, the accessibility of faculty to students is the more direct concern and that traditional measures of research activity do not appropriately address this dynamic. As suggested by Porter's work, while Carnegie Classifications may relate to institutional cultures that affect teaching – even if by measuring cultural aspects that are only

indirectly indicative of impacts on teaching, such as research funding – research on other cultural aspects of institutions is lacking.

Despite this methodological limitation of the literature, it seems clear from the evidence, that the distinct cultures that form at institutions significantly affect faculty teaching and student engagement. The variables used to compose the Carnegie Classifications would appear to suggest through this research that smaller, less research-oriented schools have faculty that more often employ teaching practices that promote student engagement. The literature has considered a variety of teaching practices that align with student engagement in multiple areas including active and collaborative learning, higher-order thinking, and student-faculty interactions.

Faculty Identities and Teaching

Compared to examinations of the relationships between institutional cultures, disciplinary cultures, and teaching, scholars have only begun in the last two decades to understand how faculty members' identities relate to their teaching. Much attention has been given to understanding disparities in student evaluations of teaching, particularly by race and gender (e.g., Benton & Cashin, 2014; Kogan et al., 2010; Smith, 2009). However, student perceptions and ratings of faculty teaching are not the focus in this study. Still, it is notable, as is the case with research on faculty identities and teaching, that much work that has been done generally does not take into consideration the cultural contexts (e.g., institutional, disciplinary) of the faculty teaching.

Research has suggested that institutions with greater faculty racial diversity are more likely to see faculty using a wide array of teaching practices (Hurtado, 2001). While this may relate to institutional cultures, another possibility is simply that faculty of color are more likely than white faculty to incorporate new or different teaching practices than their colleagues.

Umbach (2006) highlighted that surprisingly little research to that point had examined the relationship between faculty racial identities and teaching practices. Research looking at faculty use of effective teaching practices has shown that faculty of color do engage in effective teaching practices more often than White faculty. Umbach (2006) and Umbach and Wawrzynski (2005) found, for example, that all faculty of color groups used active and collaborative learning practices more often than their White colleagues, and most faculty of color also placed greater emphasis on higher-order learning in their teaching than White faculty.

Looking at how teaching practices vary by faculty members' gender identity is equally important. Goodwin and Stevens (1993) examined gender differences in what faculty considered to be "good teaching," and found fewer than expected gender differences. Men and women faculty both placed emphasis on cognitive outcomes, and no differences by gender were found in the types of teaching activities (e.g., lecture, discussion). Among the few differences found were that women faculty encouraged student interactions to a greater extent and showed more interest in seeking help from or consulting with others about their teaching. In contrast though, Nelson Laird et al. (2011) did find a small difference in the amount of time faculty spent on lecture, with women faculty spending less time lecturing and more time on active learning activities. Nelson Laird et al. further found that gender differences in teaching varied across course contexts, for instance, women faculty in life fields (as categorized using Biglan) favored lecturing more than women in non-life fields and still less than men in both life and non-life fields.

Literature examining faculty members' identities and their teaching is surprisingly limited when focusing on how teaching practices vary across identities. The literature that does exist focuses largely on faculty members' race and gender. Similar literature that considers how faculty teaching practices vary across faculty members' sexual orientations, for example, is

currently limited as this literature more often focuses instead on qualitative studies considering LGBTQ+ faculty members' teaching experiences, identity development, or their positionality in the classroom. However, BrckaLorenz et al. (2019) examined differences between LGBTQ+ faculty and non-LGBTQ+ faculty with regard to teaching practices. Their findings suggested that LGBTQ+ faculty tended to place greater importance on reflective and integrative learning and discussions with diverse others in the classroom while also placing greater importance on institutions providing supportive environments to students, compared to straight faculty. Their findings also suggested that LGBTQ+ faculty tended to spend more time in research, creative, or scholarly activities as well as service activities compared to straight faculty, while spending a moderate amount of time on teaching.

Though I treat faculty employment characteristics as expressions of institutional cultures in this study, as discussed previously, it is worth briefly considering how these characteristics, such as part-time status or tenure status, relate at the individual faculty level to faculty teaching. Umbach (2007b) found that part-time status and to a lesser extent full-time tenure-ineligible status was negatively related to faculty teaching. Part-time faculty placed significantly less importance or emphasis on active and collaborative learning, academic challenge, and faculty-student interactions, while also spending significantly less time preparing for courses. Full-time tenure-ineligible faculty showed similar relationships with emphasis on academic challenge, time spent preparing for courses, and non-class related faculty-student interactions. However, in a qualitative study, Kimmel and Fairchild (2017) found that part-time instructors viewed themselves as student-focused. Given their cited interview evidence, their finding may be more indicative of the fact that part-time faculty are often focused solely on teaching and that many take part-time positions due to an interest in teaching (Hoyt, 2012).

Intersections of Culture and Identity and the Effect on Teaching

The literature reviewed has outlined Umbach's (2007a) cultural framework of college teaching and detailed the conceptual underpinnings of the framework's components and it subsequently considered empirical research related to institutional and disciplinary cultures, faculty identities, and teaching (or student engagement). Research on disciplinary cultures has been dominated by the use of Biglan's dimensions and Holland's theory to understand the beliefs, values, behaviors, and practices that distinguish different disciplines. Scholars who have examined institutional differences have largely used the Carnegie Classification or institutional types to represent the effects of schools' missions on teaching and engagement. While Biglan's dimensions and Holland's theory represent aspects of disciplinary cultures that can be argued to directly affect their teaching – such as the consensus around appropriate methods of inquiry and practice or the socializing nature of disciplines, respectively – Porter (2006) argued that the Carnegie Classifications and the commonly used institutional variables it draws upon (e.g., enrollment, research funding, proportion of graduate students) overly simplify and may poorly represent schools' missions, particularly for how they may impact students. The literature, whether using the Carnegie Classifications or institutional types, has been relatively consistent in its findings on the impacts of these on teaching and student engagement, however, from a cultural perspective there may be more appropriate aspects of institutional cultures. Though Umbach (2007a) suggests the Carnegie Classifications as a measure of mission in his cultural framework of faculty teaching, variables that more directly consider how missions relate to teaching, for example examining the use of faculty time (BrckaLorenz et al., 2018), may provide a better understanding of how the research-teaching balance impacts the ways that faculty teach. The evidence from Umbach's (2006, 2007b) work, as discussed, further suggests a need to

consider the composition and diversity of faculty as an aspect reflective of institutional culture. If greater faculty diversity indeed relates to more effective teaching practices, then efforts to improve faculty diversity take on even greater importance for improving student engagement and learning.

Perhaps the clearest area of neglect in the research on the effects of disciplinary and institutional cultures on faculty teaching is in examining how the cultures interact and to what extent these interactions relate to differences in teaching. Umbach (2007a) indicated that where cultures overlap, they affect one another. For instance, a faculty member's disciplinary culture may put little emphasis on teaching while their institutional culture is teaching-focused. While this may serve as a more dramatic example, it is surely not uncommon, and yet the research does not provide any empirical evidence that allows researchers, administrators, faculty, or faculty teaching developers to understand how the interactions of these cultures can affect teaching. Certainly, this call is not a new one; Lattuca and Stark (1995), in discussing curricular reform, advised that "Those who attempt to lead curriculum reform in colleges and universities may be more successful if they recognize both the strength of the disciplinary cultures and the campus contextual factors that make faculty redefine discipline cultures to meet local needs" (p. 340). However, research has not sufficiently examined what happens to teaching where these cultures intersect. As Umbach's (2007a) framework suggests that a cultural perspective on teaching heavily implicates students' engagement, this may be an appropriate area to focus efforts to understand the intersection of disciplinary and institutional cultures.

As recent curricular improvement efforts have greatly emphasized diversity, equity, and inclusion, both for students in the classroom as well as for faculty, it would also prove valuable to understand how these disciplinary and institutional cultures relate to faculty members'

identities. While they spoke in terms of understanding disciplinary variations, Smart and Umbach (2007) importantly reminded scholars “not to consider faculty as a monolithic entity, but as a diverse collective with varying professional interests, attitudes, and values” (p. 191). Just as faculty of one discipline may be socialized in different institutions to adopt varying values and practices, so too might faculty of different identities be socialized differently in disciplinary and institutional cultures. Situated within this literature, I detail in the following chapter the methods that will be used to examine the proposed research questions.

Chapter 3: Methods

In this chapter I detail the methods and analytical approach that were used to examine the relationships between institutional and disciplinary faculty cultures, their intersections, faculty teaching practices, and faculty identities. To answer the research questions, a quantitative approach, using cross-classified multilevel modelling, was applied to broadly examine the nature and extent of these relationships. This chapter includes five key elements: a) data sources, b) sample selection and description, c) measures, d) analytic method, and e) study limitations.

Data Sources

I draw on two secondary data sources to examine the research questions. The main data source is the Faculty Survey of Student Engagement (FSSE), a faculty-oriented companion survey to the student-oriented National Survey of Student Engagement (NSSE). As detailed below, FSSE is well-suited for a large-scale quantitative study of the proposed research questions as it provides data on faculty teaching practices as well as faculty characteristics, including institutional and disciplinary memberships. To better examine faculty institutional cultures, additional institutional data are drawn from the U.S. Department of Education National Center for Education Statistics's Integrated Postsecondary Education Data System (IPEDS).

Faculty Survey of Student Engagement (FSSE)

As a companion to NSSE, FSSE is intended to better understand the instructional side of student engagement. Administered to faculty and instructional staff⁴ at four-year higher education institutions, FSSE examines faculty perceptions and use of educational practices research has linked to positive student learning and engagement, as well as how faculty use their time on professional activities (e.g., research, teaching) and how institutions emphasize different

⁴ Hereafter referred to as “faculty” or “faculty members” in the context of FSSE and its respondents.

activities (FSSE, n.d.a, 2020). FSSE data are intended to be a “catalyst for productive discussions related to teaching, learning, and the quality of students’ educational experiences” (FSSE, 2020, p. 1). Facilitating these discussions, FSSE organizes core survey items into 10 indicators within four themes that parallel NSSE’s engagement indicators: academic challenge, learning with peers, experiences with faculty, and campus environment (FSSE, n.d.b). FSSE also includes items regarding faculty activities (e.g., use of time in research, teaching activities, etc.) and teaching or course structure (e.g., course goals, use of class time; FSSE, 2019). Though faculty respondents may teach both undergraduate and graduate level courses, many of the items ask faculty to respond with regard to one particular undergraduate course that they taught that academic year, anchoring many items on teaching practices to a specific course context.

Appendix A includes the complete FSSE survey instrument.

Integrated Postsecondary Education Data System (IPEDS)

Data from FSSE are supplemented with institutional data from IPEDS. Per federal law, all U.S. higher education institutions that participate in federal student financial aid programs must submit data to IPEDS each year. IPEDS data are collected through a series of surveys regarding enrollments and student characteristics, degree or credential completions, costs of attendance and financial aid, faculty⁵ and staff, and institutional finances (IPEDS, n.d.b). The breadth of the dataset makes it well-suited to understanding variation among U.S. higher education institutions.

Sample Selection and Description

To examine the research questions, I used a five-year sample of faculty who responded to the 2015 to 2019 administrations of FSSE. This timeframe was chosen to avoid the potential for

⁵ As with FSSE, faculty and instructional staff are hereafter referred to as “faculty” in reference to IPEDS data.

confounding influences due to the COVID-19 pandemic which most prominently affected faculty teaching by changing the mode of instruction (e.g., in-person in classroom to synchronous virtual instruction) for numerous faculty starting in spring 2020 (FSSE is administered in the spring). Institutions self-select to administer the survey among a sample of faculty that they select (FSSE, n.d.a). In the 2015 to 2019 FSSE administrations, a total of 387 U.S. and Canadian institutions participated, with over 50,000 faculty respondents representing 138 disciplines. The five-year sample includes only unduplicated⁶ institutions and faculty respondents. These data are supplemented with institutional data from IPEDS.

With a focus on understanding institutional and disciplinary cultures, only institutions and disciplines that have complete data for institution- and discipline-level measures were included in the final sample. Institutions outside of the U.S. were excluded from the final sample as were faculty with incomplete data for the measures described in the following section. The final sample included approximately 30,000 faculty members from 322 institutions, representing 121 disciplines. The following sections provide additional detail about the final sample, with particular attention to faculty identities, institutional, and disciplinary characteristics.

Group Sample Sizes

Given the structure of multilevel modeling (see “Analytic Method” below for detail), attention must be paid to the sample size at both the individual level as well as at the group levels to ensure unbiased parameter estimates (Chung et al., 2018). For a cross-classified model when faculty are members of both institutions and disciplines, this means ensuring that there are sufficient numbers of institutions and disciplines as well as that there are a sufficient number of faculty within institutions and disciplines. Research does not indicate a set rule for sample sizes.

⁶ Since faculty respondents are unduplicated in the sample, there are no repeated measures to take into consideration. Because of this, time was not included as a measure in this study.

For example, Kreft (1996) suggested having at least 30 groups with 30 cases per group, while Hox (1998) suggested that scholars interested in cross-level interactions or variance components should adjust sample sizes to 50 groups with at least 20 cases per group or 100 groups with at least 10 cases per group, respectively (the 50 groups or more rule was further confirmed in simulation studies by Maas and Hox, 2005). Appropriate sample sizes for cross-classified models, as a special application of multilevel modeling, has been less studied. Chung et al. (2018) ran simulation studies on cross-classified models and ultimately suggested having a minimum of 50 groups with an average of 10 cases per group to produce sufficiently unbiased estimates (though increasing the number of groups to 100 reduced bias modestly more).

The sample sizes in this study sufficiently met these guidelines for ensuring unbiased parameter estimates in cross-classified multilevel models. As seen in Table 3.1, across the 322 institutions and 121 disciplines included in the sample, the average numbers of faculty per institution and per discipline are well above 10. Additionally, though less important if following Chung et al’s (2018) rule of *average* group size, only three institutions and two disciplines (0.9% and 1.7%, respectively) had fewer than 10 faculty represented in the sample.

Table 3.1

Institution and Discipline Group Sizes

	N	Mean faculty per group
Institutions	322	92.6
Institutions with <10 faculty	3	
Disciplines	121	246.5
Disciplines with <10 faculty	2	

Description of Faculty

The faculty included in the sample represent a wide array of personal and professional identities and taught a wide range of undergraduate courses (see Table 3.2 for full detail). While a goal of this study is to contribute to the literature by examining faculty identities in relation to institutional and disciplinary cultures, the analytical approach used in this study (see “Analytic Method” below) requires a degree of parsimony as overly complex models may fail to produce results (Bates et al., 2015; Beretvas & Murphy, 2013). Given the complexities of faculty identities and the often small group sizes of faculty with minoritized identities, this required decisions about how to examine the sample while remaining as inclusive as possible. A general guide used for this study was to examine faculty groups that represented approximately one percent or less of the sample and decide if these faculty could be included in combination with another faculty group.

With regard to faculty members’ gender identities, the final sample was nearly split evenly between faculty identifying as men and those identifying as women (46.8% and 48.4%, respectively). A smaller number of faculty preferred not to respond with their gender identity (4.8%). Faculty describing themselves as having another gender identity represented less than one percent of the initial sample; as combining these faculty with another of the identities inappropriately disregards their gender identity, these faculty were excluded from the final sample. Faculty in the final sample also indicated having a variety of sexual orientations, the most common of which was straight or heterosexual (83.2%). Faculty of other sexual orientations, such as gay, lesbian, queer, or questioning, individually represented approximately one percent or less of the final sample. To preserve the ability to examine the relationships between faculty sexual identities and institutional and disciplinary cultures, rather than excluding

these faculty, this study will follow the approach of research using FSSE (e.g., BrckaLorenz et al., 2019) and will combine them into an “LBGQ+” group (5.9%). A sizable number (10.9%) of faculty in the final sample preferred not to indicate their sexual orientation.

Faculty members further described a variety of racial or ethnic identities. Faculty of several racial and ethnic identities represented extremely small numbers of faculty. As this study is, in part, focused on the relationships of these identities with institutional and disciplinary cultures, these faculty were included with other faculty of other racial or ethnic groups. Despite the decision to keep these faculty voices in the study within broader groups, care must be taken to not over generalize or over interpret findings among these faculty. Among those in the final sample, faculty most commonly identified as White (72.7%). Nearly equal numbers of faculty identified as Asian, Native Hawaiian, or other Pacific Islander (5.4%) or as Black or African American (5.1%). Faculty in the final sample will also include those identifying as Hispanic or Latino/a (3.3%), faculty identifying multiple racial or ethnic identities (2.9%), those identifying as another racial or ethnic identity (1.8%), and those who preferred not to describe their racial or ethnic identity (8.7%).

Faculty that will be in the final sample also represented a wide array of additional professional and course characteristics, which are briefly described here. Approximately half (51.6%) of faculty taught between four and seven undergraduate and graduate courses in the year they responded to FSSE (mean=5.5). Approximately half of faculty (49.6%) in the final sample have between five and 19 years of teaching experience (mean=16.7). Over three-quarters of faculty (81.5%) were employed full-time, with approximately two-thirds holding ranks as Professor (23.3%), Associate Professor (22.6%), or Assistant Professor (22.8%). A majority of courses taught by faculty members in the final sample, in regard to which they responded to

DAL and CL items, were upper division courses (mostly juniors and seniors; 54.0%), did not fulfill a General Education requirement (52.6%), were conducted in an on-campus or auxiliary classroom format (85.9%), and most commonly had class sizes of more than 30 students (35.8%).

Table 3.2

Faculty and Course Characteristics

	%
<i>Faculty identities</i>	
Gender	
Man	46.8
Woman	48.4
Prefer not to respond	4.8
Race/ethnicity	
Asian, Native Hawaiian, or other Pacific Islander	5.4
Black or African American	5.1
Hispanic or Latinx	3.3
White	72.7
Another race or ethnicity	1.8
Multiracial	2.9
Prefer not to respond	8.7
Sexual orientation	
Straight (Heterosexual)	83.2
LGBQ+	5.9
Prefer not to respond	10.9
<i>Course characteristics</i>	
Division	
Lower division (mostly first-year students or sophomores)	38.8
Upper division (mostly juniors or seniors)	54.0
Other division	7.2
Course size	
Small course (20 or fewer students)	31.8
Medium course (21-30 students)	32.4
Large course (More than 30 students)	35.8
Fulfills a general education requirement	47.4
Course format	
Classroom instruction (on-campus or auxiliary)	85.9
Distance education (online, live or pre-recorded video or audio, correspondence, etc.)	5.1
Combination of classroom instruction and distance education	9.0

Table 3.2 cont.

	%
<i>Faculty professional characteristics</i>	
Course load (mean=5.5)	
0-3 courses	23.9
4-5 courses	27.2
6-7 courses	24.4
8 or more courses	24.5
Employment status	
Part-time	18.5
Full-time	81.5
Employment rank	
Professor	23.3
Associate Professor	22.6
Assistant Professor	22.8
Instructor or Lecturer	24.2
Other	7.0
Years teaching at any college/university (mean=16.7)	
4 or less	14.4
5-9	17.6
10-19	32.0
20-29	21.2
30 or more	14.9

Examining faculty racial, gender, and sexual orientation representation across professional characteristics helps to further understand the sample of faculty that responded to FSSE in 2015 through 2019 (Tables 3.3, 3.4, and 3.5). While these data paint a complex portrait of the faculty in the study, several key trends appear. One of the clearest differentiators is faculty gender identity, with Women faculty (compared to men and faculty who preferred not to describe their gender identity) having greater representation among part-time faculty, adjunct faculty, faculty at institutions with no tenure system and faculty at institutions that have a tenure system but who are not themselves in tenure-track positions, compared to their representation among full-time faculty, not adjunct faculty, and tenured or tenure-track faculty. Notably, Men faculty have their greatest representation among tenured faculty, while Women faculty have their

lowest representation among tenured faculty. In terms of years of teaching experience and faculty gender identities, there is a distinct trend of Women faculty having greater levels of representation among faculty with fewer years of teaching experience, while Men faculty's representation increases at each increasing band of years of teaching experience. Altogether this might suggest a sample of faculty at the start of increasing gender diversity, with women faculty being overrepresented in several indicators of an early-stage faculty career (being part-time, adjunct, non-tenure track, untenured but on tenure-track, or having fewer years of teaching experience).

The diversity of professional characteristics across racial identities and sexual orientation is more complex, particularly by part-time and adjunct status. For instance, White, Black, and Hispanic or Latinx faculty have greater representation (if slightly) among part-time and adjunct faculty than faculty with these racial identities do among full-time and not adjunct faculty. Similarly, straight (heterosexual) faculty have slightly greater representation among part-time and adjunct faculty, compared to full-time and not adjunct faculty, while LGBTQ+ faculty are nearly equally represented among part- and full-time faculty and adjunct and not adjunct faculty. Differences in racial representation by tenure status are most pronounced between faculty with tenure and faculty on tenure track but not tenured, with White faculty having greater representation among faculty with tenure status, while all other racial identity groups (except faculty who preferred not to describe their racial identity) represented greater proportions of faculty on tenure track (compared to being tenured). White faculty also represented greater proportions of faculty as years of teaching experience increased, while for most other racial groups the opposite trend exists, representing greater proportions of faculty with fewer years of teaching experience. Similarly, the proportion of LGBTQ+ faculty increases as years of teaching

experience decreases. As with Women faculty, this may suggest the sample includes more diverse faculty in the early stages of their career.

Table 3.3

Employment and Adjunct Status by Faculty Identities (%)

	Part-time (n=5,520)	Full-time (n=24,304)	Adjunct (n=5,502)	Not adjunct (n=24,163)
Gender				
Man	43.3	47.6	43.8	47.5
Woman	53.5	47.3	53.0	47.4
Prefer not to respond	3.2	5.2	3.2	5.2
Race/ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	3.8	5.8	3.3	5.9
Black or African American	5.2	5.1	5.9	4.9
Hispanic or Latinx	3.7	3.2	3.8	3.2
White	74.7	72.2	74.6	72.3
Another race or ethnicity	1.8	1.8	1.7	1.8
Multiracial	3.2	2.9	3.2	2.9
Prefer not to respond	7.5	9.0	7.5	9.0
Sexual orientation				
Straight (Heterosexual)	84.3	83.0	84.6	82.9
LGBQ+	6.0	5.9	5.8	6.0
Prefer not to respond	9.7	11.1	9.6	11.2

Table 3.4*Tenure Status by Faculty Identities (%)*

	No tenure system at institution (n=904)	Not on tenure track, but institution has tenure system (n=10,263)	On tenure track but not tenured (5,764)	Tenured (n=12,639)
Gender				
Man	43.6	39.9	44.1	54.0
Woman	53.7	56.5	50.8	40.3
Prefer not to respond	2.8	3.6	5.2	5.7
Race/ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	6.4	3.4	8.9	5.5
Black or African American	5.0	5.6	5.9	4.3
Hispanic or Latinx	4.3	3.5	3.8	2.9
White	71.6	75.2	67.2	73.3
Another race or ethnicity	2.3	1.7	1.5	1.9
Multiracial	3.9	3.1	3.7	2.5
Prefer not to respond	6.5	7.6	9.0	9.7
Sexual orientation				
Straight (Heterosexual)	86.2	84.4	82.0	82.7
LGBQ+	5.2	6.0	6.6	5.6
Prefer not to respond	8.6	9.7	11.3	11.8

Table 3.5*Years of Teaching Experience by Faculty Identities (%)*

	4 or less (n=4,282)	5-9 (n=5,247)	10-19 (n=9,534)	20-29 (n=6,327)	30 or more (n=4,434)
Gender					
Man	40.9	41.6	44.2	49.3	60.6
Woman	56.0	54.5	50.5	45.0	34.3
Prefer not to respond	3.1	4.0	5.3	5.7	5.1
Race/ethnicity					
Asian, Native Hawaiian, or other Pacific Islander	8.7	6.3	5.2	3.9	3.9
Black or African American	5.8	5.5	5.1	4.5	4.8
Hispanic or Latinx	4.2	3.2	3.7	3.0	2.4
White	69.5	72.7	71.8	74.2	75.7
Another race or ethnicity	1.3	1.8	1.9	1.7	2.1
Multiracial	4.0	3.4	3.1	2.4	1.8
Prefer not to respond	6.4	7.1	9.3	10.3	9.3
Sexual orientation					
Straight (Heterosexual)	84.4	83.9	82.1	82.3	85.0
LGBQ+	6.8	6.5	6.4	5.5	3.8
Prefer not to respond	8.8	9.6	11.5	12.2	11.2

Description of Institutions

Faculty in the final sample represented a range of institutions (Table 3.6). Faculty most commonly represented Master’s Colleges and Universities (45.5% of faculty, from 47.5% of the 322 institutions) and Doctoral Universities (39.6%, from 24.2% of the 322 institutions). A majority of faculty (68.3%) represented public institutions, though public institutions accounted for little more than half (54.0%) of the 322 institutions. Additionally, over half of faculty (63.3%) in the sample were at institutions with large or very large (5,000 or more students) enrollment sizes, though these institutions represent only 39.7% of institutions. Institutions were situated in a variety of locales, from large cities to remote rural locales, across all regions of the U.S. Though these characteristics are not examined in this study, it is nonetheless important to acknowledge that variety of institutional characteristics and contexts represented in the sample.

Table 3.6*Faculty and Institution Sample by Institutional Characteristics*

	Percent of faculty (n=29,824)	Percent of institutions (n=322)
Carnegie Classifications		
Doctoral Universities	39.6	24.2
Master's Colleges and Universities	45.5	47.5
Baccalaureate Colleges	14.6	27.0
Other	0.4	1.2
Institutional Control		
Public	68.3	54.0
Private	31.7	46.0
Institution Enrollment Size		
Very Small (fewer than 1,000)	3.5	10.9
Small (1,000-2,499)	15.7	28.0
Medium (2,500-4,999)	17.5	21.4
Large (5,000-9,999)	29.5	23.6
Very Large (10,000 or more)	33.8	16.1

Description of Disciplines

Faculty also represented a wide array of disciplines (Table 3.7). A little more than one-quarter of faculty held appointments in disciplines in the arts and humanities (26.1% representing 12.4% of the 121 disciplines), with the second-most represented group being physical sciences, mathematics, and computer sciences (12.8% of faculty representing 8.3% of the 121 disciplines). Represented disciplines also include those in biological sciences and agriculture, social sciences, business, communications and media, education, engineering, health profession, and social service professions. More broadly, approximately one-quarter of faculty held appointments in STEM disciplines (26.6%, representing 37.2% of the 121 disciplines).

Table 3.7*Faculty and Disciplinary Sample by General Disciplinary Area*

	Faculty (%) (n=29,824)	Disciplines (%) (n=121)
Arts & Humanities	26.1	12.4
Biological Sciences, Agriculture, & Natural Resources	8.3	13.2
Physical Sciences, Mathematics, & Computer Sciences	12.8	8.3
Social Sciences	11.3	7.4
Business	9.3	9.1
Communications, Media, & Public Relations	4.2	5.0
Education	8.8	9.1
Engineering	4.5	11.6
Health Professions	9.6	13.2
Social Service Professions	2.9	4.1
Other disciplines (not reported)	2.2	6.6

Measures

To examine the research questions, measures are primarily drawn from FSSE with several institutional measures drawn from IPEDS. The study relies on three types of measures: dependent measures for teaching practices related to deep approaches to learning and collaborative learning, independent measures for aspects of institutional and disciplinary cultures, and independent measures to control for course and professional contexts of faculty members' responses. Table 3.8 below summarizes the variable names, descriptions, sources, and types. The following sections provide additional detail about these measures, with further detail found in Appendix B.

Table 3.8*Summary of Variable Names, Descriptions, and Types*

Variable Name	Variable Description	Data Source	Variable Type/Coding
<i>Dependent Variables</i>			
DAL	Deep approaches to learning	FSSE	Continuous, standardized as Z-scores
CL	Collaborative learning	FSSE	Continuous, standardized as Z-scores
<i>Independent Variables of Interest</i>			
BIGLAN_Cat	Expanded categories from interacting the three Biglan dimensions	FSSE	Categorical, effect coded as eHPL, eHPN, eHAL, eHAN, eSPL, eSPN, eSAL, eSAN
MTmTeach	Institutional mean of faculty time on teaching	FSSE	Continuous, standardized as Z-scores
Pct_FT	Percentage of instructional staff that are full-time	IPEDS	Continuous, standardized as Z-scores
Pct_TTr	Percentage of full-time instructional staff that are tenured or tenure-track	IPEDS	Continuous, standardized as Z-scores
Pct_ExInstr	Percentage of institutional expenditures on teaching	IPEDS	Continuous, standardized as Z-scores
Race	Faculty racial/ethnic identities	FSSE	Categorical, effect coded as eAsian, eBlack, eLatin, eWhite, eOthR, eMultiR, ePNTR_R
Gender	Faculty gender identities	FSSE	Categorical, effect coded as eMan, eWoman, ePNTR_G
SexOrientation	Faculty sexual orientation	FSSE	Categorical, effect coded as eStraight, eLGBQ, ePNTR_O
<i>Independent Control Variables</i>			
CrsDivision	Course division	FSSE	Categorical, effect coded as eLowDiv, eUppDiv, eOthDiv
CrsSize	Course size	FSSE	Categorical, effect coded as eSmCrs, eMedCrs, eLrgCrs
GenEd	Course meets a general education requirement	FSSE	Dichotomous, effect coded as eGenEd, e2GenEd
CrsFormat	Course format	FSSE	Categorical, effect coded as eClsrm, eDist, eOthForm
YrsTeach	Years of teaching experience	FSSE	Continuous, standardized as Z-scores
CrsLoad	Course load (graduate and undergraduate)	FSSE	Continuous, standardized as Z-scores
PartTime	Faculty employed part-time	FSSE	Dichotomous, effect coded as ePart, e2Part
Rank	Faculty position/rank	FSSE	Categorical, effect coded as eProf, eAssocProf, eAsstProf, eInstrLect, eOthRank

Dependent Measures

The dependent measures in this study represent teaching practices related to academic and social aspects of student engagement – deep approaches to learning and collaborative learning. Both are composite scale measures drawn from FSSE. For these two measures, faculty responded to their constituent survey items with regard to one undergraduate course the faculty taught in the year they responded to the survey. Each dependent measure is described further in the following sections.

Deep Approaches to Learning (DAL)

Two scales within the academic challenge theme – higher-order learning (HO) and reflective learning (RI) – comprise this study’s conceptualization of deep approaches to learning (Nelson Laird et al., 2005). The HO scale is comprised of four items, measured on a four-point Likert scale, regarding the extent to which faculty emphasize applying, analyzing, evaluating, and synthesizing ideas and information (FSSE, 2019). These four items align with the levels of Bloom’s taxonomy that extend beyond basic memory and comprehension of information (Krathwohl, 2002), and thus are indicative of faculty teaching practices that are intended to engage undergraduate students in deep approaches to learning.

The RI scale includes seven items, measured on a four-point Likert scale, that gauge the importance faculty place in their selected course on connecting or combining ideas with one another, connecting ideas to one’s experiences and real-life issues, or understanding and evaluating one’s own or others’ ideas. These items similarly represent teaching practices that necessitate students’ use of deep approaches to learning as memorization and repetition would be insufficient to reasonably achieve these aims.

The DAL composite scale then can be represented by the mean score of these 11 items, representing the how faculty emphasize or place importance on DAL in their courses. DAL was standardized as a Z-score for analysis so that model estimates function as effect sizes (for continuous variables) or standardized mean differences (for categorical variables) and so that model estimates are in reference to the mean faculty member score. Appendix B (Table B.1) includes the full text of these 11 items and calculation of the composite DAL measure.

Collaborative Learning (CL)

FSSE's learning with peers theme includes an indicator for collaborative learning (CL). The CL scale includes four items, measured on a four-point Likert scale, regarding the extent to which faculty encourage undergraduate students to discuss course material with each other and work together to study or complete coursework (FSSE, 2019). While broad definitions of collaborative learning could encompass numerous practices, those measured in the CL scale arguably include some of the most broadly applicable or core forms of collaborative learning in a course context. The composite scale is the average of the four items, and similarly to DAL, is standardized as a Z-score for analysis. See Appendix B (Table B.1) for the full text of the CL items and the composite variable calculation.

FSSE Psychometric Properties

Evidence indicates that FSSE provides reliable and valid measures for understanding faculty teaching. The reliability and validity of the three FSSE scales used as dependent measures in this study – DAL (HO and RI) and CL – is of particular importance to ensure that the composite scores of these three scales can be validly interpreted as measures of the underlying constructs (Paulsen & BrckaLorenz, 2018a). To evaluate the construct validity of the FSSE scales, Paulsen and BrckaLorenz (2018a) used exploratory and confirmatory factor

analyses using 2017 FSSE data, finding that the HO, RI, and CL scales, as described above, generally form coherent factors that are suitable as conceptual measures. Furthermore, Paulsen and BrckaLorenz (2017) examined the internal consistency of the FSSE scales using 2017 FSSE data, finding that Cronbach's alphas and inter-item correlations show a high degree of internal consistency for the HO, RI, and CL scales. Additional analysis in the FSSE Psychometric Portfolio indicates Cronbach's alphas of 0.729 for HO, 0.880 for RI, and 0.836 for CL (BrckaLorenz, 2017; BrckaLorenz & Nelson Laird, 2017; Wong & BrckaLorenz, 2017).

Another key concern with using latent variables, such as the HO, RI, and CL scales, is that the measures function similarly across different groups of respondents, known as measurement invariance (Paulsen & BrckaLorenz, 2018b). Paulsen and BrckaLorenz (2018b) examined the measurement invariance of FSSE scales' constituent items (including HO, RI, and CL), using 2017 data, across groups by gender, race, discipline, employment status and rank, course division, and course format. They found that measurement invariance was not a significant issue for these FSSE items, increasing confidence that observed differences between groups on HO, RI, and CL, are due to actual differences in groups and not due to measurement error.

A final important consideration for a cross-classified multilevel analysis are the intra-class correlation coefficients (ICC) for these dependent measures. In a multilevel analysis, the ICC can be interpreted as the proportion of variance in the dependent measure that is attributable to the grouping variable. In the proposed study, these groupings would be institutions and disciplines. FSSE's Psychometric Portfolio for HO, RI, and CL, provides the institution-level ICCs of 0.03, 0.0385, and 0.0301, respectively (BrckaLorenz, 2017; BrckaLorenz & Nelson Laird, 2017; Wong & BrckaLorenz, 2017), suggesting small amounts of variance in these

measures are attributable to institutions. ICCs will be calculated for both institutions and disciplines for the proposed sample as part of this study's analysis.

Independent Measures of Interest

Of the independent measures used in this study, those relating to disciplinary and institutional cultures and faculty identities are of key importance to answering the research questions. Three measures of institutional cultures are drawn from IPEDS, while all other independent measures of interest are derived from FSSE. The following sections provides further detail about these measures.

Measures of Disciplinary Cultures

While FSSE does not measure disciplinary cultures directly, the faculty members' identification of their academic disciplines allows for aspects of disciplinary cultures to be coded into the dataset. The literature suggests that either Biglan's dimensions or categories based in Holland's theory are useful, and prior research provides a guide on how to categorize individual disciplines using these frameworks (e.g., Biglan, 1973b; Nelson Laird, 2008; Pike, 2006). However, a study comparing the explanatory power of both frameworks with regard to how faculty emphasize or place importance on DAL suggested that Biglan's dimensions provided a small to moderately greater degree of explanatory power (Hiller & Nelson Laird, 2021).

As discussed in Chapter 2, past research has examined the individual Biglan dimensions, consistently demonstrating that the Hard-Soft dimension tends to have the greatest explanatory power and with Soft disciplines, generally, showing more positive relationships with better student engagement, outcomes, and teaching practices. Use of all three Biglan dimensions in past research, and the resultant eight Biglan categories, has been less often explored. Therefore, in this study the academic disciplines of respondents' faculty appointments were recoded into one

categorical variable of eight categories using Biglan's three dimensions: hard/soft, pure/applied, and life/non-life. For instance, faculty members who identified their academic discipline as Biology were recoded as being in a Hard-Pure-Life discipline, while faculty in Journalism were recoded as Soft-Applied-Nonlife. The coding scheme is based on the work of Biglan (1973a; b), Malaney (1986), Nelson Laird et al. (2008), and Stoecker (1993), with coding for additional disciplines imputed based on their work and common understandings of the disciplines. For example, Art History was uncategorized in the Biglan dimensions per prior scholars' work but is imputed to be a Soft-Pure-Nonlife discipline as both Art (fine and applied) and History are Soft-Pure-Nonlife disciplines. Similarly, multiple education disciplines were imputed to be Soft-Applied-Life disciplines since prior scholars classified Business Education, Elementary and Middle School Education, Physical Education, and Music or Art Education as Soft-Applied-Life disciplines. See Appendix B (Tables B.2 and B.3) for full detail on these variables and discipline recoding using Biglan's dimensions. While the categories derived from the three Biglan dimensions certainly cannot fully represent all aspects of disciplinary cultures that relate to faculty teaching, as explained in Chapter 2, they do represent important and enduring qualities of the ways the faculty in different disciplines conceive of and engage with knowledge and inquiry.

Per this coding scheme, faculty represent a wide array of disciplines as categorized using the Biglan dimensions. Majorities of faculty in the final sample represent soft disciplines (71.0%, representing 57.9% of disciplines), pure disciplines (54.4% representing 35.5% of disciplines), and non-life disciplines (58.9%, representing 50.4% of disciplines). Putting the dimensions in interaction, as is common in past scholarship that uses the Biglan dimensions, and considering faculty representation across the resultant eight categories shows that faculty in the final sample most commonly represent soft-pure-nonlife disciplines (25.4%, representing 11.6% of

disciplines), while the fewest faculty represent hard-applied-life disciplines (2.1%, representing 8.3% of disciplines). See Table 3.9 for descriptives of Biglan categories and Table 3.10 for a breakdown of the faculty composition of each Biglan category by faculty identities.

Table 3.9

Descriptives of Biglan Categories

	Faculty (n=29,824)		Disciplines (n=121)	
	N	%	N	%
Hard-Pure-Life (HPL)	2,627	8.8	14	11.6
Hard-Pure-Nonlife (HPN)	3,314	11.1	9	7.4
Hard-Applied-Life (HAL)	619	2.1	10	8.3
Hard-Applied-Nonlife (HAN)	2,090	7.0	18	14.9
Soft-Pure-Life (SPL)	2,706	9.1	6	5.0
Soft-Pure-Nonlife (SPN)	7,585	25.4	14	11.6
Soft-Applied-Life (SAL)	6,319	21.2	30	24.8
Soft-Applied-Nonlife (SAN)	4,564	15.3	20	16.5

Table 3.10

Faculty Composition of Biglan Categories by Faculty Identities (%)

	HPL	HPN	HAL	HAN	SPL	SPN	SAL	SAN	Total
Gender									
Man	50.3	61.0	43.5	75.2	43.0	45.0	27.3	54.3	46.8
Woman	44.7	33.9	51.7	20.0	54.3	48.7	69.2	40.8	48.4
Prefer not to respond	5.1	5.1	4.8	4.9	2.7	6.3	3.5	4.9	4.8
Race/ethnicity									
Asian, Native Hawaiian, or other Pacific Islander	4.8	8.7	7.3	14.5	3.3	3.1	3.0	7.6	5.4
Black or African American	3.4	4.0	6.5	5.7	5.8	3.4	7.4	5.7	5.1
Hispanic or Latinx	2.8	2.4	1.9	3.3	3.5	4.4	3.5	2.4	3.3
White	75.9	72.0	71.9	60.6	75.2	73.5	75.2	70.8	72.7
Another race or ethnicity	1.4	1.4	1.3	2.6	2.6	1.7	1.6	1.9	1.8
Multiracial	3.3	2.5	2.4	2.7	3.7	3.6	2.6	2.2	2.9
Prefer not to respond	8.4	8.9	8.7	10.6	5.9	10.5	6.7	9.5	8.7
Sexual orientation									
Straight (Heterosexual)	84.4	85.0	86.6	84.8	82.8	77.9	86.2	85.1	83.2
LGBQ+	5.2	3.3	3.2	2.4	9.2	9.1	5.1	4.0	5.9
Prefer not to respond	10.4	11.6	10.2	12.8	8.0	13.1	8.7	10.9	10.9

Measures of Institutional Cultures

Similarly, FSSE does not directly measure institutional cultures. While scholars have previously examined institutional cultures in terms of institutional mission, as captured by the Carnegie Classifications for instance, Porter (2006) argued that more direct measures should be utilized instead. For instance, the Carnegie Classifications, though broadly analyzing and capturing a multitude of aspects of institutional missions, does not include in its analysis measures that are directly applicable to faculty and cultures around teaching (The Carnegie Classifications of Institutions of Higher Education, n.d.). Instead, this study explores more direct measures which have not yet been explored as indicators of institutional culture, such as the resources institutions dedicate to teaching, how they organize instructional staff in terms of employment status and tenure, and the extent faculty spend their time on teaching.

One way that institutional cultures may manifest is in the proportion of faculty time on teaching in relation to institutions' two other core missions of research and service. On FSSE, faculty indicate approximately how many hours per week they spend on each of these three missions, measured as a categorical variable (0, 1-4, 5-8, 9-12, 13-16, 17-20, 21-30, More than 30; FSSE, 2019). To obtain an approximate percentage of faculty time on teaching, responses are coded using the mid-point of each range (e.g., 1-4 coded as 2.5), with the time on teaching divided by the sum of time on all three missions. Following past research using FSSE, "More than 30" is recoded as 32.5 (BrckaLorenz et al., 2018). These faculty-level approximate percentages are then averaged across each institution to obtain the institutional mean percentage of time on teaching. See Appendix B (Table B.4) for detail.

This study draws directly on IPEDS data related to instructional expenses and faculty composition to supplement the FSSE dataset. Three variables are calculated using IPEDS data.

The first variable captures the percentage of institutional expenditures dedicated to instruction. Given that institutions must spend money to achieve their goals and missions, this measure is intended to assess the balance of institutional teaching missions in relation to all others an institution may have. Financial data collected by IPEDS align with accounting standards for public and private institutions. The collection of financial data across different accounting standards results in data for total and instructional expenses reported across three sets of variables (6 variables in total) for public, private non-profit, and private for-profit institutions. The percentage of expenses related to instruction is calculated as instructional expenditures divided by total expenditures for each institution.

Given the clear role of institutions in hiring and organizing faculty job responsibilities, two variables are calculated to understand faculty composition. The first – the percentage of full-time faculty – divides the number of full-time instructional staff by the total number of instructional staff. The second – the percentage of full-time faculty who are tenured or tenure track – sums the number of full-time instructional staff who are tenured or on tenure track and divides that sum by the total number of full-time instructional staff. The total number of full-time instructional staff includes instructional staff with faculty status who are not on tenure track or whose institutions do not use a tenure system, who are on short- or long-term contracts (e.g., annual, multiyear, or indefinite), as well as instructional staff without faculty status. See Appendix B (Table B.4) for full information about these three variables.

The characteristics of institutions with regard to these four FSSE- and IPEDS-derived measures of institutional culture should further be considered (see Table 3.11). The institutional means of the approximate percentage of faculty time on teaching ranged from 39.68% to 73.00%, with an overall mean of 56.62% across all institutions. Another measure of the degree

institutions emphasize a teaching mission – the percentage of total expenditures on instruction – shows a greater range across institutions, from 8.90% to 58.44%, with a lower overall mean of 36.15%. There was greater variation in faculty composition across institutions. The percentage of all instructional staff that are full-time ranged from 10.98% to 100.00%, with an overall mean of 61.50%, and the percentage of these full-time instructional staff who are tenured or tenure-track ranged from 20.16% to 100.00%, with an overall mean of 73.98%.

Table 3.11

Descriptives of Institutional Variables

	Mean	Median	Std. Dev.	Min.	Max.
Mean percentage (approx.) of faculty time on teaching	0.5662	0.5748	0.0609	0.3968	0.7300
Percentage of full-time instructional staff that are tenured/tenure-track	0.7398	0.7439	0.1249	0.2016	1.0000
Percentage of all instructional staff that are full-time	0.6150	0.6255	0.1728	0.1098	1.0000
Percentage of all expenditures on instruction	0.3615	0.3630	0.0777	0.0890	0.5844

Measures of Faculty Identities

With regard to faculty identities, the literature has indicated gender and racial identities being highly important to consider in relation to faculty work. Though the literature on faculty cultures has not considered sexual orientation, gender identities beyond Man or Woman, religious identities, or political identities in relation to faculty work, research (or the lack thereof) suggests they would also be valuable to consider in this study. However, FSSE’s core survey items do not collect information about faculty members’ religious or political identities. Additionally, as noted above, though faculty respondents to FSSE can identify gender identities other than Man or Woman, there were too few of these faculty members to the dataset to include them in the analysis. Faculty respondents to FSSE provided information across three items about their gender, racial, and sexual identities, and so these are the faculty identities in focus in this

study. These three items were selected-response items, with race or ethnicity allowing for multiple selections (FSSE, 2019). See Appendix B (Table B.5) for detail on these variables. As noted above, this study needed to balance the desire to provide detail about interrelationships between faculty identities and institutional and disciplinary cultures with regard to teaching practices and the need to avoid overly-complex statistical models. This required decisions about grouping or excluding small groups of faculty, which are detailed below.

Faculty could identify their gender as either man, woman, or another gender identity (to which they had the opportunity to specify further in a text entry) or could indicate that they preferred not to respond. Regrettably, due to the extremely small sample size of faculty of another gender identity (less than 1% of the original sample), and the inappropriateness of including these faculty in one of the other gender identity groups, faculty of another gender identity are excluded from the study.

For race or ethnicity, faculty were asked how they describe themselves, with selections of American Indian or Alaska Native, Asian, Black or African American, Hispanic or Latina/o, Middle Eastern or North African (not included as an option prior to 2019), Native Hawaiian or other Pacific Islander, White, or another race or ethnicity (listed as “Other” prior to 2019), or that they preferred not to respond (FSSE, 2018, 2019). Faculty selecting more than one racial or ethnic identity are coded as multiracial. Several identities had comparatively few faculty identifying with them. To preserve their experiences in the dataset and prevent excluding them from the study, faculty identifying as Native Hawaiian or Pacific Islander are included as “Asian, Native Hawaiian, or other Pacific Islander” and faculty identifying as American Indian or Alaska Native or Middle Eastern or North African are included as faculty with “another race or ethnicity,” in line with past scholarship using FSSE (e.g., Hiller et al., 2019; Miller et al., 2020).

Faculty further described their sexual orientation, with selections of straight (heterosexual), bisexual, gay, lesbian, queer, questioning or unsure, or another sexual orientation (to which they had the opportunity to specify further in a text entry), or that they preferred not to respond (FSSE, 2019). Relatively small numbers of faculty identified as bisexual, gay, lesbian, queer, questioning or unsure, or another sexual orientation, respectively. To prevent the exclusion of some or all of these faculty members and to allow for the examination of the role of sexual orientation with regard to faculty cultures and teaching, these faculty are included in the study as a combined LGBTQ+ faculty (e.g., BrckaLorenz et al., 2019).

Independent Control Measures

As faculty respondents to FSSE's DAL and CL items in reference to a specific course that faculty taught, other FSSE items will be used to control for possible influences of course contexts. Course characteristics include: 1) course size, 2) course division, 3) course format, and 4) whether the course fulfills a general education requirement. All four measures are categorical, selected-response items. Course size is recoded as small course (20 or fewer students), medium course (21-30 students), or large course (31 or more students). Course division is coded as lower division (mostly first-year or sophomore students), upper division (mostly junior or senior students), or other division. Course format is recoded as in-person instruction (in a classroom on campus or auxiliary location), distance instruction (online, live or pre-recorded video, etc.), or a combination of in-person and distance instruction. Whether a course fulfills a general education requirement is coded as a dichotomous yes or no response. Appendix B (Tables B.6) provides the full original item response categories and recoding.

Additional professional characteristics are controlled for to better identify the effects of faculty identities and institutional and disciplinary cultures on faculty teaching, regardless of a

faculty member's professional characteristics. These professional characteristics include: 1) years of teaching experience, 2) course load, 3) faculty rank, and 4) employment status. Years of teaching experience is a continuous measure calculated from a text-entry item asking faculty for the year they began teaching at any college or university and is grand mean-centered. Course load is measured across two categorical, ordinal items asking faculty about the numbers of undergraduate and graduate courses that they taught in the survey year, with categories of zero courses to nine or more courses (for the undergraduate item) and zero to four or more (for the graduate item). The variable is the sum of these two items, with nine or more courses being coded as nine and four or more courses being coded as four. Faculty rank is measured as a categorical variable (dummy coded for analysis) with twenty response options that are recoded as Professor, Associate Professor, Assistant Professor, Instructor or Lecturer, or another rank. Employment status is measured as a dichotomous variable as either full-time or part-time. Appendix B (Table B.7) includes the FSSE items, response options, and coding.

Analytic Method

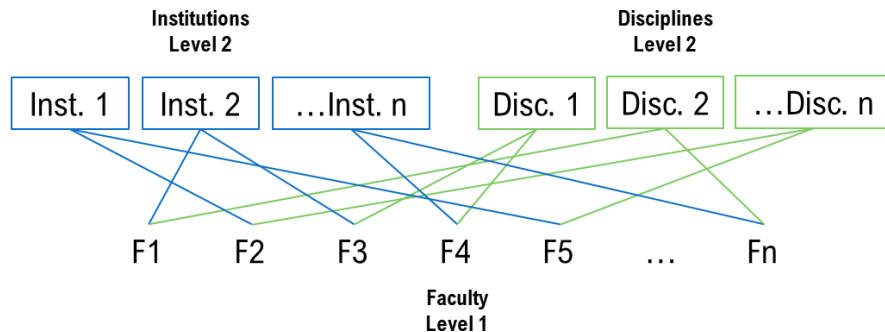
Given the nested nature of the data, with faculty members within both institutions and within disciplines, cross-classified multilevel models will be employed to answer the research questions. At its simplest, a multilevel model is one where the data includes units at level-1 (e.g., students, employees, faculty) who can be grouped into a number of level-2 units (e.g., schools, departments, neighborhoods; Snijders & Bosker, 2012). Such nested, multilevel data structures pose a unique problem in statistics as they may violate an assumption of linear multiple regression models that error terms are uncorrelated due to the nested groupings. Multilevel models account for the groupings in order to better analyze the multiple sources of variation. By accounting for these groupings, multilevel models allow for the possibility of understanding

random versus fixed effects. For instance, since multilevel models partition variance to account for grouping, the overall model intercept is allowed to vary across level-2 groups (i.e., modeling group-level intercepts), with a random effect that describes this distribution of group intercepts. Similarly, in typical Ordinary Least Squares (OLS) regression, the coefficients for each independent variable are fixed effects, while in multilevel modeling, these can also be allowed to randomly vary across level-2 groups, producing random effects that describe these variable coefficients.

Cross-classified models are a special application of multilevel modeling where the units at the various levels do not form a perfect hierarchy but instead have units at one level that are associated with two or more types of groupings that themselves are not nested together (Beretvas, 2011). This is the situation in this study, where faculty (level-1) are members of one institution (level-2j) and one discipline (level-2k), each, but disciplines are not nested within institutions (see Figure 3.1). Importantly, when conceptualizing the data relationships in this way, ignoring one of the cross-classified factors could result in a mis-specified model that increases Type I error and inaccurately estimates the variance components, with greater risk to level-two effects (e.g., ignoring institutions to examine disciplines could result in the effects of disciplines being inaccurate or even appearing significant when they are not, and vice versa). This is one area where this study seeks to build upon past research (e.g., Umbach, 2006, 2007; Umbach & Wawrzynski, 2005) that utilized multilevel modeling but did not account for faculty members' cross-classification.

Figure 3.1

Conceptual Cross-Classified Structure of Faculty within Institutions and Disciplines



The development of a cross-classified model follows the same process as simpler multilevel models, beginning with a null, or unconditional, model, and a full conditional model, with each of these including within (level-1) models and between (level-2) models (Raudenbush & Bryk, 2002). The null, or unconditional, model contains no explanatory independent variables and is used to examine how variance in the dependent variable is partitioned between and within groups. This allows for the calculation of the ICC for each level-2 grouping variable which can be interpreted as the proportion of variance explained by the grouping variable. With two level-2 groups in this study, ICCs can be calculated for both institutions and disciplines.

The conditional model generally begins with the within model which adds variables that explain the level-1, or individual, variance. For the current study, these include variables for faculty racial, gender, and sexual orientation identities and variables to control for faculty professional and course characteristics. The between model adds in variables to explain level-2 variance, including variables for discipline Biglan categories, the four institutional variables, any random components of the within model, and any cross-level interactions (e.g., interactions between identities and Biglan categories).

In the following sections I detail how the models were specified using this process. The null models were the same for all three research questions and are detailed in “Research Question 1” below. For the conditional models, only the combined (within and between) full model equations are presented below for each research question for clarity. Due to the number of models that were analyzed, the descriptions below present example models for each step. For model equations, Raudenbush and Bryk’s (2002) notation has been adapted. For all models across all research questions, i represents an individual faculty member, j represents an institution, and k represents a discipline.

Research Question 1

To what extent do faculty teaching practices around collaborative learning and deep approaches to learning vary by faculty identities and by institutional and disciplinary cultures?

This research question represents the first step in addressing the problem and purpose identified in Chapter 1. As prior research examining relationships between faculty cultures and teaching practices has not employed cross-classified multilevel modeling, this question seeks to understand how faculty identities, disciplinary cultures, and institutional cultures relate individually to teaching practices while accounting for the cross-classified nature of the data. While conceptually there may be no reason to expect regression coefficients to be the same across all institutions and disciplines (e.g., it is likely faculty identities and other characteristics have variable relationships with teaching practices in different institutions and disciplines), these models will treat level-1 and level-2 regression coefficients as fixed effects in order to build upon past literature and understand how the use of a cross-classified model affects variables’ relationships with teaching practices.

Null Model

Two null models were constructed, one for each of the two dependent variables in this study, DAL and CL. Null models include a within model (level-1) and a between model (level-2) and are commonly written as a combined model. For this study the null models can be represented by:

$$Y_{ijk} = \gamma_0 + b_{0j0} + c_{00k} + d_{0jk} + e_{ijk}$$

where Y_{ijk} is the faculty score for DAL or CL (for faculty member i in institution j and discipline k), γ_0 is the overall grand mean for DAL or CL across all faculty, b_{0j0} is the random effect of institution j , c_{00k} is the random effect of discipline k , d_{0jk} is the random interaction effect (the deviation between the actual mean of faculty in institution j and discipline k and the mean predicted by the grand mean and the two group effects), and e_{ijk} is the random individual effect. The variances of the two random group effects, the random interaction effect, and the random individual effect can then be used to calculate the ICCs, which can be interpreted as the proportions of variance attributable to the level-2 groups (Raudenbush & Bryk, 2002). Notably, the variance of the random interaction effect, d_{0jk} , though it would be valuable for understanding the interactions of institutional and disciplinary cultures, may be unobtainable, as Raudenbush and Bryk suggested that small cell sizes⁷ often result in this variance being confounded with individual-level variance. Two ICCs for each dependent variable (DAL and CL) will be instructive to understand the proportion of variance due to institutional effects and the proportion of variance due to disciplinary effects.

⁷ Cell sizes would be the sample size of groups that result from the interaction of institutions and disciplines (i.e., discipline k in institution j). For instance, if a table were constructed with institutions in rows and disciplines in columns, the table cells would represent these specific groups. Raudenbush and Bryk (2012) did not suggest that small cell sizes impact the estimation of other components of cross-classified multilevel models.

While some scholars have argued that a sufficiently large ICC is necessary to justify multilevel modeling, Huang (2018) argued that multilevel modeling may be valuable even with small ICC values as not using multilevel models (or not using a cross-classified model) can increase Type I error substantially, particularly for level-2 variables. FSSE's psychometric portfolios for CL and the constituent scales for DAL (HO and RI) suggest institution-level ICCs will be far smaller than discipline-level ICCs (BrckaLorenz, 2017; BrckaLorenz & Nelson Laird, 2017; Wong & BrckaLorenz, 2017). Given the likely small institution-level ICCs for DAL and CL, it is possible that the influence of institutional cultures proposed by Umbach's (2007a) framework in these areas of teaching practice may be overstated. Given that this study is substantially focused on examining variation and interactions across level-2 institutions and disciplines, it would be conceptually and statistically appropriate to continue with a cross-classified multilevel design to ensure proper estimation of the models and to provide greater clarity in understanding the relationships present.

Full Conditional Model

The full conditional models were examined for DAL and CL, allowing for consideration of the fixed effect relationships between faculty identities, disciplinary cultures as represented by the eight Biglan categories, and institutional cultures as represented by the four institutional variables (while controlling for individual course and professional characteristics). The level-1 individual and the level-2 institutional variables were the same across both full models for DAL and CL.

Within Model. The next step begins seeking to explain variance in DAL and CL by adding in level-1 independent variables. These variables included the control variables for course characteristics – as faculty responded to DAL and CL items in reference to specific courses they

taught – and for professional characteristics of faculty. Of the eight control variables, two are entered into the model as continuous variables, standardized as Z-scores, and the other six are entered into the model as effect-coded variables, so that the model intercept is interpreted as the mean DAL or CL score for the average faculty member. Additionally, variables to examine faculty identities for race, gender, and sexual orientation are entered using effect coding. Effect coding allows model estimates to be obtained for all identities (instead of needing to omit certain identities as reference groups) and allows model estimates to be in reference to the overall average faculty member DAL or CL scores rather than a particular identity as a reference group. As effect coding omits one group from the model, a second set of effect codes were modeled for each variable to produce a full set of model estimates for all identities (Mayhew & Simonoff, 2015). Because model estimates for effect coded variables are in reference to the overall average faculty member score, and not an omitted reference group, model estimates are unaffected by modelling the second set of effect coded variables and can thus be presented together as a full set of model estimates.

Between Model. The between models for this research question will add the fixed effects of level-2 variables for disciplines and institutions. For institutions, these include the four continuous variables for the institutional mean time on teaching, the percentage of instructional staff that are full-time, the percentage of full-time instructional staff that are tenured or tenure-track, and the percentage of expenditures on instruction. These four variables were entered as standardized Z-scores so that the model intercept refers to the average institution and so that (due to DAL and CL being standardized as Z-scores) model estimates function as effect sizes.

The discipline variables were modeled using the eight Biglan categories to better understand how the dimensions interactively shape disciplinary cultures around teaching

practices. Similar to faculty identity variables, the eight Biglan categories were effect-coded, so that the model estimates can be interpreted in reference to the average discipline DAL and CL scores and so that full sets of estimates can be obtained. Additionally, if average teaching practices for disciplinary categories are assumed to represent the typical disciplinary group norms and behaviors, then effect coding enables further interpretation, particularly with regard to faculty identity interaction effects. Similar to the within model, the variables entered in the between model are entered as fixed effects.

Combined Model. Having described the within and between models, the models can be combined for the full conditional models for DAL and CL. In the model equation below, for DAL or CL, the last category for each effect-coded variable (as listed in Table 3.8) is omitted. To obtain estimates for these omitted categories, a second model was run with a second set of effect-coded variables that omits the first category listed for each effect-coded variable (e.g., for racial identities, ePNTR_R is omitted from the first model and eAsian is omitted from the second model).

$$\begin{aligned}
Y_{ijk} = & \gamma_0 + \gamma_1(eAsian)_{ijk} + \gamma_2(eBlack)_{ijk} + \gamma_3(eLatin)_{ijk} + \gamma_4(eWhite)_{ijk} + \gamma_5(eOthR)_{ijk} \\
& + \gamma_6(eMultiR)_{ijk} + \gamma_7(eMan)_{ijk} + \gamma_8(eWoman)_{ijk} + \gamma_9(eStraight)_{ijk} \\
& + \gamma_{10}(eLGBQ)_{ijk} + \gamma_{11}(eLowDiv)_{ijk} + \gamma_{12}(eUppDiv)_{ijk} + \gamma_{13}(eSmCrs)_{ijk} \\
& + \gamma_{14}(eMedCrs)_{ijk} + \gamma_{15}(eGenEd)_{ijk} + \gamma_{16}(eClsrm)_{ijk} + \gamma_{17}(eDist)_{ijk} \\
& + \gamma_{18}(YrsTeach)_{ijk} + \gamma_{19}(CrsLoad)_{ijk} + \gamma_{20}(ePart)_{ijk} + \gamma_{21}(eProf)_{ijk} \\
& + \gamma_{22}(eAssocProf)_{ijk} + \gamma_{23}(eAsstProf)_{ijk} + \gamma_{24}(eInstrLect)_{ijk} \\
& + \gamma_{25}(MTmTeach)_j + \gamma_{26}(Pct_TTr)_j + \gamma_{27}(Pct_FT)_j + \gamma_{28}(Pct_ExInstr)_j \\
& + \gamma_{29}(eHPL)_k + \gamma_{30}(eHPN)_k + \gamma_{31}(eHAL)_k + \gamma_{32}(eHAN)_k + \gamma_{33}(eSPL)_k \\
& + \gamma_{34}(eSPN)_k + \gamma_{35}(eSAL)_k + b_{0j0} + c_{00k} + d_{0jk} + e_{ijk}
\end{aligned}$$

where Y_{ijk} represents DAL or CL scores, γ_0 is the model intercept, or expected mean DAL or CL score, when all other variables are set to 0, γ_p represents the fixed effect regression coefficient relating the associated variable to Y_{ijk} (p denoting the number of the variable)⁸. The remaining four terms are the residual random effects of institutions, disciplines, institution-discipline interactions, and individuals, respectively. The random effect terms at the end of the equation are now noted as being residual indicating that they take into account the other variables in the model.

To understand how the inclusion of the independent variables explains the variation described by the null models, the proportional reduction of prediction error can be calculated for each level of the model using the variance parameters produced by the full conditional and null models and can be interpreted as the variance explained at each level (Snijders & Bosker, 1994; 2012). Luo and Kwok (2010) extended Snijders and Bosker's (1994) proportional reduction of prediction error calculations to cross-classified multilevel models, demonstrating their effectiveness for understanding variance explained in these models. These proportional reduction in prediction error figures are commonly thought of as pseudo- R^2 values (Snijders & Bosker, 2012). At level-1, the proportional reduction of prediction error more specifically identifies the reduction of error in predicting individual DAL or CL scores (Y_{ijk}) and is calculated as one minus the sum of all conditional model variances divided by the sum of all null model variances. At either level-2, the proportional reduction of prediction error identifies the reduction of error in predicting the institutional or disciplinary group means (\bar{Y}_j or \bar{Y}_k) for DAL or CL and is calculated as one minus the sum of conditional group (institution or discipline) variance and

⁸ Following each 'p', '00' is omitted for each coefficient subscript for clarity. '00' denotes that coefficients are not allowed to vary across level-2 'j' or 'k' units.

conditional individual variance (itself divided by the institution or discipline group harmonic mean) divided by the sum of the same null model variances (individual null model variance again itself divided by the group harmonic mean).

Research Question 2

To what extent do faculty teaching practices around collaborative learning and deep approaches to learning vary by the interaction of institutional and disciplinary cultures?

As this research question builds off the first by examining the interactions between the level-2 variables, the null models and the within models of the conditional models remained the same for both DAL and CL but the between models of the conditional models required further specification.

Understanding how institutional and disciplinary cultures interact was examined in two ways using cross-classified modeling. First, the level-2 variables used above were allowed vary across the other group by adding random slopes to the model (i.e., institutional variables being allowed to vary across disciplines and disciplinary variables being allowed to vary across institutions). This would help understand, for example, if the relationship between Hard-Pure-Life disciplines and how faculty emphasize or place importance on DAL varies across institutions. To test whether the variances of the random slopes were significantly different from zero, the default Wald Z test was used in SPSS, though since variance is by definition non-negative, the SPSS-produced p-values were divided by two to produce the one-tailed p-value (Snijders & Bosker, 2012). While this allows for an understanding of whether relationships between each variable and DAL or CL randomly vary across institutions or disciplines, a lack of such variance does not preclude the possibility that disciplinary and institutional variables may interact in ways that are similar across all institutions or disciplines.

For this reason, a second way to understand interactions of institutional and disciplinary cultures is to put disciplinary and institutional variables in interaction together as fixed effects. This would allow an even clearer understanding of how institutional and disciplinary cultures interact by examining how the relationship between, for example, an institutional variable and DAL does or does not depend on its relationship with a disciplinary variable. Interaction terms would be entered into the model as fixed effects.

Full Conditional Model

Making the changes described above in the between model results in a series of new full combined models, for DAL and for CL. For the random slope portion of this analysis, it would be conceptually expected that all institutional and disciplinary variables would be randomly varying across the other group at the same time (i.e., in the same model). However, practically-speaking, the model could not accommodate all random slopes together, thus random slopes were added to the model one at a time, then removed for the next random slope to be examined. The following equation models this for the institutional variable, mean percentage of time on teaching. As level-1 terms from $\gamma_1(eAsian)_{ijk}$ to $\gamma_{24}(eInstrLect)_{ijk}$ were identical to those terms in the Research Question 1 model, they are elided here for readability:

$$\begin{aligned}
 Y_{ijk} = & \gamma_0 + \dots + \gamma_{25}(MTmTeach)_j + \gamma_{26}(Pct_TTr)_j + \gamma_{27}(Pct_FT)_j + \gamma_{28}(Pct_ExInstr)_j \\
 & + \gamma_{29}(eHPL)_k + \gamma_{30}(eHPN)_k + \gamma_{31}(eHAL)_k + \gamma_{32}(eHAN)_k + \gamma_{33}(eSPL)_k \\
 & + \gamma_{34}(eSPN)_k + \gamma_{35}(eSAL)_k + c_{250k}(MTmTeach)_j + b_{0j0} + c_{00k} + d_{0jk} + e_{ijk}
 \end{aligned}$$

where Y_{ijk} represents DAL or CL scores, γ_0 is the model intercept, or expected mean DAL or CL score, when all other variables are set to 0, γ_p represents the fixed effect regression coefficient relating the associated variable to Y_{ijk} , c_{p0k} represents the random effect of an institutional slope coefficient across disciplines, and the remaining four terms represent the residual random effects

of institutions, disciplines, institution-discipline interactions, and individuals, respectively. When disciplinary variables are allowed to vary across institutions, the random effect of the slope coefficient is denoted (using eHPL as an example) as $b_{pj0}(eHPL)_j$. As the fixed effects are not in focus in this part of the analysis, the models were not replicated using the second set of effect-coded variables; however, the second set of effect-coded Biglan categories is used in order to test the random slope of eSAN across institutions.

The second part of the analysis includes fixed effects for all interactions between Biglan categories and the four institutional variables (32 fixed effect interactions in total for DAL and CL, each). The following model equation presents this interaction model, showing interactions between institutional mean time on teaching and the Biglan categories, while eliding the interactions between the Biglan categories and the other three institutional variables for readability (level-1 variables are also elided as above as these terms are unchanged). To obtain full results for all effect-coded categories, the second set of effect coded variables are substituted in a second model, including in the interaction terms.

$$\begin{aligned}
Y_{ijk} = & \gamma_0 + \dots + \gamma_{25}(MTmTeach)_j + \gamma_{26}(Pct_TTr)_j + \gamma_{27}(Pct_FT)_j + \gamma_{28}(Pct_ExInstr)_j \\
& + \gamma_{29}(eHPL)_k + \gamma_{30}(eHPN)_k + \gamma_{31}(eHAL)_k + \gamma_{32}(eHAN)_k + \gamma_{33}(eSPL)_k \\
& + \gamma_{34}(eSPN)_k + \gamma_{35}(eSAL)_k + \gamma_{36}((MTmTeach)_j * (eHPL)_k) \\
& + \gamma_{37}((MTmTeach)_j * (eHPN)_k) + \gamma_{38}((MTmTeach)_j * (eHAL)_k) \\
& + \gamma_{39}((MTmTeach)_j * (eHAN)_k) + \gamma_{40}((MTmTeach)_j * (eSPL)_k) \\
& + \gamma_{41}((MTmTeach)_j * (eSPN)_k) + \gamma_{42}((MTmTeach)_j * (eSAL)_k) \\
& + b_{0j0} + c_{00k} + d_{0jk} + e_{ijk}
\end{aligned}$$

where Y_{ijk} represents DAL or CL scores, γ_0 is the model intercept, or expected mean DAL or CL score, when all other variables are set to 0, γ_p represents the fixed effect regression coefficient

relating the associated variable to Y_{ijk} , and the remaining four terms represent the residual random effects of institutions, disciplines, institution-discipline interactions, and individuals, respectively. As in the first research question, the variances obtained from the full interaction models for DAL and CL, along with the variances from the null models, were used to calculate the proportional reduction of prediction errors to better understand how the interaction terms explain variance in DAL and CL.

Research Question 3

To what extent do the relationships between faculty identities and teaching practices around collaborative learning and deep approaches to learning vary by disciplinary and institutional cultures?

This research question takes yet another step, building off the second research question by considering cross-level interactions – how level-1 variables of race, gender, and sexual orientation identities vary across institutions and disciplines and how they interact with variables related to institutional and disciplinary cultures. This required further specification of the full conditional model.

This analysis also occurred in two ways. First, the slope coefficients for faculty race, gender, and sexual orientation identities were allowed randomly vary across level-2 institutions and disciplines. As above, these random slopes were added to the model one-at-a-time. This allows for a broader understanding of whether relationships between faculty identities and teaching practices vary (and to what extent) across institutions and disciplines.

As in the second research question, whether or not the identity-teaching practice relationships vary across institutions or disciplines does not prevent the possibility that faculty identities may interact with aspects of institutional and disciplinary cultures in similar ways

across all institutions and disciplines. To examine this, faculty identities were interacted with the variables of institutional and disciplinary cultures to better understand the nature of how identity and teaching vary across these settings.

Full Conditional Model

The additions described above require a new set of full conditional model equations for both DAL and CL. In this first part of the analysis, the model equation allows level-1 faculty identity variables to vary across level-2 institutions or disciplines, with random slopes entered one-at-a-time, resulting in 26 random slopes models each for DAL and CL. The equation below shows, as an example, the Asian, Native Hawaiian, or other Pacific Islander identity varying across level-2 institutions. For readability, terms from $\gamma_{11}(eLowDiv)_{ijk}$ to $\gamma_{35}(eSAL)_k$ are elided as they are unchanged from the models noted above:

$$Y_{ijk} = \gamma_0 + \gamma_1(eAsian)_{ijk} + \gamma_2(eBlack)_{ijk} + \gamma_3(eLatin)_{ijk} + \gamma_4(eWhite)_{ijk} + \gamma_5(eOthRace)_{ijk} \\ + \gamma_6(eMultiR)_{ijk} + \gamma_7(eMan)_{ijk} + \gamma_8(eWoman)_{ijk} + \gamma_9(eStraight)_{ijk} \\ + \gamma_{10}(eLGBQ)_{ijk} + \dots + b_{1j0}(eAsian)_{ijk} + b_{0j0} + c_{00k} + d_{0jk} + e_{ijk}$$

where Y_{ijk} represents DAL or CL scores, γ_0 is the model intercept, or expected mean DAL or CL score, when all other variables are set to 0, γ_p represents the fixed effect regression coefficient relating the associated variable to Y_{ijk} , b_{pj0} represents the cross-level random effect of a level-1 variable across level-2 institutions, and the final four terms represent the residual random effects of institutions, disciplines, institution-discipline interactions, and individuals, respectively. The cross-level interaction of a level-1 identity across level-2 disciplines would be represented by c_{p0k} (replacing the b_{pj0} term in the equation). As in the second research question, to add the random slopes for effect-coded faculty identities omitted from these models (PNTR_R, PNTR_G, and PNTR_O), the second set of effect-coded identities are substituted.

The second part of the analysis enters all interactions between identities and Biglan categories and between identities and the four institutional variables as fixed effects (156 interactions each for DAL and CL). The model equation below depicts these interactions, showing two example interaction terms between level-1 identities and level-2 institutional and disciplinary variables, while eliding all other interaction terms for readability. Again, the control variables from $\gamma_{11}(eLowDiv)_{ijk}$ to $\gamma_{24}(eInstrLect)_{ijk}$ are elided as they are unchanged from the previous models, for readability. Since these interactions include two sets of effect-coded variables (identities and Biglan categories), four interaction models each for DAL and CL were analyzed in order to produce the full sets of model results: a) between the first sets of effect-coded variables for identities and Biglan categories, b) between the first set for identities and second set for Biglan categories, c) between the second set for identities and first set for Biglan categories, and d) between the second set of effect-coded variables for identities and Biglan categories).

$$\begin{aligned}
Y_{ijk} = & \gamma_0 + \gamma_1(eAsian)_{ijk} + \gamma_2(eBlack)_{ijk} + \gamma_3(eLatin)_{ijk} + \gamma_4(eWhite)_{ijk} + \gamma_5(eOthR)_{ijk} \\
& + \gamma_6(eMultiR)_{ijk} + \gamma_7(eMan)_{ijk} + \gamma_8(eWoman)_{ijk} + \gamma_9(eStraight)_{ijk} \\
& + \gamma_{10}(eLGBQ)_{ijk} + \dots + \gamma_{25}(MTmTeach)_j + \gamma_{26}(Pct_{Tr})_j + \gamma_{27}(Pct_{FT})_j \\
& + \gamma_{28}(Pct_{ExInstr})_j + \gamma_{29}(eHPL)_k + \gamma_{30}(eHPN)_k + \gamma_{31}(eHAL)_k + \gamma_{32}(eHAN)_k \\
& + \gamma_{33}(eSPL)_k + \gamma_{34}(eSPN)_k + \gamma_{35}(eSAL)_k + \gamma_{36}((eAsian)_{ijk} * (eHPL)_k) + \dots \\
& + \gamma_{43}((eAsian)_{ijk} * (MTmTeach)_j) + \dots + b_{0j0} + c_{00k} + d_{0jk} + e_{ijk}
\end{aligned}$$

where Y_{ijk} represents DAL or CL scores, γ_0 is the model intercept, or expected mean DAL or CL score, when all other variables are set to 0, γ_p represents the fixed effect regression coefficient relating the associated variable to Y_{ijk} , and the remaining four terms represent the residual random effects of institutions, disciplines, institution-discipline interactions, and individuals,

respectively. Additionally, the proportional reduction in prediction errors were calculated for this interaction model using the variance parameters along with the variances of the null models.

Study Limitations

The use of a cross-classified multilevel analysis with secondary survey data imposes several limitations that require consideration prior to conducting and interpreting findings. First, the non-random nature of the survey sample limits generalizability of the findings and requires some caution in interpreting results. Institutions self-selected to participate in FSSE, thus the findings may not be fully representative of all four-year U.S. institutions. However, the sample descriptives do indicate that a wide range of institutional characteristics are represented in the sample. Furthermore, the faculty who responded to FSSE may not be fully representative of all faculty in four-year U.S. institutions (and thus the disciplines represented). As a survey about teaching (as it relates to student learning and engagement) and directed at instructional staff, it is possible that faculty who place greater value on teaching may be overrepresented. For instance, the faculty descriptives indicate that faculty who responded had an average course load of 5.5 courses and approximately three-quarters of faculty taught four or more courses. The sample may underrepresent faculty who teach, for example one or two courses per year, but have a greater focus on research or other responsibilities. This may suggest some caution, particularly when interpreting how institutional and disciplinary cultures relate to faculty teaching for faculty less focused on teaching. However, the overrepresentation of faculty who focus more so on teaching may also serve as a strength of the study, allowing results to better and more truly reflect the ways that institutional and disciplinary cultures relate to faculty teaching.

Secondly, the cross-classified analysis presents a couple limitations. There is the likelihood that the random effect of the interaction between level-2 institutions and disciplines

cannot be estimated by the models and that it will be confounded with individual random effects (Raudenbush & Bryk, 2002). Indeed, crossing the 322 institutions with the 121 disciplines shows extremely small faculty sample sizes, increasing the likelihood this interactional random effect will be confounded with individual random effects. None of the literature suggests that this risks the validity of other model parameters, and the research questions proposed can be sufficiently answered from other evidence provided in the models. Nonetheless, this potentially limits a fuller understanding of the interactions of institutions and disciplines on teaching. Another potential limitation is that FSSE's psychometric portfolio suggests the possibility that institution-level ICCs will be fairly small (BrckaLorenz, 2017; BrckaLorenz & Nelson Laird, 2017; Wong & BrckaLorenz, 2017). However, Huang (2018) indicated that small ICCs are not inherently problematic, particularly if the multilevel structure is theoretically and conceptually appropriate, and not modeling institutions would risk increasing bias in model estimates (Beretvas, 2011). Still, given the focus of this study on the interactions of institutions and disciplines, small ICCs, indicating small amounts of variance attributable to institutions, could limit the ability of the models to identify potentially significant interactions. For example, limited variance across institutions may limit the ability to identify if disciplinary cultures, as captured by the Biglan dimensions, significantly vary across institutions.

A final limitation of this analytical approach is that the substantial number of models, and requisite tests of statistical significance, presents a high likelihood of an increase in Type I error, or greater likelihood of results showing statistically significant results that are, in reality, not significant. Commonly known as the multiple comparisons problem, the problem arises due to the use of probabilities (as expressed by p-values) to determine statistical significance. Common in higher education research, this study relies on a threshold of $p < .05$ to determine statistical

significance, suggesting that, in theory, one in 20 statistical tests would be expected to show a false positive, a significant result that is not actually significant. Thus, by analyzing just over 100 models, each of which include multiple statistical tests (e.g., testing the significance of variable coefficients), it is likely this study includes some number of false positives. Statisticians and scholars have proposed various means of correcting for this issue, though most methods present some drawbacks. For instance, one of the most common methods, the Bonferroni correction, which simply divides the p-value threshold (here, $p < .05$) by the number of statistical tests of significance, has been noted to be extremely conservative, which could actually result in Type II error, or rejecting significant results that actually are significant. For instance, this study, in total, includes hundreds of statistical tests of significance – the final interaction models of RQ3 alone include over 150 tests apiece on variable coefficients. Using the Bonferroni correction in this study would result in rejecting many significant variable coefficients that are likely significant. Other methods are less conservative but require substantial post-hoc analysis. As this study is exploratory in nature and includes over 1,500 statistical tests of significance across the models, the decision was made to not adjust the results for the multiple comparisons problem and instead to interpret the findings in Chapter 5 with caution. In general, corrections for the multiple comparisons problem, whether Bonferroni or others, tend to suggest that the smaller the p-value (i.e., closer to 0) compared to others in a given study, the more likely it is to indicate a truly significant result. Without using a correction method, the results presented in this study then would be interpreted as a “best case” for the degree of interaction between institutional and disciplinary cultures and faculty identities.

Given the important focus of this study on how faculty identities relate to teaching and institutional and disciplinary cultures, it is necessary to acknowledge the limitations of the

proposed methods in understanding how identity relates to faculty experiences of teaching and cultures. It is important to remember that behind this study are faculty with complex experiences who work and live within complex cultures. Any survey that produces quantitative data would only ever be capable of scratching the surface of these complexities, and care should be taken to not over-interpret findings based on survey data as they relate to faculty identities. For instance, if a significant relationship in the interaction between Black faculty and institutional and disciplinary variables is not found, it may mean that the chosen variables were not appropriate indicators that are meaningful to Black faculty's experiences. Furthermore, while the use of effect coding allows for all identities to have model estimates presented, instead of reference identity groups being omitted, by instead making model estimates in reference to the overall average faculty member scores, it must be noted that these average scores are naturally weighted toward culturally dominant identities, particularly those of White and Straight faculty.

Additionally, the use of secondary survey data required choices to be made about the representation of small populations of faculty in this study, as described previously. As such, it is important to be upfront and clear about whose experiences are represented in this study and how. While this study references examining faculty gender identities, only faculty identifying as men and women are represented since so few faculty identified as another gender identity and could not reasonably be combined with another group. Other small populations of faculty, such as faculty identifying as gay, lesbian, bisexual, queer, questioning, another sexual orientation, Native Hawaiian or other Pacific Islander, Middle Eastern or North African, among others, were grouped with other faculty to maintain their presence in the study. While this helps to better understand their experiences when compared to excluding them entirely from the study (particularly in the case of sexual orientation which has not been studied before in relation to

teaching and faculty cultures), interpretations of findings will be more limited than for other groups of faculty such as faculty identifying as straight, White, or Black. While some caution is warranted in not overgeneralizing any results across faculty identities (e.g., not all White or Black faculty have the same experiences), greater caution must be exercised with groups that include small populations. Caution is also warranted for other small populations, such as faculty identifying as another race or ethnicity not specified in FSSE or faculty preferring not to identify their gender identity, for similar reasons. These groups of faculty are not monolithic and are representative of faculty who hold a wide array of identities that we as researchers are not privy to. While it is important to give voice to these faculty members' experiences, even if in imperfect ways, it is equally important to acknowledge that the proposed study naturally has limits in its ability to understand or explain faculty members of diverse identities' experiences with teaching, institutional cultures, and disciplinary cultures.

A final consideration is the lack of including professional cultures in the study. As described in the previous chapter, in contrast with institutional and disciplinary cultures, professional cultures can be characterized as a unifying influence across all faculty (Umbach, 2007). Without accounting for professional cultures, their influences, to the extent that they exist and are interrelated with other faculty cultures as proposed by Umbach, are likely confounded with the other influences on faculty teaching practices examined in this study. Though Clark (1987) discussed several broad values faculty typically hold as a profession, it is possible that professional subcultures exist around certain institutional or disciplinary cultural indicators. For instance, whether a faculty member is tenured or tenure-track versus non-tenure track can be broadly considered an indicator of institutional culture as institutions control the scope and terms of faculty employment and yet professional norms and values may differ across these types of

faculty. Similarly, whether or not a discipline is more professionally applied or not may relate to varying professional cultures related to the importance of developing students' professional skills.

Chapter 4: Findings

It is widely acknowledged that in teaching and learning, context matters. Framing these contexts in terms of faculty cultures, institutional and disciplinary cultures are often the most visible influences on teaching, with faculty identities also influencing how faculty teach. Yet, past research has not clearly identified how these cultures and identities overlap and interact to influence teaching. The purpose of this exploratory study is to examine these intersections, with research questions that address how institutional and disciplinary cultures and faculty identities relate to teaching practices around DAL and CL, how institutional and disciplinary cultures interact to influence these teaching practices, and how faculty identities interact with institutional and disciplinary cultures as they relate to teaching practices around DAL and CL.

To answer this study's research questions, in this chapter, I present the results of the analyses described in Chapter 3. The results are organized around each research question. Interpretation and discussion of these results follow in Chapter 5.

Research Question 1 Results

To what extent do faculty teaching practices around collaborative learning and deep approaches to learning vary by faculty identities and by institutional and disciplinary cultures?

The intent of Research Question 1 (RQ1) is to establish the baseline relationships between the variables of interest to this study – around institutional and disciplinary cultures and faculty identities – and how faculty emphasize or place importance on undergraduate students' use of DAL and the extent to which faculty encourage undergraduate students to engage in CL in their courses. While past research has utilized multilevel modeling, a cross-classified design has not yet been used to examine faculty teaching practices within institutions and disciplines

simultaneously. The results of these analyses provide a clearer understanding of these relationships and serve as a base to build from for the second and third research questions.

DAL and CL Null Models

First, the null models, which account for the level-2 institution and discipline groupings but no other explanatory independent variables, were examined for both dependent variables, DAL and CL. Using the variance parameters generated by these models, ICCs were calculated. As seen in Table 4.1, interpreting the ICC as the proportion of the total variance attributable to the level-2 groupings, 22.38% of the total variance in how faculty emphasize or place importance on students’ use of DAL is attributable to the grouping of faculty into institutions and disciplines, with 3.18% attributable to institutions and 19.21% attributable to disciplines. As suggested by the FSSE Psychometric Portfolio (BrckaLorenz, 2017; BrckaLorenz & Nelson Laird, 2017) for the constituent FSSE scales that comprise this study’s DAL variable, the ICC for institutions is small while considerably more variance is related to faculty disciplines. For the extent to which faculty encourage students to engage in CL, 5.88% of the total variance is attributable to the level-2 groups, with 1.68% for institutions and 4.20% for disciplines. Similarly, the small institution-level ICC for the CL variable aligns with the FSSE Psychometric Portfolio (Wang & BrckaLorenz, 2017), with the discipline-level ICC being similarly small.

Table 4.1

Level-2 Intraclass Correlation Coefficients (ICCs) for DAL and CL

	DAL	CL
Institution	0.0318	0.0168
Discipline	0.1921	0.0420
Total	0.2238	0.0588

Given the FSSE Psychometric Portfolio data (BrckaLorenz, 2017; BrckaLorenz & Nelson Laird, 2017; Wang & BrckaLorenz, 2017), it is not surprising that the institution-level

ICCs are small across both dependent variables, but the difference between the two discipline-level ICCs is particularly notable. Whether this difference represents true disparate levels of variation across disciplines in how faculty emphasize or place importance on students' use of DAL and how they encourage student engagement in CL in their courses is not clear from the data. Another possibility is that the teaching practices captured by the CL variable are more similarly understood and used by faculty across disciplines than the practices captured by the DAL variable.

DAL and CL Model Building

Before presenting results for the full conditional models described in Chapter 3, it is valuable to consider the changes in the proportional reduction in prediction error (which can be interpreted as a pseudo- R^2 or percentage of variance explained) as variables are added to the model. Starting from the null models, variables were added in several steps: 1) course and professional control variables (Control Model), 2) identity variables (Identity Model), 3) institutional variables (Institution Model), and 4) discipline variables (Full Model), with the addition of these last variables representing the full conditional fixed effects models for RQ1. Tables 4.2 and 4.3 summarize the random effects (variance parameters) and the proportional reduction of error in predicting individual-level outcomes and in predicting institution and discipline group means for each step for DAL and CL models, respectively.

Considering the overall proportional reduction in prediction error (at level-1) in how faculty emphasize or place importance on students' use of DAL, it is clear that far more variance is explained by the inclusion of the Biglan category variables than by institutional variables (or course, professional, and identity variables). Accounting for course and professional control characteristics and faculty identities, institutional variables – institutional mean time on teaching,

percentage of full-time faculty, percentage of full-time faculty who are tenured or tenure track, and the percentage of expenditures on instruction – explain less than 1% of the variance at the individual-level (an increase of 0.19 percentage points from 7.05% reduction in variance in the Identity Model). Meanwhile, adding the Biglan categories to the Institutional Model more than doubles the amount of variance explained, increasing the proportional reduction in prediction error from 7.24% to 18.52%. The explanatory power of the Biglan categories can also be observed in the proportional reduction of error in predicting discipline group means. While course and professional characteristics and identities explain a small portion of the variance in discipline group means, the inclusion of the Biglan categories explains more than half of this variance (54.49%) and the institutional variables explain only a marginal amount of variance (0.06%). Notably, when examining the proportional reduction in prediction error at the institution-level alone, the four institutional variables explain less variance than course and professional characteristics or identities. In fact, race, gender, and sexual orientation identities explained approximately one-quarter of institution group mean variance (though, remember from the ICCs that for DAL, institution-level variance was small to begin with).

Table 4.2

Proportional Reduction in Prediction Error in DAL Model Building

	Null Model (DAL-NM)	Control Model (DAL-1.1)	Identity Model (DAL-1.2)	Institution Model (DAL-1.3)	Full Model (DAL-1.4)
Random effects					
Individual Residual (Level-1)	0.7564	0.7351	0.7280	0.7278	0.7278
Institution Intercept (Level-2)	0.0310	0.0280	0.0199	0.0183	0.0183
Discipline Intercept (Level-2)	0.1872	0.1683	0.1580	0.1579	0.0480
Proportional reduction in prediction error					
Level-2 (Institution Group Mean)		7.38%	25.47%	28.98%	28.98%
Level-2 (Discipline Group Mean)		9.58%	14.73%	14.79%	69.28%
Level-1 (Individual Outcome)		4.44%	7.05%	7.24%	18.52%

Note. See Appendix C for full model results. Throughout Chapter 4, each model is labelled by the dependent variable – “DAL” or “CL” – and numbered for ease of reference to the Appendices.

Given that substantially less variance was attributable to institutional and disciplinary groupings for extent to which faculty encourage students to engage in CL, it is no surprise that, overall, institutional and disciplinary variables explain less variance at the individual or group levels that was observed in the DAL variable. As seen in Table 4.3, the Full Model explains only 4.85% of the variance in individual outcomes, which can be mostly attributed to course and professional characteristics and identities (3.11% in the Identity Model). Similar to how faculty emphasize or place importance on students’ use of DAL, the inclusion of the Biglan categories in the model explains substantially more variance in discipline group means than any of the other variables, increasing the proportional reduction in prediction error at the discipline level from 4.92% to 33.98%. Additionally, variance in the institution group means is largely explained by course and professional characteristics and identities (16.52% in the Identity Model). Notably, the proportional reduction in prediction error at the institution level decreases with the Institution Model. However, the total variance (sum of the variance parameters) for the Identity and Institution Models are nearly equal (these sums are equal below due to rounding). Given the very small institution-level ICC (0.0168; Table 4.1), one possible explanation is poor model fit, meaning that the four chosen institutional variables do not meaningfully explain variance in extent to which faculty encourage students to engage in CL. While this might be an argument for excluding these four institutional variables from the model, as an exploratory study interested in examining interactions between institutional and disciplinary cultures and faculty identities, it is worth continuing to include these variables in subsequent analyses.

Table 4.3*Proportional Reduction in Prediction Error in CL Model Building*

	Null Model (CL-NM)	Control Model (CL-1.1)	Identity Model (CL-1.2)	Institution Model (CL-1.3)	Full Model (CL-1.4)
Random effects (variance parameters)					
Individual Residual (Level-1)	0.9343	0.9131	0.9112	0.9110	0.9110
Institution Intercept (Level-2)	0.0167	0.0142	0.0114	0.0117	0.0117
Discipline Intercept (Level-2)	0.0417	0.0388	0.0393	0.0392	0.0219
Proportional reduction of variance					
Level-2 (Institution Group Mean)		8.28%	16.52%	15.63%	15.71%
Level-2 (Discipline Group Mean)		5.48%	4.78%	4.92%	33.98%
Level-1 (Individual Outcome)		2.67%	3.11%	3.10%	4.85%

Note. See Appendix C for full model results.

Full Conditional RQ1 Models for DAL and CL

The full conditional fixed effects models, introduced above and as described by the equations in Chapter 3, allow for a fuller analysis of RQ1. For how faculty emphasize or place importance on students' use of DAL, as noted in Table 4.2 above, the full conditional model had an overall proportional reduction in prediction error of 18.52%. This model allows for the discipline and institution intercepts – or the average group score for DAL after accounting for course and professional characteristics, identities, and institutional and disciplinary variables – to vary for each discipline and institution. Among institutions (see Table 4.4), the variance (0.0183) of the intercepts was significant ($Z=7.553$, $p<.001$), suggesting that there were significant differences across institutions in how faculty emphasize or place importance on students' use of DAL. Similarly, among disciplines, the variance (0.0480) was also significant ($Z=6.393$, $p<.001$). As variables were either standardized as Z-scores or effect-coded, the model intercept can be interpreted as the adjusted grand mean or the expected DAL score for the average faculty member in the average discipline at the average institution. This overall average faculty member,

accounting for course, professional, identity, disciplinary, and institutional characteristics, would be expected to have an adjusted grand mean DAL score significantly different from zero, $t(271.548)=3.719, p<.001$, of 0.1139.

As seen in Table 4.4, focusing on the primary independent variables of interest – faculty racial, gender, and sexual orientation identities and disciplinary and institutional cultures – multiple significant relationships exist. Considering faculty racial identities, Black or African American and Hispanic or Latinx faculty emphasize or place importance on students' use of DAL in their courses to a significantly greater degree than the average faculty member, while White faculty and faculty who preferred not to describe their racial identity emphasize or place importance on DAL at to a significantly lower degree than the average faculty member. Black or African American faculty emphasized or place importance on DAL in their courses 0.1473, $t(21,804.190)=6.525, p<.001$, standard deviation units and Hispanic or Latinx faculty did so 0.0950, $t(28,495.362)=3.652, p<.001$, units more than the average faculty member. On the other hand, White faculty emphasized or placed importance on students' use of DAL in their courses 0.1686, $t(28,494.142)=-14.672, p<.001$, standard deviation units and faculty who preferred not to describe their racial identity did so 0.1001, $t(29,692.471)=-4.609, p<.001$, units less than the average faculty member. Men and Women faculty also showed significant relationships with how faculty emphasize or place importance on students' use of DAL in their courses. Faculty identifying as Men emphasized or placed importance on DAL 0.0523, $t(29,611.493)=-4.709, p<.001$, standard deviation units less than the average faculty member, while Women faculty emphasized or placed importance on DAL 0.0512, $t(29,624.134)=4.526, p<.001$, units more than the average faculty member. No sexual orientation identities demonstrated a significant relationship with emphasis on DAL in courses. Despite the significance of these relationships,

interpreting these effects as effect sizes suggests that the magnitudes of these relationships are small (Rocconi & Gonyea, 2018).

Looking next at disciplinary characteristics, nearly all Biglan categories, seven of eight, showed significant relationships with how faculty emphasize or place importance on students' use of DAL in their courses, with faculty in three of four Hard discipline categories emphasizing DAL to a significantly lower degree than the average faculty member and faculty in all four Soft discipline categories doing so to a significantly greater degree. Faculty in HPL disciplines emphasized or placed importance on DAL 0.2759, $t(119.628)=-4.466$, $p<.001$, standard deviation units, faculty in HPN disciplines did so 0.5823, $t(110.852)=-7.851$, $p<.001$, units, and faculty in HAN disciplines emphasized or placed importance on DAL 0.4512, $t(125.676)=-7.816$, $p<.001$, units less than the average faculty members. Meanwhile, faculty in SPL disciplines emphasized or placed importance on students' use of DAL 0.4629, $t(99.609)=5.432$, $p<.001$, standard deviation units, faculty in SPN disciplines did so 0.2452, $t(95.423)=4.244$, $p<.001$, units, faculty in SAL disciplines emphasized or placed importance on DAL 0.3274, $t(112.141)=7.225$, $p<.001$, units, and faculty in SAN disciplines emphasized or placed importance on DAL 0.2324, $t(108.267)=4.470$, $p<.001$, units more than average faculty member. Interpreting these relationships as effect sizes suggests that magnitudes of the relationships between these Biglan categories and emphasis on DAL are large, and perhaps very large in the case of HPN disciplines (Rocconi & Gonyea, 2018).

Two institutional variables demonstrated significant, negative relationships with emphasis on DAL in courses. From the overall average score for how faculty emphasize or place importance on students' use of DAL (0.1139), each one standard deviation unit higher in the institutional mean time on teaching relates to lower emphasis or importance placed on DAL by

0.0401 $t(268.133)=-3.775, p<.001$, standard deviation units. Similarly, each one standard deviation unit greater in the percent of full-time faculty that are tenured or tenure-track lowers emphasis or importance placed on DAL by 0.0355, $t(292.626)=-3.590, p<.001$, units. Unlike the effects of discipline how faculty emphasize or place importance on students' use of DAL, the effect sizes of these two institutional variables could arguably be considered very small (Rocconi & Gonyea, 2018).

Table 4.4

Full Conditional Fixed Effects Model Results for DAL and CL

	DAL (DAL-1.4)		CL (CL-1.4)	
	Est.	Sig.	Est.	Sig.
Random Effects				
Individual (Residual)	0.7278	†††	0.9110	†††
Institution (Intercept)	0.0183	†††	0.0117	†††
Discipline (Intercept)	0.0480	†††	0.0219	†††
Fixed Effects				
Intercept	0.1139	***	-0.0389	
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.1511	***	-0.0311	**
Upper Division	0.1040	***	0.0155	
Other Division	0.0471	***	0.0156	
Course Enrollment Size				
Small Course	0.0207	**	-0.0332	***
Medium Course	0.0014		0.0026	
Large Course	-0.0222	**	0.0307	***
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0860	***	-0.0171	**
Meets a Gen Ed Requirement	0.0860	***	0.0171	**
Course Format				
Classroom	-0.0620	***	0.1757	***
Distance	-0.0084		-0.3721	***
Other Format	0.0704	***	0.1964	***
Course Load				
Years of Teaching Experience	-0.0469	***	-0.0541	***
Employment Status				
Part-Time	0.0124		-0.0144	
Full-Time	-0.0124		0.0144	
Rank				
Professor	-0.0206		-0.0386	**
Associate Professor	-0.0064		-0.0004	
Assistant Professor	0.0393	***	0.0360	**
Instructor/Lecturer	-0.0272	*	-0.0111	
Other Rank	0.0149		0.0142	

Table 4.4. cont.

Fixed Effects	Est.	Sig.	Est.	Sig.
<i>Faculty Identities</i>				
<i>Race/Ethnicity</i>				
Asian, Native Hawaiian, or other Pacific Islander	-0.0203		-0.0108	
Black or African American	0.1473	***	0.0636	*
Hispanic or Latinx	0.0950	***	0.0653	*
White	-0.1686	***	-0.0959	***
Another race/ethnicity	0.0534		-0.0095	
Multiracial	-0.0067		0.0296	
Preferred not to respond	-0.1001	***	-0.0422	
<i>Gender</i>				
Man	-0.0523	***	-0.0375	**
Woman	0.0512	***	0.0406	**
Preferred not to respond	0.0011		-0.0031	
<i>Sexual Orientation</i>				
Straight (Heterosexual)	-0.0019		-0.0123	
LGBQ+	0.0273		0.0299	
Preferred not to respond	-0.0254		-0.0176	
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0401	***	-0.0076	
Percent of Instructional Staff that Are Full-Time	-0.0033		-0.0126	
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0355	***	-0.0098	
Percent of Expenditures on Instruction	-0.0145		-0.0118	
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2759	***	0.1417	**
Hard-Pure-Nonlife (HPN) Discipline	-0.5823	***	0.2921	***
Hard-Applied-Life (HAL) Discipline	0.0414		-0.0460	
Hard-Applied-Nonlife (HAN) Discipline	-0.4512	***	0.1358	**
Soft-Pure-Life (SPL) Discipline	0.4629	***	-0.2273	***
Soft-Pure-Nonlife (SPN) Discipline	0.2452	***	-0.1661	***
Soft-Applied-Life (SAL) Discipline	0.3274	***	-0.0436	
Soft-Applied-Nonlife (SAN) Discipline	0.2324	***	-0.0866	*

Note. See Appendix C for full model results.

* $p < .05$, two-tailed. ** $p < .01$, two-tailed. *** $p < .001$, two-tailed. † $p < .05$, one-tailed. †† $p < .01$, one-tailed. ††† $p < .001$, one-tailed.

Looking at extent to which faculty encourage students to engage in CL in their courses, the full conditional fixed effects model had an overall proportional reduction in prediction error of 4.85%. Though the model explains only a small amount of variation, the variance of institution group intercepts (0.0117) was significant ($Z=6.213$, $p < .001$), as was the variance of discipline group intercepts (0.0219; $Z=5.472$, $p < .001$), suggesting significant differences across

institutions and disciplines. As above, the model intercept can be interpreted as the adjusted grand mean or the expected CL score for the average faculty member in the average discipline at the average institution. This overall average faculty member, accounting for course, professional, identity, disciplinary, and institutional characteristics, would not be expected to have a adjusted mean CL score significantly different from zero, $t(488.901)=-1.455, p>.05$. Looking at how faculty race, gender, and sexual orientation identities and disciplinary cultures relate to the extent to which faculty encourage students to engage in CL in their courses, multiple significant relationships exist, similar to how faculty emphasize or place importance on students' use of DAL. However, unlike how faculty emphasize or place importance on students' use of DAL in their courses, no institutional variables showed a significant relationship with the extent to which faculty encourage students to engage in CL in their courses.

As seen in Table 4.4, considering faculty racial identities, Black or African American and Hispanic or Latinx faculty encouraged students to engage in CL in their courses significantly more than the average faculty member, while White faculty did so significantly less than the average faculty member. Black or African American faculty encouraged CL in their courses 0.0636, $t(18,236.367)=2.559, p<.05$, standard deviation units and Hispanic or Latinx faculty encouraged CL 0.0653, $t(27,193.345)=2.262, p<.05$, units more than the average faculty member. Oppositely, White faculty encouraged CL in their courses less than the average faculty member, by 0.0959, $t(27,108.741)=-7.524, p<.001$, standard deviation units. Men and Women faculty also showed significant relationships with the extent to which faculty encourage students to engage in CL in their courses. Men faculty encouraged CL 0.0375, $t(29,716.032)=-3.018, p<.01$, standard deviation units less than the average faculty member, while Women faculty encouraged CL 0.0406, $t(29,726.125)=3.212, p<.01$, units more than the average faculty

member. Similar to how faculty emphasized or placed importance on students' use of DAL in their courses, no sexual orientation identities demonstrated a significant relationship with the extent to which faculty encourage students to engage in CL in their courses. For these faculty identities, the magnitudes of these effects are small to very small (Rocconi & Gonyea, 2018).

Examining relationships between Biglan categories and the extent to which faculty encourage students to engage in CL in their courses, six Biglan categories showed significant relationships, with faculty in three of four Hard discipline categories encouraging CL significantly more than the average faculty member and faculty in three of four Soft discipline categories doing so significantly less. Faculty in HPL disciplines encouraged CL 0.1417, $t(123.912)=3.015$, $p<.01$, standard deviation units, faculty in HPN disciplines encouraged CL 0.2921, $t(97.243)=5.334$, $p<.001$, units, and faculty in HAN disciplines encouraged CL 0.1358, $t(127.532)=3.073$, $p<.01$, units more than the average faculty member. Oppositely, faculty in SPL disciplines encouraged CL 0.2273, $t(88.390)=-3.694$, $p<.001$, standard deviation units, faculty in SPN disciplines encouraged CL 0.1661, $t(84.496)=-4.024$, $p<.001$, units, and faculty in SAL disciplines encouraged CL 0.0866, $t(102.640)=-2.251$, $p<.05$, units less than the average faculty member. The magnitudes of the relationships between these Biglan categories and the extent to which faculty encourage students to engage in CL range from very small (as in SAL disciplines) to near-medium (as in HPN disciplines; Rocconi & Gonyea, 2018).

Research Question 2 Results

To what extent do faculty teaching practices around collaborative learning and deep approaches to learning vary by the interaction of institutional and disciplinary cultures?

Having examined the individual relationships of institutional and disciplinary cultural variables with how faculty emphasize or place importance on undergraduate students' use of

DAL and the extent to which faculty encourage undergraduate students to engage in CL in their courses, the second research question (RQ2) then looks at how the cultures interact in their relationships with these two areas of faculty teaching. As described in Chapter 3, in this study these interactions are examined in two ways. First, each of the institutional and disciplinary variables' relationships with DAL and CL are allowed to randomly vary across the other level-2 group (e.g., relationship between Biglan categories and the extent to which faculty encourage CL randomly varying across institutions). These randomly varying relationships (or random slopes) allow for an understanding of whether, for example, the relationship between being in a Hard-Pure-Life discipline with how faculty emphasize or place importance on students' use of DAL significantly varies from institution to institution. For this analysis, for both DAL and CL, the models would not support including all random slopes in the same model, as the models would fail to converge. Therefore, each institutional variable and each Biglan category were modelled individually as random slopes (e.g., institutional mean time on teaching was allowed to randomly vary across disciplines, while all other institutional and disciplinary variables do not have a random slope).

Disciplinary and Institutional Variable Random Slopes on DAL

Allowing each of the Biglan categories, in turn, to vary randomly across institutions, seven of the eight models provided results. The model for Soft-Pure-Life (SPL) failed to converge, which suggests that the underlying data did not support a random slope for this Biglan category since that was the only change to the model from the full conditional fixed effects model presented in the first research question results (Bates et al., 2015). Table 4.5 summarizes select random effects and fixed effects for the random slope models of the other seven Biglan categories. For each of these seven models, the variance of the Biglan category slope was

significant, suggesting that the relationships between these Biglan categories and how faculty emphasize or place importance on students' use of DAL in their courses varies across institutions. In other words, for example, the degree to which faculty in Hard-Pure-Life (HPL) disciplines emphasize or place importance on DAL is to some degree different between Institution A, Institution B, and so forth. The variance of slopes for HPL disciplines was 0.0078 ($Z= 2.508, p<.01$), 0.0083 ($Z= 2.777, p<.01$) for Hard-Pure-Nonlife (HPN) disciplines, 0.0101 ($Z= 2.309, p<.01$) for Hard-Applied-Life (HAL) disciplines, 0.0064 ($Z= 1.991, p<.01$) for Hard-Applied-Nonlife (HAN) disciplines, 0.0041 ($Z= 2.226, p<.01$) for Soft-Pure-Nonlife (SPN) disciplines, 0.0036 ($Z= 2.128, p<.01$) for Soft-Applied-Life (SAL) disciplines, and 0.0078 ($Z= 2.508, p<.01$) for Soft-Applied-Nonlife (SAN) disciplines. While significant, the variances of these Biglan category slopes are small, however, and generally half as small or smaller than the variances of the institution intercepts.

Given that the relationships between these seven Biglan categories and how faculty emphasize or place importance on students' use of DAL in their courses varies significantly across institutions, it is additionally useful to understand whether there is any pattern to this variability. Looking at the relationships between these significantly varying Biglan category slopes and the institution intercepts (the covariance) helps to identify whether a pattern exists. Where the covariance between the Biglan category slopes and institution intercepts is not significant, it suggests that the variability in the relationship between the Biglan category and how faculty emphasize or place importance on students' use of DAL in their courses is not likely related to the variability in different institutions average level of emphasis or importance placed on DAL). As seen in Table 4.5, five of the Biglan categories have significant covariances between their slopes and the institution intercepts, with four (HPL, HPN, HAL, HAN) having a

positive covariance and one (SAN) having a negative covariance. These significant covariances are very small in magnitude, suggesting that these relationships are likely weak.

Table 4.5

Select Random and Fixed Effects for Biglan Category Random Slope Models on DAL

	Random Slope Models for Biglan Categories													
	Hard-Pure-Life (HPL) (DAL-2.1)		Hard-Pure-Nonlife (HPN) (DAL-2.2)		Hard-Applied-Life (HAL) (DAL-2.3)		Hard-Applied-Nonlife (HAN) (DAL-2.4)		Soft-Pure-Nonlife (SPN) (DAL-2.5)		Soft-Applied-Life (SAL) (DAL-2.6)		Soft-Applied-Nonlife (SAN) (DAL-2.7)	
	Est.	Sig.	Est.	Sig.	Est.	Sig.	Est.	Sig.	Est.	Sig.	Est.	Sig.	Est.	Sig.
Random Effects														
Institution (Intercept)	0.0185	††	0.0185	††	0.0197	††	0.0189	††	0.0177	††	0.0187	††	0.0185	††
[Biglan Cat.] (Slope)	0.0078	†	0.0083	†	0.0101	†	0.0064	†	0.0041	†	0.0036	†	0.0078	†
[Biglan Cat.]-Institution (Covariance)	0.0057	†	0.0051	†	0.0080	†	0.0064	†	0.0014		0.0078		-0.0057	†
Fixed Effects														
Intercept	0.1121	***	0.1109	***	0.1115	***	0.1114	***	0.1130	***	0.1138	***	0.1121	***
[Biglan Cat.]	-0.2812	***	-0.5864	***	0.0413		-0.4563	***	0.2386	***	0.3239	***	0.2375	***

Note. In each model, [Biglan Cat.] refers to the Biglan category identified in the column header that was allowed to randomly vary in that model. The model for Soft-Pure-Life (SPL) failed to converge and is not presented here. See Appendix C for full model results.

* $p < .05$, two-tailed. ** $p < .01$, two-tailed. *** $p < .001$, two-tailed. † $p < .05$, one-tailed. †† $p < .01$, one-tailed. ††† $p < .001$, one-tailed.

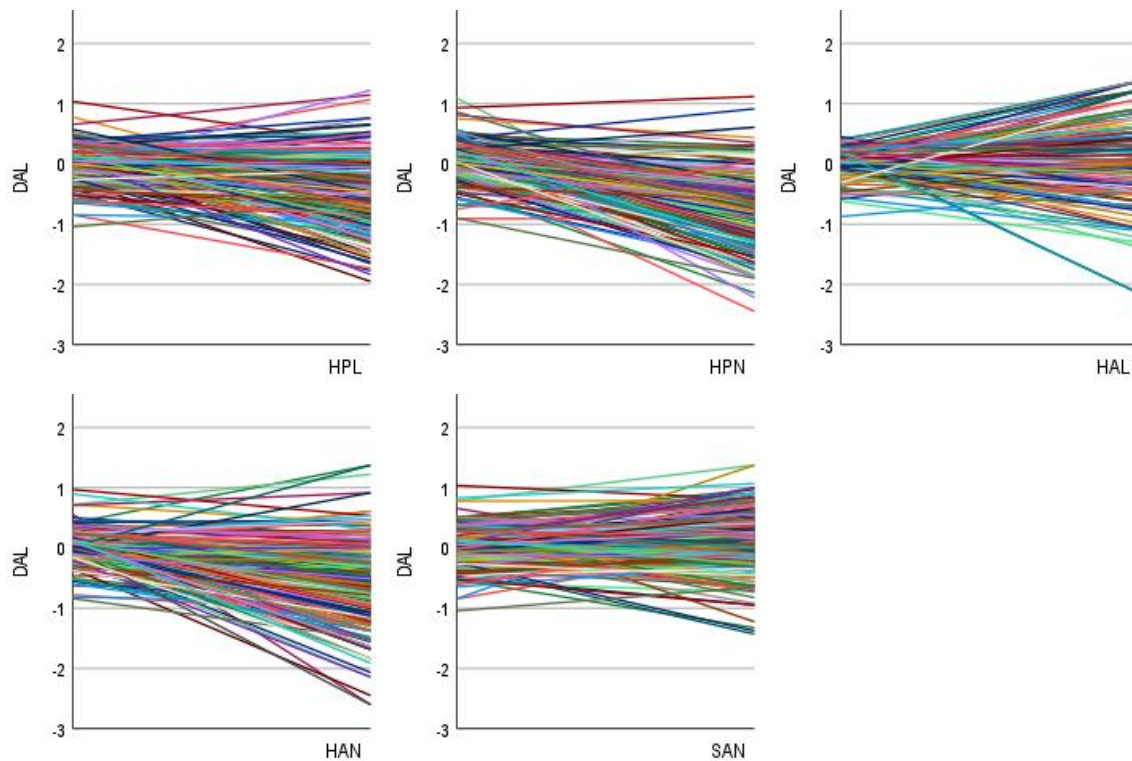
The significant, positive covariances between the HPL, HPN, HAL, and HAN Biglan category slopes and institution-level intercepts suggests that there are greater differences across institutions in the relationships between these Biglan categories and how faculty emphasize or place importance on students' use of DAL than compared to the average discipline. To better see this pattern, consider Figure 4.1, where the relationships between the Biglan categories and emphasis or importance placed on DAL are graphed for each institution. For HPL disciplines, for example, the positive covariance indicates that institutions that have an intercept greater than the overall model intercept of 0.1121 will tend to also have an HPL slope that is greater than -0.2812, while institutions with intercepts less than 0.1121 will tend to also have an HPL slope less than -0.2812. This tendency is why, as seen the HPL, HPN, HAL, and HAN graphs of Figure 4.1, there is a pattern of institution-specific lines spreading out as they move from the average discipline on the left to HPL, HPN, HAL, and HAN disciplines, respectively, to the right. Certainly, though, there are exceptions. For example, in the HPL graph of Figure 4.1, it appears that the institution with the highest intercept (top line at the y-axis) may have a slope less than -0.2812 while the institution with the lowest intercept (bottom line at the y-axis) has a positive slope.

Oppositely, as seen in Table 4.5, SAN disciplines had a significant, negative covariance between the slope and institution intercepts, suggesting that there are smaller differences across institutions in the relationship between SAN disciplines and emphasis on DAL compared to the average discipline. With a negative covariance, institutions with intercepts greater than 0.1121 will tend to have slopes less than 0.2375 for SAN, while institutions with intercepts less than 0.1121 will tend to have SAN slopes greater than 0.2375. Such a tendency would typically result in a graph where lines are converging as they move from the y-axis to the right. As seen in the

SAN graph of Figure 4.1, this pattern is difficult to see. One possible reason might be that, due to the complexity of the models, the graphs depicted in Figure 4.1 cannot account for the relationships between DAL and other variables in the model at the same time.

Figure 4.1

Covariance Between Biglan Category Slopes and Institution Intercepts



Note. Graphs depict the regression lines for each institution of DAL on Biglan categories with significant slope variance and significant covariance with institution intercepts. Individual lines are not intended to be individually discernible but are depicted to show the overall patterns of the slopes. Lines at y-axis represent the institution-specific intercepts for the average discipline, with the right-side of the x-axis depicting the institution-specific effect of the labelled Biglan category.

Similarly, the slopes of institutional variables were allowed to randomly vary across disciplines. Table 4.6 summarizes select random effects and fixed effects for the random slope models of the four institutional variables. Only one variable, the institutional mean time on teaching, had significant variance in its slopes across disciplines, suggesting that this institutional relationship with how faculty emphasize or place importance on students' use of DAL in their courses differed from discipline to discipline. The variance of the slopes for institutional mean time on teaching was 0.0024 ($Z= 2.891, p<.01$). The magnitude of this slope variance, though, is small particularly in relation to the variance of discipline intercepts, suggesting that this relationship is relatively weak. As above, with significant variance in the slopes of institutional mean time on teaching, it would be valuable to consider whether there is a pattern in how these slopes relate to the discipline intercepts (the covariance). However, the covariance between institutional mean time on teaching slopes and discipline intercepts was not significant, suggesting that there is no clear pattern between these slopes and intercepts.

Table 4.6*Random and Select Fixed Effects for Institutional Variable Random Slope Models for DAL*

	Random Slope Models for Institutional Variables							
	Institutional mean time on teaching (DAL-2.8)		Percent of instructional staff that are full-time (DAL-2.9)		Percent of full-time faculty that are tenured or tenure-track (DAL-2.10)		Percent of expenditures on instruction (DAL-2.11)	
	Est.	Sig.	Est.	Sig.	Est.	Sig.	Est.	Sig.
Random Effects								
Discipline (Intercept)	0.0478	†††	0.0484	†††	0.0481	†††	0.0480	†††
[Inst. Var.] (Slope)	0.0024	††	0.0007		0.0002		0.0002	
[Inst. Var.]-Institution (Covariance)	0.0018		0.0013		-0.0009		0.0007	
Fixed Effects								
Intercept	0.1148	***	0.1123	***	0.1142	***	0.1137	***
[Inst. Var.]	-0.0408	**	-0.0352	**	-0.0032		-0.0140	

Note. In each model, [Inst. Var.] refers to the institutional variable identified in the column header that was allowed to randomly vary in that model. See Appendix C for full model results.

* $p < .05$, two-tailed. ** $p < .01$, two-tailed. *** $p < .001$, two-tailed. † $p < .05$, one-tailed. †† $p < .01$, one-tailed. ††† $p < .001$, one-tailed.

Disciplinary and Institutional Variable Random Slopes on CL

As for how faculty emphasize or place importance on students' use of DAL, each of the Biglan categories was allowed to randomly vary across institutions for the extent to which faculty encourage students to engage in CL in their courses. Of the eight Biglan categories, models for seven produced results, with one (SPN) failing to converge. Given the substantially smaller ICCs for CL (see Table 4.1), it is again likely that the underlying data simply do not support allowing the relationship of SPN disciplines with CL to randomly vary (Bates et al., 2015). Table 4.7 summarizes select random effects and fixed effects for the random slope models of the seven Biglan categories. In contrast to faculty emphasis or importance placed on DAL, none of the randomly varying slopes for the Biglan categories showed significant variance. This

suggests that the relationships between these seven Biglan categories (HPL, HPN, HAL, HAN, SPL, SAL, SPN) with the extent to which faculty encourage students to engage in CL in their courses do not vary across institutions and that the relationships between these disciplinary categories and faculty encouragement of CL is likely to be substantially similar from one institution to another. For instance, the model indicates faculty in SAN disciplines encourage students to engage in CL in their courses 0.0866, $t(102.330)=-2.251$, $p<.05$, standard deviation units less than the average faculty member, and this relationship would not be expected to be substantially different from institution to institution (whereas for faculty emphasis or importance placed on DAL, the relationship with SAN disciplines is significantly different from institution to institution). As the slopes of the Biglan categories do not have significant variance across institutions, there is no need to consider the covariance, or relationship, between the slopes and institution intercepts.

Table 4.7

Select Random and Fixed Effects for Biglan Category Random Slope Models for CL

	Random Slope Models for Biglan Categories													
	Hard-Pure-Life (HPL) (CL-2.1)		Hard-Pure-Nonlife (HPN) (CL-2.2)		Hard-Applied-Life (HAL) (CL-2.3)		Hard-Applied-Nonlife (HAN) (CL-2.4)		Soft-Pure-Life (SPL) (CL-2.5)		Soft-Applied-Life (SAL) (CL-2.6)		Soft-Applied-Nonlife (SAN) (CL-2.7)	
	Est.	Sig.	Est.	Sig.	Est.	Sig.	Est.	Sig.	Est.	Sig.	Est.	Sig.	Est.	Sig.
Random Effects														
Institution (Intercept)	0.0117	†††	0.0117	†††	0.0120	†††	0.0118	†††	0.0119	†††	0.0118	†††	0.0117	†††
[Biglan Cat.] (Slope)	0.0004		0.0008		0.0071		0.0014		0.0021		0.0032		0.0004	
[Biglan Cat.]–Institution (Covariance)	0.0006		0.0009		0.0018		0.0007		0.0020		-0.0013		-0.0006	
Fixed Effects														
Intercept	-0.0390		-0.0389		-0.0400		-0.0390		-0.0397		-0.0387		-0.0390	
[Biglan Cat.]	0.1417	*	0.2925	†††	-0.0516		0.1363	††	-0.2291	††††	-0.0470		-0.0866	*

Note. In each model, [Biglan Cat.] refers to the Biglan category identified in the column header that was allowed to randomly vary in that model. The model for Soft-Pure-Nonlife (SPN) failed to converge and is not presented here. See Appendix C for full model results.

* $p < .05$, two-tailed. ** $p < .01$, two-tailed. *** $p < .001$, two-tailed. † $p < .05$, one-tailed. †† $p < .01$, one-tailed. ††† $p < .001$, one-tailed.

The slopes of institutional variables were also allowed to randomly vary across level-2 disciplines for the extent to which faculty encourage students to engage in CL in their courses. Table 4.8 summarizes select random effects and fixed effects for the random slope models of the four institutional variables. The model for the percent of instructional staff that are full-time failed to converge, also likely attributable to the underlying data not supporting the addition of a random slope on this variable (Bates et al., 2015). As with how faculty emphasize or place importance on students' use of DAL, only one variable, the institutional mean time on teaching, had significant variance in its across disciplines, suggesting that this institutional relationship with the extent to which faculty encourage CL in their courses differed from discipline to discipline. The variance of the slopes for institutional mean time on teaching was 0.0013 ($Z=2.153, p<.05$). This slope variance is small and substantially smaller than the variance of the discipline intercepts. Despite the significant variance in the slopes of the institutional mean time on teaching, the covariance between the slopes and the discipline intercepts was not significant. As before, this suggests no pattern exists between the relationship of institutional mean time on teaching and the extent to which faculty encourage students to engage in CL and the average level of encouragement of CL for each discipline.

Table 4.8*Random and Select Fixed Effects for Institutional Variable Random Slope Models for CL*

	Random Slope Models for Institutional Variables					
	Institutional mean time on teaching (CL-2.8)		Percent of full-time faculty who are tenured or tenure-track (CL-2.9)		Percent of expenditures on instruction (CL-2.10)	
Random Effects	Est.	Sig.	Est.	Sig.	Est.	Sig.
Discipline (Intercept)	0.0219	†††	0.0219	†††	0.0220	†††
[Inst. Var.] (Slope)	0.0013	†	0.0006		0.0007	
[Inst. Var.]-Institution (Covariance)	0.0004		0.0000		-0.0003	
Fixed Effects	Est.	Sig.	Est.	Sig.	Est.	Sig.
Intercept	-0.0379		-0.0390		-0.0386	
[Inst. Var.]	-0.0045		-0.0115		-0.0089	

Note. In each model, [Inst. Var.] refers to the institutional variable identified in the column header that was allowed to randomly vary in that model. The model for the percentage of instructional staff that are full-time failed to converge and is not presented here. See Appendix C for full model results.

*p<.05, two-tailed. **p<.01, two-tailed. ***p<.001, two-tailed. †p<.05, one-tailed. ††p<.01, one-tailed. †††p<.001, one-tailed.

Interactions between Disciplinary and Institutional Variables for DAL and CL

In addition to the possibility of the relationships between disciplinary and institution variables with faculty teaching around DAL and CL randomly varying across institutions and disciplines, respectively, it is possible that the disciplinary and institutional variables themselves interact in unique ways that relate to faculty teaching. All Biglan categories were interacted with the four institutional variables – institutional mean time on teaching, percentage of instructional staff that are full-time, percentage of full-time faculty who are tenured or tenure-track, and the percentage of expenditures on instruction – and the interaction terms were entered into the full conditional fixed effects models (DAL-1.4 and CL-1.4) from RQ1. For how faculty emphasize or

place importance on students' use of DAL in their courses, the interaction model explained approximately 18.55% of the total variance, only marginally greater than in the non-interaction fixed effects model (DAL-1.4). Similarly, for the extent to which faculty encourage students to engage in CL in their courses, the interaction model explained approximately 4.92% of the total variance, also only marginally greater than in the non-interaction fixed effects model (CL-1.4). This might generally suggest that the interaction terms between institutional and disciplinary variables do not add much benefit to explaining variance in faculty teaching around DAL or CL, and yet, looking at the model results significant interactions exist between some of the Biglan categories and institutional variables. As an exploratory study, these merit further consideration.

Regarding how faculty emphasize or place importance on students' use of DAL in their courses, five interaction terms were significant (see Table 4.9). As interactions between effect-coded variables (Biglan categories) and continuous variables (institutional variables), these interactions can be interpreted as the additional effect, in addition to the main effect of the institutional variable, for faculty of the given Biglan category per each additional standard deviation in the institutional variable. The overall average faculty member emphasizes or places importance on DAL in their courses 0.0410 standard deviation units for each standard deviation unit greater in the institutional mean time on teaching less than the average faculty member. In other words, for the average faculty member in the average discipline, the more faculty time spent on teaching at an institution, the less faculty will tend to emphasize DAL. However, SPL faculty, who in this model emphasize DAL 0.4618, $t(99.502)=5.365$, $p<.001$, standard deviation units more than the average faculty member, had a significant interaction effect of 0.0454, $t(29,721.028)=2.670$, $p<.01$, meaning SPL faculty actually emphasize or place importance on DAL in their courses 0.0044 standard deviation units more (combining the institutional main

effect and the interaction effect) for each standard deviation unit greater in institutional mean time on teaching than the average faculty member. Similarly, SAN faculty, who in this model emphasize or place importance on DAL 0.2361, $t(108.446)=4.491$, $p<.001$, more than the average faculty member, had a significant, positive interaction effect of 0.0512, $t(29,744.101)=3.538$, meaning that SAN faculty emphasize DAL in their courses 0.0102 units more for each additional standard deviation unit in institutional mean time on teaching than the average faculty member.

The other three significant interaction terms for how faculty emphasize or place importance on students' use of DAL appear with the percentage of instructional staff that are full-time (see Table 4.9). The overall average faculty member emphasizes or places importance on DAL in their courses 0.0385, $t(497.671)=-3.395$, $p<.001$, standard deviation units less for each additional standard deviation unit in the percentage of instructional staff that are full-time. In other words, the greater the percentage of full-time faculty at an institution, the less the average faculty member would be expected to emphasize or place importance on DAL. Faculty in HAN and SAN disciplines had interaction effects where with greater percentages of full-time faculty at an institution, these faculty emphasized DAL even less. With an interaction effect of -0.0481, $t(28,416.410)=-2.355$, $p<.05$, faculty in HAN disciplines, who in this model emphasize DAL 0.4543, $t(127.398)=-7.763$, $p<.001$, standard deviation units less than the average faculty member, actually emphasize DAL 0.0866 units less for each additional standard deviation unit in the percentage of full-time faculty. Likewise, SAN faculty had an interaction effect of -0.0309, $t(29,730.325)=-2.157$, $p<.05$, indicating that these faculty actually emphasize DAL 0.0694 units less for each additional standard deviation unit in the percentage of full-time faculty at an institution. Oppositely, SPN faculty, who in this model emphasize DAL 0.2453,

$t(95.504)=4.201, p<.001$, more than the average faculty member, had a positive interaction effect of 0.0286, $t(29,674.422)=2.377, p<.05$, for a total effect of emphasizing DAL 0.0099 less for each additional standard deviation unit in the percentage of full-time faculty. In other words, greater percentages of full-time faculty at an institution still result in SPN faculty emphasizing or placing importance on students' use of DAL less, but not to the extent of faculty in other disciplines.

Table 4.9

Select Disciplinary and Institutional Variable Interaction Model Results for DAL and CL

	DAL (DAL-2.12)		CL (CL-2.11)	
	Est.	Sig.	Est.	Sig.
Random Effects				
Individual (Residual)	0.7266	†††	0.9102	†††
Institution (Intercept)	0.0181	†††	0.0115	†††
Discipline (Intercept)	0.0490	†††	0.0221	†††
Fixed Effects				
Intercept	0.1142	***	-0.0354	
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0410	***	-0.0005	
Percent of Instructional Staff that Are Full-Time	-0.0385	***	-0.0044	
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0008		-0.0053	
Percent of Expenditures on Instruction	-0.0097		-0.0031	
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2726	***	0.1389	**
Hard-Pure-Nonlife (HPN) Discipline	-0.5849	***	0.2893	***
Hard-Applied-Life (HAL) Discipline	0.0403		-0.0298	
Hard-Applied-Nonlife (HAN) Discipline	-0.4543	***	0.1366	**
Soft-Pure-Life (SPL) Discipline	0.4618	***	-0.2324	***
Soft-Pure-Nonlife (SPN) Discipline	0.2453	***	-0.1692	***
Soft-Applied-Life (SAL) Discipline	0.3283	***	-0.0467	
Soft-Applied-Nonlife (SAN) Discipline	0.2361	***	-0.0866	*
<i>Interaction Effects</i>				
HPL x Institutional Mean Time on Teaching	-0.0282		-0.0050	
HPN x Institutional Mean Time on Teaching	-0.0168		0.0497	**
HAL x Institutional Mean Time on Teaching	-0.0171		-0.0093	
HAN x Institutional Mean Time on Teaching	-0.0283		0.0170	
SPL x Institutional Mean Time on Teaching	0.0454	**	-0.0002	
SPN x Institutional Mean Time on Teaching	-0.0225		-0.0464	***
SAL x Institutional Mean Time on Teaching	0.0161		-0.0269	
SAN x Institutional Mean Time on Teaching	0.0512	***	0.0211	
HPL x Percent of Instructional Staff that Are Full-Time	-0.0183		-0.0418	*
HPN x Percent of Instructional Staff that Are Full-Time	0.0057		0.0010	
HAL x Percent of Instructional Staff that Are Full-Time	0.0264		0.0316	
HAN x Percent of Instructional Staff that Are Full-Time	-0.0481	*	0.0287	

Table 4.9. cont.

Fixed Effects	Est.	Sig.	Est.	Sig.
SPL x Percent of Instructional Staff that Are Full-Time	0.0209		-0.0056	
SPN x Percent of Instructional Staff that Are Full-Time	0.0286	*	-0.0085	
SAL x Percent of Instructional Staff that Are Full-Time	0.0157		-0.0052	
SAN x Percent of Instructional Staff that Are Full-Time	-0.0309	*	-0.0001	
HPL x Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0203		-0.0263	
HPN x Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0018		0.0280	
HAL x Percent of Full-Time Faculty that Are Tenured/Tenure-Track	0.0252		0.0409	
HAN x Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0177		-0.0187	
SPL x Percent of Full-Time Faculty that Are Tenured/Tenure-Track	0.0187		0.0084	
SPN x Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0127		-0.0173	
SAL x Percent of Full-Time Faculty that Are Tenured/Tenure-Track	0.0050		-0.0159	
SAN x Percent of Full-Time Faculty that Are Tenured/Tenure-Track	0.0035		0.0009	
HPL x Percent of Expenditures on Instruction	0.0315		-0.0277	
HPN x Percent of Expenditures on Instruction	-0.0190		-0.0423	*
HAL x Percent of Expenditures on Instruction	0.0270		0.0700	
HAN x Percent of Expenditures on Instruction	-0.0200		0.0309	
SPL x Percent of Expenditures on Instruction	0.0121		-0.0072	
SPN x Percent of Expenditures on Instruction	-0.0016		0.0015	
SAL x Percent of Expenditures on Instruction	-0.0091		-0.0110	
SAN x Percent of Expenditures on Instruction	-0.0209		-0.0142	
Proportional reduction in prediction error (Level-1)	18.55%		4.92%	
Proportional reduction in prediction error (Level-2 Institutions)	29.43%		16.20%	
Proportional reduction in prediction error (Level-2 Disciplines)	68.80%		33.73%	

Note. See Appendix C for full model results.

* $p < .05$, two-tailed. ** $p < .01$, two-tailed. *** $p < .001$, two-tailed. † $p < .05$, one-tailed. †† $p < .01$, one-tailed. ††† $p < .001$, one-tailed.

Notably, the magnitudes of these significant interaction effects are generally similar to the magnitudes of the main effects of the institutional variables. However, in comparison with the effects of the Biglan categories, the institutional variable main effects and interaction effects are small in magnitude. To better illustrate these effects, Table 4.10 estimates the mean DAL score for faculty in each Biglan category at the average institution and at institutions with one standard deviation unit greater in the institutional mean time on teaching and the percentage of instructional staff that are full-time, with all other characteristics being average. From this it can be more clearly seen that the relationships of the Biglan categories to emphasis on DAL only

change to a small degree when factoring in these institutional and interaction effects. For instance, faculty in HPL, HPN, and HAN disciplines will tend to emphasize DAL less than the average faculty member in other disciplines (with faculty in HPN disciplines tending to emphasize DAL the least, followed by faculty in HAN disciplines), and the same is still true when the characteristics of the institution change.

Table 4.10

Disciplinary-Institutional Variable Interaction Effect Partially-Estimated Means for DAL

	Average Institution	Institution with a one-SD increase in...	
		Institutional mean time on teaching	Percentage of instructional staff that are full-time
Average Discipline	0.1142 ^a	0.0732	0.0757
Hard-Pure-Life (HPL) Discipline	-0.2726	-0.3418	-0.3294
Hard-Pure-Nonlife (HPN) Discipline	-0.5849	-0.6426	-0.6176
Hard-Applied-Life (HAL) Discipline	0.0403	-0.0178	0.0282
Hard-Applied-Nonlife (HAN) Discipline	-0.4543	-0.5235	-0.5409
Soft-Pure-Life (SPL) Discipline	0.4618	0.4662	0.4443
Soft-Pure-Nonlife (SPN) Discipline	0.2453	0.1819	0.2355
Soft-Applied-Life (SAL) Discipline	0.3283	0.3035	0.3056
Soft-Applied-Nonlife (SAN) Discipline	0.2361	0.2463	0.1667

Note. Partially-estimated means in bold had significant interaction effects. Estimated means for the “average institution” are the model intercept plus Biglan category main effects. Estimated means for the “average discipline” are the model intercept plus the institutional variable main effects. All other estimated means are the sum of the model intercept, Biglan category and institutional main effects, and the interaction effects.

^a Overall model intercept, or adjusted grand mean.

For the extent to which faculty encourage students to engage in CL in their courses, there were four significant interactions between Biglan categories and three of the institutional variables. As seen above in Table 4.9, two of these interactions occurred with the institutional

mean time on teaching. For the average faculty member, the effect of the institutional mean time on teaching was not significant, $t(452.676)=-0.049, p>.05$. Yet, faculty in HPN disciplines, who encourage CL 0.2893, $t(97.142)= 5.255, p<.001$, standard deviation units more than the average faculty member, had a significant interaction, encouraging CL 0.0497, $t(29,739.736)=2.982, p<.01$, more for each additional standard deviation unit in the institutional mean time on teaching. Oppositely, faculty in SPN disciplines, who encourage CL 0.1692, $t(84.475)=-4.077, p<.001$ standard deviation units less than the average faculty member, had a significant interaction, encouraging CL 0.0464, $t(29,535.515)=-3.560, p<.001$ less for each additional standard deviation unit in the institution mean time on teaching. The percentage of instructional staff that are full-time also did not have a significant relationship with how faculty encourage CL in their courses, $t(653.773)=-0.404, p>.05$, but had a significant interaction effect of -0.0418, $t(29,748.365)=-2.155, p<.05$ with faculty in HPL disciplines, who encourage CL 0.1389, $t(123.965)=2.937, p<.01$, more than the average faculty member. Faculty in HPN disciplines also had a significant interaction effect with the percentage of expenditures on instruction, encouraging CL in their courses 0.0423, $t(29,739.564)= -2.324, p<.05$, standard deviation units less per each additional standard deviation unit in the percentage of expenditures on instruction.

Compared to how faculty emphasize or place importance on students' use of DAL, the magnitudes of the effects on the extent to which faculty encourage students to engage in CL in their courses are notably smaller. The partially-estimated means, estimating the combined effects of the Biglan categories, institutional variables, and their interactions on encouraging CL, again help to better compare how the institutional and interaction effects are generally far smaller than the main effects of the Biglan categories. As seen in Table 4.11, the institutional and interaction effects tend to only have a marginal to small impact on the estimated means compared to the

effects of the Biglan categories. Similar to how faculty emphasize or place importance on DAL, the disciplines where faculty encourage CL the most and the least, HPN and SPL, respectively, at the average institution remained so regardless of changes in institutional characteristics.

Table 4.11

Disciplinary-Institutional Variable Interaction Effect Partially-Estimated Means for CL

	Average Institution	Institution with a one-SD increase in...		
		Institutional mean time on teaching	Percentage of instructional staff that are full-time	Percentage of full-time faculty that are tenured or tenure-track
Average Discipline	-0.0354 ^a	-0.0359	-0.0404	-0.0435
Hard-Pure-Life (HPL) Discipline	0.1389	0.1334	0.0927	0.1081
Hard-Pure-Nonlife (HPN) Discipline	0.2893	0.3384	0.2858	0.2439
Hard-Applied-Life (HAL) Discipline	-0.0298	-0.0397	-0.0027	0.0372
Hard-Applied-Nonlife (HAN) Discipline	0.1366	0.1531	0.1608	0.1645
Soft-Pure-Life (SPL) Discipline	-0.2324	-0.2332	-0.2425	-0.2427
Soft-Pure-Nonlife (SPN) Discipline	-0.1692	-0.2162	-0.1822	-0.1708
Soft-Applied-Life (SAL) Discipline	-0.0467	-0.0741	-0.0564	-0.0608
Soft-Applied-Nonlife (SAN) Discipline	-0.0866	-0.0660	-0.0912	-0.1039

Note. Partially-estimated means in bold had significant interaction effects. Estimated means for the “average institution” are the model intercept plus Biglan category main effects. Estimated means for the “average discipline” are the model intercept plus the institutional variable main effects. All other estimated means are the sum of the model intercept, Biglan category and institutional main effects, and the interaction effects.

^a Overall model intercept, or adjusted grand mean.

Research Question 3 Results

To what extent do the relationships between faculty identities and teaching practices around collaborative learning and deep approaches to learning vary by disciplinary and institutional cultures?

Having examined the variation and interactions across disciplines and institutions with regard to their relationships with how faculty emphasize or place importance on undergraduate students' use of DAL and the extent to which faculty encourage undergraduate students to engage in CL in their courses, the results of the third research question (RQ3) expand further by considering how the identity characteristics of faculty relate to these broader disciplinary and institutional cultures. As described in Chapter 3, these relationships are examined similarly to those in RQ2. First, the relationships between faculty members' identity characteristics and teaching practices around DAL and CL were allowed to randomly vary across disciplines and institutions. While, conceptually, these random slopes for all 13 identities would be included in the same model; however, similar to the second research question, in practice this was not feasible and the random slopes were modelled individually (i.e., a random slope across level-2 disciplines for each identity was modelled one at a time, and then again random slopes across level-2 institutions for each identity were modelled one at a time). Next, each identity characteristic was interacted with the Biglan categories and institutional variables to identify interaction effects.

Faulty Identity Random Slopes for DAL

Allowing faculty identities to randomly vary across institutions for how faculty emphasize or place importance on students' use of DAL resulted in three models that did not produce results due to convergence failure. As in RQ2, this is likely due to these models simply not supporting the addition of the random slope for those identities (Bates et al., 2015). As seen in Table 4.12, two of the seven racial identity random slope models – those for faculty identifying as Asian, Native Hawaiian, or other Pacific Islander and faculty who preferred not to identify their race – did not produce results. Of the other five racial identities, none of the

variances of their random slopes were significant. This suggests that for faculty identifying as Black or African American, Hispanic or Latinx, White, as another racial identity, or as Multiracial, the relationships between their racial identities and how they emphasize or place importance on DAL in their courses does not vary considerably from one institution to another. For instance, the otherwise average faculty member who identifies as Hispanic or Latinx, in the average discipline and institution, emphasizes DAL in their courses 0.0951, $t(617.207)=3.557$, $p<.001$, standard deviation units more than the average faculty member, and this relationship can be reasonably expected to be the same (or substantially similar) regardless of the institution.

Results of gender and sexual orientation identity random slopes across institutions for how faculty emphasize or place importance on students' use of DAL were similar (see Table 4.13). Of the three gender identities, the model for Women faculty did not produce results due to convergence failure. For Men faculty or faculty who preferred not to identify their gender, the variances of the random slopes were not significant, suggesting, again, that these relationships do not vary significantly from institution to institution. For sexual orientation identities, none of the variances of the random slopes for faculty identifying as Straight, LGBTQ+, or for faculty who preferred not to identify their sexual orientation were significant, likewise indicating that the relationships between these identities and emphasis on DAL are not expected to differ across institutions.

Table 4.12

Select Random and Fixed Effects for Racial Identity Random Slope Models across Institutions for DAL

	Random Slope Models for Racial Identities											
	Black or African American (DAL-3.1)		Hispanic or Latinx (DAL-3.2)		White (DAL-3.3)		Another racial identity (DAL-3.4)		Multiracial (DAL-3.5)			
Random Effects	Est.	Sig.	Est.	Sig.	Est.	Sig.	Est.	Sig.	Est.	Sig.	Est.	Sig.
Institution (Intercept)	0.0178	††	0.0182	††	0.0228	††	0.0177	††	0.0180	††		
[Identity] (Slope)	-0.0041		0.0013		-0.0042		-0.0031		-0.0017			
[Identity]-Institution (Covariance)	0.0020		0.0033		0.0014	†	0.0033		0.0014			
Fixed Effects	Est.	Sig.	Est.	Sig.	Est.	Sig.	Est.	Sig.	Est.	Sig.	Est.	Sig.
Intercept	0.1147	***	0.1140	***	0.1131	***	0.1143	***	0.1141	***		
[Identity]	0.1551	***	0.0951	***	-0.1678	***	0.0548		-0.0059			

Note. In each model, [Identity] refers to the racial identity identified in the column header that was allowed to randomly vary in that model. The models for faculty identifying as Asian, Native Hawaiian, or other Pacific Islander and faculty who preferred not to identify their race failed to converge and are not presented here. See Appendix C for full model results.

* $p < .05$, two-tailed. ** $p < .001$, two-tailed. *** $p < .001$, two-tailed. † $p < .05$, one-tailed. †† $p < .01$, one-tailed. ††† $p < .001$, one-tailed.

Table 4.13

Select Random and Fixed Effects for Gender and Sexual Orientation Identity Random Slope Models across Institutions for DAL

Random Slope Models for Gender and Sexual Orientation Identities															
				Preferred not to identify gender (DAL-3.7)			Straight (DAL-3.8)			LGBQ+ (DAL-3.9)			Preferred not to identify sexual orientation (DAL-3.10)		
				Est.	Sig.		Est.	Sig.		Est.	Sig.		Est.	Sig.	
Random Effects															
Institution (Intercept)				0.0184	††		0.0210	††		0.0180	††		0.0210	††	
[Identity] (Slope)				-0.0005			-0.0021			-0.0021			0.0021		
[Identity]-Institution (Covariance)				0.0021			0.0002			0.0007			0.0002		
Fixed Effects				Est.	Sig.		Est.	Sig.		Est.	Sig.		Est.	Sig.	
Intercept				0.1135	***		0.1134	***		0.1142	***		0.1134	***	
[Identity]				-0.0513	***		-0.0016			0.0277			-0.0255		

Note. In each model, [Identity] refers to the gender or sexual orientation identity identified in the column header that was allowed to randomly vary in that model. The model for Women faculty failed to converge and is not presented here. See Appendix C for full model results.

*p<.05, two-tailed. **p<.01, two-tailed. ***p<.001, two-tailed. †p<.05, one-tailed. ††p<.01, one-tailed. †††p<.001, one-tailed.

Random slopes across disciplines were also examined for racial, gender, and sexual orientation identities to consider whether the relationships between identities and how faculty emphasize or place importance on students' use of DAL differed across disciplines. Of the 13 random slope models, five – for Black or African American faculty, Hispanic or Latinx faculty, Multiracial faculty, Women faculty, and LGBTQ+ faculty – did not produce results due to convergence failure, suggesting, again, that the underlying data did not support the inclusion of a random slope for these identities (Bates et al., 2015). As seen in Table 4.14, three racial identities had random slopes that had significant variance across disciplines. The relationship between Asian, Native Hawaiian, or other Pacific Islander faculty and how they emphasize or place importance on DAL in their courses (the slope) had a variance of 0.0057 ($Z= 1.945, p<.05$), for White faculty this variance was 0.0021 ($Z= 1.985, p<.05$), and for faculty who preferred not to identify their race this variance was 0.0057 ($Z= 1.945, p<.05$). These variances are small, suggesting that for these faculty, differences from discipline to discipline in how they emphasize DAL in their courses are perhaps subtle in nature.

The ways that these relationships between identity and how faculty emphasize or place importance on students' use of DAL relate to how the average faculty member in each discipline emphasizes DAL – or the covariance between the slopes noted above and the discipline intercepts – are important to consider given the significant variance noted above. However, for Asian, Native Hawaiian, or other Pacific Islander faculty, White faculty, and faculty who preferred not to identify their race these covariances were not significant, suggesting that any pattern in how the relationships between identity and emphasis on DAL vary is likely unrelated to the average faculty emphasis or importance placed on DAL in each discipline. The covariance between identity slopes and discipline intercepts was significant for faculty of another racial

identity, however, as slope did not show significant variance, this covariance is not interpreted here.

Table 4.14

Select Random and Fixed Effects for Racial Identity Random Slope Models across Disciplines for DAL

	Random Slope Models for Racial Identities							
	Asian, Native Hawaiian, or other Pacific Islander (DAL-3.11)		White (DAL-3.12)		Another racial identity (DAL-3.13)		Preferred not to identify race (DAL-3.14)	
Random Effects	Est.	Sig.	Est.	Sig.	Est.	Sig.	Est.	Sig.
Discipline (Intercept)	0.0478	†††	0.0458	†††	0.0468	†††	0.0478	†††
[Identity] (Slope)	0.0057	†	0.0021	†	0.0024		0.0057	†
[Identity]-Discipline (Covariance)	-0.0054		0.0011		-0.0074	†	0.0054	
Fixed Effects	Est.	Sig.	Est.	Sig.	Est.	Sig.	Est.	Sig.
Intercept	0.1132	***	0.1150	***	0.1109	***	0.1132	***
[Identity]	-0.0361		-0.1665	***	0.0520		-0.0938	***

Note. In each model, [Identity] refers to the racial identity identified in the column header that was allowed to randomly vary in that model. The models for Black or African American faculty, Hispanic or Latinx faculty, and Multiracial faculty failed to converge and are not presented here. See Appendix C for full model results.

* $p < .05$, two-tailed. ** $p < .01$, two-tailed. *** $p < .001$, two-tailed. † $p < .05$, one-tailed. †† $p < .01$, one-tailed. ††† $p < .001$, one-tailed.

The results for racial identity random slopes across disciplines contrasts with the random slopes for gender and sexual orientation identities, as seen in Table 4.15. Of the four identities (Men, faculty preferring not to identify their gender, Straight faculty, and faculty preferring not to identify their sexual orientation) for which the models produced results, none of the random slopes showed significant variance across disciplines. This suggests that for these faculty, the

relationships between their identities and how they emphasize or place importance on students' use of DAL in their courses was not likely different from discipline to discipline. For instance, Men faculty emphasize DAL in their courses 0.0546, $t(98.408)=-4.366$, $p<.001$, standard deviation units less than the average faculty member, and this relationship not likely to differ regardless of the faculty member's discipline. As above, for Men faculty and faculty who preferred not to identify their gender, the covariance was significant, however, without significant variance on the slope, these covariances are not interpreted.

Table 4.15

Select Random and Fixed Effects for Gender and Sexual Orientation Identity Random Slope Models across Disciplines for DAL

	Random Slope Models for Gender and Sexual Orientation Identities							
	Man (DAL-3.15)		Preferred not to identify gender (DAL-3.16)		Straight (DAL-3.17)		Preferred not to identify sexual orientation (DAL-3.18)	
Random Effects	Est.	Sig.	Est.	Sig.	Est.	Sig.	Est.	Sig.
Discipline (Intercept)	0.0527	†††	0.0527	†††	0.0497	†††	0.0497	†††
[Identity] (Slope)	0.0018		0.0018		0.0005		0.0005	
[Identity]-Discipline (Covariance)	-0.0052	†	0.0052	†	-0.0013		0.0013	
Fixed Effects	Est.	Sig.	Est.	Sig.	Est.	Sig.	Est.	Sig.
Intercept	0.1174	***	0.1174	***	0.1139	***	0.1139	***
[Identity]	-0.0546	***	0.0030		-0.0019		-0.0248	

Note. In each model, [Identity] refers to the gender or sexual orientation identity identified in the column header that was allowed to randomly vary in that model. The models for Women faculty and LGBTQ+ faculty failed to converge and are not presented here. See Appendix C for full model results.

* $p<.05$, two-tailed. ** $p<.01$, two-tailed. *** $p<.001$, two-tailed. † $p<.05$, one-tailed. †† $p<.01$, one-tailed. ††† $p<.001$, one-tailed.

Faculty Identity Random Slopes for CL

The ways that the relationships between faculty identities and the extent to which faculty encourage students to engage in CL in their courses vary across institutions and across disciplines were also examined. Table 4.16 summarizes the results of these random slope models across institutions for faculty racial identities, though the models for Black or African American faculty and faculty identifying as another race did not produce results due to convergence failure. Given the small institution ICC for CL, it is again likely that the underlying data did not support the inclusion of random slopes in the models for these two identities (Bates et al., 2015). None of the variances of the random slopes for Asian, Native Hawaiian, or other Pacific Islander faculty, Hispanic or Latinx faculty, White faculty, Multiracial faculty, or faculty preferring not to identify their race were significant. This suggests that for these faculty the extent that they encourage students to engage in CL in their courses likely does not differ substantially from institution to institution. Results were similar for the random slopes of gender and sexual orientation identities across institutions (see Table 4.17). Models for Women faculty, Straight faculty, and faculty preferring not to identify their sexual orientation did not produce results due to convergence failure. Similarly, the variances of the random slopes for Men faculty, faculty preferring not to identify their gender, and LGBTQ+ faculty were not significant, suggesting that the extent that these faculty encourage students to engage in CL in their courses is not likely different from institution to institution.

Table 4.16

Select Random and Fixed Effects for Racial Identity Random Slope Models across Institutions for CL

Random Effects	Random Slope Models for Racial Identities											
	Asian, Native Hawaiian, or other Pacific Islander (CL-3.1)		Hispanic or Latinx (CL-3.2)		White (CL-3.3)		Multiracial (CL-3.4)		Preferred not to identify race (CL-3.5)		Est.	Sig.
Institution (Intercept)	0.0119	†††	0.0119	†††	0.0134	†††	0.0119	†††	0.0119	†††	0.0119	†††
[Identity] (Slope)	0.0058		0.0017		0.0003		0.0040		0.0058			
[Identity]-Institution (Covariance)	0.0035		0.0024		-0.0015		0.0023		-0.0035			
Fixed Effects	Est.	Sig.	Est.	Sig.	Est.	Sig.	Est.	Sig.	Est.	Sig.	Est.	Sig.
Intercept	-0.0379		-0.0392		-0.0394		-0.0388		-0.0379			
[Identity]	-0.0078		0.0630		-0.0957	***	0.0297		-0.0436			

Note. In each model, [Identity] refers to the racial identity identified in the column header that was allowed to randomly vary in that model. The models for faculty identifying as Black or African American or as another race failed to converge and are not presented here. See Appendix C for full model results.

* $p < .05$, two-tailed. ** $p < .01$, two-tailed. *** $p < .001$, two-tailed. † $p < .05$, one-tailed. †† $p < .01$, one-tailed. ††† $p < .001$, one-tailed.

Table 4.17*Select Random and Fixed Effects for Gender and Sexual Orientation Identity Random Slope**Models across Institutions for CL*

	Random Slope Models for Gender and Sexual Orientation Identities					
	Man (CL-3.6)		Preferred not to identify gender (CL-3.7)		LGBQ+ (CL-3.8)	
	Est.	Sig.	Est.	Sig.	Est.	Sig.
Random Effects						
Institution (Intercept)	0.0106	†††	0.0106	†††	0.0117	†††
[Identity] (Slope)	0.0006		0.0006		0.0015	
[Identity]-Institution (Covariance)	0.0011		-0.0011		0.0010	
Fixed Effects						
Intercept	-0.0388		-0.0388		-0.0390	
[Identity]	-0.0367	**	-0.0039		0.0299	

Note. In each model, [Identity] refers to the gender or sexual orientation identity identified in the column header that was allowed to randomly vary in that model. The models for Women faculty, Straight faculty, and faculty preferring not to identify their sexual orientation failed to converge and are not presented here. See Appendix C for full model results.

* $p < .05$, two-tailed. ** $p < .01$, two-tailed. *** $p < .001$, two-tailed. † $p < .05$, one-tailed. †† $p < .01$, one-tailed. ††† $p < .001$, one-tailed.

As seen in Table 4.18, examining how the relationships between identities and the extent that faculty encourage students to engage in CL in their courses varied across disciplines, only four models – for Black or African American faculty, Men faculty, Women faculty, and faculty who preferred not to identify their gender – produced results. Models for all other identities did not produce results due to convergence failure, again most likely because the underlying data do not support allowing these relationships to vary across disciplines (Bates et al., 2015). Examining these four models, none of the variances of the random slopes for Black or African American

faculty, Men faculty, Women faculty, and faculty who preferred not to identify their gender were significant. Again, this suggests that the extent to which these faculty encourage students to engage in CL in their courses do not differ substantially regardless of their discipline.

Table 4.18

Select Random and Fixed Effects for Racial and Gender Identity Random Slope Models across Disciplines for CL

	Random Slope Models for Racial and Gender Identities							
	Black or African American (CL-3.9)		Man (CL-3.10)		Woman (CL-3.11)		Preferred not to identify gender (CL-3.12)	
	Est.	Sig.	Est.	Sig.	Est.	Sig.	Est.	Sig.
Random Effects								
Discipline (Intercept)	0.0218	†††	0.0226	†††	0.0188	†††	0.0226	†††
[Identity] (Slope)	0.0018		0.0015		0.0042		0.0015	
[Identity]-Discipline (Covariance)	-0.0011		-0.0012		0.0026		0.0012	
Fixed Effects								
Intercept	-0.0387		-0.0407		-0.0361		-0.0407	
[Identity]	0.0669	**	-0.0329	*	0.0396	*	-0.0077	

Note. In each model, [Identity] refers to the gender or sexual orientation identity identified in the column header that was allowed to randomly vary in that model. The models for Asian, Native Hawaiian, or other Pacific Islander faculty, Hispanic or Latinx faculty, White faculty, Multiracial faculty, faculty of another racial identity, faculty who preferred not to identify their race, Straight faculty, LGBTQ+ faculty, and faculty who preferred not to identify their sexual orientation failed to converge and are not presented here. See Appendix C for full model results.

*p<.05, two-tailed. **p<.01, two-tailed. ***p<.001, two-tailed. †p<.05, one-tailed. ††p<.01, one-tailed. †††p<.001, one-tailed.

Interactions between Faculty Identities and Institutional and Disciplinary Variables for DAL

Though the relationships between faculty identities and how faculty emphasize or place importance on students’ use of DAL or the extent to which faculty encourage students to engage

in CL showed little or no variation, respectively, across level-2 institutions or disciplines, faculty identities can still interact with aspects of institutional and disciplinary cultures in unique ways that are common across all institutions or disciplines. Examining faculty emphasis or importance placed on DAL, the faculty identities were interacted with the eight Biglan categories and the four institutional variables, resulting in 156 interactions. As before, interactions between effect-coded faculty identities and continuous institutional variables can be interpreted as the additional effect per each additional standard deviation unit in the institutional variable for faculty of the given identity. Interactions between effect-coded faculty identities and effect-coded Biglan categories can be broadly interpreted as the additional effect, beyond the main effects of a given Biglan category or identity, for being a faculty member of that identity in that Biglan category compared to the overall average faculty member.

Table 4.19 provides selected findings of this interaction model on how faculty emphasize or place importance on students' use of DAL in their courses, including the main effects of faculty identities, Biglan categories, and institutional variables, as well as the interaction effects. This interaction model resulted in a proportional reduction in prediction error (which can be interpreted as variance explained) of 18.83%, only marginally greater than that of the full conditional fixed effects model (18.52%; see Table 4.2). While the addition of the 156 interaction terms contributes little to the overall explanation of variance, the interactions provide greater depth in understanding the relationships between identities and institutional and disciplinary cultures.

For how faculty emphasize or place importance on students' use of DAL, of the 156 interactions, 23 were statistically significant. The significant interactions mostly occurred between faculty identities and the Biglan categories. Again, these interaction effects described

here are in addition to the separate main effects for each identity and each Biglan category. When combined they represent the total effect of being a faculty member of a given identity in the given Biglan category. Among faculty in HPN disciplines, Asian, Native Hawaiian, or other Pacific Islander faculty emphasized DAL to a significantly greater degree than the average HPN faculty member ($\beta=0.1392$, $t[29,513.754]=2.637$, $p<.01$), for a total effect of emphasizing DAL 0.3328 standard deviation units less than the average faculty member. Black or African American faculty emphasized DAL to a significantly greater degree than the average HPL ($\beta=0.1675$, $t[29,577.702]=2.140$, $p<.05$) and HAL ($\beta=0.2610$, $t[29,552.812]=2.138$, $p<.05$) faculty, for total effects emphasizing DAL 0.1712 and 0.5322 units, respectively, more than the average faculty member. Oppositely, Black or African American faculty emphasized DAL to a significantly lower degree than the average SPN ($\beta=-0.1821$, $t[29,540.326]=-3.572$, $p<.001$) and SAL ($\beta=-0.1414$, $t[29,554.128]=-3.147$, $p<.01$) faculty, yet still resulting in total effects of emphasizing DAL 0.2995 and 0.3972 units, respectively, more than the average faculty. White faculty emphasized DAL to a significantly lower degree than the average HPN ($\beta=-0.1788$, $t[29,531.770]=-5.261$, $p<.001$), for a total effect emphasizing DAL 0.8641 standard deviation units less than the average faculty, while White faculty emphasized DAL to a significantly greater degree than the average SPN ($\beta=0.0514$, $t[29,533.839]=2.088$, $p<.05$) and SAL ($\beta=0.0554$, $t[29,523.749]=2.115$, $p<.05$) faculty, for total effects of emphasizing DAL 0.1051 and 0.1662 units, respectively, more than the average faculty member. Compared to the average faculty in HPN and SAL disciplines, faculty identifying as another race emphasized DAL to a significantly greater degree ($\beta=0.3118$, $t[29,470.777]=2.939$, $p<.01$, and $\beta=0.1894$, $t[29,483.684]=2.379$, $p<.05$, respectively), for total effects of emphasizing DAL 0.2337 units less and 0.4400 units more, respectively, than the average faculty member. Faculty of another race,

however, emphasized DAL to a significantly lower degree than the average HAL ($\beta=-0.7191$, $t(29,477.249)=-3.040$, $p<.01$) faculty, for a total effect emphasizing DAL 0.7360 standard deviation units less than the overall average faculty. Multiracial faculty emphasized DAL to a significantly lower degree than the average HPN ($\beta=-0.2055$, $t[29,449.953]=-2.506$, $p<.05$), for a total effect emphasizing DAL 0.7247 standard deviation units less than the overall average faculty member, and faculty who preferred not to identify their race likewise emphasized DAL to a significantly lower degree than the average HPN ($\beta=-0.1385$, $t[29,466.771]=-2.122$, $p<.05$) faculty, for a total effect emphasizing DAL 0.7243 units less than the overall average faculty. Faculty who identified as Hispanic or Latinx did not have any significant interactions with Biglan categories.

Additional significant interactions appeared between Biglan categories and gender and sexual orientation identities. Men faculty emphasized DAL to a significant greater degree than the average HAN ($\beta=0.1186$, $t[29,501.223]=3.096$, $p<.01$) faculty, and yet had a total effect emphasizing or placing importance on students' use of DAL 0.4115 standard deviation units less than the average faculty member; meanwhile, Men faculty emphasized DAL to a significantly lower degree than the average SPN ($\beta=-0.0558$, $t[29,485.119]=-2.449$, $p<.05$) faculty, for a total effect emphasizing DAL 0.1343 units more than the overall average faculty member. Oppositely, faculty who preferred not to identify their gender emphasized DAL to a significantly lower degree than the average HAN ($\beta=-0.1470$, $t[29,492.342]=-2.151$, $p<.05$) faculty but emphasized DAL to a significantly greater degree than the average SPN ($\beta=0.0887$, $t[29,456.028]=2.236$, $p<.05$) faculty, for total effects of emphasizing DAL 0.6479 units less and 0.3080 units more, respectively, than the average faculty member. Straight faculty emphasized DAL to a significantly greater degree than the average HPN ($\beta=0.0737$, $t(29,476.449)=2.137$, $p<.05$)

faculty, yet had a total effect emphasizing DAL 0.4363 standard deviation units less than the average faculty member. LGBQ+ faculty, meanwhile, emphasized DAL to a significantly lower degree than the average HPN ($\beta=-0.1523$, $t[29,470.031]=-2.699$, $p<.01$) faculty, with a total effect emphasizing DAL 0.6039 units less than the average faculty. However, LGBQ+ faculty emphasized DAL to a significantly greater degree than the average HAL ($\beta=0.2443$, $t[29,411.697]=2.012$, $p<.05$) faculty, for a total effect emphasizing DAL 0.3213 standard deviation units more than the average faculty. Lastly, faculty who preferred not to identify their sexual orientation emphasized DAL to a significantly lower degree than the average HAL ($\beta=-0.2600$, $t[29,458.951]=-2.570$, $p<.05$) faculty, for a total effect emphasizing DAL 0.2921 units less than the average faculty member.

Only two significant interactions occurred between faculty identities and institutional variables, both of which were with the institutional mean time on teaching. In this model, the main effect relationship between the institutional mean time on teaching and emphasis or importance placed on students' use of DAL was not significant, $t(1,815.436)=-1.804$, $p>.05$. However, for Asian, Native Hawaiian, or other Pacific Islander faculty there was a positive interaction effect, with these faculty emphasizing DAL an additional 0.0603, $t(29,600.244)=2.640$, $p<.01$, units more per each additional standard deviation in the institutional mean time on teaching. Oppositely, Men faculty had a negative interaction effect, emphasizing DAL an additional 0.0242, $t(29,509.874)=-1.979$, $p<.05$, units less per each additional standard deviation in the institutional mean time on teaching.

Table 4.19*Select Faculty Identity and Disciplinary and Institution Variable Interaction Model Results for**DAL*

	DAL (DAL-3.19)	
	Est.	Sig.
Random Effects		
Individual (Residual)	0.7251	†††
Institution (Intercept)	0.0180	†††
Discipline (Intercept)	0.0481	†††
Fixed Effects		
Intercept	0.1060	**
<i>Faculty Identities</i>		
<i>Race/Ethnicity</i>		
Asian, Native Hawaiian, or other Pacific Islander	-0.0311	
Black or African American	0.2500	***
Hispanic or Latinx	0.0870	*
White	-0.1779	***
Another race/ethnicity	-0.0381	
Multiracial	-0.0117	
Preferred not to respond	-0.0783	**
<i>Gender</i>		
Man	-0.0414	**
Woman	0.0538	***
Preferred not to respond	-0.0123	**
<i>Sexual Orientation</i>		
Straight (Heterosexual)	-0.0025	
LGBQ+	0.0558	*
Preferred not to respond	-0.0533	*
<i>Institutional Variables</i>		
Institutional Mean Time on Teaching (MtmTeach)	-0.0313	
Percent of Instructional Staff that Are Full-Time (Pct_FT)	-0.0313	
Percent of Full-Time Faculty that Are Tenured/Tenure-Track (Pct_TTr)	-0.0034	
Percent of Expenditures on Instruction (Pct_ExInstr)	-0.0172	
<i>Disciplinary Variables</i>		
Hard-Pure-Life (HPL) Discipline	-0.2463	**
Hard-Pure-Nonlife (HPN) Discipline	-0.5075	***
Hard-Applied-Life (HAL) Discipline	0.0212	
Hard-Applied-Nonlife (HAN) Discipline	-0.4886	***
Soft-Pure-Life (SPL) Discipline	0.4351	***
Soft-Pure-Nonlife (SPN) Discipline	0.2316	***
Soft-Applied-Life (SAL) Discipline	0.2886	***
Soft-Applied-Nonlife (SAN) Discipline	0.2660	***
<i>Identity x Institutional Variable Interaction Effects</i>		
Asian, Native Hawaiian, or other Pacific Islander x MtmTeach	0.0603	**
Asian, Native Hawaiian, or other Pacific Islander x Pct_FT	0.0219	
Asian, Native Hawaiian, or other Pacific Islander x Pct_TTr	-0.0073	
Asian, Native Hawaiian, or other Pacific Islander x Pct_ExInstr	0.0113	
Black or African American x MtmTeach	0.0406	
Black or African American x Pct_FT	0.0033	

Table 4.19. cont.

Fixed Effects	Est.	Sig.
Black or African American x Pct_TTr	-0.0258	
Black or African American x Pct_ExInstr	0.0113	
Hispanic or Latinx x MtmTeach	-0.0361	
Hispanic or Latinx x Pct_FT	-0.0041	
Hispanic or Latinx x Pct_TTr	0.0005	
Hispanic or Latinx x Pct_ExInstr	-0.0003	
White x MtmTeach	0.0028	
White x Pct_FT	0.0022	
White x Pct_TTr	-0.0046	
White x Pct_ExInstr	-0.0057	
Another race/ethnicity x MtmTeach	-0.0563	
Another race/ethnicity x Pct_FT	-0.0373	
Another race/ethnicity x Pct_TTr	0.0370	
Another race/ethnicity x Pct_ExInstr	-0.0356	
Multiracial x MtmTeach	0.0036	
Multiracial x Pct_FT	0.0227	
Multiracial x Pct_TTr	-0.0151	
Multiracial x Pct_ExInstr	0.0446	
Preferred not to respond (Race) x MtmTeach	-0.0148	
Preferred not to respond (Race) x Pct_FT	-0.0086	
Preferred not to respond (Race) x Pct_TTr	0.0153	
Preferred not to respond (Race) x Pct_ExInstr	-0.0256	
Man x MtmTeach	-0.0242	*
Man x Pct_FT	-0.0221	
Man x Pct_TTr	0.0033	
Man x Pct_ExInstr	0.0090	
Woman x MtmTeach	-0.0181	
Woman x Pct_FT	-0.0147	
Woman x Pct_TTr	0.0105	
Woman x Pct_ExInstr	-0.0013	
Preferred not to respond (Gender) x MtmTeach	0.0423	
Preferred not to respond (Gender) x Pct_FT	0.0368	
Preferred not to respond (Gender) x Pct_TTr	-0.0138	
Preferred not to respond (Gender) x Pct_ExInstr	-0.0077	
Straight (Heterosexual) x MtmTeach	0.0114	
Straight (Heterosexual) x Pct_FT	0.0158	
Straight (Heterosexual) x Pct_TTr	-0.0019	
Straight (Heterosexual) x Pct_ExInstr	0.0038	
LGBQ+ x MtmTeach	0.0215	
LGBQ+ x Pct_FT	0.0130	
LGBQ+ x Pct_TTr	0.0090	
LGBQ+ x Pct_ExInstr	-0.0222	
Preferred not to respond (Sexual Orientation) x MtmTeach	-0.0329	
Preferred not to respond (Sexual Orientation) x Pct_FT	-0.0288	
Preferred not to respond (Sexual Orientation) x Pct_TTr	-0.0072	
Preferred not to respond (Sexual Orientation) x Pct_ExInstr	0.0184	
<i>Identity x Disciplinary Variable Interaction Effects</i>		
Asian, Native Hawaiian, or other Pacific Islander x HPL	-0.0555	
Asian, Native Hawaiian, or other Pacific Islander x HPN	0.1392	**
Asian, Native Hawaiian, or other Pacific Islander x HAL	0.0571	

Table 4.19. cont.

Fixed Effects	Est.	Sig.
Asian, Native Hawaiian, or other Pacific Islander x HAN	0.0463	
Asian, Native Hawaiian, or other Pacific Islander x SPL	-0.0237	
Asian, Native Hawaiian, or other Pacific Islander x SPN	-0.0285	
Asian, Native Hawaiian, or other Pacific Islander x SAL	-0.1076	
Asian, Native Hawaiian, or other Pacific Islander x SAN	-0.0274	
Black or African American x HPL	0.1675	*
Black or African American x HPN	0.0072	
Black or African American x HAL	0.2610	*
Black or African American x HAN	0.0640	
Black or African American x SPL	-0.0869	
Black or African American x SPN	-0.1821	***
Black or African American x SAL	-0.1414	**
Black or African American x SAN	-0.0893	*
Hispanic or Latinx x HPL	-0.0098	
Hispanic or Latinx x HPN	0.0645	
Hispanic or Latinx x HAL	0.0461	
Hispanic or Latinx x HAN	-0.1070	
Hispanic or Latinx x SPL	-0.0709	
Hispanic or Latinx x SPN	0.0833	
Hispanic or Latinx x SAL	-0.0657	
Hispanic or Latinx x SAN	0.0594	
White x HPL	-0.0360	
White x HPN	-0.1788	***
White x HAL	0.0825	
White x HAN	-0.0586	
White x SPL	0.0304	
White x SPN	0.0514	*
White x SAL	0.0554	*
White x SAN	0.0536	
Another race/ethnicity x HPL	-0.0715	
Another race/ethnicity x HPN	0.3118	**
Another race/ethnicity x HAL	-0.7191	**
Another race/ethnicity x HAN	0.1578	
Another race/ethnicity x SPL	-0.0004	
Another race/ethnicity x SPN	0.0017	
Another race/ethnicity x SAL	0.1894	*
Another race/ethnicity x SAN	0.1303	
Multiracial x HPL	-0.0114	
Multiracial x HPN	-0.2055	*
Multiracial x HAL	0.1347	
Multiracial x HAN	-0.0749	
Multiracial x SPL	0.0858	
Multiracial x SPN	0.0646	
Multiracial x SAL	0.0395	
Multiracial x SAN	-0.0326	
Preferred not to respond (Race) x HPL	0.0166	
Preferred not to respond (Race) x HPN	-0.1385	*
Preferred not to respond (Race) x HAL	0.1376	
Preferred not to respond (Race) x HAN	-0.0275	
Preferred not to respond (Race) x SPL	0.0658	

Table 4.19. cont.

Fixed Effects	Est.	Sig.
Preferred not to respond (Race) x SPN	0.0096	
Preferred not to respond (Race) x SAL	0.0305	
Preferred not to respond (Race) x SAN	-0.0941	
Man x HPL	0.0060	
Man x HPN	0.0314	
Man x HAL	-0.0826	
Man x HAN	0.1186	**
Man x SPL	0.0452	
Man x SPN	-0.0558	*
Man x SAL	-0.0318	
Man x SAN	-0.0310	
Woman x HPL	0.0475	
Woman x HPN	-0.0659	
Woman x HAL	-0.0372	
Woman x HAN	0.0283	
Woman x SPL	0.0341	
Woman x SPN	-0.0329	
Woman x SAL	0.0500	
Woman x SAN	-0.0240	
Preferred not to respond (Gender) x HPL	-0.0535	
Preferred not to respond (Gender) x HPN	0.0345	
Preferred not to respond (Gender) x HAL	0.1198	
Preferred not to respond (Gender) x HAN	-0.1470	*
Preferred not to respond (Gender) x SPL	-0.0793	
Preferred not to respond (Gender) x SPN	0.0887	*
Preferred not to respond (Gender) x SAL	-0.0182	
Preferred not to respond (Gender) x SAN	0.0550	
Straight (Heterosexual) x HPL	-0.0214	
Straight (Heterosexual) x HPN	0.0737	*
Straight (Heterosexual) x HAL	0.0157	
Straight (Heterosexual) x HAN	-0.0240	
Straight (Heterosexual) x SPL	-0.0274	
Straight (Heterosexual) x SPN	0.0285	
Straight (Heterosexual) x SAL	-0.0090	
Straight (Heterosexual) x SAN	-0.0360	
LGBQ+ x HPL	0.0279	
LGBQ+ x HPN	-0.1523	**
LGBQ+ x HAL	0.2443	*
LGBQ+ x HAN	-0.0375	
LGBQ+ x SPL	-0.0340	
LGBQ+ x SPN	-0.0320	
LGBQ+ x SAL	-0.0264	
LGBQ+ x SAN	0.0100	
Preferred not to respond (Sexual Orientation) x HPL	-0.0065	
Preferred not to respond (Sexual Orientation) x HPN	0.0786	
Preferred not to respond (Sexual Orientation) x HAL	-0.2600	*
Preferred not to respond (Sexual Orientation) x HAN	0.0615	
Preferred not to respond (Sexual Orientation) x SPL	0.0614	
Preferred not to respond (Sexual Orientation) x SPN	0.0035	
Preferred not to respond (Sexual Orientation) x SAL	0.0354	

Table 4.19. cont.

Fixed Effects	Est.	Sig.
Preferred not to respond (Sexual Orientation) x SAN	0.0260	
Proportional reduction in prediction error (Level-1)	18.83%	
Proportional reduction in prediction error (Level-2 Institutions)	29.79%	
Proportional reduction in prediction error (Level-2 Disciplines)	69.30%	

Note. See Appendix C for full model results.

* $p < .05$, two-tailed. ** $p < .01$, two-tailed. *** $p < .001$, two-tailed. † $p < .05$, one-tailed. †† $p < .01$, one-tailed. ††† $p < .001$, one-tailed.

The magnitudes of these interaction effects between faculty identities and disciplinary and institutional variables are small to medium in magnitude. Notable exceptions include the very small effect between Men faculty and institutional mean time on teaching (-0.0242) or the very large effect between faculty of another race and HAL disciplines (-0.7191). As can be seen, though, from the results in Table 4.19, interaction effects between identities and Biglan categories tend to be smaller than the disciplinary effects while being anywhere from smaller to many times greater than the identity effects. To better contextualize these interaction effects, Tables 4.20 and 4.21 show the partially-estimated means for faculty emphasis on DAL. In each table the “average institution” and “average discipline” columns illustrate the estimated means for each faculty identity group and progressing to the right illustrates how those identity group means are affected by the main effects of institutional variables, Biglan categories, and interaction effects. As seen in Table 4.20, the estimated means for each faculty identity group change to a small to very small degree from their estimated means at the average institution (which does not account for institutional variable or interaction effects) to institutions with one additional standard deviation greater in the institutional variables. For instance, looking at faculty racial identities, though there are some fluctuations with each institutional variable, Black or African American faculty emphasize or place importance on students’ use of DAL to the greatest

extent compared to the average faculty member, and likewise for Women faculty and LGBTQ+ faculty. The estimated means are also helpful to contextualize not just the magnitude, but the directions of the effects. For instance, considering the interactions between identities and Biglan categories, Black or African American faculty had positive interactions with two Hard discipline categories and two negative interactions with two Soft discipline categories, whereas White faculty had a negative interaction with a Soft discipline category and two positive interactions with Hard discipline categories. But put in context with the estimated means, as seen in Table 4.21, it can be seen that Black or African American faculty consistently across discipline categories emphasize or place importance on DAL much more than the average faculty in those categories, even despite the negative interactions, while White faculty consistently emphasize DAL less than the average faculty in those discipline categories, despite the positive interactions.

Table 4.20

Identity-Institutional Variable Interaction Effect Partially-Estimated Means for DAL

	Institution with an additional one-SD in...				
	Average Institution	Institutional mean time on teaching	Percentage of instructional staff that are full-time	Percentage of full-time faculty that are tenured or tenure-track	Percentage of expenditures on instruction
Average Faculty Member	0.1060 ^a	0.0747	0.0747	0.1026	0.0887
Asian, Native Hawaiian, or other Pacific Islander	0.0749	0.1040	0.0655	0.0642	0.0690
Black or African American	0.3559	0.3652	0.3280	0.3268	0.3500
Hispanic or Latinx	0.1929	0.1255	0.1575	0.1901	0.1754
White	-0.0719	-0.1004	-0.1010	-0.0799	-0.0949
Another race/ethnicity	0.0679	-0.0197	-0.0007	0.1015	0.0150
Multiracial	0.0943	0.0666	0.0856	0.0758	0.1217
Preferred not to respond (Race)	0.0277	-0.0184	-0.0123	0.0396	-0.0152
Man	0.0645	0.0090	0.0111	0.0644	0.0563
Woman	0.1597	0.1103	0.1137	0.1669	0.1412
Preferred not to respond (Gender)	0.0937	0.1047	0.0991	0.0765	0.0687
Straight	0.1034	0.0835	0.0879	0.0982	0.0900
LGBQ+	0.1618	0.1520	0.1435	0.1675	0.1224
Preferred not to respond (Sexual Orientation)	0.0527	-0.0115	-0.0074	0.0422	0.0539

Note. Partially-estimated means in bold had significant interaction effects. Estimated means for the “average institution” are the model intercept plus identity main effects. Estimated means for the “average faculty member” are the model intercept plus the institutional variable main effects. All other estimated means are the sum of the model intercept, identity and institutional main effects, and the interaction effects. For all estimated means, all other characteristics held at average (i.e., variables held at “0”).

^a Overall model intercept, or adjusted grand mean.

Table 4.21

Identity-Disciplinary Variable Interaction Effect Partially-Estimated Means for DAL

	Average	HPL	HPN	HAL	HAN	SPL	SPN	SAL	SAN
	Discipline	Discipline	Discipline	Discipline	Discipline	Discipline	Discipline	Discipline	Discipline
Average Faculty Member	0.1060 ^a	-0.1403	-0.4015	0.1272	-0.3827	0.5410	0.3376	0.3946	0.3719
Asian, Native Hawaiian, or other Pacific Islander	0.0749	-0.2269	-0.2933	0.1532	-0.3675	0.4863	0.2780	0.2559	0.3135
Black or African American	0.3559	0.2772	-0.1443	0.6382	-0.0687	0.7041	0.4055	0.5031	0.5326
Hispanic or Latinx	0.1929	-0.0632	-0.2500	0.2603	-0.4027	0.5571	0.5078	0.4158	0.5183
White	-0.0719	-0.3542	-0.7582	0.0318	-0.6191	0.3935	0.2111	0.2721	0.2477
Another race/ethnicity	0.0679	-0.2499	-0.1278	-0.6300	-0.2630	0.5025	0.3012	0.5459	0.4641
Multiracial	0.0943	-0.1634	-0.6187	0.2501	-0.4693	0.6151	0.3904	0.4223	0.3276
Preferred not to respond (Race)	0.0277	-0.2020	-0.6183	0.1865	-0.4885	0.5285	0.2689	0.3468	0.1995
Man	0.0645	-0.1758	-0.4116	0.0031	-0.3055	0.5447	0.2403	0.3213	0.2995
Woman	0.1597	-0.0391	-0.4136	0.1437	-0.3006	0.6289	0.3584	0.4984	0.4016
Preferred not to respond (Gender)	0.0937	-0.2062	-0.3793	0.2347	-0.5420	0.4494	0.4140	0.3640	0.4146
Straight	0.1034	-0.1643	-0.3304	0.1403	-0.4092	0.5111	0.3635	0.3830	0.3334
LGBQ+	0.1618	-0.0566	-0.4980	0.4273	-0.3644	0.5628	0.3614	0.4239	0.4378
Preferred not to respond (Sexual Orientation)	0.0527	-0.2001	-0.3762	-0.1861	-0.3745	0.5492	0.2878	0.3767	0.3446

Note. Partially-estimated means in bold had significant interaction effects. Estimated means for the “average institution” are the model intercept plus identity main effects. Estimated means for the “average faculty member” are the model intercept plus the institutional variable main effects. All other estimated means are the sum of the model intercept, identity and institutional main effects, and the interaction effects. For all estimated means, all other characteristics held at average (i.e., variables held at “0”).

^a Overall model intercept, or adjusted grand mean.

Interactions between Faculty Identities and Institutional and Disciplinary Variables for CL

Examining the extent to which faculty encourage students to engage in CL in their courses, the same 156 interactions between faculty identities, the eight Biglan categories, and the four institutional variables were considered. As above, interactions between effect-coded faculty identities and continuous institutional variables can be interpreted as the additional effect per each one standard deviation unit increase in the institutional variable for faculty of the given identity. Interactions between effect-coded faculty identities and effect-coded Biglan categories can be broadly interpreted as the additional effect, beyond the main effects of a given Biglan category or identity, for being a faculty member of that identity in that Biglan category.

This interaction model resulted in a proportional reduction in prediction error (interpreted as variance explained) of 4.99%, only slightly greater than that of the full conditional fixed effects model (4.85%; see Table 4.3). Similar to the interaction model for emphasis on DAL above, the addition of the 156 interaction terms contributes little to the overall explanation of variance, and yet the interactions provide greater nuance in understanding the relationships between identities and institutional and disciplinary cultures. Table 4.22 includes selected findings of this interaction model, including the main effects of faculty identities, Biglan categories, and institutional variables, as well as the interaction effects.

For the extent to which faculty encourage students to engage in CL in their courses, fewer interactions, 13 of 156, were statistically significant, though, like how faculty emphasize or place importance on students' use of DAL, the significant interactions mostly occurred between faculty identities and the Biglan categories. Asian, Native Hawaiian, or other Pacific Islander faculty encouraged CL significantly less than the average faculty in HPL disciplines ($\beta=-0.1720$, $t[29,585.790]=-2.206$, $p<.05$), with a total effect of encouraging CL 0.0324 standard deviation

units less than the overall average faculty member. Black or African American faculty encouraged CL significantly more than the average HAL faculty ($\beta=0.2856$, $t[29,603.510]=2.093$, $p<.05$), for a total effect encouraging CL 0.2924 units more than the average faculty member. Oppositely, Black or African American faculty encouraged CL significantly less than the average faculty in SPN ($\beta=-0.1243$, $t[29,623.536]=-2.179$, $p<.05$) and SAN ($\beta=-0.1240$, $t[29,618.160]=-2.098$, $p<.05$) disciplines, for total effects encouraging CL in their courses 0.1954 and 0.0842 standard deviation units less, respectively, than the overall average faculty member. Hispanic or Latinx faculty encouraged CL significantly less than the average faculty in HAL disciplines ($\beta=-0.6990$, $t[29,588.979]=-3.164$, $p<.01$), for a total effect encouraging CL 0.8359 units less than the overall average faculty member, while Hispanic or Latinx faculty encouraged CL more than the average SPN ($\beta=0.1575$, $t[29,411.663]=2.545$, $p<.05$) faculty, for a total effect encouraging CL 0.0572 units less than the average faculty. Faculty identifying another race encouraged CL significantly more than the average HPN ($\beta=0.2399$, $t[29,547.189]=2.020$, $p<.05$) faculty, for a total effect encouraging CL 0.5771 standard deviation units more than the average faculty member. Finally, Multiracial faculty encouraged CL significantly less than the average SAL ($\beta=-0.1426$, $t[29,557.511]=-1.984$, $p<.05$) faculty, for a total effect encouraging CL 0.1575 units less than the overall average faculty member.

Additionally, two gender or sexual orientation identities had significant interactions with Biglan categories. Men faculty encouraged CL significantly more than the average HAN ($\beta=0.1008$, $t[29,571.681]=2.354$, $p<.05$) faculty, for a total effect encouraging student engagement in CL 0.1969 standard deviation units more than the average faculty member. Meanwhile, Straight faculty encouraged CL significantly less than the average HAN ($\beta=-0.1063$,

$t[29554.300]=-2.121, p<.05$) faculty, for a total effect encouraging CL -0.0023 units less than the overall average faculty member.

Three significant interactions occurred between institutional variables and racial and sexual orientation identities. In this model, the main effect relationship between the percentage of instructional staff that are full-time and the extent to which faculty encourage student engagement in CL was not significant, $t(4,106.650)=-1.179, p>.05$. Yet, Asian, Native Hawaiian, or other Pacific Islander had a significant interaction effect, encouraging CL 0.0507, $t(29,643.731)=-1.983, p<.05$, standard deviation units less per each additional standard deviation unit in the percentage of instructional staff that are full-time. For the percentage of full-time faculty that are tenured or tenure-track, the main effect relationship was also not significant, $t(3,789.010)=-0.055, p>.05$. However, LGBQ+ faculty had a significant interaction effect, encouraging CL an additional 0.0492, $t(29,620.042)=2.706, p<.01$, units per each additional standard deviation unit in the percentage of tenured or tenure-track faculty. Oppositely, faculty who preferred not to identify their sexual orientation had a significant interaction effect, encouraging CL 0.0396, $t(29,584.573)=-2.242, p<.05$, units less per each additional standard deviation unit in the percentage of tenured or tenure-track faculty.

Table 4.22

Select Faculty Identity and Disciplinary and Institution Variable Interaction Model Results for CL

Random Effects	CL (CL-3.13)	
	Est.	Sig.
Individual (Residual)	0.9107	†††
Institution (Intercept)	0.0112	†††
Discipline (Intercept)	0.0211	†††

Table 4.22. cont.

Fixed Effects	Est.	Sig.
Intercept	-0.0348	
<i>Faculty Identities</i>		
<i>Race/Ethnicity</i>		
Asian, Native Hawaiian, or other Pacific Islander	0.0068	
Black or African American	0.1035	**
Hispanic or Latinx	-0.0402	
White	-0.0957	***
Another race/ethnicity	0.0058	
Multiracial	0.0643	
Preferred not to respond	-0.0445	
<i>Gender</i>		
Man	-0.0285	
Woman	0.0328	
Preferred not to respond	-0.0043	
<i>Sexual Orientation</i>		
Straight (Heterosexual)	-0.0207	
LGBQ+	0.0427	
Preferred not to respond	-0.0221	
<i>Institutional Variables</i>		
Institutional Mean Time on Teaching (MtmTeach)	-0.0123	
Percent of Instructional Staff that Are Full-Time (Pct_FT)	-0.0212	
Percent of Full-Time Faculty that Are Tenured/Tenure-Track (Pct_TTr)	-0.0010	
Percent of Expenditures on Instruction (Pct_ExInstr)	-0.0186	
<i>Disciplinary Variables</i>		
Hard-Pure-Life (HPL) Discipline	0.1328	*
Hard-Pure-Nonlife (HPN) Discipline	0.3314	***
Hard-Applied-Life (HAL) Discipline	-0.0967	
Hard-Applied-Nonlife (HAN) Discipline	0.1246	
Soft-Pure-Life (SPL) Discipline	-0.1747	*
Soft-Pure-Nonlife (SPN) Discipline	-0.1746	***
Soft-Applied-Life (SAL) Discipline	-0.0792	
Soft-Applied-Nonlife (SAN) Discipline	-0.0637	
<i>Identity x Institutional Variable Interaction Effects</i>		
Asian, Native Hawaiian, or other Pacific Islander x MtmTeach	0.0241	
Asian, Native Hawaiian, or other Pacific Islander x Pct_FT	-0.0507	*
Asian, Native Hawaiian, or other Pacific Islander x Pct_TTr	-0.0245	
Asian, Native Hawaiian, or other Pacific Islander x Pct_ExInstr	0.0197	
Black or African American x MtmTeach	-0.0204	
Black or African American x Pct_FT	-0.0102	
Black or African American x Pct_TTr	0.0270	
Black or African American x Pct_ExInstr	-0.0008	
Hispanic or Latinx x MtmTeach	-0.0119	
Hispanic or Latinx x Pct_FT	-0.0226	
Hispanic or Latinx x Pct_TTr	0.0218	
Hispanic or Latinx x Pct_ExInstr	0.0123	
White x MtmTeach	-0.0169	
White x Pct_FT	0.0006	
White x Pct_TTr	-0.0166	
White x Pct_ExInstr	0.0195	
Another race/ethnicity x MtmTeach	-0.0320	

Table 4.22. cont.

Fixed Effects	Est.	Sig.
Another race/ethnicity x Pct_FT	0.0719	
Another race/ethnicity x Pct_TTr	-0.0085	
Another race/ethnicity x Pct_ExInstr	-0.0110	
Multiracial x MtmTeach	0.0417	
Multiracial x Pct_FT	0.0096	
Multiracial x Pct_TTr	-0.0023	
Multiracial x Pct_ExInstr	-0.0461	
Preferred not to respond (Race) x MtmTeach	0.0155	
Preferred not to respond (Race) x Pct_FT	0.0016	
Preferred not to respond (Race) x Pct_TTr	0.0030	
Preferred not to respond (Race) x Pct_ExInstr	0.0065	
Man x MtmTeach	0.0030	
Man x Pct_FT	-0.0009	
Man x Pct_TTr	0.0138	
Man x Pct_ExInstr	-0.0111	
Woman x MtmTeach	0.0115	
Woman x Pct_FT	0.0117	
Woman x Pct_TTr	0.0078	
Woman x Pct_ExInstr	-0.0037	
Preferred not to respond (Gender) x MtmTeach	-0.0145	
Preferred not to respond (Gender) x Pct_FT	-0.0108	
Preferred not to respond (Gender) x Pct_TTr	-0.0217	
Preferred not to respond (Gender) x Pct_ExInstr	0.0147	
Straight (Heterosexual) x MtmTeach	0.0137	
Straight (Heterosexual) x Pct_FT	0.0121	
Straight (Heterosexual) x Pct_TTr	-0.0096	
Straight (Heterosexual) x Pct_ExInstr	-0.0024	
LGBQ+ x MtmTeach	0.0013	
LGBQ+ x Pct_FT	-0.0101	
LGBQ+ x Pct_TTr	0.0492	**
LGBQ+ x Pct_ExInstr	0.0010	
Preferred not to respond (Sexual Orientation) x MtmTeach	-0.0150	
Preferred not to respond (Sexual Orientation) x Pct_FT	-0.0021	
Preferred not to respond (Sexual Orientation) x Pct_TTr	-0.0396	*
Preferred not to respond (Sexual Orientation) x Pct_ExInstr	0.0014	
<i>Identity x Disciplinary Variable Interaction Effects</i>		
Asian, Native Hawaiian, or other Pacific Islander x HPL	-0.1720	*
Asian, Native Hawaiian, or other Pacific Islander x HPN	-0.0934	
Asian, Native Hawaiian, or other Pacific Islander x HAL	0.1809	
Asian, Native Hawaiian, or other Pacific Islander x HAN	-0.0454	
Asian, Native Hawaiian, or other Pacific Islander x SPL	-0.0017	
Asian, Native Hawaiian, or other Pacific Islander x SPN	-0.0085	
Asian, Native Hawaiian, or other Pacific Islander x SAL	0.0689	
Asian, Native Hawaiian, or other Pacific Islander x SAN	0.0712	
Black or African American x HPL	-0.0110	
Black or African American x HPN	-0.0680	
Black or African American x HAL	0.2856	*
Black or African American x HAN	0.0128	
Black or African American x SPL	0.0674	
Black or African American x SPN	-0.1243	*

Table 4.22. cont.

Fixed Effects	Est.	Sig.
Black or African American x SAL	-0.0385	
Black or African American x SAN	-0.1240	*
Hispanic or Latinx x HPL	0.0482	
Hispanic or Latinx x HPN	0.1294	
Hispanic or Latinx x HAL	-0.6990	**
Hispanic or Latinx x HAN	0.0823	
Hispanic or Latinx x SPL	0.0811	
Hispanic or Latinx x SPN	0.1575	*
Hispanic or Latinx x SAL	0.1038	
Hispanic or Latinx x SAN	0.0967	
White x HPL	-0.0096	
White x HPN	-0.0398	
White x HAL	0.0167	
White x HAN	0.0546	
White x SPL	-0.0011	
White x SPN	-0.0025	
White x SAL	0.0056	
White x SAN	-0.0240	
Another race/ethnicity x HPL	0.0063	
Another race/ethnicity x HPN	0.2399	*
Another race/ethnicity x HAL	-0.0102	
Another race/ethnicity x HAN	-0.0293	
Another race/ethnicity x SPL	-0.1931	
Another race/ethnicity x SPN	-0.0448	
Another race/ethnicity x SAL	-0.0241	
Another race/ethnicity x SAN	0.0554	
Multiracial x HPL	0.0448	
Multiracial x HPN	-0.1056	
Multiracial x HAL	0.3002	
Multiracial x HAN	-0.0426	
Multiracial x SPL	-0.0447	
Multiracial x SPN	0.0162	
Multiracial x SAL	-0.1426	*
Multiracial x SAN	-0.0258	
Preferred not to respond (Race) x HPL	0.0933	
Preferred not to respond (Race) x HPN	-0.0626	
Preferred not to respond (Race) x HAL	-0.0742	
Preferred not to respond (Race) x HAN	-0.0323	
Preferred not to respond (Race) x SPL	0.0922	
Preferred not to respond (Race) x SPN	0.0062	
Preferred not to respond (Race) x SAL	0.0269	
Preferred not to respond (Race) x SAN	-0.0495	
Man x HPL	0.0121	
Man x HPN	-0.0494	
Man x HAL	-0.0114	
Man x HAN	0.1008	*
Man x SPL	-0.0062	
Man x SPN	-0.0328	
Man x SAL	-0.0137	
Man x SAN	0.0006	

Table 4.22. cont.

Fixed Effects	Est.	Sig.
Woman x HPL	0.0510	
Woman x HPN	0.0468	
Woman x HAL	-0.0547	
Woman x HAN	0.0040	
Woman x SPL	-0.0609	
Woman x SPN	0.0031	
Woman x SAL	0.0189	
Woman x SAN	-0.0083	
Preferred not to respond (Gender) x HPL	-0.0631	
Preferred not to respond (Gender) x HPN	0.0025	
Preferred not to respond (Gender) x HAL	0.0661	
Preferred not to respond (Gender) x HAN	-0.1048	
Preferred not to respond (Gender) x SPL	0.0670	
Preferred not to respond (Gender) x SPN	0.0298	
Preferred not to respond (Gender) x SAL	-0.0052	
Preferred not to respond (Gender) x SAN	0.0076	
Straight (Heterosexual) x HPL	-0.0051	
Straight (Heterosexual) x HPN	0.0269	
Straight (Heterosexual) x HAL	0.0614	
Straight (Heterosexual) x HAN	-0.1063	*
Straight (Heterosexual) x SPL	-0.0348	
Straight (Heterosexual) x SPN	0.0286	
Straight (Heterosexual) x SAL	0.0312	
Straight (Heterosexual) x SAN	-0.0020	
LGBQ+ x HPL	0.0375	
LGBQ+ x HPN	0.0071	
LGBQ+ x HAL	-0.1203	
LGBQ+ x HAN	0.1168	
LGBQ+ x SPL	0.0704	
LGBQ+ x SPN	-0.0335	
LGBQ+ x SAL	-0.0777	
LGBQ+ x SAN	-0.0004	
Preferred not to respond (Sexual Orientation) x HPL	-0.0324	
Preferred not to respond (Sexual Orientation) x HPN	-0.0340	
Preferred not to respond (Sexual Orientation) x HAL	0.0589	
Preferred not to respond (Sexual Orientation) x HAN	-0.0106	
Preferred not to respond (Sexual Orientation) x SPL	-0.0356	
Preferred not to respond (Sexual Orientation) x SPN	0.0049	
Preferred not to respond (Sexual Orientation) x SAL	0.0464	
Preferred not to respond (Sexual Orientation) x SAN	0.0024	
Proportional reduction in prediction error (Level-1)	4.99%	
Proportional reduction in prediction error (Level-2 Institutions)	16.90%	
Proportional reduction in prediction error (Level-2 Disciplines)	35.27%	

Note. See Appendix C for full model results.

*p<.05, two-tailed. **p<.01, two-tailed. ***p<.001, two-tailed. †p<.05, one-tailed. ††p<.01, one-tailed. †††p<.001, one-tailed.

In general, the magnitudes of these interaction effects are small to very small. One notable exception was the very large interaction effect for Hispanic or Latinx faculty in HAL disciplines (-0.6990). This interaction effect aside, the interaction effects are generally similar in magnitude to the main effects of identity or the institutional variables, sometimes a little smaller or greater. The partially-estimated means (see Tables 4.23 and 4.24) help to better contextualize the magnitudes and directions of these effects. similar to the identity-institutional interactions for how faculty emphasize or place importance on students' use of DAL, for each faculty identity group, their estimated means change only slightly between the average institution and accounting for a one standard deviation unit increase in the institutional variables, with interaction effects (Table 4.23). This results in a degree of stability, where for instance, Black or African American faculty and Multiracial faculty tend to encourage student engagement in CL more than the average faculty member regardless of the institutional effects, while White faculty consistently encourage CL the least compared to the average faculty member. For identity-discipline interactions, compared to emphasis on DAL, for encouraging CL it is noticeable in the estimated means, particularly for racial identity groups, that due to the Biglan category main effects being smaller, thus allowing identity and interaction effects to exert greater influence on the estimated means, that there is less consistency across disciplinary categories. For instance, with emphasis on DAL, Black or African American faculty tended to emphasize DAL the most, and White faculty the least, compared to the average faculty member across each Biglan category. For encouraging CL, however, this is not quite the case. Though Black or African American faculty do tend to encourage CL more than the average faculty (and White faculty less than the average faculty), they are not consistently encouraging CL the most (or the least) compared to the

average faculty. The exceptionally large interaction effect for Hispanic or Latinx faculty in HAL disciplines causes one such notable instance.

Table 4.23

Identity-Institutional Variable Interaction Effect Partially-Estimated Means for CL

	Institution with an additional one-SD in...				
	Average Institution	Institutional mean time on teaching	Percentage of instructional staff that are full-time	Percentage of full-time faculty that are tenured or tenure-track	Percentage of expenditures on instruction
Average Faculty Member	-0.0348 ^a	-0.0471	-0.0560	-0.0357	-0.0533
Asian, Native Hawaiian, or other Pacific Islander	-0.0280	-0.0162	-0.0999	-0.0534	-0.0268
Black or African American	0.0687	0.0360	0.0373	0.0948	0.0494
Hispanic or Latinx	-0.0749	-0.0992	-0.1188	-0.0541	-0.0812
White	-0.1305	-0.1597	-0.1511	-0.1480	-0.1296
Another race/ethnicity	-0.0289	-0.0733	0.0217	-0.0384	-0.0585
Multiracial	0.0295	0.0589	0.0179	0.0263	-0.0351
Preferred not to respond (Race)	-0.0793	-0.0761	-0.0990	-0.0772	-0.0914
Man	-0.0633	-0.0726	-0.0854	-0.0504	-0.0929
Woman	-0.0020	-0.0028	-0.0115	0.0049	-0.0242
Preferred not to respond (Gender)	-0.0390	-0.0658	-0.0710	-0.0616	-0.0429
Straight	-0.0554	-0.0540	-0.0645	-0.0660	-0.0764
LGBQ+	0.0080	-0.0031	-0.0233	0.0562	-0.0096
Preferred not to respond (Sexual Orientation)	-0.0568	-0.0841	-0.0801	-0.0974	-0.0740

Note. Partially-estimated means in bold had significant interaction effects. Estimated means for the “average institution” are the model intercept plus identity main effects. Estimated means for the “average faculty member” are the model intercept plus the institutional variable main effects. All other estimated means are the sum of the model intercept, identity and institutional main effects, and the interaction effects. For all estimated means, all other characteristics held at average (i.e., variables held at “0”).

^a Overall model intercept, or adjusted grand mean.

Table 4.24

Identity-Disciplinary Variable Interaction Effect Partially-Estimated Means for CL

	Average	HPL	HPN	HAL	HAN	SPL	SPN	SAL	SAN
	Discipline	Discipline	Discipline	Discipline	Discipline	Discipline	Discipline	Discipline	Discipline
Average Faculty Member	-0.0348 ^a	0.0981	0.2967	-0.1315	0.0898	-0.2095	-0.2094	-0.1140	-0.0984
Asian, Native Hawaiian, or other Pacific Islander	-0.0280	-0.0671	0.2101	0.0562	0.0513	-0.2044	-0.2110	-0.0382	-0.0204
Black or African American	0.0687	0.1906	0.3322	0.2577	0.2061	-0.0386	-0.2301	-0.0490	-0.1189
Hispanic or Latinx	-0.0749	0.1061	0.3859	-0.8707	0.1319	-0.1686	-0.0920	-0.0504	-0.0419
White	-0.1305	-0.0073	0.1612	-0.2104	0.0488	-0.3063	-0.3076	-0.2040	-0.2181
Another race/ethnicity	-0.0289	0.1102	0.5424	-0.1358	0.0664	-0.3968	-0.2483	-0.1323	-0.0372
Multiracial	0.0295	0.2072	0.2554	0.2331	0.1115	-0.1899	-0.1288	-0.1923	-0.0600
Preferred not to respond (Race)	-0.0793	0.1469	0.1895	-0.2502	0.0130	-0.1619	-0.2476	-0.1315	-0.1925
Man	-0.0633	0.0816	0.2188	-0.1714	0.1622	-0.2442	-0.2707	-0.1562	-0.1263
Woman	-0.0020	0.1818	0.3763	-0.1534	0.1266	-0.2376	-0.1735	-0.0623	-0.0739
Preferred not to respond (Gender)	-0.0390	0.0308	0.2949	-0.0696	-0.0192	-0.1467	-0.1839	-0.1234	-0.0950
Straight	-0.0554	0.0723	0.3029	-0.0907	-0.0371	-0.2650	-0.2014	-0.1034	-0.1211
LGBQ+	0.0080	0.1783	0.3465	-0.2091	0.2494	-0.0963	-0.2001	-0.1489	-0.0561
Preferred not to respond (Sexual Orientation)	-0.0568	0.0436	0.2406	-0.0947	0.0572	-0.2671	-0.2265	-0.0896	-0.1181

Note. Partially-estimated means in bold had significant interaction effects. Estimated means for the “average institution” are the model intercept plus identity main effects. Estimated means for the “average faculty member” are the model intercept plus the institutional variable main effects. All other estimated means are the sum of the model intercept, identity and institutional main effects, and the interaction effects. For all estimated means, all other characteristics held at average (i.e., variables held at “0”).

^a Overall model intercept, or adjusted grand mean.

Chapter 5: Discussion of Findings

Given the contextual complexities of teaching in higher education, it is imperative to better understand how faculty teaching with regard to what research has identified as broadly effective teaching practices varies across the contexts within which faculty work. Despite this, little is understood about how institutional and disciplinary cultures and faculty identities interrelate in how they influence faculty teaching. Scholarship has examined each of these cultural and identity influences individually, with some scholars conceptually arguing that these influences overlap. This exploratory study, grounded in Umbach's (2007a) Culture and College Teaching framework, is the first to empirically examine, in combination, institutional and disciplinary cultures and faculty identities to further scholars' and practitioners' understanding of these cultural and identity influences in two areas of teaching practice: how faculty emphasize or place importance on students' use of DAL and the extent to which faculty encourage students to engage in CL in their courses. To accomplish this, three research questions were examined:

- 1) To what extent do faculty teaching practices around collaborative learning and deep approaches to learning vary by institutional and disciplinary cultures?
- 2) To what extent do faculty teaching practices around collaborative learning and deep approaches to learning vary by the interaction of institutional and disciplinary cultures?
- 3) To what extent do the relationships between faculty identities and teaching practices around collaborative learning and deep approaches to learning vary by disciplinary and institutional cultures?

Using data from FSSE, and supplemented with institutional data from IPEDS, a cross-classified multilevel design was employed to more appropriately take into account faculty

members' simultaneous memberships within institutions and disciplines. This analytical approach allowed for more in-depth understandings of how institutions and disciplines account for variation in how faculty emphasize or place importance on undergraduate students' use of DAL and the extent to which faculty encourage undergraduate students to engage in CL in their courses, as well as how aspects of institutional and disciplinary cultures and faculty identities varied across institutions and disciplines.

In this final chapter, I discuss the findings of this study in several ways. First, key findings from the analysis presented in Chapter 4 are interpreted and situated within the literature. Second, highlighting the significance of these results, I discuss the implications of these findings on research and practice. Finally, as, in this author's opinion, good science should raise more questions than it answers, future directions for research are considered.

Interpreting and Contextualizing the Findings

Chapter 4 presented the results of approximately 100 cross-classified multilevel models to answer the three research questions. A brief synopsis of the results from these analyses follows, from which several key findings of this study can be interpreted. First, the importance of institutional influences on teaching practice is possibly overstated in the literature, at least with regard to how faculty emphasize or place importance on students' use of DAL and the extent to which faculty encourage students to engage in CL in their courses, as in this study institutions accounted for little variation in either area of teaching practice and significant relationships with aspects of institutional cultures were severely limited. Conversely, disciplines wield far greater influence in how faculty teach, particularly with regard to how faculty emphasize or place importance on students' use of DAL in their courses. Secondly, this study does provide support for the interaction of institutional and disciplinary cultures in Umbach's (2007a) framework,

though, interactions were limited and may be subtle in nature. Thirdly, this study also provides evidence that faculty identities interact with institutional and disciplinary cultures, and though again the nature of these variations and interactions may be subtle from a bird's eye perspective, the interactions are somewhat complex in nature and can be quite powerful in how they influence faculty teaching. Following the synopsis of results, each of these key interpretative findings are discussed in greater detail and contextualized within the literature.

Synopsis of Results

Prior to interpreting and contextualizing the key findings of this study, it is beneficial to review the results of the analyses from Chapter 4. Analysis for RQ1 examined the nature of the relationships between how faculty emphasis or place importance on students' use of DAL and the extent to which faculty encourage student use of CL in their courses and faculty identities, disciplinary cultures as represented by the Biglan categories, and institutional cultures as represented by the institutional mean time on teaching, the percentage of instructional staff that are full-time, the percentage of full-time faculty that are tenured or tenure-track, and the percentage of expenditures on instruction.

The initial step of RQ1 analysis entailed considering the ICCs obtained from the null model as well as the proportional reductions in prediction error through the model building process to better understanding how the different faculty, disciplinary, and institutional characteristics explained variance in the two areas of teaching practice. Results showed that for emphasis or importance placed on DAL, discipline accounted for a considerable amount of the total variance (19.21%) while institutions accounted for only a small amount (3.18%). For encouragement of CL, both institutions (1.68%) and disciplines (4.20%) accounted for only small amounts of the total variance. Considering the proportional reductions in prediction error,

for both DAL and CL, the model building process showed that faculty identities explained more variance in institutional group means than the institutional variables. In fact, a negative change in the proportional reduction in prediction error of level-2 institution group means attributable to institutional variables could suggest that these variables are not suitable for explaining institutional variance in encouragement of CL (i.e., that the model is mis-specified).

Alternatively, for both DAL and CL, the model building process shows that the Biglan categories explain the vast majority of variance in the disciplinary group means, as might be expected.

The primary RQ1 analysis examined the full fixed-effects models, including all faculty identity, disciplinary, and institutional variables (along with control variables). For how faculty emphasize or place importance on students' use of DAL, the model showed numerous significant relationships between faculty identities, such as Black or African American and Hispanic or Latinx faculty emphasizing DAL more than the average faculty member or White faculty doing so less than average, with Women and Men faculty, respectively, following the same pattern. Seven of the eight Biglan categories also showed significant relationships, with faculty in three Hard discipline categories emphasizing DAL less than the average faculty and faculty in all four Soft discipline categories emphasizing DAL more than average. Two institutional variables – institutional mean time on teaching and the percentage of instructional staff that are full-time also had significant, negative relationships with emphasis on DAL. For the extent to which faculty encourage students to engage in CL, fewer relationships were significant. Where faculty identities' relationships with encouragement of CL were significant they followed similar patterns as on emphasis on DAL: Black or African American, Latinx, and Women faculty encouraged CL more than the average faculty member, while White and Men faculty did so less than the average. The opposite occurred with the Biglan categories, where three Hard discipline

categories had significant, positive relationships and three Soft discipline categories had significant, negative relationships. Particularly notable was that the effect sizes for the Biglan categories were generally many times greater than the effect sizes of faculty identities or institutional variables for both DAL and CL outcome variables.

Analysis for RQ2 occurred in two steps as well, with the first part examining how the relationships between Biglan categories and DAL and CL randomly varied across institutions and how the relationships between institutional variables and DAL and CL randomly varied across disciplines. Regarding how faculty emphasize or place importance on students' use of DAL in courses, seven of the eight Biglan categories showed significant variance in their random slopes across institutions, suggesting that the relationships between disciplines are emphasis on DAL are somewhat dependent on the institution, although the variance is small. Of those seven, five had significant covariances with the institution intercepts. Most notable of these are the four Hard discipline categories where these disciplines had more positive relationships with emphasis on DAL as the average institutional emphasis on DAL increased, and vice versa. For emphasis on DAL, only one institutional variable – the institutional mean time on teaching – had significant variance in its random slope across discipline. This suggests that how institutions influence faculty time on teaching in turn influences teaching differently in different disciplines, however, the nonsignificant covariance with discipline intercepts indicates no real pattern in this relationship. Regarding the extent to which faculty encourage student use of CL in their courses, none of the Biglan categories had significant variance in their random slopes across institutions, indicating that the relationships between Biglan categories and emphasis on CL are relatively the same regardless of the institution. Yet, institutional mean time on teaching, again, had significant variance in its random slope across disciplines.

The second part of RQ2 analysis put the Biglan categories and the four institutional variables in interaction as fixed effects, exploring another way in which disciplines and institutions might interact as they relate to these two areas of teaching practice. Of the 32 interaction effects, five were significant with regard to how faculty emphasize or place importance on students' use of DAL and four were significant in relation to the extent to which faculty encourage students to engage in CL in their courses. Notably, several interactions involved variables that did not have significant variance in their random slopes in the first part of RQ2 analysis, such as institutional mean time on teaching with SPL disciplines for emphasis on DAL or the percent of expenditures on instruction with HPN disciplines for encouragement of CL. More importantly though, for both emphasis on DAL and encouragement of CL, is that the magnitudes of these interaction effects were generally aligned with the institutional variable effect sizes while effect sizes of the Biglan categories were far greater. Thus, while there are interactions occurring, the overall scope suggests that disciplinary effects on their own are more influential. This aligns with the proportional reductions in prediction error at level-1 (individual outcomes) and each level-2 (institutional and disciplinary group means) which suggest that these interaction models explain only marginal to small amounts of variation in these outcomes and group means.

The RQ3 analysis likewise built from the RQ1 analysis in a similar way as RQ2 to examine how faculty identities interacted with disciplines and institutions. For the first part of this analysis, the faculty identity characteristics were allowed to randomly vary across both institutions and disciplines. With regard to how faculty emphasize or place importance on students' use of DAL in their courses, none of the faculty identities had significant variance in their random slopes across institutions, meaning that the ways that identity relates to emphasis on

DAL is relatively the same regardless of the institution. Meanwhile, across disciplines, three racial identities (Asian, Native Hawaiian, or other Pacific Islander faculty, White faculty, and faculty who preferred not to identify their race) had significant variance in their random slopes, indicating that the ways that faculty of these identities emphasize DAL differs from discipline to discipline. However, no faculty identity had significant variance in its random slope across institutions or disciplines for the extent to which faculty encourage students to engage in CL in their courses, suggesting that these relationships are fairly similar from institution to institution and from discipline to discipline.

Similar to RQ2, faculty identities were then put in interaction with the Biglan categories and institutional variables as fixed effects in order to examine how the individual identities interact with institutional and disciplinary cultures in ways that are the same regardless of the institution or discipline. Of the 156 interactions in each model, 23 were significant in relation to how faculty emphasize or place importance on students' use of DAL in their courses and 13 were significant in relation to the extent to which faculty encourage student engagement in CL. For both emphasis on DAL and encouragement of CL, the vast majority of significant interactions occurred between faculty identities and the Biglan categories. Likewise, for both areas of teaching practice these interaction effects showed considerable nuance, as opposed to broad patterns. Particularly notable are the varied magnitudes of interaction effects, with some interaction effect sizes being similar in magnitude to the effects of faculty identities, some being similar to those of the Biglan categories (which were larger, in general, than the effect of faculty identities), and some interaction effects being many times greater in magnitude than the effects of faculty identities. For instance, for emphasis on DAL, faculty of another race in HAL disciplines had a significant, negative interaction effect of -0.7191, while the main effects of

being a faculty member of another race (-0.0381) or in HAL disciplines (0.0212) were many times smaller and non-significant. For both of these interaction models the proportional reductions in prediction error for level-1 (individual) and level-2 (group means) outcomes showed only marginal to small improvement in the variance explained by including interaction terms in the model. While this might on the surface suggest these interaction effects do not add much value to explaining teaching practices in these two areas (after all, only 23 and 13 of 156 interactions were significant for emphasis on DAL and encouragement of CL, respectively), the magnitudes of the effect sizes would seem to suggest meaningful interactions between faculty identities and institutional and especially disciplinary contexts.

Interpreting and Contextualizing Key Findings

From these results and aligning with this study's three research questions, several key findings can be drawn. First, with regard to how faculty emphasize or place importance on students' use of DAL or the extent to which they encourage students to engage in CL in their courses, disciplinary cultures appear far more influential than institutional cultures, the latter of which appears to have only limited effects on these teaching practices. Second, institutional and disciplinary cultures do appear to interact as they relate to how faculty teach in these two areas of practice, but the interactions are limited and may be subtle. Third, as they relate to how faculty teach in these two areas of practice, faculty identities interact with institutional and, even more so, disciplinary cultures in somewhat limited, yet potentially meaningful, ways. Each of these key findings is discussed in greater detail below while contextualizing the findings within the literature.

Strength of Disciplinary Cultures and Weakness of Institutional Cultures

Past scholarship on faculty cultures was split on whether it was disciplinary cultures (Clark, 1987) or institutional cultures (Tierney, 1991) that were more dominant in influencing faculty work or whether disciplinary and institutional cultures together influenced faculty work. Even in their work examining academic disciplines, Becher and Trowler (2001) suggested the possibility that “a given institutional context may serve to counteract the influence of disciplinary cultures” (p.196). Similarly, Lattuca and Stark (1995) suggest that institutional contexts could require faculty to adapt their disciplinary cultures to institutional contexts. Furthermore, though his framework does not describe or suggest their relative strengths, Umbach (2007a) placed institutional and disciplinary cultures (along with professional cultures) on co-equal footing. In seeking to better understand the relationships between institutional and disciplinary cultures and their interactions with faculty teaching practices I offer substantial empirical evidence, something that had been lacking in past scholarship, to this debate.

I have very clearly demonstrated that institutions hold little influence over faculty teaching in at least two areas of practice - how faculty emphasize or place importance on students' use of DAL and the extent to which they encourage student engagement in CL in their courses – while disciplines are generally very influential. Indications of this are throughout the analyses in each research question but are particularly prominent in the RQ1 results. An initial indicator of this relative imbalance in strength, especially for emphasis on DAL, are the ICCs calculated from the null models (again, the models without any independent explanatory variables). For emphasis on DAL, disciplines were attributable for approximately six times more variance than did institutions, while for encouragement of CL, disciplines were attributable for more than double that of institutions. Taking faculty emphasis on DAL as an example, this

suggests that faculty members' teaching practices were far more similar (small amount of variance) from institution to institution than they were from discipline to disciplines, where there was a considerable amount of variance. Arguably, this is only an indirect indicator of relative strength as the respective cultures may or may not be responsible for the variances observed that are attributable to institutions and disciplines. There could even be methodological reasons for some degree of this disparity. For instance, it could be that institutions that are similarly teaching-oriented or at least provide considerable teaching resources disproportionately self-selected to administer FSSE. The survey items, especially for DAL, could have also disproportionately accentuated disciplinary differences if they are biased toward a particular disciplinary perspective of DAL. Either of these methodological issues (and perhaps others) could feasibly influence the variances observed. This could be more of a question for encouragement of CL, where only very small or small amounts of variance were attributable to institutions and disciplines, respectively. Yet, such issues are unlikely to be the root cause of the disparity in variances observed in emphasis on DAL, considering that for encouragement of CL, the constituent items could be seen as somewhat universal CL practices, regardless of discipline, such as "Work with other students on course projects or assignments," or "Prepare for exams by discussing or working through course material with other students."

The picture of how institutional and disciplinary cultures explain these two areas of teaching practice comes more into view in the model building process. The relative weakness of institutional cultures, at least as exemplified by institutional mean time on teaching, percentage of instructional staff that are full-time, percentage of full-time faculty that are tenured or tenure-track, and the percentage of expenditures on instruction, in explaining variance in these two areas of teaching practice is clear. Changes in the proportional reduction in error of predicting level-2

institutional group means are indicative of the percentage of institutional variance explained by each set of variables. The results strongly indicate that the four institutional variables explain little or no variance in institutional group means for emphasis on DAL and encouragement of CL, respectively. For how faculty emphasize or place importance on student use of DAL, of the total variance in institutional group means explained in the final fixed effects model, only about one-tenth is due to the institutional variables, while over half is due to faculty identities. For the extent to which faculty encourage student engagement in CL, the decrease in the proportional reduction in prediction error when adding the institutional variables suggests that including these variables is a model misspecification (Snijders & Bosker, 2012), meaning that the four variables do not contribute to understanding how faculty teach around CL within institutions or disciplines.

One possibility is these four institutional variables are simply not salient indicators of institutional cultures, at least with regard to how faculty emphasize or place importance on student use of DAL and especially the extent to which faculty encourage student engagement in CL. While scholarship on faculty cultures has typically gravitated toward the Carnegie Classifications or other common typologies of institutions (e.g., liberal arts, HBCU, community college, etc.), Porter (2006) argued that these are only proxy measures when studying student learning and engagement and more applicable variables should be examined. Thus, as the teaching practices examined in this study directly corresponded to student engagement, four institutional variables were selected that more directly centered faculty and teaching in the institution. Given this, several potential faculty and teaching-related aspects of institutional cultures were identified. Past studies have noted that institutions that place an emphasis on teaching, as opposed to research, are often characterized by heavier teaching loads and by the use

of teaching practices that encourage greater student engagement (Pascarella & Terenzini, 2005; Pascarella et al., 2005; Umbach, 2007a). Additionally, Umbach (2007b) found that contingent faculty, including part-time faculty and full-time, non-tenure track faculty, tend to utilize effective teaching practices (such as CL) less often than full-time, tenured or tenure-track faculty. Thus, institutional mean time on teaching, percentage of instructional staff that are full-time, percentage of full-time faculty that are tenured or tenure-track, and the percentage of expenditures on instruction were chosen to represent aspects of institutional cultures centered on faculty and teaching. It would be reasonable that, if institutional cultures were as influential as the literature suggests, and these variables represented salient aspects of institutional cultures, that these chosen variables would show greater ability to explain institutionally-related variance.

That is not what I found in these results. In addition to the results of the model building that suggested the four institutional variables related to little or no variance explained in emphasis on DAL and encouragement of CL, the results of the full fixed-effects models for RQ1 provide greater detail. Only two of the institutional variables were significantly related to how faculty emphasize or place importance on students' use of DAL in their courses: institutional mean time on teaching and the percentage of instructional staff that are full-time. While at first this appears to align with past research (Pascarella & Terenzini, 2005; Pascarella et al., 2005; Umbach, 2007a, 2007b), the effects here are negative – the more time on average that faculty in an institution spend on teaching and the greater the proportion of full-time faculty, the lower the use of DAL teaching practices. Additionally, the very small effect sizes of these two significant effects affirms the relative weakness of institutional cultures in influencing faculty teaching around DAL. Further evidence of this point is that none of the four institutional variables had a significant relationship with the extent to which faculty encourage student engagement in CL in

their courses. Not even the percentage of expenditures on instruction, where institutions ranged from 9% to 58% of expenditures on instruction, had a significant relationship, suggesting that faculty taught relatively similarly no matter the amount of institutional financial resources toward instruction.

While I argue that these four institutional variables are salient aspects of institutional cultures, it is possible that these four variables are salient aspects of institutional cultures for some areas of teaching practice, but simply not for how faculty emphasize or place importance on students' use of DAL and the extent to which faculty encourage student engagement in CL. Do the results hint at other salient aspects of institutional cultures? Considering the results of model building, one might look toward faculty identities or course and professional characteristics, which explained the majority of the total proportional reduction in prediction error of level-2 institution group means. Faculty racial and gender identities showed several significant relationships with teaching in both of these areas, as did multiple course characteristics (e.g., course size, format, and whether a course met a General Education requirement). While in this study these variables were oriented around faculty rather than institutions (i.e., they were level-1 individual variables and not level-2 institutional variables), it is plausible that faculty racial and gender composition at an institutional level or some aspects of how institutions direct the structure of courses might be salient aspects of institutional cultures for teaching practices around DAL and CL.

The other side of this story is the strength of disciplines in explaining how faculty emphasize or place importance on students' use of DAL or the extent to which they encourage student engagement in CL in their courses. In addition to the greater amount of variance attributable to disciplines, compared to institutions, in faculty teaching practices around DAL

and CL, as discussed above, the explanatory power of the Biglan categories is especially notable. Whereas the four institutional variables did not explain much, if any, of the variance in institution-level group means, the Biglan categories explained the vast majority of variance in discipline-level group means (i.e., the change in the proportional reduction in prediction errors for level-2 disciplines is largely attributable to the inclusion of the Biglan categories in the model). This holds true for both how faculty emphasize of place importance on students' use of DAL and the extent to which faculty encourage student engagement in CL in their courses. The strength of the Biglan categories, as opposed to the four institutional variables, could potentially be related their nature. While the four institutional variables are measurable characteristics of institutions, the Biglan categories were derived from the perceived differences between disciplines by faculty, and arguably represent enduring epistemological and social characteristics of the disciplines (Becher & Trowler, 2001) rather than being organizationally-oriented or a mere result of organizational policy-making.

Digging deeper into the results of the full fixed effects model for RQ1 helps to better understand the ways in which the Biglan categories explain disciplinary variation. Most clearly highlighting the relative strength of disciplines in influencing faculty teaching practices are the magnitudes of the effects of the Biglan categories. These effect sizes are substantially larger than those of the faculty identities or four institutional variables, for both how faculty emphasize or place importance on students' use of DAL or the extent to which they encourage student engagement in CL in their courses. Such results give weight to arguments that disciplinary cultures are the driving force behind teaching behavior (Clark, 1987). While the small to very small effect sizes do suggest that institutions play a role in shaping faculty teaching, the significant effects of the Biglan categories range from approximately five to 16 times greater in

magnitude than the significant institutional effects, hardly an endorsement of Becher and Trowler's (2001) or Lattuca and Stark's (1995) arguments that institutional contexts matter. With the small to very small magnitudes of the institutional effects sizes, and the relatively greater strength of disciplinary effects, practitioners may find it difficult to even discern in what ways institutional contexts matter to teaching in their work.

Notably, and in line with prior research suggesting that the Hard-Soft dimension has greater explanatory power than the other two (Biglan, 1973b; Hiller & Nelson Laird, 2021; Nelson Laird et al., 2008), there appears to be a pattern, descriptively speaking, in how disciplinary cultures as captured by the Biglan categories relate to teaching in these two areas. Hard discipline categories have negative relationships with emphasis on DAL and Soft discipline categories have positive relationships. Given that Soft disciplines are broadly characterized as having lower consensus around the nature and bounds of knowledge and inquiry, it follows that these disciplines might exhibit more of the teaching practices that are associated with emphasis on DAL, such as how faculty value students' ability to "Try to better understand someone else's views by imagining how an issue looks from their perspective," or "Forming a new idea or understanding from various pieces of information," which arguably might be more difficult to emphasize or place importance on in teaching in Hard disciplines where there is particular agreement in the discipline about particular knowledge areas.

Oppositely, Hard discipline categories have positive relationships with the extent to which faculty encourage student engagement in CL, while Soft discipline categories have negative relationships. While the small to medium effect sizes here are most likely an indicator of the small ICC for disciplines on encouragement of CL, the pattern is clear. Given that the practices captured by the survey items could be considered relatively universal CL practices, as

described above, it may at first glance be difficult to understand why this pattern in Biglan category effects appears. However, Becher and Trowler (2001) described Hard disciplines as often being associated with Urban disciplines, where greater numbers of scholars work on the same or similar topics and issues, increasing the availability of scholars with whom to collaborate. Additionally, scholars in Hard disciplines, by virtue of the greater consensus around knowledge and inquiry, tend to share knowledge bases, reducing barriers to collaboration. While, certainly, scholars in Soft disciplines do collaborate, which may translate in teaching to encouraging students to collaborate, collaboration may be a less important cultural facet compared to Hard disciplines.

Further results from RQ2 and RQ3 further emphasize these findings that institutional cultures may simply not matter as much in explaining or influencing faculty teaching practices than disciplinary cultures. This is unsurprising, though, given those analyses used RQ1's model as a base, meaning that these differences are to an extent built-in. However, several notable results are apparent. These results will be noted throughout each of the next two findings where appropriate.

While Umbach's (2007a) framework did not presuppose the relative strengths of cultures, it does assume that institutional and disciplinary cultures matter when it comes to how faculty teach, in line with Becher and Trowler's (2001) and Lattuca and Stark's (1995) arguments. While I do not argue that institutional cultures do not matter, they do appear to have little influence on faculty teaching, particularly compared to the influences of disciplinary cultures. What is particularly striking about this finding is what it means for socialization, which is a part of Umbach's (2007a) framework that was not in focus in this study.

Umbach (2007a) highlighted that socialization into each culture plays a critical role in shaping how faculty will be exposed to and acquire the cultural norms, practices, beliefs, etc., of the respective cultures within which they work. Tierney (2016) characterized this definition of socialization, though, as assuming a perspective of culture as relatively stable and something that can simply be acquired. Arguably though, this view does not align with Umbach's (2007a) operative definition of culture as "*mutually shaping* patterns of norms, values, practices, beliefs, and assumptions" (Kuh & Whitt, 1988, p. 12; emphasis added). Tierney (2016) offers another view on socialization that may be of greater utility for this discussion as it better grapples with the socially-constructed nature of culture and how cultures are mutually shape and are shaped by their members. Tierney argues that instead of culture being acquired through socialization, socialization is the "give-and-take" of faculty interpreting the cultures they are a part of through the lens of their own backgrounds and contexts (Tierney, 2016, p. 89). This is certainly much closer to the "mutually shaping" definition of culture.

So, thinking about socialization in this way, what might the finding that disciplines exert stronger influence than institutions on teaching practices tell us? One possibility is that the current finding suggests disciplinary cultures might be more salient than institutional cultures to faculty with regard to teaching practices in these two areas. If socialization is a process of interpretation of culture through individual backgrounds and contexts, institutional cultures may be getting interpreted through those individual lenses to a greater degree than disciplinary cultures, perhaps making it more difficult to directly discern the influence of institutional cultures. The fact that individual faculty identities and course and professional characteristics explained more variation in institutional means than did the institutional variables might suggest that institutional variation is confounded with individual variation. When it comes to teaching in

these two areas of practice, disciplinary cultures may need less interpretation because they are more directly relevant. Arguably the aspects of disciplinary cultures captured by the Biglan categories, such as whether knowledge and inquiry are applied to real life issues or whether members of a field agree about how to approach questions in the discipline, are more directly relevant to how faculty emphasize or place importance on students' use of DAL or the extent to which they encourage students to engage in CL than the percentage of faculty at an institution that are full-time, for instance. Interestingly, the one institutional variable that appeared most relevant, in terms of its statistical significance, was the institutional mean time on teaching. Notably, the time that faculty have to teach, compared to other tasks, would arguably be more directly relevant to teaching in these two areas of practice.

Limited Interactions between Institutional and Disciplinary Cultures

A key aspect of Umbach's (2007a) framework, aligning with the views of other scholars (e.g., Lattuca & Stark, 1995), is that institutional, disciplinary, and other faculty cultures interact as they relate to how faculty teach. Less work, however, has been done to empirically test this theoretical assumption. In this study I provided evidence that there is very limited interaction between institutional and disciplinary cultures as they regard how faculty emphasize or place importance on students' use of DAL or the extent to which they encourage students to engage in CL in their courses. Related to the finding discussed above, the evidence from the second research question explored in two ways the extent to which and how institutional and disciplinary cultures might interact.

The strongest evidence for the interaction between institutional and disciplinary cultures was arguably observed with regard to how faculty emphasize or place importance on students' use of DAL in their courses. When allowing the relationships between Biglan categories and

emphasis on DAL to vary across institutions, findings indicated that these relationships are indeed not necessarily the same across all institutions. For instance, the degree to which faculty emphasize or place importance on DAL in Hard-Pure-Life disciplines, such as Biology, is not the same at every institution, nor is it for faculty in six of the other seven Biglan categories. Even considering the possibility that the multiple comparisons limitation suggests a higher probability that one of these results may not be truly statistically significant, the consistency of the evidence strongly suggests some degree of interaction between disciplinary and institutional cultures. This is further underscored by a consistency in the Hard-discipline category covariances between these Biglan-DAL relationships and the average institutional emphasis on DAL. The significant, positive covariances for each of the four Hard-discipline Biglan categories suggests that the more faculty emphasize DAL on average across an institution, the more faculty in these four categories do as well, with the opposite also being true. These relationships result in greater variation across institutions in how faculty in these four Hard-discipline categories emphasize or place importance on DAL, compared to the overall average faculty member and average institution.

The evidence here does not suggest why this effect appears. One possibility is that institutional efforts to improve teaching may have a subtle effect of raising the bar to encourage faculty to teach in ways that improve student engagement and learning. Research has indicated that teaching professional development offered by institutions, such as teaching orientations, teaching workshops, mentoring, or offices or centers that support teaching are related to improved teaching practices, including higher-order learning, reflective and integrative learning, and collaborative learning (Condon et al., 2016; Fassett et al., 2021; Steinert et al., 2016). Interestingly, Fassett and colleagues' findings indicated that faculty in STEM disciplines, which

generally fall within the Hard-discipline Biglan categories, tended to participate in fewer teaching professional development opportunities. While this might be suggestive of the finding above that faculty in Hard-discipline categories emphasize DAL less than the average faculty member, given the finding in the current study that Hard-discipline category faculty at institutions with higher average emphasis on DAL tended to also emphasize DAL at higher levels, there may be something else within the institutional culture influencing teaching practices aside from participation in teaching professional development.

While these findings certainly suggest interaction between institutional and disciplinary cultures, they must be qualified by noting that the variances and covariances observed are notably small to very small. This might suggest a somewhat subtle interaction as opposed to a more immediately noticeable interaction. That is to say, for example, that an educational developer could observe Biology faculty at several institutions and not necessarily notice differences in how they emphasize or place importance on DAL from institution to institution nor notice that differences are related to how other faculty at the institution teach. Furthermore, on the surface this finding would seem to conflict with Smart and Umbach's (2007) finding that differences in teaching practices across disciplinary environments did not significantly vary across four-year colleges and universities. While their study used Holland's theory to examine disciplinary cultures (environments in their wording), they did not examine the interaction across individual institutions but rather across five Carnegie classifications of institutions. Given the small variances and covariances observed in this study, it is possible that this variance is only truly distinguishable by examining it across individual institutions.

Yet, I would further argue that the evidence more strongly indicates only limited interaction between institutional and disciplinary cultures with regard to how faculty emphasize

or place importance on DAL in their courses. Examining how institutional variables' relationships with emphasis on DAL varied across disciplines, only one, the institutional mean time on teaching, showed significant variance across disciplines. Though, as disciplinary cultures are particularly constructed around how scholars conceive of knowledge and inquiry and are thus intrinsically related to how faculty conduct their research and teaching (Becher & Trowler, 2001), this would not be surprising. The non-significant covariance with the average emphasis on DAL in each discipline suggests no clear pattern in how the institutional mean time on teaching varies across disciplines, however, one can imagine that disciplines that are more strongly oriented toward teaching, as opposed to research for example, relate to a more positive relationship between institutional mean time on teaching and emphasis on DAL.

Looking at the fixed interaction effects, that is the effects common across all institutions and disciplines, between the Biglan categories and institutional variables on how faculty emphasize or place importance on DAL further suggests only limited interaction between institutional and disciplinary cultures. Only five of the 32 interactions were statistically significant, and given the multiple comparisons limitation, the true number of significant interactions could be less than this. Additionally, the effect sizes of these significant interactions are small to very small, suggesting that in practice these effects may not be discernible to practitioners. Of these five interactions, the two most likely to be truly significant, based on the earlier discussion of the multiple comparisons limitation, are interactions between the institutional mean time on teaching and Soft-Pure-Life and Soft-Applied-Nonlife disciplines. Both of these disciplinary categories have a small, but positive interaction effect suggesting that as the institutional mean time on teaching increases, faculty in these disciplines emphasize DAL to a greater degree than faculty in the average discipline. Prior research has clearly linked Soft

disciplines to increased use of effective teaching practices and more student-centered teaching (Nelson Laird et al., 2008; Umbach & Wawrzynski, 2005). It is reasonable then that as faculty time on teaching increases in an institution, faculty in Soft disciplines might be more ready or prone to emphasize or place importance on students' use of DAL in their courses. However, the fact that the other two Soft-discipline categories did not also have a significant, positive interaction effect with institutional mean time on teaching would suggest that there might be other factors at play. Hiller and Nelson Laird (2021) suggested that though the Hard-Soft dimension had far greater explanatory power with regard to faculty emphasis on DAL than the Pure-Applied or Life-Nonlife dimensions, the three dimensions did appear to dynamically interact. It could be that there is something particular about being in a Soft-Pure-Life or Soft-Applied-Nonlife discipline rather than a Soft-Applied-Life or Soft-Pure-Nonlife discipline that moderates the otherwise negative main effect of institutional time on teaching.

I found even less evidence of institutional and disciplinary culture interaction with regard to the extent to which faculty encourage student engagement in CL in their courses. None of the Biglan category relationships with encouragement of CL varied significantly across institutions, suggesting that these relationships are relatively the same regardless of the institution. Given the overall very small variance in CL attributable to institutional groupings, this is not a surprising finding. Considering the institutional variables, the relationship between the institutional mean time on teaching and encouragement of CL had significant variance across disciplines, similar to emphasis on DAL. It is possible, again, that such variation could be expected given the nature of academic disciplines and how their cultures are oriented toward teaching. Though, as with emphasis on DAL, the variance in these relationships across disciplines was small and the covariance between these relationships and the average encouragement of CL in disciplines was

not significant, suggesting no clear pattern in how these relationships vary across disciplines and suggesting that the differences may be too subtle to notice in practice.

Additionally, the fixed interaction effects between Biglan categories and institutional variables on the extent to which faculty encourage student engagement in CL in their courses also suggests limited institutional and disciplinary culture interaction. Of the effects, only four were significant, with only small effect sizes. Two of the interactions occurred between institutional mean time on teaching and Hard-Pure-Nonlife and Soft-Pure-Nonlife discipline categories, with the interactions suggesting that greater institutional mean time on teaching accentuates the main effects of these disciplinary categories. As not all Hard or Soft disciplinary categories showed significant interactions with the institutional mean time on teaching, the findings might again indicate, as with Hiller and Nelson Laird's (2021) findings, that the Hard-Soft dimension dynamically interacts with the Pure-Applied and Life-Nonlife dimensions.

It is clear that institutional and disciplinary cultures have at best only limited interaction in terms of how they influence how faculty emphasize or place importance on students' use of DAL or the extent to which they encourage student engagement in CL in their courses. This finding further supports the first finding. In terms of how they influence teaching in these two areas, even with limited interaction, disciplines exert far more influence than institutions. A key indicator of this are the main effects of the Biglan categories that have medium to large effect sizes, several times the magnitudes of the interaction effects or institutional variable main effects.

This highlights the earlier discussion of socialization in the context of institutional and disciplinary cultures. While some recent scholarship has identified the varied sources of faculty socialization, for example more clearly acknowledging the role that disciplines play in

socialization particularly with regard to teaching (BrckaLorenz et al., 2020; Oleson & Hora, 2014), research on faculty socialization is often centered around institutions, discussing socialization into an organization or institutions as the dominant form of socialization in faculty work (e.g., Tierney & Rhoads, 1993). Given this, and the conceptual work underpinning Umbach's (2007a) model that suggests a stronger role for institutions in influencing faculty teaching, an intriguing possibility is that the influence of institutional teaching cultures and socialization is getting interpreted to some extent through faculty members' disciplinary contexts, causing it to function as a disciplinary influence. Consider, for example, teaching professional development opportunities as a form of institutional socialization. Though increased participation in institutionally-organized teaching professional development opportunities may relate to greater use of effective teaching practices (Fassett et al., 2021), recent scholarship has also suggested that informal means of socialization such as informal conversations with colleagues or informal mentorships are quite impactful in faculty work for early and mid-career faculty (Thompson, 2015; Thompson & Trigwell, 2018). It is probable that such conversations and mentorships predominantly occur with disciplinary colleagues. Furthermore, early research on the Biglan model indicated that more years of faculty experience and holding tenure were associated with greater distinctiveness in the Biglan categories, suggesting mid- and later-career faculty were more strongly socialized toward their disciplinary cultures than younger and non-tenured faculty (Creswell & Bean, 1981). Thus, even if institutional forms of socialization avoid disciplinary influence (e.g., multidisciplinary teaching workshops as opposed to teaching workshops targeted to STEM faculty), such socialization may naturally be filtered through disciplinary lenses, either by individual faculty members or through interaction with disciplinary colleagues.

Limited, Yet Meaningful, Interactions between Identities and Cultures

Another purpose of this study was to better examine how faculty members' identities intersected with the institutional and disciplinary cultures in which they conduct their teaching. Umbach's (2007a) framework indicated that faculty identities should interact with institutional and disciplinary cultures as they relate to faculty teaching, and past scholars of faculty cultures have acknowledged that identity can play a significant role in how faculty conduct their work, particularly for women and racially-minoritized faculty (Kuh & Whitt, 1988). Again, though, I found evidence of only limited interactions between faculty members' racial or ethnic, gender, and sexual orientation identities and institutional or disciplinary cultures. Despite this, I argue that the evidence suggests potentially more meaningful interactions than were observed between institutional and disciplinary cultures.

It is clear that there are not broad and systematic ways in which faculty identities interact with institutional and disciplinary cultures. First, consider how the relationships between faculty identities and teaching practices in these two areas varied across institutions and disciplines. Looking first at how faculty emphasize or place importance on students' use of DAL in their courses vary across institutions or disciplines, several models failed to even produce results (three models and five models, respectively). Bates and colleagues' (2015) discussion strongly suggests that such failures are likely because the underlying data do not support these relationships varying across institutions or disciplines, meaning that for these identities – Asian, Native Hawaiian, or other Pacific Islander faculty, faculty preferring not to identify their race, and Women faculty across institutions and Black or African American faculty, Hispanic or Latinx faculty, multiracial faculty, Women faculty, and LGBTQ+ faculty across disciplines – their relationships with how they emphasize DAL are likely substantially similar or the same across

institutions or disciplines. In fact, for only three identities – Asian, Native Hawaiian, or other Pacific Islander faculty, White faculty, and faculty who preferred not to identify their race – did their relationships with how they emphasize DAL show significant variance across disciplines. No faculty identity group showed significant variance in these relationships across institutions. However, the variances of the relationships for these three racial identity groups across disciplines were small, suggesting as before, that the differences might be subtle across disciplines. Additionally, the covariances of these relationships with the average levels of emphasis on DAL in each discipline were not significant, suggesting that how these relationships vary from one discipline to another is not necessarily related to how the average faculty in their disciplines emphasizes DAL.

If the variability across institutions and disciplines in the relationships between faculty identities and how they emphasize or place importance on students' use of DAL was limited, then the variability in extent to which they encourage student engagement in CL across institutions and disciplines was nonexistent. To a greater degree than with emphasis on DAL, multiple models failed to produce results on encouragement of CL. Models examining the variability of the relationships between encouragement of CL and Black or African American faculty, faculty of another race, Women faculty, Straight faculty, and faculty who preferred not to identify their sexual orientation across institutions failed to provide results, and models examining this variability across disciplines with Asian, Native Hawaiian, or other Pacific Islander faculty, Hispanic or Latinx faculty, White faculty, faculty of another race, multiracial faculty, faculty who preferred not to identify their race, Straight faculty, LGBTQ+ faculty, and faculty who preferred not to identify their sexual orientation also failed. Again, this suggests that the underlying data simply do not support these relationships varying across institutions or

disciplines (Bates et al., 2015). For all other faculty identity groups, the variance in their relationships with encouragement of CL across institutions or disciplines was not significant. Together, such findings indicate that these relationships are substantially similar or the same regardless of the specific institution or discipline.

A lack of variation across institutions or disciplines might suggest that to some degree there is something universal about the experiences of many faculty of different racial, gender, or sexual orientation identities across institutional or disciplinary cultures. As discussed in Chapter 2, research had already indicated that Women and faculty of color are more apt to engage in effective teaching practices, for example, with faculty of color generally encouraging student engagement in active and collaborative learning more than their White colleagues (Nelson Laird, 2011; Umbach, 2006; Umbach & Wawrzynski, 2005). This study confirms those prior findings while identifying that only the few faculty identity groups show those relationships varying across disciplines. This universality of teaching practices by faculty identity would certainly be unsurprising given the earlier discussion of faculty members' lived experiences and how their identities relate to their work. Findings that Women and faculty of color, for instance, carry disproportionate workloads compared to Men and White faculty, often spending more time on teaching and service (Allen et al., 2002; O'Meara et al., 2017), already suggest shared experiences tied to faculty members' identities across institutions and disciplines. This study then could be viewed as extending such findings to suggest that there might be shared conceptions or expectations of teaching practices related to faculty identities. This universality, or lack of variation across individual institutions or disciplines, though, does not necessarily mean that faculty identities do not interact with aspects of institutional or disciplinary cultures.

The fixed interaction effects between faculty identities and institutional variables and Biglan categories on teaching practices in these two areas, that is the effects that are common regardless of a faculty members' specific institution or discipline, generally show limited rather than broad and systematic interactions. More interaction was observed with how faculty emphasize or place importance on students' use of DAL in their courses, though only 23 of the 156 interactions were significant, and the multiple comparisons limitation would suggest that fewer interactions are truly significant. Notably, of these significant interactions, perhaps the only broad pattern observed was that nearly all were between faculty identities and the Biglan categories. The interactions between faculty identities and the Biglan categories occurred across most faculty identities and most Biglan categories. Faculty racial identities were particularly salient, accounting for 13 of the 21 significant interactions between identities and the Biglan categories. Only two faculty identities – Asian, Native Hawaiian, or other Pacific Islander faculty and Men faculty – had a significant interaction with any institutional variable, the institutional mean time on teaching for both of these groups of faculty. Such evidence further underscores the earlier conclusion that, with regards to how faculty emphasize or place importance on students' use of DAL or the extent to which they encourage students to engage in CL in their courses, institutional cultures simply appear to not matter as much as disciplinary cultures.

Given the exploratory nature of this study and the multiple comparisons limitation, what is perhaps more important in these findings than simply which interactions were significant is the magnitudes of the effect sizes present. I argue that this is what distinguishes these interactions from the preceding interactions between institutional and disciplinary cultures and makes the interactions between faculty identities and institutional and disciplinary cultures potentially more meaningful. Whereas between institutional and disciplinary cultures, the interaction effect sizes

were generally small to very small in magnitude, allowing the disciplinary effects of the Biglan categories to be the key influence in how faculty emphasized DAL, the effect sizes in focus here are generally small to medium in magnitude (with one potentially very large effect size). In some cases, the interaction effects sizes are several times greater than the identity main effect. For instance, the largest effect size (of a significant interaction) observed was -0.7191 for faculty of another racial identity in Hard-Applied-Life disciplines, which far exceeds the magnitudes of either of the main effects, both of which were non-significant. It should be noted, though, that faculty of another race are not monolithic, and this group potentially represents faculty from a wide range of racial or ethnic identities, some of whom may not have as strong of an interaction effect if they had been examined separately. Similarly, Asian, Native Hawaiian, or other Pacific Islander faculty and LGBTQ+ faculty in Hard-Pure-Nonlife had interaction effects several times greater in magnitude than the main effects of their identities (though, again, these two faculty groups combine the experiences of faculty of several racial or sexual orientation identities, respectively).

Nonetheless, the proportional strength of these interaction effects creates a more nuanced picture of faculty teaching practice where faculty of different identities are dynamically interacting with their disciplinary cultures. While disciplinary cultures continue to disproportionately influence faculty emphasis on DAL, faculty identities clearly play a substantially more meaningful role than the examined aspects of institutional cultures. Examining the partially-estimated means for emphasis on DAL by faculty identity and Biglan category clearly shows that identities have a more meaningful influence in combination with disciplines than institutional cultures with disciplines. One especially notable example is Black or African American faculty in Hard-Pure-Life disciplines. In Hard-Pure-Life disciplines, faculty

of all other racial or ethnic identities tend to emphasize DAL less than the average faculty member, and yet Black or African American faculty tend to emphasize DAL more often than the average faculty member, to a medium degree. While examining why this may occur is not within the scope of this research, such interactions have not been explored to this extent in past scholarship.

Interactions between faculty identities and aspects of institutional and disciplinary cultures on the extent to which faculty encourage student engagement in CL follow much the same pattern, showing slightly more limited interaction than with emphasis on DAL, but with potentially meaningful effect sizes. Of the 156 interactions, only 13 were significant. Again, disciplines were clearly more salient, with 10 of the 13 significant interactions with faculty identities occurring with the Biglan categories. Interestingly, while institutional mean time on teaching has generally been the noteworthy institutional variable in this study, the institutional-identity interactions on encouragement of CL occurred between Asian, Native Hawaiian, or other Pacific Islander faculty and percent of faculty that are full-time and between LGBTQ+ faculty or faculty who preferred not to identify their sexual orientation and percent of full-time faculty that are tenured or tenure-track. It is possible, though, that given the multiple comparisons limitation, these may not be truly significant interactions.

As with emphasis on DAL, it is the magnitudes of the effects sizes of the interactions between faculty identities and aspects of institutional and disciplinary cultures that makes them potentially more meaningful than the institutional-disciplinary interactions considered previously. Though the effect sizes are generally small, mostly between 0.1 and 0.2, they are generally similar to or larger than the main effect sizes of the Biglan categories or identities alone. For example, the effect size between Black or African American faculty and SPN

disciplines, -0.1243 , is similar in magnitude to both of the significant main effects, and the magnitude of the effect size between Hispanic or Latinx faculty and HAL disciplines, -0.6990 , is many times greater than either of the nonsignificant main effects. Compared to emphasis on DAL, where the Biglan categories still generally held more influence, the interactions between identities and institutional or disciplinary cultures carry equal or greater weight than identities or either culture alone. Yet again, this creates a more nuanced picture of how faculty identities and institutional and disciplinary cultures relate to teaching with regard to encouragement of CL. The partially-estimated means demonstrate this dynamic interaction. One particularly notable example is the above-mentioned interaction between Hispanic or Latinx faculty and HAL disciplines. This very large effect size results in these faculty encouraging CL substantially less often than other groups of faculty in any other discipline. If this interaction is truly significant, it suggests something particularly unique about these faculty in these disciplines with regard to their teaching that would not have been discernible without examining these interactions.

Though limited, if these identity interactions with aspects of institutional and disciplinary cultures are potentially meaningful, what might that suggest about the socialization that faculty experience? As cultures are generally slow to change and are most-shaped by their culturally dominant members (Kuh & Whitt, 1988; Tierney & Rhoads, 1993), historically White Men faculty, this question bears further consideration in light of these findings. As cultures, broadly-speaking, are a representation of the “norms, values, practices, beliefs, and assumptions” (Kuh & Whitt, 1988, p. 12), then it is reasonable to assume that the average teaching practice of a discipline or institution’s members is, to some degree, representative of its culture. For this discussion, consider disciplinary cultures, where the Biglan dimensions and faculty identities were effect-coded so that the model results represent differences from the overall mean. One way

to interpret the interaction effects, then, is to look at each Biglan category individually, where the interaction effects would then be interpreted as the difference for each faculty group from the average teaching behavior of that Biglan category (e.g., how multiracial faculty differ from the average teaching behavior of faculty in HPN disciplines).

Looked at in this way, non-significant interaction effects are suggestive of where disciplinary effects are consistent across these faculty identities. It is not possible to know from the current analysis but thinking in terms of socialization presents a couple possibilities. If we assume that these disciplinary cultures are still dominated by the norms and practices of White Straight Men faculty, then one possibility is that faculty of color, Women, LGBTQ+ faculty, and faculty who preferred not to identify their gender or sexual orientation gravitated to and adopted the teaching practices of White Straight Men faculty (e.g., encouragement of CL in SPL disciplines). Another possibility is that these disciplinary cultures evolved, with practices shifting such that they are to some extent representative of faculty of different racial, gender, or sexual orientation backgrounds. In this vein, equally interesting to consider are those disciplinary cultures where White, Straight, and/or Men faculty have a significant interaction, that is their teaching practices are significantly different from the disciplinary average. For instance, with regard to emphasis on DAL, Black or African American faculty and Hispanic or Latinx faculty are the only racial groups to not have a significant interaction in HPN disciplines. Though, it is not knowable from this analysis, one possible interpretation is that these faculty best represent the culture of HPN disciplines for emphasis on DAL.

Implications and Future Directions

Having reviewed and interpreted the findings of this exploratory study, it is necessary to consider the implications of these findings for research and for practice. The following sections

elaborate on what these findings mean for research and for practice and how these implications are indicative of the broader theoretical, empirical, and practical significance of this study.

Lastly, given the implications of these findings, this section will consider future directions for research.

Implications for Research

As an exploratory study, there are naturally multiple implications for research. Though prior studies of faculty teaching practices have either used faculty cultures as an organizing framework or discussed their findings through the lens of faculty cultures, for the first time in the literature, I applied Umbach's (2007a) Culture and College Teaching Framework to better examine the interrelationships between institutional and disciplinary cultures and faculty identities. While Umbach does not ascribe any particular degree of interaction to these influences on faculty teaching, the literature clearly suggests that both institutions and disciplines have meaningful effects on faculty teaching and that their interactions should also be meaningful. Conceptually, this makes sense, as for example, one would reasonably expect that the faculty work of a biology professor at a large, major research institution would be different to some extent than the work of a biology professor at a small liberal arts baccalaureate institution. However, I found that, at least with regard to how faculty emphasize or place importance on students' use of DAL or the extent to which they encourage students to engage in CL in their courses, institutional cultures simply do not carry as much influence as disciplinary cultures. While there is not an even balance in how institutional and disciplinary cultures influence faculty teaching, there is still some limited interaction between cultures.

I offered, then, clear empirical evidence that does not necessarily invalidate Umbach's (2007a) Culture and College Teaching Framework, but instead better clarifies the nature and

extent of the interrelationships conceptualized in the framework. This is important. The interrelationships between institutional and disciplinary cultures have been conceptualized to some extent since early work on faculty cultures (e.g., Austin, 1990; Clark, 1987; Kuh & Whitt, 1988), but empirical research had not yet fully examined these conceptualized relationships. Furthermore, I provided greater understanding of these interrelationships between cultures than past work, such as Smart and Umbach's (2007) study examining course teaching objectives which found no significant interactions between academic environments and institutional affiliations.

As Umbach's framework does not conceptualize or stipulate any particular degree of relationships between the cultures and how they influence teaching, the findings of this study suggest a couple possibilities for improving the framework. As suggested by the first and second major findings discussed above, it is necessary to de-emphasize institutional cultures and highlight the strong role of disciplinary cultures while noting how disciplinary cultures might vary across institutions. Thinking of Figure 2.1, this might look like an adjustment of the size and overlap of the cultural ovals. A second change, suggested by the possibility that institutional cultural influences may be getting interpreted through the lens of disciplinary cultures, is to consider not just the intersections of cultures but the ways in which they may feed into each other, as in an institutional influence becoming or appearing as a disciplinary one but not as an interaction. This suggests some blurring of the lines between cultures and the need for scholars to more consciously question what cultures are attributable for certain influences and how. Visualizing this change in Figure 2.1, it might appear as arrows connecting the cultures and fading into each other, in addition to the overlapping intersections of cultures. Certainly, such clarifications of the framework may need to be further adjusted as the role of professional

cultures was not examined in this study. Given the discussion in Chapter 2, it is yet unclear, for instance, how influential professional cultures are in teaching or how they interrelate with or are interpreted through institutional or disciplinary cultures.

As this suggests, I further contributed to the empirical literature on faculty cultures through the use of cross-classified multilevel modelling. This analytic method allowed for the variation across individual faculty, disciplines, and institutions to be more clearly modelled to better examine how faculty identities and characteristics of institutional and disciplinary cultures explain this variation. The limited past research on the interaction between institutions and disciplines used other quantitative methods that do not allow for such clarity, such as Smart and Umbach's (2007) use of MANOVA. Past research that has examined faculty teaching and either the contextual influences of institutions or disciplines has utilized multilevel modeling (e.g., Umbach, 2006, 2007). However, without the use of a cross-classified design to account for faculty institutional and disciplinary affiliations simultaneously, the ability of past research to examine the interactions between the two was substantially limited. For instance, Umbach (2006) used multilevel modeling, with institutions as the level-2 grouping variable, to examine variations in teaching across faculty of different racial or ethnic identities. While Umbach did not focus on disciplinary influences on teaching in this study, disciplinary academic environments are utilized as control variables. Though, conceptually this may be appropriate as Holland's categories apply to both individuals as well as to academic environments, it potentially confounds individual variation with disciplinary variation. Given the findings of this study that disciplines are far more important than institutions (at least in these two areas of teaching practice), not modelling disciplines as well as institutions potentially inflates the effects of institutions, as suggested by the literature on multilevel modeling (Beretvas, 2011). This study,

then, suggests that value for researchers in using cross-classified multilevel designs when studying the disciplinary and institutional effects on faculty teaching.

A third implication of these findings for researchers lies in the variables used to examine institutional and disciplinary cultures. This study contributed further evidence for the value of using the Biglan dimensions as indicators of disciplinary cultures, given that they accounted for a substantial amount of the variation in discipline-level group means in both how faculty emphasize or place importance on students' use of DAL and the extent to which faculty encourage student engagement in CL in their courses. The complexity of culture suggests that it is unlikely, if not impossible, for any empirical study to fully capture and explain all variation. It is clear that the Biglan dimensions still help to explain deeply embedded and enduring cultural values, norms, and practices in faculty teaching to a substantial degree. This should largely be unsurprising to researchers given the strength of evidence indicating the validity and value of the Biglan dimensions in explaining disciplinary differences (e.g., Simpson, 2015; Smart & Elton, 1982; Stoecker, 1993).

An arguably more valuable implication for researchers is that the chosen indicators of institutional cultures for this study appear to have been mostly irrelevant with regard to explaining faculty practices in these two areas of teaching. Of the four variables – institutional mean time on teaching, the percentage of faculty that are full-time, the percentage of full-time faculty that are tenured or tenure-track, and the percentage of expenditures on instruction – only the institutional mean time on teaching consistently proved to be meaningful in findings. For a study of faculty teaching, it is certainly reasonable to expect that the amount of time faculty in an institution dedicate toward teaching activities would relate to how individual faculty practice their teaching. It is interesting then that institutional expenditures on instruction largely did not

prove to be significant, suggesting that this is not a meaningful indicator of institutional missions as they relate to teaching and that faculty teach regardless of the financial resources at-hand at their institutions. Additionally, though the literature clearly suggests that how institutions shape the composition of their faculty through control of job conditions, such as full-time status and tenure, impacts how faculty approach and conduct their work, this study indicates that these are not especially meaningful indicators of institutional cultures around teaching.

A final, and important, implication of this study for researchers, is that, though interactions between faculty identities and institutional and disciplinary cultures were limited, they appeared to be meaningful when they do occur. The fact that these interactions were, generally, not broad, systematic interactions with regard to teaching practices around DAL and CL, suggests that they could be easily missed. However, the interactions that did exist often had effect sizes on par with or greater than the main effects of identities or disciplinary cultures as captured by the Biglan dimensions. This suggests that there are faculty experiences that are possibly quite unique in terms of how faculty are interacting with their disciplines as it relates to their teaching. Researchers interested in examining relationships between faculty identities and teaching practices, then, must be cautious to not be overly focused on broad systematic findings and should seek to structure their analytic methods in a way that would allow for particular faculty experiences to be examined.

Implications for Practice

The findings of this study also suggest several important implications for faculty, educational developers, and administrators. I argue these findings can help practitioners to better understand the influences of institutional and disciplinary cultures and faculty identities on faculty teaching practices related to how faculty emphasize or place importance on students' use

of DAL or the extent to which they encourage students to engagement in CL in their courses. These results help to identify how typical faculty in different types of disciplines (e.g., Soft-Applied-Life disciplines) teach differently than faculty in other disciplines and how certain institutional characteristics or faculty identities can further shape how faculty teach. This may be useful, for example, if an educational developer is working to improve how faculty engage students in deep learning across multiple disciplines. A one-size-fits-all development practice in such a situation is unlikely to be successful for all faculty as faculty of different identities may not necessarily be influenced by their institutional or disciplinary cultures in the same way, potentially posing differing sets of barriers to these faculty employing teaching practices more supportive of DAL.

Additionally, I argued that many of the interactions between institutional and disciplinary cultures and faculty identities are likely somewhat subtle in nature, and possibly unrecognizable in practice. This implies that practitioners may unconsciously assume that such interrelationships between these influences do not exist or that they are not important. Certainly, though, this study does indicate that certain interactions may actually be meaningful, especially between disciplinary cultures and faculty members' racial or ethnic identities. This strongly suggests that practitioners seeking to improve their teaching practices must more consciously consider how institutional and disciplinary cultures and faculty identities relate to teaching and how an individual faculty member's context and teaching practices relate to those of similarly-situated faculty.

Importantly, the findings of the study indicated that institutions do not have much influence over faculty teaching, compared to disciplines and individual characteristics. While some interactions between institutional and disciplinary cultures existed, their limited scope

leaves disciplinary cultures and, for some faculty, identities more strongly influencing teaching practices than anything attributable to an institution. If socialization is viewed as the process of acquiring cultural practices, or even as an individual interpretative and reinterpreted process as faculty engage with these cultures, then it is clear that faculty socialization is largely disciplinary in nature, even within the same institution, at least as regards teaching practices around DAL and CL. In other words, this study's findings strongly suggest that it is possible that the socialization faculty experience in one institution's Chemistry department shares more in common with the socialization faculty in other institutions' Chemistry departments experience than with the socialization faculty experience in other departments at their same institution. This is not overly surprising as research has suggested that teaching is primarily influenced by disciplinary cultures (Oleson & Hora, 2014).

The implication of this disciplinary influence for faculty teaching and educational development is profound as educational development is most commonly approached with an institutional focus. Educational development has expanded significantly in recent decades and one of the most common strategies for educational development is to have such efforts directed by an institutional center for teaching (Austin & Sorcinelli, 2013; Gullatt & Weaver, 1997). Notably, disciplinary influences do not appear to be in focus. Austin and Sorcinelli's (2013) discussion of the future of faculty educational development is very heavily focused on broader changes in the higher education environment and how institutions can and should respond to them to meet the needs of faculty. While they highlight that faculty development must take into consideration the contexts of faculty if it is to be most effective, faculty members' disciplinary areas do not register as a meaningful context that requires discussion. I strongly disagree. If disciplinary socialization is more dominant then it is incumbent on institutionally-oriented

educational developers to engage with disciplinary cultures. Not doing so would possibly risk valuable efforts to improve teaching and learning being overridden by disciplinary cultural norms, values, and practices around teaching, wasting valuable institutional resources in the process and realizing little improvement in teaching.

What appears to be necessary is a re-orientation of faculty educational development to more fully take into consideration the differing disciplinary cultures within which faculty have long studied, trained, and work. It is unreasonable for institutional actors, whether educational developers or administrators, to expect faculty to adopt institutionally-desired teaching practices, even if research broadly identifies them as best practices, without helping faculty to understand how such practices can complement or fit within their disciplinary cultural understandings. This may be most especially true for faculty whose disciplinary cultures have not historically been oriented to certain practices. For instance, this study's findings indicate that faculty in the four Hard discipline Biglan categories emphasize or place importance on students' use of DAL to a lesser extent than faculty in the Soft discipline categories. While there are likely a myriad of cultural reasons for this, there are also likely ways that faculty in Hard disciplines can be helped to integrate teaching practices around DAL into their disciplinary cultural understandings. This could be one possible explanation behind why faculty in these Hard discipline categories tend to place greater emphasis on students' use of DAL the more faculty on average do at an institution. Certainly, educational developers have already in some ways been engaging with faculty within their disciplinary contexts. Pchenitchnaia and Cole's (2009) work found that educational developers in teaching and learning centers at research-extensive universities rated certain practices, such as individual classroom observations, individual consultations, and discipline-based group consultations, as essential current and future practices.

Such practices necessarily take into account faculty disciplines, even if implicitly. Educational developers and administrators should continue to think creatively about how other essential educational development practices can be adapted to better take into account the influences of faculty disciplines. Individual or discipline-based group consultations could effectively enable center-based educational developers to tailor broadly effective teaching practices to more specific disciplinary contexts. While it may be too much to overload existing teaching and learning center staff with engaging in a substantially greater number of individual classroom observations, particularly at large institutions, the expertise of educational developers in these centers could be utilized by administrators in leadership training on how to conduct classroom observations. If institutions required department chairs, for instance, to participate in such trainings, broadly effective teaching practices could potentially be further tailored to the contexts of specific disciplinary cultures without overburdening educational developers. Administrators and educational developers may find further success contextualizing broadly effective teaching practices within specific disciplinary cultures by drawing upon existing expertise amongst disciplinary faculty who engage in teaching research and development (e.g., as part of the broader field of the scholarship of teaching and learning, SoTL), perhaps by restructuring their job responsibilities or offering incentives to promotion and tenure to encourage these faculty to continue valuable disciplinary teaching development or research and to share that work with their disciplinary colleagues.

In light of increasing efforts to improve diversity and inclusion in institutional academic teaching environments, it is further necessary for educational developers and administrators to not only consider the disciplinary cultural understandings faculty may have but also how their identities, particularly their racial or ethnic identities, factor into their cultural understandings of

faculty teaching. It is clear from this study's findings that faculty identities do interrelate with faculty cultures, most especially disciplinary cultures, in generally non-systematic and unique ways. This study only scratches the surface in understanding how identity and faculty cultures relate and influence faculty teaching, and yet the findings point to the fact that institutional actors cannot expect broad institutional efforts alone to support increasingly diverse faculty in their teaching. For instance, the findings suggest that multiple faculty racial or ethnic groups teach differently across different disciplines. Educational developers and administrators could find that policies and practices that work well to support Black or African American faculty, or Women faculty in one or more disciplines may not work as well in other disciplines. While further research, as suggested below, may be necessary to offer clearer recommendations of how administrators and educational developers can tailor educational teaching development to account for disciplinary cultures and faculty identities, many of the suggestions above would benefit from incorporating even general understandings of how faculty of different identities interact with their disciplinary cultures.

Certainly, though, this work of re-orienting faculty development to take account of disciplinary cultures and faculty identities cannot entirely fall on educational developers. Cultures are vastly complex and at their cores represent socially-constructed norms, values, and practices (Kuh & Whitt, 1988; Umbach, 2007a). As such, in the long-term it is necessary to also approach this goal from within disciplines themselves. Though socialization arguably occurs throughout a faculty member's career, contextualizing broadly effective teaching practices within disciplinary cultures may prove more effective during graduate training. For instance, a recent study of graduate student teaching development found graduate student benefitted from a combination of both interdisciplinary and disciplinary teaching development opportunities

(Bishop-Williams et al., 2017). Institutional and disciplinary support for such graduate student training could prove instrumental in incorporating broadly effective teaching practices more effectively into disciplinary cultures. Disciplinary associations have a role to play as well by creating space and encouraging discipline members to more directly engage in teaching research and development. Given the strength of disciplinary cultures in relation to faculty teaching practices, as identified in this study, efforts such as those highlighted here could significantly help to improve faculty teaching practices and undergraduate student experiences in the classroom.

Future Directions for Research

The findings of this study and their implications for research and practice point to several fruitful areas for further study. First, as an exploratory study, future research should continue to expand upon the foundation laid here to better understand how these aspects of institutional and disciplinary cultures and faculty identities interact as they influence other areas of teaching practice, beliefs, or approaches. While the findings that emerged in this study applied to both how faculty emphasize or place importance on students' use of DAL and the extent to which they encourage students to engage in CL in their courses, these findings may or may not equally apply to other areas of teaching practice. Given the complexities of culture, it would be valuable for higher education researchers and practitioners to better understand how these findings apply more broadly. For instance, do these findings equally apply to other aspects of academic or social classroom engagement, such as students engaging with diversity or teaching that supports inclusive and supportive learning environments? As suggested by the measures used in this study, deep approaches to learning can be viewed as a broad construct. Do these findings equally apply to components of deep approaches to learning such as how faculty emphasize higher-order

learning skills or place importance on reflective or integrative learning practices? A final consideration for future research in other areas of teaching is that this study was framed around teaching practices in undergraduate coursework. Whether the findings of this study equally apply to teaching practices in graduate level coursework should also be explored in future work.

Along these same lines, future research may also want to examine other aspects of disciplinary and institutional cultures, professional or other faculty cultures, and faculty identities. While the Biglan categories explained a substantial amount of variation in the discipline-level group means, other aspects of disciplinary cultures may prove valuable to understand. Other aspects or indicators of institutional cultures should also be examined given the marginal amount of variation these four variables explained. While the institutional mean time on teaching proved to interact more with disciplines and identities than the other institutional variables, other institutional factors may have meaningful influences on teaching as well. Operationalizing professional cultures and examining how they interrelate with institutional and disciplinary cultures would be further instructive of how these diversifying and unifying influences affect teaching. Lastly, this study acknowledged its limitations in the examination of faculty identities, for instance excluding faculty of another gender identity (not Man nor Woman) or combining other small faculty groups. Future research that can explore how these or other faculty identities (e.g., religious identities) interrelate with faculty institutional, disciplinary, or other cultures would prove valuable. Such studies can help to better understand and provide empirical evidence in support of or to better modify and clarify Umbach's (2007a) Culture and College Teaching Framework.

Additionally, future research should seek to understand the role that socialization plays in how faculty are influenced by institutional and disciplinary cultures. Umbach's (2007a)

framework primarily situates socialization as the means by which faculty acquire institutional, disciplinary, and other cultures that are relevant to their work and teaching. However, socialization may be better conceptualized in a broader sense, aiding those who enter the faculty in understanding these cultures, but also as an ongoing process through which current faculty interact with others and with their communities as they continue carrying out their work. For instance, Becher (1989), expanding on Biglan's dimensions, conceived of two socially-oriented dimensions, Convergent-Divergent, or the degree to which faculty in a discipline hew closely to group norms, practices, expectations, etc., and Urban-Rural, or the degree to which many scholars focus on the same or substantially similar topics and questions, that sought to explain how scholars within a discipline interacted with one another and with their work. Bringing in such aspects of socialization, such as the Convergent-Divergent dimension, could also help to better understand the role that faculty identities have in how faculty understand their disciplines (or their institutions if the dimension could be applied to institutional cultures). Are racially minoritized faculty systematically excluded from shaping the dominant cultural norms and practices of their disciplines? Do faculty who diverge from their disciplines' common norms and practices utilize more or less effective teaching practices? Such research could aid in understanding these and many other questions.

As researchers consider how institutions create teaching environments supportive of diverse faculty and students, future research could also consider how aspects of institutional and disciplinary cultures factor into institutional efforts. One avenue would be to consider the role of faculty autonomy, which multiple scholars have suggested is necessary for diverse and inclusive teaching environments (e.g., Gappa et al., 2005). Autonomy directly relates to the sense that faculty can make their own choices, with higher levels of autonomy relating to more positively

motivated faculty (Ryan & Deci, 2000; BrckaLorenz et al., 2017). BrckaLorenz and colleagues (2017) also found that autonomy varied across disciplinary areas and faculty demographics. Understanding how autonomy interrelates with faculty identities and institutional and disciplinary cultures with regards to faculty teaching practices would thus prove valuable.

Given the implication that broad institutional efforts to improve faculty teaching or address diversity and inclusion as they relate to teaching environments may need to be more tailored to account for disciplinary cultural understandings, examining how current educational development and diversity efforts relate to teaching practices would be necessary. For instance, do certain aspects of disciplinary cultures make faculty more receptive to participating in educational development activities, do aspects of institutional or disciplinary cultures serve as barriers to participation in educational development activities? Are more individually or disciplinary focused educational development activities (such as individual or disciplinary group consultation, or classroom observation) more effective than broad multidisciplinary activities? Furthermore, many disciplinary or professional organizations focus on faculty teaching and educational development outside the bounds of specific institutions. How do these activities complement or conflict with institutional educational development efforts? All of these are questions that could be explored from the foundation laid by this study.

Conclusion

Despite an understanding amongst scholars for several decades that research must explore the contexts and cultures of institutions and disciplines if efforts to improve faculty teaching are to be successful (Lattuca & Stark, 1995), much of the interrelationships between these two cultures and faculty identities were little explored. In this exploratory study, I addressed this gap in the literature by applying Umbach's (2007a) Culture and College Teaching

Framework which itself sought to better unify the literature on faculty cultures into a more cohesive framework. I drew on past scholarship to examine disciplinary cultures through the lens of the Biglan dimensions, and contrary to prior research that primarily used the Carnegie Classifications to understand institutional cultures, I identified four variables that the literature would suggest to be more directly related to faculty work and teaching. Furthermore, I expanded on the current literature examining faculty cultures and teaching by employing a cross-classified multilevel design, concluding that a) disciplines are far more important than institutions in explaining faculty teaching practices related to DAL and CL; b) while institutional and disciplinary cultures do appear to interact, the interactions are limited in scope; and, c) faculty identities interact with institutional and disciplinary cultures in limited yet meaningful, if non-systematic, ways.

These findings supported multiple implications for research and practice and suggest ways that future research can dig deeper to better understand the scope and nature of the interactions between institutional and disciplinary cultures and faculty identities as they relate to faculty teaching practices. As faculty and students become ever more diverse, efforts to improve faculty teaching and the cultures (or environments) in which faculty work will become increasingly important. This exploratory study provides clear empirical evidence that examining faculty teaching through the lens of faculty cultures offers a valuable way to connect and examine multiple aspects of the teaching-learning environment to better understand how faculty teach and what influences their teaching.

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Appendix A: FSSE Instrument



Faculty Survey of Student Engagement

*This is a facsimile of the FSSE survey (available at fsse.indiana.edu).
The survey itself is administered online.*

- 1. How important is it to you that undergraduates at your institution do the following before they graduate?**
Response options: Very important, Important, Somewhat important, Not important
 - a. Participate in an internship, co-op, field experience, student teaching, or clinical placement
 - b. Hold a formal leadership role in a student organization or group
 - c. Participate in a learning community or some other formal program where groups of students take two or more classes together
 - d. Participate in a study abroad program
 - e. Work with a faculty member on a research project
 - f. Complete a culminating senior experience (capstone course, senior project or thesis, comprehensive exam, portfolio, etc.)
 - g. Participate in a community-based project (service-learning) as part of a course
- 2. How important is it to you that your institution increase its emphasis on each of the following?**
Response options: Very important, Important, Somewhat important, Not important
 - a. Students spending significant amounts of time studying and on academic work
 - b. Providing support to help students succeed academically
 - c. Students using learning support services (tutoring services, writing center, etc.)
 - d. Encouraging contact among students from different backgrounds (social, racial/ethnic, religious, etc.)
 - e. Providing opportunities for students to be involved socially
 - f. Providing support for students' overall well-being (recreation, health care, counseling, etc.)
 - g. Helping students manage their non-academic responsibilities (work, family, etc.)
 - h. Students attending campus activities and events (performing arts, athletic events, etc.)
 - i. Students attending events that address important social, economic, or political issues
- 3. Indicate your perception of the quality of student interactions with the following people at your institution.**
Response options: 1=Poor to 7=Excellent
 - a. Other students
 - b. Academic advisors
 - c. Faculty
 - d. Student services staff (career services, student activities, housing, etc.)
 - e. Other administrative staff and offices (registrar, financial aid, etc.)
- 4. In a typical 7-day week, about how many hours do you spend on each of the following?**
Response options: 0, 1-4, 5-8, 9-12, 13-16, 17-20, 21-30, More than 30 hours
 - a. Teaching activities (preparing, teaching class sessions, grading, meeting with students outside of class, etc.)
 - b. Advising students
 - c. Research, creative, or scholarly activities
 - d. Service activities (committee work, administrative duties, etc.)
- 5. In a typical 7-day week, about how many hours do you spend on each of the following teaching-related activities?**
Response options: 0, 1-4, 5-8, 9-12, 13-16, 17-20, More than 20 hours
 - a. Preparing class sessions
 - b. Teaching class sessions
 - c. Grading assignments and exams
 - d. Meeting with students outside of class
 - e. Course administration (emailing students, maintaining course website, etc.)
 - f. Working to improve your teaching (self-reflection, meeting with teaching consultants, attending teaching workshops, conducting research on your own courses, etc.)
- 6. In a typical 7-day week, do you participate in the following activities?**
Response options: Yes, No
 - a. Working with undergraduates on research
 - b. Supervising undergraduate internships or other field experiences
- 7. During the current school year, have you taught an undergraduate course?**
Response options: Yes, No

If No, respondent skips to #11, and then to #31.
- 8. During the current school year, about how often have you done each of the following with the undergraduate students you teach or advise?**
Response options: Very often, Often, Sometimes, Never
 - a. Talked about their career plans
 - b. Worked on activities other than coursework (committees, student groups, etc.)
 - c. Discussed course topics, ideas, or concepts outside of class
 - d. Discussed their academic performance
- 9. About how many of your undergraduate courses at this institution have included a community-based project (service-learning)?**
Response options: All, Most, Some, None

Faculty Survey of Student Engagement

10. In your undergraduate courses, to what extent do you do the following?

Response options: Very much, Quite a bit, Some, Very little

- Clearly explain course goals and requirements
- Teach course sessions in an organized way
- Use examples or illustrations to explain difficult points
- Use a variety of teaching techniques to accommodate diversity in student learning styles
- Review and summarize material for students
- Provide standards for satisfactory completion of assignments (rubrics, detailed outlines, etc.)
- Provide feedback to students on drafts or works in progress
- Provide prompt and detailed feedback on tests or completed assignments

11. What is the general academic discipline of your appointment?
[Write-in]

Please answer the following questions based on *one particular undergraduate course section you are teaching or have taught during the current school year.*

- 12a. Is your selected course section in the same academic discipline as your appointment?

Response options: Yes, No

- 12b. [If answered "No"] What is the general academic discipline of your selected course section?

[Write-in]

13. What is the class level of most students in your selected course section?

Response options: Lower division (mostly first-year students or sophomores); Upper division (mostly juniors or seniors); Other, please describe: _____

14. Estimate the total number of students in your selected course section.

Response options: 20 or fewer, 21-30, 31-40, 41-50, 51-100, More than 100

15. Does your selected course section fulfill a general education requirement on your campus?

Response options: Yes, No

16. In what format do you teach your selected course section?

Response options: Classroom instruction on-campus; Classroom instruction at an auxiliary location (satellite campus, rented facility, etc.); Distance education (online, live or pre-recorded video or audio, correspondence, etc.); Combination of classroom instruction and distance education

17. In an average 7-day week, about how many hours do you expect the typical student to spend preparing for your selected course section (studying, reading, writing, doing homework or lab work, analyzing data, rehearsing, and other academic activities)?

Response options: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, More than 10 hours

18. In an average 7-day week, about how many hours do you think the typical student *actually* spends preparing for your selected course section (studying, reading, writing, doing homework or lab work, analyzing data, rehearsing, and other academic activities)?

Response options: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, More than 10 hours

- 19a. In an average 7-day week, of the time students spend preparing for your selected course section, about how many hours do you expect students to spend on assigned reading?

Response options: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, More than 10 hours

- 19b. [If answered greater than 0] About how much of the assigned reading in your selected course section do you think the typical student completes?

Response options: All, Most, Some, None

20. In an average 7-day week, about how many hours do you think the typical student in your selected course section spends doing each of the following?

Response options: 0, 1-5, 6-10, 11-15, 16-20, 21-25, 26-30, More than 30 hours

- Preparing for class (studying, reading, writing, doing homework or lab work, analyzing data, rehearsing, and other academic activities)
- Participating in co-curricular activities (organizations, campus publications, student government, fraternity or sorority, intercollegiate or intramural sports, etc.)
- Working for pay **on campus**
- Working for pay **off campus**
- Doing community service or volunteer work
- Relaxing and socializing (time with friends, video games, TV or videos, keeping up with friends online, etc.)
- Providing care for dependents (children, parents, etc.)
- Commuting to campus (driving, walking, etc.)

21. In your selected course section, to what extent do you think the typical student does their best work?

Response options: Very much, Quite a bit, Some, Very little

22. In your selected course section, how important is it to you that the typical student do the following?

Response options: Very important, Important, Somewhat important, Not important

- Ask questions or contribute to course discussions in other ways
- Prepare two or more drafts of a paper or assignment before turning it in
- Come to class having completed readings or assignments
- Reach conclusions based on their own analysis of numerical information (numbers, graphs, statistics, etc.)
- Use numerical information to examine a real-world problem or issue (unemployment, climate change, public health, etc.)
- Evaluate what others have concluded from numerical information

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23. In your selected course section, how important is it to you that the typical student do the following?

Response options: Very important, Important, Somewhat important, Not important

- Combine ideas from different courses when completing assignments
- Connect their learning to societal problems or issues
- Include diverse perspectives (political, religious, racial/ethnic, gender, etc.) in course discussions or assignments
- Examine the strengths and weaknesses of their own views on a topic or issue
- Try to better understand someone else's views by imagining how an issue looks from their perspective
- Learn something that changes the way they understand an issue or concept
- Connect ideas from your course to their prior experiences and knowledge

24. In your selected course section, about what percent of class time is spent on the following?

Response options: 0%, 1-9%, 10-19%, 20-29%, 30-39%, 40-49%, 50-74%, 75% or more

- Lecture
- Discussion
- Small-group activities
- Student presentations or performances
- Independent student work (writing, painting, designing, etc.)
- Movies, videos, music, or other performances not involving or produced by students
- Assessing student learning (tests, evaluations, surveys, polls, etc.)
- Experiential activities (labs, field work, clinical or field placements, etc.)

25. In your selected course section, how much do you encourage students to do the following?

Response options: Very much, Quite a bit, Some, Very little

- Ask other students for help understanding course material
- Explain course material to other students
- Prepare for exams by discussing or working through course material with other students
- Work with other students on course projects or assignments
- Identify key information from reading assignments
- Review notes after class
- Summarize what has been learned from class or from course materials

26. In your selected course section, how much opportunity do students have to engage in discussions with people from the following groups?

Response options: Very much, Quite a bit, Some, Very little

- People of a race or ethnicity other than their own
- People from an economic background other than their own
- People with religious beliefs other than their own
- People with political views other than their own
- People with a sexual orientation other than their own

27. In your selected course section, how much does the coursework emphasize the following?

Response options: Very much, Quite a bit, Some, Very little

- Memorizing course material
- Applying facts, theories, or methods to practical problems or new situations
- Analyzing an idea, experience, or line of reasoning in depth by examining its parts
- Evaluating a point of view, decision, or information source
- Forming a new idea or understanding from various pieces of information

28a. Does your selected course section include assigned papers, reports, or other writing tasks?

Response options: Yes, No

[If answered "Yes"] **About how many papers, reports, or other writing tasks of the following lengths do you assign?**

Response options: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, More than 10 papers, etc.

28b. Up to 5 pages

28c. From 6 to 10 pages

28d. 11 pages or more

29. To what extent do you structure your selected course section so that students learn and develop in the following areas? Response options: Very much, Quite a bit, Some, Very little

- Writing clearly and effectively
- Speaking clearly and effectively
- Thinking critically and analytically
- Analyzing numerical and statistical information
- Acquiring job- or work-related knowledge and skills
- Working effectively with others
- Developing or clarifying a personal code of values and ethics
- Understanding people of other backgrounds (economic, racial/ethnic, political, religious, nationality, etc.)
- Solving complex real-world problems
- Being an informed and active citizen

30. Prior to the current school year, about how many times have you taught your selected course?

Response options: 0, 1-2, 3-4, 5-9, 10 or more times

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*This is a facsimile of the FSSE survey (available at fsse.indiana.edu).
The survey itself is administered online.*

31. Estimate the total number of *undergraduate* students you have taught during the current school year.
Response options: 0, 1-25, 26-50, 51-75, 76-100, 101-125, 126-150, 151-200, 201-300, More than 300 students
32. Enter the total number of *undergraduate* courses you have taught or are scheduled to teach during the current school year.
Response options: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 or more courses
33. Enter the total number of *graduate* courses you have taught or are scheduled to teach during the current school year.
Response options: 0, 1, 2, 3, 4 or more courses
34. During this academic term, does your institution consider you to be employed full-time or part-time?
Response options: Full-time, Part-time
35. Does your institution consider you to be an adjunct faculty member?
Response options: Yes, No
36. Do you hold an administrative position?
Response options: Yes, please specify: _____; No
37. Which of the following best describes your academic rank or title?
Response options: Professor; Associate Professor; Assistant Professor; Instructor; Senior or Master Lecturer; Lecturer; Clinical Professor; Clinical Associate Professor; Clinical Assistant Professor; Clinical Instructor; Clinical Lecturer; Senior Research Professor or Scientist; Associate Research Professor or Scientist; Assistant Research Professor or Scientist; Research Instructor; Professor of Practice, Professional Practice or Artist in Residence; Emeritus faculty; Visiting faculty; Graduate Teaching Assistant Other, please specify: _____
38. What is your current tenure status?
Response options: Tenured; On tenure track but not tenured; Not on tenure track, but this institution has a tenure system; No tenure system at this institution
39. Enter the year that you began teaching at any college or university (1995, etc.): [Write-in year]
40. Do you hold a terminal degree (the highest degree awarded)?
Response options: Yes, in the field that I teach; Yes, in a different field; No
41. Are you currently working towards a degree?
Response options: Yes, please specify: _____; No
42. What is the highest degree you have earned?
Response options: Doctoral degree; Master's degree; Other, please specify: ____
43. Enter your year of birth (1965, etc.): [Write-in year]
44. What is your gender identity?
Response options: Man; Woman; Another gender identity, please specify: ____; I prefer not to respond
45. Are you a U.S. citizen or permanent resident? [Item does not appear on Canadian instrument]
Response options: Yes, No
46. How would you describe yourself? (Select all that apply.) [Item does not appear on Canadian instrument]
Response options: American Indian or Alaska Native; Asian; Black or African American; Hispanic or Latina/o; Middle Eastern or North African; Native Hawaiian or other Pacific Islander; White; Another race or ethnicity; I prefer not to respond
47. Which of the following best describes your sexual orientation?
Response options: Straight (heterosexual); Bisexual; Gay; Lesbian; Queer; Questioning or unsure; Another sexual orientation, please specify: _____; I prefer not to respond

Appendix B: Summary of Variables

This appendix presents relevant items from the FSSE instrument used in this proposed study, variable names, variable sources (FSSE or IPEDS), variable types, and variable coding or recoding, including whether variables are centered or standardized.

Table B.1. Dependent variables

Variable Name	Source	Type	Item or Calculation	Variable Coding
DAL	FSSE	Continuous	= (sum of fHO and fRI items) / 11	Standardized Z-scores
fHO	FSSE	Ordinal	In your selected course section, how much does the coursework emphasize the following a) Applying facts, theories, or methods to practical problems or new situations b) Analyzing an idea, experience, or line of reasoning in depth by examining its parts c) Evaluating a point of view, decision, or information source d) Forming a new idea or understanding from various pieces of information	1=Very little 2=Some 3=Quite a bit 4=Very much
fRI	FSSE	Ordinal	In your selected course section, how important is it to you that the typical student do the following? a) Combined ideas from different courses when completing assignments b) Connected your learning to societal problems or issues c) Included diverse perspectives (political, religious, racial/ethnic, gender, etc.) in course discussions or assignments d) Examined the strengths and weaknesses of your own views on a topic or issue e) Tried to better understand someone else's views by imagining how an issue looks from his or her perspective f) Learned something that changed the way you understand an issue or concept g) Connected ideas from your courses to your prior experiences and knowledge	1=Very little 2=Some 3=Quite a bit 4=Very much
CL	FSSE	Continuous	= (sum of fCL items) / 4	Standardized Z-scores
fCL	FSSE	Ordinal	In your selected course section, how much do you encourage students to do the following? a) Ask other students for help understanding course material b) Explain course material to other students c) Prepare for exams by discussing or working through course material with other students d) Work with other students on course projects or assignments	1=Very little 2=Some 3=Quite a bit 4=Very much

Table B.2. *Disciplinary independent variables*

Variable Name	Source	Type	Item or Calculation	Variable Coding
DAapptcode	FSSE	Categorical	What is the general academic discipline of your appointment?	Text entry coded into 121 disciplines
Biglan_HS	FSSE	Dichotomous	Recoded from DAapptcode (see Table B.3. for recoding scheme)	0=Hard 1=Soft
Biglan_PA	FSSE	Dichotomous	Recoded from DAapptcode (see Table B.3. for recoding scheme)	0=Pure 1=Applied
Biglan_LN	FSSE	Dichotomous	Recoded from DAapptcode (see Table B.3. for recoding scheme)	0=Life 1=Nonlife
Biglan_Cat	FSSE	Categorical	Recoded from DAapptcode (see Table B.3. for recoding scheme)	Effect coded, #1 omitted on first run, #2 omitted on second run 1=Hard-Pure-Life (HPL) 2=Hard-Pure-Nonlife (HPN) 3=Hard-Applied-Life (HAL) 4=Hard-Applied-Nonlife (HAN) 5=Soft-Pure-Life (SPL) 6=Soft-Pure-Nonlife (SPN) 7=Soft-Applied-Life (SAL) 8=Soft-Applied-Nonlife (SAN)

Table B.3. *Biglan discipline coding*

Biglan_HS	Biglan_PA	Biglan_LN	Biglan_Cat	Coded disciplines
Hard	Pure	Life	HPL	Biochemistry or biophysics Biology (general) Biomedical science Botany Cell and molecular biology Environmental science/studies Kinesiology
				Marine science Microbiology or bacteriology Natural science Neuroscience Other biological sciences Physiology and developmental biology Zoology
Hard	Pure	Nonlife	HPN	Astronomy Atmospheric science (including meteorology) Chemistry Earth science (including geology) Mathematics
				Other physical sciences Physical sciences (general) Physics Statistics

Table B.3. cont.

Biglan_HS	Biglan_PA	Biglan_LN	Biglan_Cat	Coded disciplines					
Hard	Applied	Life	HAL	Agriculture	Nutrition and dietetics				
				Bioengineering	Other agriculture and natural resources				
				Biomedical engineering	Pharmacy				
				Dentistry	Speech				
				Medicine	Veterinary science				
				Hard	Applied	Nonlife	HAN	Aero-, astronautical engineering	Information systems
								Chemical engineering	Information technology
								Civil engineering	Materials engineering
								Computer engineering and technology	Mechanical engineering
								Computer information systems	Network security and systems
Computer science	Other computer science and technology								
Electrical or electronic engineering	Other engineering								
Engineering (general)	Petroleum engineering								
Industrial engineering	Software engineering								
Soft	Pure	Life	SPL					Anthropology	Political science
				Ethnic studies	Psychology				
				Gender studies	Sociology				
Soft	Pure	Nonlife	SPN	Art history	Music				
				Arts, fine and applied	Other fine and performing arts				
				English (language and literature)	Other humanities				
				French (language and literature)	Other language and literature				
				Geography	Philosophy				
				History	Spanish (language and literature)				
				Humanities (general)	Theater or drama				

Table B.3. cont.

Biglan_HS	Biglan_PA	Biglan_LN	Biglan_Cat	Coded disciplines					
Soft	Applied	Life	SAL	Allied health	Occupational safety and health				
				Business education	Occupational therapy				
				Criminal justice	Other education				
				Criminology	Other health professions				
				Early childhood education	Parks, recreation, leisure studies, sports mgmt.				
				Education (general)	Physical education				
				Elementary, middle school education	Physical therapy				
				Family and consumer studies	Rehabilitation sciences				
				Health science	Religion				
				Healthcare administration and policy	Secondary education				
				Hospitality and tourism	Social studies education				
				Mathematics education	Social work				
				Music or art education	Special education				
				Natural resources and conservation	Speech therapy				
				Nursing	Theological studies, ministry				
				Soft	Applied	Nonlife	SAN	Accounting	Journalism
								Architecture	Management
Broadcast communications	Management information systems								
Business administration	Marketing								
Communications (general)	Mass communications and media studies								
Economics	Organizational leadership or behavior								
Entrepreneurial studies	Other business								
Finance	Other communications								
International business	Public administration, policy								
International relations	Urban planning								

Note. Categorizations based on Nelson Laird et al. (2008), Biglan (1973b), and Malaney (1986), and Hiller & Nelson Laird (2021).

Table B.4. *Institutional independent variables*

Variable Name	Source	Type	Item or Calculation	Variable Coding
MTmTeach	FSSE	Continuous	(Using recoded midpoints of Time_ items) $=(\text{Time_Teaching}) / (\text{Time_Teaching} + \text{Time_Research} + \text{Time_Service})$	Standardized Z-scores
Time_	FSSE	Ordinal	In a typical 7-day week, about how many hours do you spend on each of the following? a) (_Teaching) Teaching activities (preparing, teaching class sessions, grading, meeting with students outside of class, etc.) c) (_Research) Research, creative, or scholarly activities d) (_Service) Service activities (committee work, administrative duties, etc.)	(Recoded midpoints in parentheses) 1=0 (0) 2=1-4 (2.5) 3=5-8 (6.5) 4=9-12 (10.5) 5=13-16 (14.5) 6=17-20 (18.5) 7=21-30 (25.5) 8=More than 30 hours (32.5)
Pct_TTr	IPEDS	Continuous	$=(\text{number of full-time instructional staff that are tenured or tenure track}) / (\text{number of full-time instructional staff})$	Standardized Z-scores
Pct_FT	IPEDS	Continuous	$=(\text{number of full-time instructional staff}) / (\text{total number of instructional staff})$	Standardized Z-scores
Pct_ExInstr	IPEDS	Continuous	$=(\text{expenditures on teaching}) / (\text{total expenditures})$	Standardized Z-scores

Table B.5. *Faculty identity variables*

Variable Name	Source	Type	Item or Calculation	Variable Coding
Gender	FSSE	Categorical	What is your gender identity?	Effect coded, #1 omitted on first run, #2 omitted on second run 1=Man 2=Woman 3=Prefer not to respond
Race	FSSE	Categorical	How would you describe yourself?	Effect coded, #1 omitted on first run, #2 omitted on second run 1=Asian, Native Hawaiian, other Pacific Islander 2=Black 3=Latinx 4=White 5=Other race 6=Multiracial 7=Prefer not to respond
SexOrient	FSSE	Categorical	Which of the following best describes your sexual orientation?	Effect coded, #1 omitted on first run, #2 omitted on second run 1=Straight 2=LGBQ+ 3=Prefer not to respond

Table B.6. *Course characteristics independent control variables*

Variable Name	Source	Type	Item or Calculation	Variable Coding
Crs_div	FSSE	Categorical	What is the class level of most students in your selected course section?	Dummy coded (reference group indicated in parentheses) 1=Lower division (mostly first-year students or sophomores) 2=Upper division (mostly juniors or seniors) (ref.) 3=Other
Crs_size	FSSE	Categorical	Estimate the total number of students in your selected course section.	Dummy coded (reference group indicated in parentheses) 1=20 or fewer (ref.) 2=21-30 3=More than 30
Gened	FSSE	Dichotomous	Does your selected course section fulfill a general education requirement on your campus?	0=No 1=Yes
Crs_form	FSSE	Categorical	In what format do you teach your selected course section?	Dummy coded (reference group indicated in parentheses) 1=In-person on campus or auxiliary (ref.) 2=Distance (synchronous or asynchronous) 3=Other format

Table B.7. *Professional characteristics independent control variables*

Variable Name	Source	Type	Item or Calculation	Variable Coding
Yrsteach	FSSE	Continuous	(Recoded by FSSE staff from item below) Enter the year that you began teaching at any college or university (1995, etc.)	Standardized Z-scores
Crsload	FSSE	Continuous	= ugcrsnum + gradcrsnum	Standardized Z-scores
ugcrsnum	FSSE	Ordinal	Enter the total number of undergraduate courses you have taught or are scheduled to teach during the current school year.	0=0 1=1 2=2 3=3 4=4 5=5 6=6 7=7 8=8 9=9 or more courses (coded as 9)
gradcrsnum	FSSE	Ordinal	Enter the total number of graduate courses you have taught or are scheduled to teach during the current school year.	0=0 1=1 2=2 3=3 4=4 or more courses (coded as 4)
Parttime	FSSE	Dichotomous	During this academic term, does your institution consider you to be employed full-time or part-time?	0=Full-time 1=Part-time
Rank	FSSE	Categorical	Which of the following best describes your academic rank or title?	Dummy coded (reference group indicated in parentheses) 1=Professor (ref.) 2=Associate Professor 3=Assistant Professor 4=Instructor or Lecturer 5=Other rank

Appendix C: Full Model Results Tables

Table C.1. Model DAL-NM

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7564	0.0062	121.1389	0.0000
Institution (Intercept)	0.0310	0.0036	8.6798	0.0000
Discipline (Intercept)	0.1872	0.0256	7.3025	0.0000

Table C.2. Model DAL-1.1

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7351	0.0061	121.1021	0.0000
Institution (Intercept)	0.0280	0.0033	8.4825	0.0000
Discipline (Intercept)	0.1683	0.0232	7.2581	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.0409	0.0413	0.9890	0.3242
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.1575	0.0090	-17.5138	0.0000
Upper Division	0.1028	0.0089	11.5325	0.0000
Other Division				
Course Enrollment Size				
Small Course	0.0179	0.0081	2.2255	0.0261
Medium Course	0.0012	0.0073	0.1622	0.8712
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0935	0.0059	-15.8666	0.0000
Meets a Gen Ed Requirement				
Course Format				
Classroom	-0.0685	0.0106	-6.4362	0.0000
Distance	-0.0073	0.0165	-0.4400	0.6600
Other Format				
Course Load				
Years of Teaching Experience	0.0394	0.0057	6.9656	0.0000
Employment Status	-0.0556	0.0060	-9.1899	0.0000
Employment Status				
Part-Time	0.0086	0.0085	1.0085	0.3132
Full-Time				
Rank				
Professor	-0.0306	0.0117	-2.6254	0.0087
Associate Professor	-0.0076	0.0106	-0.7228	0.4698
Assistant Professor	0.0438	0.0109	4.0026	0.0001
Instructor/Lecturer	-0.0250	0.0111	-2.2598	0.0238
Other Rank				
Proportional reduction in prediction error (Level-1)		4.44%		
Proportional reduction in prediction error (Level-2 Institutions)		7.38%		
Proportional reduction in prediction error (Level-2 Disciplines)		9.58%		

Note. Since this model was examined for model building purposes only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.3. Model DAL-1.2

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7280	0.0060	121.0815	0.0000
Institution (Intercept)	0.0199	0.0026	7.7068	0.0000
Discipline (Intercept)	0.1580	0.0219	7.2266	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1583	0.0418	3.7883	0.0002
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.1522	0.0090	-16.9957	0.0000
Upper Division	0.1052	0.0089	11.8620	0.0000
Other Division				
Course Enrollment Size				
Small Course	0.0194	0.0080	2.4282	0.0152
Medium Course	0.0006	0.0073	0.0828	0.9340
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0858	0.0059	-14.5335	0.0000
Meets a Gen Ed Requirement				
Course Format				
Classroom	-0.0641	0.0106	-6.0637	0.0000
Distance	-0.0071	0.0164	-0.4326	0.6653
Other Format				
Course Load	0.0436	0.0056	7.7649	0.0000
Years of Teaching Experience	-0.0457	0.0061	-7.5438	0.0000
Employment Status				
Part-Time	0.0138	0.0085	1.6269	0.1038
Full-Time				
Rank				
Professor	-0.0237	0.0116	-2.0410	0.0413
Associate Professor	-0.0066	0.0105	-0.6278	0.5301
Assistant Professor	0.0395	0.0109	3.6307	0.0003
Instructor/Lecturer	-0.0257	0.0110	-2.3345	0.0196
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0209	0.0210	-0.9992	0.3177
Black or African American	0.1513	0.0225	6.7223	0.0000
Hispanic or Latinx	0.0990	0.0260	3.8024	0.0001
White	-0.1727	0.0115	-15.0501	0.0000
Another race/ethnicity	0.0532	0.0329	1.6173	0.1058
Multiracial	-0.0080	0.0263	-0.3025	0.7622
Preferred not to respond				
Gender				
Man	-0.0528	0.0111	-4.7449	0.0000

Table. C.3. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Woman	0.0530	0.0113	4.6833	0.0000
Preferred not to respond				
Sexual Orientation				
Straight (Heterosexual)	-0.0019	0.0104	-0.1828	0.8549
LGBQ+	0.0274	0.0155	1.7705	0.0766
Preferred not to respond				
Proportional reduction in prediction error (Level-1)			7.05%	
Proportional reduction in prediction error (Level-2 Institutions)			25.47%	
Proportional reduction in prediction error (Level-2 Disciplines)			14.73%	

Note. Since this model was examined for model building purposes only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.4. Model DAL-1.3

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7278	0.0060	121.1004	0.0000
Institution (Intercept)	0.0183	0.0024	7.5478	0.0000
Discipline (Intercept)	0.1579	0.0219	7.2261	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1573	0.0417	3.7671	0.0002
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.1516	0.0090	-16.9258	0.0000
Upper Division	0.1040	0.0089	11.7105	0.0000
Other Division				
Course Enrollment Size				
Small Course	0.0204	0.0080	2.5495	0.0108
Medium Course	0.0012	0.0073	0.1647	0.8692
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0857	0.0059	-14.5321	0.0000
Meets a Gen Ed Requirement				
Course Format				
Classroom	-0.0623	0.0106	-5.8911	0.0000
Distance	-0.0084	0.0164	-0.5133	0.6078
Other Format				
Course Load	0.0446	0.0056	7.9007	0.0000
Years of Teaching Experience	-0.0466	0.0061	-7.7011	0.0000
Employment Status				
Part-Time	0.0125	0.0085	1.4689	0.1419
Full-Time				
Rank				
Professor	-0.0211	0.0116	-1.8109	0.0702

Table C.4. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Associate Professor	-0.0064	0.0105	-0.6082	0.5431
Assistant Professor	0.0395	0.0109	3.6262	0.0003
Instructor/Lecturer	-0.0267	0.0110	-2.4172	0.0156
Other Rank				
<i>Faculty Identities</i>				
<i>Race/Ethnicity</i>				
Asian, Native Hawaiian, or other Pacific Islander	-0.0208	0.0210	-0.9924	0.3210
Black or African American	0.1465	0.0226	6.4862	0.0000
Hispanic or Latinx	0.0965	0.0260	3.7052	0.0002
White	-0.1691	0.0115	-14.6989	0.0000
Another race/ethnicity	0.0535	0.0329	1.6255	0.1041
Multiracial	-0.0064	0.0263	-0.2445	0.8069
Preferred not to respond				
<i>Gender</i>				
Man	-0.0530	0.0111	-4.7626	0.0000
Woman	0.0530	0.0113	4.6872	0.0000
Preferred not to respond				
<i>Sexual Orientation</i>				
Straight (Heterosexual)	-0.0019	0.0104	-0.1794	0.8576
LGBQ+	0.0277	0.0155	1.7878	0.0738
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0396	0.0106	-3.7309	0.0002
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0032	0.0095	-0.3331	0.7393
Percent of Instructional Staff that Are Full-Time	-0.0357	0.0099	-3.6100	0.0004
Percent of Expenditures on Instruction	-0.0146	0.0103	-1.4076	0.1603
Proportional reduction in prediction error (Level-1)			7.24%	
Proportional reduction in prediction error (Level-2 Institutions)			28.98%	
Proportional reduction in prediction error (Level-2 Disciplines)			14.79%	

Note. Since this model was examined for model building purposes only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.5. *Model DAL-1.4*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7278	0.0060	121.1137	0.0000
Institution (Intercept)	0.0183	0.0024	7.5531	0.0000
Discipline (Intercept)	0.0480	0.0075	6.3932	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1139	0.0306	3.7195	0.0002
<i>Course and Professional Control Variables</i>				
<i>Course Division</i>				
Lower Division	-0.1511	0.0090	-16.8808	0.0000

Table C.5. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Upper Division	0.1040	0.0089	11.7240	0.0000
Other Division	0.0471	0.0130	3.6192	0.0003
Course Enrollment Size				
Small Course	0.0207	0.0080	2.5927	0.0095
Medium Course	0.0014	0.0073	0.1957	0.8448
Large Course	-0.0222	0.0080	-2.7878	0.0053
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0860	0.0059	-14.5937	0.0000
Meets a Gen Ed Requirement	0.0860	0.0059	14.5937	0.0000
Course Format				
Classroom	-0.0620	0.0106	-5.8647	0.0000
Distance	-0.0084	0.0164	-0.5142	0.6071
Other Format	0.0704	0.0136	5.1820	0.0000
Course Load	-0.0469	0.0061	-7.7534	0.0000
Years of Teaching Experience	0.0437	0.0056	7.7593	0.0000
Employment Status				
Part-Time	0.0124	0.0085	1.4577	0.1449
Full-Time	-0.0124	0.0085	-1.4577	0.1449
Rank				
Professor	-0.0206	0.0116	-1.7734	0.0762
Associate Professor	-0.0064	0.0105	-0.6101	0.5418
Assistant Professor	0.0393	0.0109	3.6084	0.0003
Instructor/Lecturer	-0.0272	0.0110	-2.4633	0.0138
Other Rank	0.0149	0.0166	0.8985	0.3689
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0203	0.0209	-0.9675	0.3333
Black or African American	0.1473	0.0226	6.5250	0.0000
Hispanic or Latinx	0.0950	0.0260	3.6516	0.0003
White	-0.1686	0.0115	-14.6720	0.0000
Another race/ethnicity	0.0534	0.0329	1.6236	0.1045
Multiracial	-0.0067	0.0263	-0.2529	0.8003
Preferred not to respond	-0.1001	0.0217	-4.6087	0.0000
Gender				
Man	-0.0523	0.0111	-4.7095	0.0000
Woman	0.0512	0.0113	4.5257	0.0000
Preferred not to respond	0.0011	0.0195	0.0589	0.9530
Sexual Orientation				
Straight (Heterosexual)	-0.0019	0.0104	-0.1827	0.8550
LGBQ+	0.0273	0.0155	1.7637	0.0778
Preferred not to respond	-0.0254	0.0153	-1.6636	0.0962
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0401	0.0106	-3.7754	0.0002
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0033	0.0095	-0.3499	0.7267
Percent of Instructional Staff that Are Full-Time	-0.0355	0.0099	-3.5896	0.0004
Percent of Expenditures on Instruction	-0.0145	0.0103	-1.3990	0.1629
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2759	0.0618	-4.4661	0.0000
Hard-Pure-Nonlife (HPN) Discipline	-0.5823	0.0742	-7.8508	0.0000

Table C.5. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Hard-Applied-Life (HAL) Discipline	0.0414	0.0753	0.5505	0.5828
Hard-Applied-Nonlife (HAN) Discipline	-0.4512	0.0577	-7.8160	0.0000
Soft-Pure-Life (SPL) Discipline	0.4629	0.0852	5.4320	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2452	0.0578	4.2444	0.0001
Soft-Applied-Life (SAL) Discipline	0.3274	0.0453	7.2254	0.0000
Soft-Applied-Nonlife (SAN) Discipline	0.2324	0.0520	4.4697	0.0000
Proportional reduction in prediction error (Level-1)		18.52%		
Proportional reduction in prediction error (Level-2 Institutions)		29.98%		
Proportional reduction in prediction error (Level-2 Disciplines)		69.28%		

Table C.6. Model CL-NM

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9343	0.0077	121.2580	0.0000
Institution (Intercept)	0.0167	0.0024	7.0787	0.0000
Discipline (Intercept)	0.0417	0.0065	6.3857	0.0000

Table C.7. Model CL-1.1

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9131	0.0075	121.2277	0.0000
Institution (Intercept)	0.0142	0.0021	6.6731	0.0000
Discipline (Intercept)	0.0388	0.0061	6.3543	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.1215	0.0248	-4.9054	0.0000
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.0338	0.0100	-3.3798	0.0007
Upper Division	0.0148	0.0099	1.5019	0.1331
Other Division				
Course Enrollment Size				
Small Course	-0.0366	0.0088	-4.1451	0.0000
Medium Course	0.0027	0.0081	0.3316	0.7402
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0207	0.0065	-3.1825	0.0015
Meets a Gen Ed Requirement				
Course Format				
Classroom	0.1722	0.0117	14.6575	0.0000
Distance	-0.3717	0.0183	-20.2940	0.0000
Other Format				
Course Load	0.0380	0.0062	6.1013	0.0000
Years of Teaching Experience	-0.0605	0.0067	-9.0098	0.0000
Employment Status				

Table C.7. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Part-Time	-0.0173	0.0094	-1.8443	0.0652
Full-Time				
Rank				
Professor	-0.0454	0.0129	-3.5094	0.0004
Associate Professor	-0.0018	0.0117	-0.1551	0.8767
Assistant Professor	0.0383	0.0121	3.1508	0.0016
Instructor/Lecturer	-0.0091	0.0122	-0.7473	0.4549
Other Rank				
Proportional reduction in prediction error (Level-1)		2.67%		
Proportional reduction in prediction error (Level-2 Institutions)		8.28%		
Proportional reduction in prediction error (Level-2 Disciplines)		5.48%		

Note. Since this model was examined for model building purposes only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.8. *Model CL-1.2*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9112	0.0075	121.2247	0.0000
Institution (Intercept)	0.0114	0.0019	6.1376	0.0000
Discipline (Intercept)	0.0393	0.0062	6.3412	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0498	0.0282	-1.7663	0.0781
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.0304	0.0100	-3.0446	0.0023
Upper Division	0.0163	0.0099	1.6509	0.0988
Other Division				
Course Enrollment Size				
Small Course	-0.0358	0.0088	-4.0732	0.0000
Medium Course	0.0021	0.0081	0.2591	0.7956
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0165	0.0066	-2.5128	0.0120
Meets a Gen Ed Requirement				
Course Format				
Classroom	0.1755	0.0117	14.9791	0.0000
Distance	-0.3720	0.0183	-20.3590	0.0000
Other Format				
Course Load	0.0400	0.0062	6.4452	0.0000
Years of Teaching Experience	-0.0543	0.0067	-8.0390	0.0000
Employment Status				
Part-Time	-0.0144	0.0094	-1.5388	0.1239
Full-Time				

Table C.8. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Rank				
Professor	-0.0399	0.0129	-3.0867	0.0020
Associate Professor	-0.0013	0.0117	-0.1152	0.9083
Assistant Professor	0.0353	0.0121	2.9112	0.0036
Instructor/Lecturer	-0.0096	0.0122	-0.7872	0.4312
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0081	0.0234	-0.3463	0.7291
Black or African American	0.0677	0.0247	2.7417	0.0061
Hispanic or Latinx	0.0620	0.0289	2.1465	0.0318
White	-0.0962	0.0127	-7.5727	0.0000
Another race/ethnicity	-0.0103	0.0368	-0.2801	0.7794
Multiracial	0.0274	0.0294	0.9318	0.3515
Preferred not to respond				
Gender				
Man	-0.0356	0.0124	-2.8703	0.0041
Woman	0.0375	0.0126	2.9691	0.0030
Preferred not to respond				
Sexual Orientation				
Straight (Heterosexual)	-0.0114	0.0116	-0.9812	0.3265
LGBQ+	0.0276	0.0173	1.5966	0.1104
Preferred not to respond				
Proportional reduction in prediction error (Level-1)		3.11%		
Proportional reduction in prediction error (Level-2 Institutions)		16.52%		
Proportional reduction in prediction error (Level-2 Disciplines)		4.78%		

Note. Since this model was examined for model building purposes only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.9. *Model CL-1.3*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9110	0.0075	121.2329	0.0000
Institution (Intercept)	0.0117	0.0019	6.2142	0.0000
Discipline (Intercept)	0.0392	0.0062	6.3412	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0504	0.0283	-1.7841	0.0751
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.0301	0.0100	-3.0166	0.0026
Upper Division	0.0156	0.0099	1.5755	0.1152
Other Division				
Course Enrollment Size				

Table C.9. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Small Course	-0.0353	0.0089	-3.9862	0.0001
Medium Course	0.0025	0.0081	0.3108	0.7559
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0164	0.0066	-2.5037	0.0123
Meets a Gen Ed Requirement				
Course Format				
Classroom	0.1764	0.0117	15.0308	0.0000
Distance	-0.3724	0.0183	-20.3692	0.0000
Other Format				
Course Load	0.0404	0.0063	6.4497	0.0000
Years of Teaching Experience	-0.0547	0.0068	-8.0972	0.0000
Employment Status				
Part-Time	-0.0145	0.0095	-1.5274	0.1267
Full-Time				
Rank				
Professor	-0.0380	0.0130	-2.9276	0.0034
Associate Professor	-0.0005	0.0117	-0.0448	0.9643
Assistant Professor	0.0356	0.0121	2.9332	0.0034
Instructor/Lecturer	-0.0113	0.0123	-0.9178	0.3587
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0076	0.0234	-0.3233	0.7465
Black or African American	0.0637	0.0249	2.5619	0.0104
Hispanic or Latinx	0.0612	0.0289	2.1175	0.0342
White	-0.0943	0.0128	-7.3894	0.0000
Another race/ethnicity	-0.0101	0.0368	-0.2740	0.7841
Multiracial	0.0284	0.0294	0.9656	0.3343
Preferred not to respond				
Gender				
Man	-0.0357	0.0124	-2.8791	0.0040
Woman	0.0376	0.0126	2.9749	0.0029
Preferred not to respond				
Sexual Orientation				
Straight (Heterosexual)	-0.0114	0.0116	-0.9823	0.3260
LGBQ+	0.0279	0.0173	1.6130	0.1067
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0074	0.0097	-0.7639	0.4456
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0128	0.0088	-1.4526	0.1474
Percent of Instructional Staff that Are Full-Time	-0.0099	0.0092	-1.0815	0.2803
Percent of Expenditures on Instruction	-0.0120	0.0095	-1.2551	0.2104
Proportional reduction in prediction error (Level-1)		3.10%		
Proportional reduction in prediction error (Level-2 Institutions)		15.63%		
Proportional reduction in prediction error (Level-2 Disciplines)		4.92%		

Note. Since this model was examined for model building purposes only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.10. Model CL-1.4

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9110	0.0075	121.2343	0.0000
Institution (Intercept)	0.0117	0.0019	6.2134	0.0000
Discipline (Intercept)	0.0219	0.0040	5.4716	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0389	0.0267	-1.4547	0.1464
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.0311	0.0100	-3.1148	0.0018
Upper Division	0.0155	0.0099	1.5709	0.1162
Other Division	0.0156	0.0145	1.0726	0.2835
Course Enrollment Size				
Small Course	-0.0332	0.0088	-3.7559	0.0002
Medium Course	0.0026	0.0081	0.3180	0.7505
Large Course	0.0307	0.0088	3.4891	0.0005
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0171	0.0066	-2.6007	0.0093
Meets a Gen Ed Requirement	0.0171	0.0066	2.6007	0.0093
Course Format				
Classroom	0.1757	0.0117	14.9749	0.0000
Distance	-0.3721	0.0183	-20.3586	0.0000
Other Format	0.1964	0.0152	12.9555	0.0000
Course Load	-0.0541	0.0068	-8.0161	0.0000
Years of Teaching Experience	0.0413	0.0063	6.6003	0.0000
Employment Status				
Part-Time	-0.0144	0.0095	-1.5233	0.1277
Full-Time	0.0144	0.0095	1.5233	0.1277
Rank				
Professor	-0.0386	0.0130	-2.9805	0.0029
Associate Professor	-0.0004	0.0117	-0.0352	0.9719
Assistant Professor	0.0360	0.0121	2.9618	0.0031
Instructor/Lecturer	-0.0111	0.0123	-0.9062	0.3648
Other Rank	0.0142	0.0185	0.7684	0.4422
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0108	0.0234	-0.4640	0.6427
Black or African American	0.0636	0.0248	2.5585	0.0105
Hispanic or Latinx	0.0653	0.0289	2.2619	0.0237
White	-0.0959	0.0128	-7.5243	0.0000
Another race/ethnicity	-0.0095	0.0368	-0.2592	0.7955
Multiracial	0.0296	0.0294	1.0052	0.3148
Preferred not to respond	-0.0422	0.0243	-1.7379	0.0822
Gender				
Man	-0.0375	0.0124	-3.0183	0.0025

Table C.10. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Woman	0.0406	0.0126	3.2124	0.0013
Preferred not to respond	-0.0031	0.0218	-0.1427	0.8865
<i>Sexual Orientation</i>				
Straight (Heterosexual)	-0.0123	0.0116	-1.0577	0.2902
LGBQ+	0.0299	0.0173	1.7312	0.0834
Preferred not to respond	-0.0176	0.0171	-1.0342	0.3011
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0076	0.0097	-0.7818	0.4350
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0126	0.0088	-1.4343	0.1525
Percent of Instructional Staff that Are Full-Time	-0.0098	0.0092	-1.0646	0.2878
Percent of Expenditures on Instruction	-0.0118	0.0095	-1.2359	0.2175
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	0.1417	0.0470	3.0149	0.0031
Hard-Pure-Nonlife (HPN) Discipline	0.2921	0.0548	5.3341	0.0000
Hard-Applied-Life (HAL) Discipline	-0.0460	0.0597	-0.7713	0.4416
Hard-Applied-Nonlife (HAN) Discipline	0.1358	0.0442	3.0726	0.0026
Soft-Pure-Life (SPL) Discipline	-0.2273	0.0615	-3.6941	0.0004
Soft-Pure-Nonlife (SPN) Discipline	-0.1661	0.0413	-4.0235	0.0001
Soft-Applied-Life (SAL) Discipline	-0.0436	0.0338	-1.2910	0.1994
Soft-Applied-Nonlife (SAN) Discipline	-0.0866	0.0385	-2.2509	0.0265
Proportional reduction in prediction error (Level-1)			4.85%	
Proportional reduction in prediction error (Level-2 Institutions)			15.71%	
Proportional reduction in prediction error (Level-2 Disciplines)			33.98%	

Table C.11. *Model DAL-2.1*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7261	0.0060	120.5904	0.0000
Institution (Intercept)	0.0185	0.0024	7.5751	0.0000
Institution (Intercept) – HPL (Slope) Covariance	0.0057	0.0022	2.5529	0.0053
HPL Slope	0.0078	0.0031	2.5083	0.0061
Discipline (Intercept)	0.0479	0.0075	6.3910	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1121	0.0306	3.6614	0.0003
<i>Course and Professional Control Variables</i>				
<i>Course Division</i>				
Lower Division	-0.1511	0.0089	-16.8836	0.0000
Upper Division	0.1038	0.0089	11.7071	0.0000
Other Division				
<i>Course Enrollment Size</i>				
Small Course	0.0214	0.0080	2.6816	0.0073
Medium Course	0.0009	0.0073	0.1214	0.9034
Large Course				
<i>Course Meets a General Education Requirement</i>				
Does Not Meet a Gen Ed Requirement	-0.0862	0.0059	-14.6239	0.0000
Meets a Gen Ed Requirement				

Table C.11. cont.

Fixed Effects	Est.	SE	t	p two-tailed
<i>Course Format</i>				
Classroom	-0.0618	0.0105	-5.8576	0.0000
Distance	-0.0088	0.0164	-0.5351	0.5926
Other Format				
Course Load	0.0434	0.0056	7.6962	0.0000
Years of Teaching Experience	-0.0472	0.0061	-7.7980	0.0000
<i>Employment Status</i>				
Part-Time	0.0127	0.0085	1.4905	0.1361
Full-Time				
<i>Rank</i>				
Professor	-0.0203	0.0116	-1.7452	0.0810
Associate Professor	-0.0056	0.0105	-0.5351	0.5926
Assistant Professor	0.0388	0.0109	3.5668	0.0004
Instructor/Lecturer	-0.0275	0.0110	-2.4952	0.0126
Other Rank				
<i>Faculty Identities</i>				
<i>Race/Ethnicity</i>				
Asian, Native Hawaiian, or other Pacific Islander	-0.0208	0.0209	-0.9938	0.3203
Black or African American	0.1464	0.0225	6.5035	0.0000
Hispanic or Latinx	0.0958	0.0260	3.6858	0.0002
White	-0.1688	0.0115	-14.7018	0.0000
Another race/ethnicity	0.0545	0.0329	1.6576	0.0974
Multiracial	-0.0069	0.0263	-0.2620	0.7933
Preferred not to respond				
<i>Gender</i>				
Man	-0.0524	0.0111	-4.7171	0.0000
Woman	0.0514	0.0113	4.5475	0.0000
Preferred not to respond				
<i>Sexual Orientation</i>				
Straight (Heterosexual)	-0.0020	0.0104	-0.1894	0.8498
LGBQ+	0.0269	0.0155	1.7409	0.0817
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0339	0.0104	-3.2517	0.0013
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0023	0.0093	-0.2458	0.8061
Percent of Instructional Staff that Are Full-Time	-0.0379	0.0097	-3.9034	0.0001
Percent of Expenditures on Instruction	-0.0166	0.0101	-1.6427	0.1016
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2812	0.0621	-4.5290	0.0000
Hard-Pure-Nonlife (HPN) Discipline	-0.5825	0.0741	-7.8635	0.0000
Hard-Applied-Life (HAL) Discipline	0.0421	0.0752	0.5603	0.5762
Hard-Applied-Nonlife (HAN) Discipline	-0.4513	0.0577	-7.8272	0.0000
Soft-Pure-Life (SPL) Discipline	0.4627	0.0851	5.4362	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2451	0.0577	4.2467	0.0001
Soft-Applied-Life (SAL) Discipline	0.3276	0.0453	7.2388	0.0000
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.12. *Model DAL-2.2*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7258	0.0060	120.6161	0.0000
Institution (Intercept)	0.0185	0.0024	7.5729	0.0000
Institution (Intercept) – HPN (Slope) Covariance	0.0051	0.0022	2.3214	0.0101
HPN Slope	0.0083	0.0030	2.7768	0.0027
Discipline (Intercept)	0.0478	0.0075	6.3923	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1109	0.0306	3.6257	0.0003
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.1511	0.0089	-16.8911	0.0000
Upper Division	0.1043	0.0089	11.7620	0.0000
Other Division				
Course Enrollment Size				
Small Course	0.0215	0.0080	2.6847	0.0073
Medium Course	0.0010	0.0073	0.1421	0.8870
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0864	0.0059	-14.6624	0.0000
Meets a Gen Ed Requirement				
Course Format				
Classroom	-0.0617	0.0106	-5.8459	0.0000
Distance	-0.0084	0.0164	-0.5123	0.6085
Other Format				
Course Load	0.0436	0.0056	7.7408	0.0000
Years of Teaching Experience	-0.0470	0.0061	-7.7651	0.0000
Employment Status				
Part-Time	0.0123	0.0085	1.4410	0.1496
Full-Time				
Rank				
Professor	-0.0201	0.0116	-1.7258	0.0844
Associate Professor	-0.0059	0.0105	-0.5642	0.5726
Assistant Professor	0.0392	0.0109	3.6019	0.0003
Instructor/Lecturer	-0.0272	0.0110	-2.4626	0.0138
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0218	0.0209	-1.0424	0.2972
Black or African American	0.1469	0.0225	6.5214	0.0000
Hispanic or Latinx	0.0952	0.0260	3.6616	0.0003
White	-0.1679	0.0115	-14.6113	0.0000
Another race/ethnicity	0.0536	0.0329	1.6295	0.1032
Multiracial	-0.0069	0.0263	-0.2623	0.7931
Preferred not to respond				

Table C.12. cont.

Fixed Effects	Est.	SE	t	p two-tailed
<i>Gender</i>				
Man	-0.0523	0.0111	-4.7086	0.0000
Woman	0.0512	0.0113	4.5288	0.0000
Preferred not to respond				
<i>Sexual Orientation</i>				
Straight (Heterosexual)	-0.0017	0.0104	-0.1658	0.8683
LGBQ+	0.0271	0.0155	1.7540	0.0794
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0350	0.0105	-3.3417	0.0010
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0031	0.0094	-0.3258	0.7448
Percent of Instructional Staff that Are Full-Time	-0.0388	0.0098	-3.9744	0.0001
Percent of Expenditures on Instruction	-0.0141	0.0102	-1.3828	0.1679
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2754	0.0617	-4.4669	0.0000
Hard-Pure-Nonlife (HPN) Discipline	-0.5864	0.0744	-7.8861	0.0000
Hard-Applied-Life (HAL) Discipline	0.0430	0.0751	0.5728	0.5677
Hard-Applied-Nonlife (HAN) Discipline	-0.4515	0.0576	-7.8375	0.0000
Soft-Pure-Life (SPL) Discipline	0.4623	0.0850	5.4352	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2453	0.0577	4.2536	0.0000
Soft-Applied-Life (SAL) Discipline	0.3275	0.0452	7.2418	0.0000
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.13. *Model DAL-2.3*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7265	0.0060	120.6700	0.0000
Institution (Intercept)	0.0197	0.0026	7.5246	0.0000
Institution (Intercept) – HAL (Slope) Covariance	0.0080	0.0029	2.7488	0.0030
HAL Slope	0.0101	0.0044	2.3088	0.0105
Discipline (Intercept)	0.0480	0.0075	6.3877	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1115	0.0307	3.6276	0.0003
<i>Course and Professional Control Variables</i>				
<i>Course Division</i>				
Lower Division	-0.1513	0.0089	-16.9079	0.0000
Upper Division	0.1040	0.0089	11.7307	0.0000
Other Division				
<i>Course Enrollment Size</i>				
Small Course	0.0212	0.0080	2.6568	0.0079
Medium Course	0.0007	0.0073	0.0926	0.9262

Table C.13. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0861	0.0059	-14.6148	0.0000
Meets a Gen Ed Requirement				
Course Format				
Classroom	-0.0614	0.0105	-5.8220	0.0000
Distance	-0.0084	0.0164	-0.5136	0.6075
Other Format				
Course Load	0.0434	0.0056	7.6918	0.0000
Years of Teaching Experience	-0.0469	0.0061	-7.7526	0.0000
Employment Status				
Part-Time	0.0129	0.0085	1.5210	0.1283
Full-Time				
Rank				
Professor	-0.0204	0.0116	-1.7582	0.0787
Associate Professor	-0.0057	0.0105	-0.5426	0.5874
Assistant Professor	0.0392	0.0109	3.6064	0.0003
Instructor/Lecturer	-0.0274	0.0110	-2.4844	0.0130
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0205	0.0209	-0.9771	0.3285
Black or African American	0.1474	0.0225	6.5447	0.0000
Hispanic or Latinx	0.0964	0.0260	3.7071	0.0002
White	-0.1691	0.0115	-14.7196	0.0000
Another race/ethnicity	0.0531	0.0329	1.6162	0.1061
Multiracial	-0.0068	0.0263	-0.2578	0.7965
Preferred not to respond				
Gender				
Man	-0.0523	0.0111	-4.7097	0.0000
Woman	0.0514	0.0113	4.5432	0.0000
Preferred not to respond				
Sexual Orientation				
Straight (Heterosexual)	-0.0018	0.0104	-0.1752	0.8609
LGBQ+	0.0269	0.0155	1.7380	0.0822
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0332	0.0104	-3.2030	0.0015
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0034	0.0093	-0.3648	0.7156
Percent of Instructional Staff that Are Full-Time	-0.0401	0.0097	-4.1467	0.0000
Percent of Expenditures on Instruction	-0.0157	0.0101	-1.5554	0.1211
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2765	0.0618	-4.4779	0.0000
Hard-Pure-Nonlife (HPN) Discipline	-0.5835	0.0741	-7.8691	0.0000
Hard-Applied-Life (HAL) Discipline	0.0413	0.0761	0.5422	0.5885
Hard-Applied-Nonlife (HAN) Discipline	-0.4524	0.0577	-7.8386	0.0000

Table C.13. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Soft-Pure-Life (SPL) Discipline	0.4610	0.0852	5.4114	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2440	0.0578	4.2237	0.0001
Soft-Applied-Life (SAL) Discipline	0.3268	0.0453	7.2133	0.0000
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.14. *Model DAL-2.4*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7266	0.0060	120.6422	0.0000
Institution (Intercept)	0.0189	0.0025	7.5824	0.0000
Institution (Intercept) – HAN (Slope) Covariance	0.0064	0.0024	2.6754	0.0037
HAN Slope	0.0064	0.0032	1.9914	0.0232
Discipline (Intercept)	0.0480	0.0075	6.3923	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1114	0.0307	3.6329	0.0003
<i>Course and Professional Control Variables</i>				
<i>Course Division</i>				
Lower Division	-0.1512	0.0090	-16.8987	0.0000
Upper Division	0.1038	0.0089	11.7055	0.0000
Other Division				
<i>Course Enrollment Size</i>				
Small Course	0.0213	0.0080	2.6689	0.0076
Medium Course	0.0010	0.0073	0.1317	0.8952
Large Course				
<i>Course Meets a General Education Requirement</i>				
Does Not Meet a Gen Ed Requirement	-0.0860	0.0059	-14.5938	0.0000
Meets a Gen Ed Requirement				
<i>Course Format</i>				
Classroom	-0.0616	0.0106	-5.8422	0.0000
Distance	-0.0085	0.0164	-0.5177	0.6046
Other Format				
<i>Course Load</i>				
Years of Teaching Experience	0.0432	0.0056	7.6661	0.0000
Employment Status	-0.0468	0.0061	-7.7332	0.0000
Part-Time	0.0129	0.0085	1.5172	0.1292
Full-Time				
<i>Rank</i>				
Professor	-0.0210	0.0116	-1.8046	0.0712
Associate Professor	-0.0059	0.0105	-0.5601	0.5754
Assistant Professor	0.0388	0.0109	3.5694	0.0004
Instructor/Lecturer	-0.0272	0.0110	-2.4663	0.0137
Other Rank				

Table C.14. cont.

Fixed Effects	Est.	SE	t	p two-tailed
<i>Faculty Identities</i>				
<i>Race/Ethnicity</i>				
Asian, Native Hawaiian, or other Pacific Islander	-0.0211	0.0209	-1.0070	0.3139
Black or African American	0.1469	0.0225	6.5197	0.0000
Hispanic or Latinx	0.0961	0.0260	3.6942	0.0002
White	-0.1684	0.0115	-14.6640	0.0000
Another race/ethnicity	0.0526	0.0329	1.5985	0.1099
Multiracial	-0.0059	0.0263	-0.2231	0.8235
Preferred not to respond				
<i>Gender</i>				
Man	-0.0524	0.0111	-4.7197	0.0000
Woman	0.0515	0.0113	4.5580	0.0000
Preferred not to respond				
<i>Sexual Orientation</i>				
Straight (Heterosexual)	-0.0019	0.0104	-0.1841	0.8539
LGBQ+	0.0270	0.0155	1.7462	0.0808
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0329	0.0104	-3.1680	0.0017
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0026	0.0093	-0.2814	0.7786
Percent of Instructional Staff that Are Full-Time	-0.0377	0.0097	-3.8937	0.0001
Percent of Expenditures on Instruction	-0.0147	0.0101	-1.4535	0.1473
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2757	0.0618	-4.4627	0.0000
Hard-Pure-Nonlife (HPN) Discipline	-0.5819	0.0742	-7.8464	0.0000
Hard-Applied-Life (HAL) Discipline	0.0418	0.0752	0.5550	0.5798
Hard-Applied-Nonlife (HAN) Discipline	-0.4563	0.0582	-7.8367	0.0000
Soft-Pure-Life (SPL) Discipline	0.4625	0.0852	5.4271	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2448	0.0578	4.2363	0.0001
Soft-Applied-Life (SAL) Discipline	0.3275	0.0453	7.2281	0.0000
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.15. *Model DAL-2.5*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7263	0.0060	120.6167	0.0000
Institution (Intercept)	0.0177	0.0024	7.3672	0.0000
Institution (Intercept) – SPN (Slope) Covariance	0.0014	0.0017	0.8304	0.2031
SPN Slope	0.0041	0.0018	2.2265	0.0130
Discipline (Intercept)	0.0481	0.0075	6.3950	0.0000

Table C.15. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1130	0.0306	3.6932	0.0003
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.1513	0.0090	-16.8985	0.0000
Upper Division	0.1038	0.0089	11.6997	0.0000
Other Division				
Course Enrollment Size				
Small Course	0.0208	0.0080	2.6038	0.0092
Medium Course	0.0006	0.0073	0.0856	0.9318
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0862	0.0059	-14.6233	0.0000
Meets a Gen Ed Requirement				
Course Format				
Classroom	-0.0617	0.0106	-5.8409	0.0000
Distance	-0.0088	0.0164	-0.5378	0.5907
Other Format				
Course Load	0.0435	0.0056	7.7210	0.0000
Years of Teaching Experience	-0.0466	0.0061	-7.7078	0.0000
Employment Status				
Part-Time	0.0128	0.0085	1.5017	0.1332
Full-Time				
Rank				
Professor	-0.0204	0.0116	-1.7543	0.0794
Associate Professor	-0.0060	0.0105	-0.5739	0.5661
Assistant Professor	0.0396	0.0109	3.6413	0.0003
Instructor/Lecturer	-0.0268	0.0110	-2.4307	0.0151
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0201	0.0209	-0.9592	0.3375
Black or African American	0.1482	0.0225	6.5715	0.0000
Hispanic or Latinx	0.0963	0.0260	3.7022	0.0002
White	-0.1690	0.0115	-14.7124	0.0000
Another race/ethnicity	0.0521	0.0329	1.5851	0.1130
Multiracial	-0.0067	0.0263	-0.2537	0.7997
Preferred not to respond				
Gender				
Man	-0.0521	0.0111	-4.6861	0.0000
Woman	0.0514	0.0113	4.5476	0.0000
Preferred not to respond				
Sexual Orientation				
Straight (Heterosexual)	-0.0017	0.0104	-0.1632	0.8703
LGBQ+	0.0268	0.0155	1.7304	0.0836
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0368	0.0106	-3.4866	0.0006
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0028	0.0095	-0.2996	0.7647
Percent of Instructional Staff that Are Full-Time	-0.0380	0.0098	-3.8598	0.0001

Table C.15. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Percent of Expenditures on Instruction	-0.0146	0.0103	-1.4261	0.1550
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2758	0.0618	-4.4632	0.0000
Hard-Pure-Nonlife (HPN) Discipline	-0.5823	0.0742	-7.8471	0.0000
Hard-Applied-Life (HAL) Discipline	0.0422	0.0753	0.5603	0.5762
Hard-Applied-Nonlife (HAN) Discipline	-0.4509	0.0577	-7.8081	0.0000
Soft-Pure-Life (SPL) Discipline	0.4630	0.0853	5.4290	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2386	0.0580	4.1131	0.0001
Soft-Applied-Life (SAL) Discipline	0.3274	0.0453	7.2230	0.0000
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.16. *Model DAL-2.6*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7264	0.0060	120.7118	0.0000
Institution (Intercept)	0.0187	0.0025	7.5036	0.0000
Institution (Intercept) – SAL (Slope) Covariance	-0.0018	0.0017	-1.0319	0.1511
SAL Slope	0.0036	0.0017	2.1283	0.0167
Discipline (Intercept)	0.0482	0.0075	6.3930	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1138	0.0307	3.7124	0.0002
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.1509	0.0089	-16.8659	0.0000
Upper Division	0.1043	0.0089	11.7612	0.0000
Other Division				
Course Enrollment Size				
Small Course	0.0204	0.0080	2.5498	0.0108
Medium Course	0.0013	0.0073	0.1844	0.8537
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0859	0.0059	-14.5785	0.0000
Meets a Gen Ed Requirement				
Course Format				
Classroom	-0.0615	0.0106	-5.8208	0.0000
Distance	-0.0086	0.0164	-0.5209	0.6024
Other Format				
Course Load	0.0437	0.0056	7.7473	0.0000
Years of Teaching Experience	-0.0472	0.0061	-7.8017	0.0000
Employment Status				
Part-Time	0.0121	0.0085	1.4254	0.1541

Table C.16. cont.

Fixed Effects	Est.	SE	t	p two-tailed
<i>Full-Time</i>				
<i>Rank</i>				
Professor	-0.0200	0.0116	-1.7169	0.0860
Associate Professor	-0.0064	0.0105	-0.6068	0.5440
Assistant Professor	0.0390	0.0109	3.5805	0.0003
Instructor/Lecturer	-0.0275	0.0110	-2.4899	0.0128
Other Rank				
<i>Faculty Identities</i>				
<i>Race/Ethnicity</i>				
Asian, Native Hawaiian, or other Pacific Islander	-0.0206	0.0209	-0.9848	0.3247
Black or African American	0.1466	0.0226	6.4959	0.0000
Hispanic or Latinx	0.0954	0.0260	3.6668	0.0002
White	-0.1685	0.0115	-14.6631	0.0000
Another race/ethnicity	0.0535	0.0329	1.6263	0.1039
Multiracial	-0.0066	0.0263	-0.2491	0.8033
Preferred not to respond				
<i>Gender</i>				
Man	-0.0523	0.0111	-4.7074	0.0000
Woman	0.0513	0.0113	4.5392	0.0000
Preferred not to respond				
<i>Sexual Orientation</i>				
Straight (Heterosexual)	-0.0017	0.0104	-0.1675	0.8670
LGBQ+	0.0270	0.0155	1.7436	0.0812
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0415	0.0107	-3.8991	0.0001
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0032	0.0095	-0.3402	0.7340
Percent of Instructional Staff that Are Full-Time	-0.0343	0.0099	-3.4597	0.0006
Percent of Expenditures on Instruction	-0.0143	0.0104	-1.3847	0.1672
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2761	0.0618	-4.4645	0.0000
Hard-Pure-Nonlife (HPN) Discipline	-0.5823	0.0742	-7.8430	0.0000
Hard-Applied-Life (HAL) Discipline	0.0414	0.0753	0.5496	0.5834
Hard-Applied-Nonlife (HAN) Discipline	-0.4515	0.0578	-7.8138	0.0000
Soft-Pure-Life (SPL) Discipline	0.4633	0.0853	5.4309	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2456	0.0579	4.2455	0.0001
Soft-Applied-Life (SAL) Discipline	0.3239	0.0456	7.1107	0.0000
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.17. Model DAL-2.7

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7261	0.0060	120.5904	0.0000
Institution (Intercept)	0.0185	0.0024	7.5751	0.0000
Institution (Intercept) – SAN (Slope) Covariance	-0.0057	0.0022	-2.5529	0.0053
SAN (Slope)	0.0078	0.0031	2.5083	0.0061
Discipline (Intercept)	0.0479	0.0075	6.3910	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1121	0.0306	3.6614	0.0003
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division				
Upper Division	0.1038	0.0089	11.7071	0.0000
Other Division	0.0472	0.0130	3.6335	0.0003
Course Enrollment Size				
Small Course				
Medium Course	0.0009	0.0073	0.1214	0.9034
Large Course	-0.0223	0.0079	-2.8089	0.0050
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement				
Meets a Gen Ed Requirement	0.0862	0.0059	14.6239	0.0000
Course Format				
Classroom				
Distance	-0.0088	0.0164	-0.5351	0.5926
Other Format	0.0706	0.0136	5.1975	0.0000
Course Load				
Years of Teaching Experience	-0.0472	0.0061	-7.7980	0.0000
Employment Status				
Part-Time				
Full-Time	-0.0127	0.0085	-1.4905	0.1361
Rank				
Professor				
Associate Professor	-0.0056	0.0105	-0.5351	0.5926
Assistant Professor	0.0388	0.0109	3.5668	0.0004
Instructor/Lecturer	-0.0275	0.0110	-2.4952	0.0126
Other Rank	0.0146	0.0166	0.8792	0.3793
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander				
Black or African American	0.1464	0.0225	6.5035	0.0000
Hispanic or Latinx	0.0958	0.0260	3.6858	0.0002
White	-0.1688	0.0115	-14.7018	0.0000
Another race/ethnicity	0.0545	0.0329	1.6576	0.0974
Multiracial	-0.0069	0.0263	-0.2620	0.7933
Preferred not to respond	-0.1002	0.0217	-4.6168	0.0000
Gender				
Man				
Woman	0.0514	0.0113	4.5475	0.0000
Preferred not to respond	0.0010	0.0195	0.0505	0.9597

Table C.17. cont.

Fixed Effects	Est.	SE	t	p two-tailed
<i>Sexual Orientation</i>				
Straight (Heterosexual)				
LGBQ+	0.0269	0.0155	1.7409	0.0817
Preferred not to respond	-0.0250	0.0153	-1.6358	0.1019
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0339	0.0104	-3.2517	0.0013
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0023	0.0093	-0.2458	0.8061
Percent of Instructional Staff that Are Full-Time	-0.0379	0.0097	-3.9034	0.0001
Percent of Expenditures on Instruction	-0.0166	0.0101	-1.6427	0.1016
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline				
Hard-Pure-Nonlife (HPN) Discipline	-0.5825	0.0741	-7.8635	0.0000
Hard-Applied-Life (HAL) Discipline	0.0421	0.0752	0.5603	0.5762
Hard-Applied-Nonlife (HAN) Discipline	-0.4513	0.0577	-7.8272	0.0000
Soft-Pure-Life (SPL) Discipline	0.4627	0.0851	5.4362	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2451	0.0577	4.2467	0.0001
Soft-Applied-Life (SAL) Discipline	0.3276	0.0453	7.2388	0.0000
Soft-Applied-Nonlife (SAN) Discipline	0.2375	0.0523	4.5386	0.0000

Note. Since this model was examined for random effects only, both sets of effect codes were not used. Since analysis of the SAN category required the second set of Biglan effect codes, the second set of effect codes for all categorical variables were used.

Table C.18. *Model DAL-2.8*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7257	0.0060	120.9236	0.0000
Institution (Intercept)	0.0183	0.0024	7.5515	0.0000
Discipline (Intercept)	0.0478	0.0075	6.3672	0.0000
Discipline (Intercept) – Institutional Mean Time on Teaching (Slope) Covariance	0.0018	0.0020	0.9214	0.1784
Institutional Mean Time on Teaching (Slope)	0.0024	0.0008	2.8909	0.0019
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1148	0.0306	3.7534	0.0002
<i>Course and Professional Control Variables</i>				
<i>Course Division</i>				
Lower Division	-0.1510	0.0089	-16.8735	0.0000
Upper Division	0.1038	0.0089	11.7057	0.0000
Other Division				
<i>Course Enrollment Size</i>				
Small Course	0.0200	0.0080	2.4996	0.0124
Medium Course	0.0001	0.0073	0.0108	0.9914
Large Course				

Table C.18. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0863	0.0059	-14.6470	0.0000
Meets a Gen Ed Requirement				
Course Format				
Classroom	-0.0628	0.0106	-5.9429	0.0000
Distance	-0.0070	0.0164	-0.4246	0.6711
Other Format				
Course Load	0.0429	0.0056	7.6004	0.0000
Years of Teaching Experience	-0.0476	0.0060	-7.8620	0.0000
Employment Status				
Part-Time	0.0122	0.0085	1.4368	0.1508
Full-Time				
Rank				
Professor	-0.0201	0.0116	-1.7285	0.0839
Associate Professor	-0.0069	0.0105	-0.6570	0.5112
Assistant Professor	0.0391	0.0109	3.5952	0.0003
Instructor/Lecturer	-0.0275	0.0110	-2.4935	0.0127
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0217	0.0209	-1.0377	0.2994
Black or African American	0.1482	0.0226	6.5700	0.0000
Hispanic or Latinx	0.0939	0.0260	3.6127	0.0003
White	-0.1691	0.0115	-14.7156	0.0000
Another race/ethnicity	0.0532	0.0329	1.6179	0.1057
Multiracial	-0.0054	0.0263	-0.2040	0.8383
Preferred not to respond				
Gender				
Man	-0.0523	0.0111	-4.7065	0.0000
Woman	0.0510	0.0113	4.5129	0.0000
Preferred not to respond				
Sexual Orientation				
Straight (Heterosexual)	-0.0019	0.0104	-0.1783	0.8585
LGBQ+	0.0287	0.0155	1.8575	0.0633
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0408	0.0122	-3.3339	0.0010
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0024	0.0095	-0.2510	0.8020
Percent of Instructional Staff that Are Full-Time	-0.0336	0.0099	-3.3861	0.0008
Percent of Expenditures on Instruction	-0.0143	0.0103	-1.3870	0.1665
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2735	0.0613	-4.4652	0.0000
Hard-Pure-Nonlife (HPN) Discipline	-0.5743	0.0735	-7.8154	0.0000
Hard-Applied-Life (HAL) Discipline	0.0420	0.0745	0.5628	0.5745
Hard-Applied-Nonlife (HAN) Discipline	-0.4460	0.0572	-7.7982	0.0000
Soft-Pure-Life (SPL) Discipline	0.4450	0.0844	5.2729	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2616	0.0572	4.5729	0.0000
Soft-Applied-Life (SAL) Discipline	0.3278	0.0450	7.2818	0.0000
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.19. *Model DAL-2.9*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7271	0.0060	120.9971	0.0000
Institution (Intercept)	0.0183	0.0024	7.5499	0.0000
Discipline (Intercept)	0.0484	0.0076	6.3865	0.0000
Discipline (Intercept) – Percent of Instructional Staff that Are Full-Time (Slope) Covariance	0.0013	0.0015	0.8842	0.1883
Percent of Instructional Staff that Are Full-Time (Slope)	0.0007	0.0004	1.5793	0.0571
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1123	0.0307	3.6603	0.0003
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.1511	0.0090	-16.8825	0.0000
Upper Division	0.1042	0.0089	11.7460	0.0000
Other Division				
Course Enrollment Size				
Small Course	0.0202	0.0080	2.5196	0.0118
Medium Course	0.0009	0.0073	0.1181	0.9060
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0858	0.0059	-14.5512	0.0000
Meets a Gen Ed Requirement				
Course Format				
Classroom	-0.0615	0.0106	-5.8210	0.0000
Distance	-0.0093	0.0164	-0.5683	0.5699
Other Format				
Course Load	0.0435	0.0056	7.7095	0.0000
Years of Teaching Experience	-0.0468	0.0061	-7.7387	0.0000
Employment Status				
Part-Time	0.0124	0.0085	1.4585	0.1447
Full-Time				
Rank				
Professor	-0.0206	0.0116	-1.7765	0.0757
Associate Professor	-0.0064	0.0105	-0.6053	0.5450
Assistant Professor	0.0394	0.0109	3.6163	0.0003
Instructor/Lecturer	-0.0271	0.0110	-2.4552	0.0141
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0195	0.0209	-0.9326	0.3511
Black or African American	0.1464	0.0226	6.4880	0.0000
Hispanic or Latinx	0.0948	0.0260	3.6454	0.0003
White	-0.1689	0.0115	-14.6954	0.0000
Another race/ethnicity	0.0537	0.0329	1.6343	0.1022
Multiracial	-0.0068	0.0263	-0.2580	0.7964

Table C.19. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Preferred not to respond				
Gender				
Man	-0.0525	0.0111	-4.7238	0.0000
Woman	0.0511	0.0113	4.5198	0.0000
Preferred not to respond				
Sexual Orientation				
Straight (Heterosexual)	-0.0017	0.0104	-0.1628	0.8707
LGBQ+	0.0270	0.0155	1.7477	0.0805
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0401	0.0106	-3.7754	0.0002
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0035	0.0095	-0.3712	0.7108
Percent of Instructional Staff that Are Full-Time	-0.0352	0.0106	-3.3257	0.0010
Percent of Expenditures on Instruction	-0.0147	0.0103	-1.4186	0.1571
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2702	0.0620	-4.3602	0.0000
Hard-Pure-Nonlife (HPN) Discipline	-0.5902	0.0742	-7.9523	0.0000
Hard-Applied-Life (HAL) Discipline	0.0416	0.0761	0.5460	0.5859
Hard-Applied-Nonlife (HAN) Discipline	-0.4449	0.0580	-7.6741	0.0000
Soft-Pure-Life (SPL) Discipline	0.4615	0.0851	5.4258	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2289	0.0577	3.9674	0.0001
Soft-Applied-Life (SAL) Discipline	0.3275	0.0453	7.2299	0.0000
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.20. *Model DAL-2.10*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7276	0.0060	121.0154	0.0000
Institution (Intercept)	0.0183	0.0024	7.5506	0.0000
Discipline (Intercept)	0.0481	0.0075	6.3952	0.0000
Discipline (Intercept) – Percent of Full-Time Faculty that Are Tenured/Tenure-Track (Slope) Covariance	-0.0009	0.0012	-0.7292	0.2329
Percent of Full-Time Faculty that Are Tenured/Tenure-Track (Slope)	0.0002	0.0003	0.6579	0.2553
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1142	0.0306	3.7339	0.0002
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.1512	0.0090	-16.8944	0.0000
Upper Division	0.1041	0.0089	11.7361	0.0000
Other Division				

Table C.20. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Course Enrollment Size				
Small Course	0.0208	0.0080	2.5956	0.0094
Medium Course	0.0013	0.0073	0.1732	0.8625
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0861	0.0059	-14.5986	0.0000
Meets a Gen Ed Requirement				
Course Format				
Classroom	-0.0619	0.0106	-5.8637	0.0000
Distance	-0.0085	0.0164	-0.5201	0.6030
Other Format				
Course Load	0.0437	0.0056	7.7522	0.0000
Years of Teaching Experience	-0.0469	0.0061	-7.7557	0.0000
Employment Status				
Part-Time	0.0124	0.0085	1.4638	0.1433
Full-Time				
Rank				
Professor	-0.0207	0.0116	-1.7793	0.0752
Associate Professor	-0.0064	0.0105	-0.6101	0.5418
Assistant Professor	0.0394	0.0109	3.6193	0.0003
Instructor/Lecturer	-0.0273	0.0110	-2.4784	0.0132
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0204	0.0209	-0.9719	0.3311
Black or African American	0.1472	0.0226	6.5230	0.0000
Hispanic or Latinx	0.0951	0.0260	3.6547	0.0003
White	-0.1686	0.0115	-14.6719	0.0000
Another race/ethnicity	0.0538	0.0329	1.6354	0.1020
Multiracial	-0.0067	0.0263	-0.2556	0.7983
Preferred not to respond				
Gender				
Man	-0.0523	0.0111	-4.7047	0.0000
Woman	0.0512	0.0113	4.5288	0.0000
Preferred not to respond				
Sexual Orientation				
Straight (Heterosexual)	-0.0019	0.0104	-0.1858	0.8526
LGBQ+	0.0272	0.0155	1.7562	0.0791
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0400	0.0106	-3.7677	0.0002
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0032	0.0098	-0.3304	0.7415
Percent of Instructional Staff that Are Full-Time	-0.0354	0.0099	-3.5766	0.0004
Percent of Expenditures on Instruction	-0.0144	0.0103	-1.3977	0.1633
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2794	0.0617	-4.5294	0.0000
Hard-Pure-Nonlife (HPN) Discipline	-0.5859	0.0739	-7.9261	0.0000
Hard-Applied-Life (HAL) Discipline	0.0429	0.0754	0.5691	0.5702
Hard-Applied-Nonlife (HAN) Discipline	-0.4536	0.0577	-7.8606	0.0000

Table C.20. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Soft-Pure-Life (SPL) Discipline	0.4747	0.0848	5.5994	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2370	0.0576	4.1183	0.0001
Soft-Applied-Life (SAL) Discipline	0.3291	0.0452	7.2796	0.0000
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.21. *Model DAL-2.11*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7276	0.0060	120.9756	0.0000
Institution (Intercept)	0.0183	0.0024	7.5475	0.0000
Discipline (Intercept)	0.0480	0.0075	6.3911	0.0000
Discipline (Intercept) – Percent of Expenditures on Instruction (Slope) Covariance	0.0007	0.0013	0.5688	0.2847
Percent of Expenditures on Instruction (Slope)	0.0002	0.0004	0.5170	0.3026
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1137	0.0306	3.7149	0.0002
<i>Course and Professional Control Variables</i>				
<i>Course Division</i>				
Lower Division	-0.1512	0.0090	-16.8870	0.0000
Upper Division	0.1039	0.0089	11.7144	0.0000
Other Division				
<i>Course Enrollment Size</i>				
Small Course	0.0207	0.0080	2.5926	0.0095
Medium Course	0.0015	0.0073	0.2018	0.8401
Large Course				
<i>Course Meets a General Education Requirement</i>				
Does Not Meet a Gen Ed Requirement	-0.0860	0.0059	-14.5935	0.0000
Meets a Gen Ed Requirement				
<i>Course Format</i>				
Classroom	-0.0620	0.0106	-5.8697	0.0000
Distance	-0.0082	0.0164	-0.5015	0.6160
Other Format				
Course Load	0.0437	0.0056	7.7519	0.0000
Years of Teaching Experience	-0.0470	0.0061	-7.7619	0.0000
<i>Employment Status</i>				
Part-Time	0.0124	0.0085	1.4622	0.1437
Full-Time				
<i>Rank</i>				
Professor	-0.0206	0.0116	-1.7732	0.0762
Associate Professor	-0.0064	0.0105	-0.6066	0.5442
Assistant Professor	0.0392	0.0109	3.5986	0.0003

Table C.21. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Instructor/Lecturer	-0.0272	0.0110	-2.4667	0.0136
Other Rank				
<i>Faculty Identities</i>				
<i>Race/Ethnicity</i>				
Asian, Native Hawaiian, or other Pacific Islander	-0.0205	0.0209	-0.9772	0.3285
Black or African American	0.1472	0.0226	6.5246	0.0000
Hispanic or Latinx	0.0950	0.0260	3.6519	0.0003
White	-0.1686	0.0115	-14.6693	0.0000
Another race/ethnicity	0.0535	0.0329	1.6250	0.1042
Multiracial	-0.0066	0.0263	-0.2496	0.8029
Preferred not to respond				
<i>Gender</i>				
Man	-0.0524	0.0111	-4.7178	0.0000
Woman	0.0511	0.0113	4.5169	0.0000
Preferred not to respond				
<i>Sexual Orientation</i>				
Straight (Heterosexual)	-0.0019	0.0104	-0.1812	0.8562
LGBQ+	0.0274	0.0155	1.7723	0.0763
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0400	0.0106	-3.7708	0.0002
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0033	0.0095	-0.3446	0.7307
Percent of Instructional Staff that Are Full-Time	-0.0355	0.0099	-3.5850	0.0004
Percent of Expenditures on Instruction	-0.0140	0.0105	-1.3308	0.1849
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2805	0.0616	-4.5553	0.0000
Hard-Pure-Nonlife (HPN) Discipline	-0.5755	0.0739	-7.7835	0.0000
Hard-Applied-Life (HAL) Discipline	0.0413	0.0749	0.5509	0.5826
Hard-Applied-Nonlife (HAN) Discipline	-0.4487	0.0576	-7.7912	0.0000
Soft-Pure-Life (SPL) Discipline	0.4521	0.0849	5.3229	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2522	0.0576	4.3798	0.0000
Soft-Applied-Life (SAL) Discipline	0.3288	0.0452	7.2717	0.0000
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.22. *Model CL-2.1*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9109	0.0075	120.8687	0.0000
Institution (Intercept)	0.0117	0.0019	6.1755	0.0000
Institution (Intercept) – HPL (Slope) Covariance	0.0006	0.0016	0.3509	0.3628
HPL Slope	0.0004	0.0026	0.1731	0.4313
Discipline (Intercept)	0.0219	0.0040	5.4710	0.0000

Table C.22. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0390	0.0267	-1.4568	0.1458
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.0311	0.0100	-3.1167	0.0018
Upper Division	0.0155	0.0099	1.5716	0.1160
Other Division				
Course Enrollment Size				
Small Course	-0.0332	0.0088	-3.7479	0.0002
Medium Course	0.0025	0.0081	0.3078	0.7582
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0171	0.0066	-2.6063	0.0092
Meets a Gen Ed Requirement				
Course Format				
Classroom	0.1757	0.0117	14.9776	0.0000
Distance	-0.3721	0.0183	-20.3650	0.0000
Other Format				
Course Load	0.0413	0.0063	6.5985	0.0000
Years of Teaching Experience	-0.0541	0.0068	-8.0129	0.0000
Employment Status				
Part-Time	-0.0144	0.0095	-1.5223	0.1279
Full-Time				
Rank				
Professor	-0.0386	0.0130	-2.9790	0.0029
Associate Professor	-0.0004	0.0117	-0.0363	0.9711
Assistant Professor	0.0359	0.0121	2.9603	0.0031
Instructor/Lecturer	-0.0112	0.0123	-0.9090	0.3634
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0108	0.0234	-0.4615	0.6445
Black or African American	0.0634	0.0248	2.5537	0.0107
Hispanic or Latinx	0.0651	0.0289	2.2556	0.0241
White	-0.0959	0.0128	-7.5180	0.0000
Another race/ethnicity	-0.0096	0.0368	-0.2604	0.7946
Multiracial	0.0297	0.0294	1.0097	0.3127
Preferred not to respond				
Gender				
Man	-0.0375	0.0124	-3.0175	0.0026
Woman	0.0406	0.0126	3.2123	0.0013
Preferred not to respond				
Sexual Orientation				
Straight (Heterosexual)	-0.0123	0.0116	-1.0588	0.2897
LGBQ+	0.0299	0.0173	1.7297	0.0837
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0074	0.0097	-0.7581	0.4490
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0124	0.0088	-1.4108	0.1593
Percent of Instructional Staff that Are Full-Time	-0.0096	0.0092	-1.0486	0.2951

Table C.22. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Percent of Expenditures on Instruction	-0.0118	0.0095	-1.2349	0.2178
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	0.1417	0.0470	3.0128	0.0031
Hard-Pure-Nonlife (HPN) Discipline	0.2921	0.0548	5.3334	0.0000
Hard-Applied-Life (HAL) Discipline	-0.0459	0.0597	-0.7696	0.4426
Hard-Applied-Nonlife (HAN) Discipline	0.1360	0.0442	3.0750	0.0026
Soft-Pure-Life (SPL) Discipline	-0.2274	0.0615	-3.6948	0.0004
Soft-Pure-Nonlife (SPN) Discipline	-0.1661	0.0413	-4.0241	0.0001
Soft-Applied-Life (SAL) Discipline	-0.0437	0.0338	-1.2916	0.1992
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.23. Model CL-2.2

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9107	0.0075	120.8300	0.0000
Institution (Intercept)	0.0117	0.0019	6.2053	0.0000
Institution (Intercept) – HPN (Slope) Covariance	0.0009	0.0016	0.5460	0.2925
HPN Slope	0.0008	0.0025	0.3237	0.3731
Discipline (Intercept)	0.0219	0.0040	5.4708	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0389	0.0267	-1.4558	0.1461
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.0311	0.0100	-3.1116	0.0019
Upper Division	0.0156	0.0099	1.5738	0.1155
Other Division				
Course Enrollment Size				
Small Course	-0.0332	0.0088	-3.7535	0.0002
Medium Course	0.0025	0.0081	0.3106	0.7561
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0171	0.0066	-2.6066	0.0091
Meets a Gen Ed Requirement				
Course Format				
Classroom	0.1758	0.0117	14.9822	0.0000
Distance	-0.3722	0.0183	-20.3713	0.0000
Other Format				
Course Load	0.0414	0.0063	6.6047	0.0000
Years of Teaching Experience	-0.0542	0.0068	-8.0195	0.0000
Employment Status				
Part-Time	-0.0144	0.0095	-1.5249	0.1273

Table C.23. cont.

Fixed Effects	Est.	SE	t	p two-tailed
<i>Full-Time</i>				
<i>Rank</i>				
Professor	-0.0386	0.0130	-2.9772	0.0029
Associate Professor	-0.0005	0.0117	-0.0399	0.9681
Assistant Professor	0.0359	0.0121	2.9568	0.0031
Instructor/Lecturer	-0.0111	0.0123	-0.9062	0.3648
Other Rank				
<i>Faculty Identities</i>				
<i>Race/Ethnicity</i>				
Asian, Native Hawaiian, or other Pacific Islander	-0.0109	0.0234	-0.4673	0.6403
Black or African American	0.0635	0.0248	2.5543	0.0106
Hispanic or Latinx	0.0653	0.0289	2.2611	0.0238
White	-0.0959	0.0128	-7.5201	0.0000
Another race/ethnicity	-0.0097	0.0367	-0.2641	0.7917
Multiracial	0.0296	0.0294	1.0066	0.3141
Preferred not to respond				
<i>Gender</i>				
Man	-0.0374	0.0124	-3.0155	0.0026
Woman	0.0406	0.0126	3.2112	0.0013
Preferred not to respond				
<i>Sexual Orientation</i>				
Straight (Heterosexual)	-0.0123	0.0116	-1.0561	0.2910
LGBQ+	0.0299	0.0173	1.7297	0.0837
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0079	0.0097	-0.8150	0.4158
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0127	0.0088	-1.4487	0.1484
Percent of Instructional Staff that Are Full-Time	-0.0099	0.0092	-1.0780	0.2818
Percent of Expenditures on Instruction	-0.0116	0.0095	-1.2198	0.2235
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	0.1417	0.0470	3.0157	0.0031
Hard-Pure-Nonlife (HPN) Discipline	0.2925	0.0548	5.3363	0.0000
Hard-Applied-Life (HAL) Discipline	-0.0459	0.0597	-0.7689	0.4430
Hard-Applied-Nonlife (HAN) Discipline	0.1359	0.0442	3.0739	0.0026
Soft-Pure-Life (SPL) Discipline	-0.2275	0.0615	-3.6966	0.0004
Soft-Pure-Nonlife (SPN) Discipline	-0.1662	0.0413	-4.0258	0.0001
Soft-Applied-Life (SAL) Discipline	-0.0437	0.0338	-1.2919	0.1991
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.24. Model CL-2.3

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9099	0.0075	120.8551	0.0000
Institution (Intercept)	0.0120	0.0020	5.9883	0.0000
Institution (Intercept) – HAL (Slope) Covariance	0.0018	0.0023	0.7887	0.2151
HAL Slope	0.0071	0.0047	1.5118	0.0653
Discipline (Intercept)	0.0218	0.0040	5.4676	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0400	0.0268	-1.4920	0.1363
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.0311	0.0100	-3.1177	0.0018
Upper Division	0.0155	0.0099	1.5660	0.1174
Other Division				
Course Enrollment Size				
Small Course	-0.0332	0.0088	-3.7530	0.0002
Medium Course	0.0025	0.0081	0.3042	0.7610
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0172	0.0066	-2.6190	0.0088
Meets a Gen Ed Requirement				
Course Format				
Classroom	0.1760	0.0117	14.9980	0.0000
Distance	-0.3725	0.0183	-20.3783	0.0000
Other Format				
Course Load	0.0412	0.0063	6.5777	0.0000
Years of Teaching Experience	-0.0541	0.0068	-8.0152	0.0000
Employment Status				
Part-Time	-0.0142	0.0095	-1.4970	0.1344
Full-Time				
Rank				
Professor	-0.0384	0.0130	-2.9657	0.0030
Associate Professor	-0.0004	0.0117	-0.0371	0.9704
Assistant Professor	0.0364	0.0121	2.9957	0.0027
Instructor/Lecturer	-0.0115	0.0123	-0.9357	0.3494
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0112	0.0234	-0.4778	0.6328
Black or African American	0.0631	0.0248	2.5374	0.0112
Hispanic or Latinx	0.0653	0.0289	2.2637	0.0236
White	-0.0957	0.0128	-7.5067	0.0000
Another race/ethnicity	-0.0098	0.0367	-0.2662	0.7901
Multiracial	0.0301	0.0294	1.0230	0.3063
Preferred not to respond				
Gender				
Man	-0.0376	0.0124	-3.0277	0.0025
Woman	0.0405	0.0126	3.2099	0.0013
Preferred not to respond				

Table C.24. cont.

Fixed Effects	Est.	SE	t	p two-tailed
<i>Sexual Orientation</i>				
Straight (Heterosexual)	-0.0123	0.0116	-1.0574	0.2904
LGBQ+	0.0299	0.0173	1.7302	0.0836
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0073	0.0097	-0.7543	0.4513
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0126	0.0088	-1.4330	0.1529
Percent of Instructional Staff that Are Full-Time	-0.0098	0.0092	-1.0695	0.2857
Percent of Expenditures on Instruction	-0.0121	0.0095	-1.2678	0.2058
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	0.1423	0.0470	3.0304	0.0030
Hard-Pure-Nonlife (HPN) Discipline	0.2927	0.0547	5.3498	0.0000
Hard-Applied-Life (HAL) Discipline	-0.0516	0.0605	-0.8532	0.3947
Hard-Applied-Nonlife (HAN) Discipline	0.1364	0.0442	3.0867	0.0025
Soft-Pure-Life (SPL) Discipline	-0.2268	0.0615	-3.6893	0.0004
Soft-Pure-Nonlife (SPN) Discipline	-0.1655	0.0412	-4.0125	0.0001
Soft-Applied-Life (SAL) Discipline	-0.0431	0.0338	-1.2772	0.2042
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.25. Model CL-2.4

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9106	0.0075	120.8723	0.0000
Institution (Intercept)	0.0118	0.0019	6.1105	0.0000
Institution (Intercept) – HAN (Slope) Covariance	0.0007	0.0018	0.4090	0.3413
HAN Slope	0.0014	0.0029	0.4996	0.3087
Discipline (Intercept)	0.0219	0.0040	5.4707	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0390	0.0268	-1.4583	0.1454
<i>Course and Professional Control Variables</i>				
<i>Course Division</i>				
Lower Division	-0.0312	0.0100	-3.1199	0.0018
Upper Division	0.0156	0.0099	1.5731	0.1157
Other Division				
<i>Course Enrollment Size</i>				
Small Course	-0.0333	0.0088	-3.7605	0.0002
Medium Course	0.0025	0.0081	0.3089	0.7574
Large Course				
<i>Course Meets a General Education Requirement</i>				
Does Not Meet a Gen Ed Requirement	-0.0171	0.0066	-2.6011	0.0093
Meets a Gen Ed Requirement				

Table C.25. cont.

Fixed Effects	Est.	SE	t	p two-tailed
<i>Course Format</i>				
Classroom	0.1759	0.0117	14.9865	0.0000
Distance	-0.3723	0.0183	-20.3692	0.0000
Other Format				
Course Load	0.0412	0.0063	6.5848	0.0000
Years of Teaching Experience	-0.0541	0.0068	-8.0091	0.0000
<i>Employment Status</i>				
Part-Time	-0.0144	0.0095	-1.5159	0.1296
Full-Time				
<i>Rank</i>				
Professor	-0.0386	0.0130	-2.9799	0.0029
Associate Professor	-0.0004	0.0117	-0.0310	0.9752
Assistant Professor	0.0360	0.0121	2.9646	0.0030
Instructor/Lecturer	-0.0112	0.0123	-0.9096	0.3631
Other Rank				
<i>Faculty Identities</i>				
<i>Race/Ethnicity</i>				
Asian, Native Hawaiian, or other Pacific Islander	-0.0110	0.0234	-0.4687	0.6393
Black or African American	0.0633	0.0248	2.5459	0.0109
Hispanic or Latinx	0.0651	0.0289	2.2538	0.0242
White	-0.0958	0.0128	-7.5154	0.0000
Another race/ethnicity	-0.0094	0.0368	-0.2556	0.7983
Multiracial	0.0298	0.0294	1.0136	0.3108
Preferred not to respond				
<i>Gender</i>				
Man	-0.0374	0.0124	-3.0152	0.0026
Woman	0.0406	0.0126	3.2159	0.0013
Preferred not to respond				
<i>Sexual Orientation</i>				
Straight (Heterosexual)	-0.0123	0.0116	-1.0615	0.2885
LGBQ+	0.0299	0.0173	1.7303	0.0836
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0076	0.0097	-0.7776	0.4374
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0125	0.0088	-1.4169	0.1575
Percent of Instructional Staff that Are Full-Time	-0.0100	0.0092	-1.0892	0.2769
Percent of Expenditures on Instruction	-0.0121	0.0095	-1.2690	0.2054
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	0.1416	0.0470	3.0132	0.0031
Hard-Pure-Nonlife (HPN) Discipline	0.2921	0.0548	5.3318	0.0000
Hard-Applied-Life (HAL) Discipline	-0.0460	0.0597	-0.7713	0.4416
Hard-Applied-Nonlife (HAN) Discipline	0.1363	0.0444	3.0701	0.0026
Soft-Pure-Life (SPL) Discipline	-0.2274	0.0616	-3.6948	0.0004
Soft-Pure-Nonlife (SPN) Discipline	-0.1662	0.0413	-4.0247	0.0001
Soft-Applied-Life (SAL) Discipline	-0.0438	0.0338	-1.2944	0.1983
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.26. *Model CL-2.5*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9105	0.0075	120.8463	0.0000
Institution (Intercept)	0.0119	0.0019	6.2339	0.0000
Institution (Intercept) – SPL (Slope) Covariance	0.0020	0.0017	1.1942	0.1162
SPN Slope	0.0021	0.0029	0.7384	0.2301
Discipline (Intercept)	0.0219	0.0040	5.4695	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0397	0.0268	-1.4842	0.138
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.0311	0.0100	-3.1173	0.002
Upper Division	0.0154	0.0099	1.5598	0.119
Other Division				
Course Enrollment Size				
Small Course	-0.0330	0.0088	-3.7250	0.000
Medium Course	0.0024	0.0081	0.2986	0.765
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0173	0.0066	-2.6326	0.008
Meets a Gen Ed Requirement				
Course Format				
Classroom	0.1759	0.0117	14.9917	0.000
Distance	-0.3725	0.0183	-20.3842	0.000
Other Format				
Course Load	0.0412	0.0063	6.5715	0.000
Years of Teaching Experience	-0.0542	0.0068	-8.0189	0.000
Employment Status				
Part-Time	-0.0144	0.0095	-1.5211	0.128
Full-Time				
Rank				
Professor	-0.0383	0.0130	-2.9566	0.003
Associate Professor	-0.0003	0.0117	-0.0236	0.981
Assistant Professor	0.0360	0.0121	2.9613	0.003
Instructor/Lecturer	-0.0114	0.0123	-0.9284	0.353
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0111	0.0234	-0.4751	0.635
Black or African American	0.0634	0.0248	2.5524	0.011
Hispanic or Latinx	0.0648	0.0289	2.2433	0.025
White	-0.0958	0.0128	-7.5099	0.000
Another race/ethnicity	-0.0095	0.0368	-0.2589	0.796
Multiracial	0.0300	0.0294	1.0190	0.308
Preferred not to respond				

Table C.26. cont.

Fixed Effects	Est.	SE	t	p two-tailed
<i>Gender</i>				
Man	-0.0374	0.0124	-3.0136	0.003
Woman	0.0408	0.0126	3.2340	0.001
Preferred not to respond				
<i>Sexual Orientation</i>				
Straight (Heterosexual)	-0.0123	0.0116	-1.0557	0.291
LGBQ+	0.0296	0.0173	1.7127	0.087
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0069	0.0097	-0.7144	0.476
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0125	0.0088	-1.4214	0.156
Percent of Instructional Staff that Are Full-Time	-0.0099	0.0092	-1.0843	0.279
Percent of Expenditures on Instruction	-0.0120	0.0095	-1.2583	0.209
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	0.1420	0.0470	3.0231	0.003
Hard-Pure-Nonlife (HPN) Discipline	0.2922	0.0548	5.3356	0.000
Hard-Applied-Life (HAL) Discipline	-0.0459	0.0597	-0.7692	0.443
Hard-Applied-Nonlife (HAN) Discipline	0.1363	0.0442	3.0821	0.003
Soft-Pure-Life (SPL) Discipline	-0.2291	0.0617	-3.7147	0.000
Soft-Pure-Nonlife (SPN) Discipline	-0.1662	0.0413	-4.0264	0.000
Soft-Applied-Life (SAL) Discipline	-0.0434	0.0338	-1.2847	0.202
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.27. Model CL-2.6

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9099	0.0075	120.7917	0.0000
Institution (Intercept)	0.0118	0.0019	6.2085	0.0000
Institution (Intercept) – SAL (Slope) Covariance	-0.0013	0.0015	-0.8870	0.1875
SAL Slope	0.0032	0.0021	1.5075	0.0658
Discipline (Intercept)	0.0218	0.0040	5.4651	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0387	0.0267	-1.4494	0.1479
<i>Course and Professional Control Variables</i>				
<i>Course Division</i>				
Lower Division	-0.0310	0.0100	-3.1059	0.0019
Upper Division	0.0156	0.0099	1.5789	0.1144
Other Division				
<i>Course Enrollment Size</i>				
Small Course	-0.0334	0.0088	-3.7784	0.0002
Medium Course	0.0024	0.0081	0.2927	0.7697

Table C.27. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0169	0.0066	-2.5786	0.0099
Meets a Gen Ed Requirement				
Course Format				
Classroom	0.1761	0.0117	15.0002	0.0000
Distance	-0.3723	0.0183	-20.3603	0.0000
Other Format				
Course Load	0.0416	0.0063	6.6416	0.0000
Years of Teaching Experience	-0.0543	0.0068	-8.0469	0.0000
Employment Status				
Part-Time	-0.0142	0.0095	-1.5020	0.1331
Full-Time				
Rank				
Professor	-0.0385	0.0130	-2.9670	0.0030
Associate Professor	-0.0006	0.0117	-0.0473	0.9623
Assistant Professor	0.0361	0.0121	2.9723	0.0030
Instructor/Lecturer	-0.0115	0.0123	-0.9377	0.3484
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0112	0.0234	-0.4811	0.6305
Black or African American	0.0639	0.0248	2.5742	0.0101
Hispanic or Latinx	0.0656	0.0289	2.2725	0.0231
White	-0.0959	0.0127	-7.5262	0.0000
Another race/ethnicity	-0.0099	0.0368	-0.2702	0.7870
Multiracial	0.0295	0.0294	1.0032	0.3158
Preferred not to respond				
Gender				
Man	-0.0373	0.0124	-3.0076	0.0026
Woman	0.0406	0.0126	3.2120	0.0013
Preferred not to respond				
Sexual Orientation				
Straight (Heterosexual)	-0.0124	0.0116	-1.0725	0.2835
LGBQ+	0.0301	0.0173	1.7441	0.0812
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0087	0.0097	-0.8897	0.3744
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0130	0.0088	-1.4882	0.1377
Percent of Instructional Staff that Are Full-Time	-0.0101	0.0092	-1.0982	0.2729
Percent of Expenditures on Instruction	-0.0117	0.0095	-1.2259	0.2212
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	0.1417	0.0469	3.0198	0.0031
Hard-Pure-Nonlife (HPN) Discipline	0.2922	0.0547	5.3450	0.0000
Hard-Applied-Life (HAL) Discipline	-0.0457	0.0596	-0.7663	0.4446
Hard-Applied-Nonlife (HAN) Discipline	0.1359	0.0441	3.0786	0.0025

Table C.27. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Soft-Pure-Life (SPL) Discipline	-0.2270	0.0614	-3.6961	0.0004
Soft-Pure-Nonlife (SPN) Discipline	-0.1659	0.0412	-4.0263	0.0001
Soft-Applied-Life (SAL) Discipline	-0.0470	0.0340	-1.3843	0.1690
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.28. *Model CL-2.7*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9109	0.0075	120.8687	0.0000
Institution (Intercept)	0.0117	0.0019	6.1755	0.0000
Institution (Intercept) – SAN (Slope) Covariance	-0.0006	0.0016	-0.3509	0.3628
SAN (Slope)	0.0004	0.0026	0.1731	0.4313
Discipline (Intercept)	0.0219	0.0040	5.4710	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0390	0.0267	-1.4568	0.1458
<i>Course and Professional Control Variables</i>				
<i>Course Division</i>				
Lower Division				
Upper Division	0.0155	0.0099	1.5716	0.1160
Other Division	0.0156	0.0145	1.0734	0.2831
<i>Course Enrollment Size</i>				
Small Course				
Medium Course	0.0025	0.0081	0.3078	0.7582
Large Course	0.0307	0.0088	3.4904	0.0005
<i>Course Meets a General Education Requirement</i>				
Does Not Meet a Gen Ed Requirement				
Meets a Gen Ed Requirement	0.0171	0.0066	2.6063	0.0092
<i>Course Format</i>				
Classroom				
Distance	-0.3721	0.0183	-20.3650	0.0000
Other Format	0.1964	0.0152	12.9608	0.0000
Course Load	0.0413	0.0063	6.5985	0.0000
Years of Teaching Experience	-0.0541	0.0068	-8.0129	0.0000
<i>Employment Status</i>				
Part-Time				
Full-Time	0.0144	0.0095	1.5223	0.1279
<i>Rank</i>				
Professor				
Associate Professor	-0.0004	0.0117	-0.0363	0.9711
Assistant Professor	0.0359	0.0121	2.9603	0.0031
Instructor/Lecturer	-0.0112	0.0123	-0.9090	0.3634

Table C.28. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Other Rank	0.0143	0.0185	0.7708	0.4408
<i>Faculty Identities</i>				
<i>Race/Ethnicity</i>				
Asian, Native Hawaiian, or other Pacific Islander				
Black or African American	0.0634	0.0248	2.5537	0.0107
Hispanic or Latinx	0.0651	0.0289	2.2556	0.0241
White	-0.0959	0.0128	-7.5180	0.0000
Another race/ethnicity	-0.0096	0.0368	-0.2604	0.7946
Multiracial	0.0297	0.0294	1.0097	0.3127
Preferred not to respond	-0.0421	0.0243	-1.7348	0.0828
<i>Gender</i>				
Man				
Woman	0.0406	0.0126	3.2123	0.0013
Preferred not to respond	-0.0031	0.0218	-0.1432	0.8862
<i>Sexual Orientation</i>				
Straight (Heterosexual)				
LGBQ+	0.0299	0.0173	1.7297	0.0837
Preferred not to respond	-0.0176	0.0171	-1.0319	0.3021
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0074	0.0097	-0.7581	0.4490
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0124	0.0088	-1.4108	0.1593
Percent of Instructional Staff that Are Full-Time	-0.0096	0.0092	-1.0486	0.2951
Percent of Expenditures on Instruction	-0.0118	0.0095	-1.2349	0.2178
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline				
Hard-Pure-Nonlife (HPN) Discipline	0.2921	0.0548	5.3334	0.0000
Hard-Applied-Life (HAL) Discipline	-0.0459	0.0597	-0.7696	0.4426
Hard-Applied-Nonlife (HAN) Discipline	0.1360	0.0442	3.0750	0.0026
Soft-Pure-Life (SPL) Discipline	-0.2274	0.0615	-3.6948	0.0004
Soft-Pure-Nonlife (SPN) Discipline	-0.1661	0.0413	-4.0241	0.0001
Soft-Applied-Life (SAL) Discipline	-0.0437	0.0338	-1.2916	0.1992
Soft-Applied-Nonlife (SAN) Discipline	-0.0866	0.0385	-2.2510	0.0265

Note. Since this model was examined for random effects only, both sets of effect codes were not used. Since analysis of the SAN category required the second set of Biglan effect codes, the second set of effect codes for all categorical variables were used.

Table C.29. Model CL-2.8

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9098	0.0075	121.1187	0.0000
Institution (Intercept)	0.0115	0.0019	6.1797	0.0000
Discipline (Intercept)	0.0219	0.0040	5.4560	0.0000
Discipline (Intercept) – Institutional Mean Time on Teaching (Slope) Covariance	0.0004	0.0014	0.2771	0.3909
Institutional Mean Time on Teaching (Slope)	0.0013	0.0006	2.1532	0.0157
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0379	0.0267	-1.4188	0.1566
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.0314	0.0100	-3.1428	0.0017
Upper Division	0.0158	0.0099	1.5930	0.1112
Other Division				
Course Enrollment Size				
Small Course	-0.0331	0.0089	-3.7391	0.0002
Medium Course	0.0016	0.0081	0.2001	0.8414
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0174	0.0066	-2.6558	0.0079
Meets a Gen Ed Requirement				
Course Format				
Classroom	0.1757	0.0117	14.9742	0.0000
Distance	-0.3727	0.0183	-20.3959	0.0000
Other Format				
Course Load	0.0405	0.0063	6.4622	0.0000
Years of Teaching Experience	-0.0541	0.0068	-8.0163	0.0000
Employment Status				
Part-Time	-0.0148	0.0095	-1.5687	0.1167
Full-Time				
Rank				
Professor	-0.0383	0.0130	-2.9517	0.0032
Associate Professor	-0.0015	0.0117	-0.1241	0.9013
Assistant Professor	0.0356	0.0121	2.9358	0.0033
Instructor/Lecturer	-0.0109	0.0123	-0.8911	0.3729
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0091	0.0234	-0.3874	0.6985
Black or African American	0.0638	0.0248	2.5666	0.0103
Hispanic or Latinx	0.0647	0.0289	2.2436	0.0249
White	-0.0964	0.0127	-7.5589	0.0000
Another race/ethnicity	-0.0108	0.0367	-0.2948	0.7682
Multiracial	0.0297	0.0294	1.0109	0.3121
Preferred not to respond				
Gender				
Man	-0.0373	0.0124	-3.0037	0.0027
Woman	0.0402	0.0126	3.1843	0.0015
Preferred not to respond				

Table C.29. cont.

Fixed Effects	Est.	SE	t	p two-tailed
<i>Sexual Orientation</i>				
Straight (Heterosexual)	-0.0124	0.0116	-1.0707	0.2843
LGBQ+	0.0305	0.0173	1.7683	0.0770
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0045	0.0108	-0.4118	0.6809
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0122	0.0088	-1.3977	0.1632
Percent of Instructional Staff that Are Full-Time	-0.0101	0.0092	-1.1014	0.2715
Percent of Expenditures on Instruction	-0.0121	0.0095	-1.2774	0.2025
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	0.1418	0.0470	3.0173	0.0031
Hard-Pure-Nonlife (HPN) Discipline	0.2863	0.0548	5.2287	0.0000
Hard-Applied-Life (HAL) Discipline	-0.0464	0.0596	-0.7778	0.4378
Hard-Applied-Nonlife (HAN) Discipline	0.1364	0.0442	3.0852	0.0025
Soft-Pure-Life (SPL) Discipline	-0.2280	0.0615	-3.7071	0.0004
Soft-Pure-Nonlife (SPN) Discipline	-0.1611	0.0413	-3.9035	0.0002
Soft-Applied-Life (SAL) Discipline	-0.0413	0.0338	-1.2209	0.2247
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.30. *Model CL-2.9*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9104	0.0075	121.1070	0.0000
Institution (Intercept)	0.0117	0.0019	6.2107	0.0000
Discipline (Intercept)	0.0219	0.0040	5.4680	0.0000
Discipline (Intercept) – Percent of Full-Time Faculty that Are Tenured/Tenure-Track (Slope) Covariance	0.0000	0.0012	0.0200	0.4920
Percent of Full-Time Faculty that Are Tenured/Tenure-Track (Slope)	0.0006	0.0005	1.1431	0.1265
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0390	0.0267	-1.4581	0.1454
<i>Course and Professional Control Variables</i>				
<i>Course Division</i>				
Lower Division	-0.0313	0.0100	-3.1308	0.0017
Upper Division	0.0157	0.0099	1.5891	0.1121
Other Division				
<i>Course Enrollment Size</i>				
Small Course	-0.0332	0.0088	-3.7489	0.0002
Medium Course	0.0023	0.0081	0.2806	0.7790
Large Course				

Table C.30. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0172	0.0066	-2.6145	0.0089
Meets a Gen Ed Requirement				
Course Format				
Classroom	0.1759	0.0117	14.9889	0.0000
Distance	-0.3725	0.0183	-20.3815	0.0000
Other Format				
Course Load	0.0412	0.0063	6.5809	0.0000
Years of Teaching Experience	-0.0542	0.0068	-8.0331	0.0000
Employment Status				
Part-Time	-0.0143	0.0095	-1.5080	0.1316
Full-Time				
Rank				
Professor	-0.0385	0.0130	-2.9699	0.0030
Associate Professor	-0.0005	0.0117	-0.0432	0.9656
Assistant Professor	0.0359	0.0121	2.9527	0.0032
Instructor/Lecturer	-0.0111	0.0123	-0.9050	0.3655
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0104	0.0234	-0.4445	0.6567
Black or African American	0.0635	0.0248	2.5572	0.0106
Hispanic or Latinx	0.0649	0.0289	2.2492	0.0245
White	-0.0957	0.0127	-7.5084	0.0000
Another race/ethnicity	-0.0090	0.0367	-0.2446	0.8068
Multiracial	0.0293	0.0294	0.9962	0.3192
Preferred not to respond				
Gender				
Man	-0.0376	0.0124	-3.0284	0.0025
Woman	0.0403	0.0126	3.1945	0.0014
Preferred not to respond				
Sexual Orientation				
Straight (Heterosexual)	-0.0124	0.0116	-1.0687	0.2852
LGBQ+	0.0298	0.0173	1.7246	0.0846
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0077	0.0097	-0.7883	0.4312
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0115	0.0095	-1.2202	0.2246
Percent of Instructional Staff that Are Full-Time	-0.0097	0.0092	-1.0607	0.2896
Percent of Expenditures on Instruction	-0.0119	0.0095	-1.2446	0.2143
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	0.1418	0.0470	3.0181	0.0031
Hard-Pure-Nonlife (HPN) Discipline	0.2917	0.0548	5.3270	0.0000
Hard-Applied-Life (HAL) Discipline	-0.0451	0.0597	-0.7553	0.4511
Hard-Applied-Nonlife (HAN) Discipline	0.1357	0.0442	3.0694	0.0026
Soft-Pure-Life (SPL) Discipline	-0.2283	0.0615	-3.7098	0.0004
Soft-Pure-Nonlife (SPN) Discipline	-0.1656	0.0413	-4.0120	0.0001
Soft-Applied-Life (SAL) Discipline	-0.0436	0.0338	-1.2901	0.1998
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.31. *Model CL-2.10*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9103	0.0075	121.0704	0.0000
Institution (Intercept)	0.0117	0.0019	6.2071	0.0000
Discipline (Intercept)	0.0220	0.0040	5.4738	0.0000
Discipline (Intercept) – Percent of Expenditures on Instruction (Slope) Covariance	-0.0003	0.0012	-0.2512	0.4008
Percent of Expenditures on Instruction (Slope)	0.0007	0.0005	1.2236	0.1105
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0386	0.0268	-1.4426	0.1498
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.0310	0.0100	-3.1046	0.0019
Upper Division	0.0154	0.0099	1.5607	0.1186
Other Division				
Course Enrollment Size				
Small Course	-0.0330	0.0088	-3.7337	0.0002
Medium Course	0.0024	0.0081	0.2993	0.7647
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0169	0.0066	-2.5832	0.0098
Meets a Gen Ed Requirement				
Course Format				
Classroom	0.1760	0.0117	14.9989	0.0000
Distance	-0.3724	0.0183	-20.3754	0.0000
Other Format				
Course Load	0.0412	0.0063	6.5818	0.0000
Years of Teaching Experience	-0.0540	0.0068	-7.9997	0.0000
Employment Status				
Part-Time	-0.0144	0.0095	-1.5209	0.1283
Full-Time				
Rank				
Professor	-0.0384	0.0130	-2.9658	0.0030
Associate Professor	-0.0003	0.0117	-0.0273	0.9782
Assistant Professor	0.0361	0.0121	2.9725	0.0030
Instructor/Lecturer	-0.0110	0.0123	-0.8994	0.3684
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0108	0.0234	-0.4627	0.6436
Black or African American	0.0639	0.0249	2.5732	0.0101
Hispanic or Latinx	0.0650	0.0289	2.2513	0.0244
White	-0.0959	0.0127	-7.5216	0.0000
Another race/ethnicity	-0.0095	0.0367	-0.2596	0.7952
Multiracial	0.0296	0.0294	1.0056	0.3146

Table C.31. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Preferred not to respond				
Gender				
Man	-0.0375	0.0124	-3.0176	0.0026
Woman	0.0405	0.0126	3.2050	0.0014
Preferred not to respond				
Sexual Orientation				
Straight (Heterosexual)	-0.0124	0.0116	-1.0666	0.2861
LGBQ+	0.0302	0.0173	1.7467	0.0807
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0077	0.0097	-0.7941	0.4278
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0127	0.0088	-1.4413	0.1505
Percent of Instructional Staff that Are Full-Time	-0.0097	0.0092	-1.0580	0.2908
Percent of Expenditures on Instruction	-0.0089	0.0102	-0.8728	0.3842
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	0.1406	0.0471	2.9851	0.0034
Hard-Pure-Nonlife (HPN) Discipline	0.2917	0.0548	5.3194	0.0000
Hard-Applied-Life (HAL) Discipline	-0.0419	0.0600	-0.6996	0.4851
Hard-Applied-Nonlife (HAN) Discipline	0.1372	0.0443	3.0958	0.0024
Soft-Pure-Life (SPL) Discipline	-0.2280	0.0616	-3.7009	0.0004
Soft-Pure-Nonlife (SPN) Discipline	-0.1672	0.0413	-4.0450	0.0001
Soft-Applied-Life (SAL) Discipline	-0.0451	0.0338	-1.3333	0.1852
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.32. *Model DAL-2.12*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7266	0.0060	121.0525	0.0000
Institution (Intercept)	0.0181	0.0024	7.5130	0.0000
Discipline (Intercept)	0.0490	0.0077	6.3917	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1142	0.0309	3.6933	0.0003
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.1511	0.0090	-16.8833	0.0000
Upper Division	0.1043	0.0089	11.7528	0.0000
Other Division	0.0468	0.0130	3.6021	0.0003
Course Enrollment Size				
Small Course	0.0199	0.0080	2.4904	0.0128
Medium Course	-0.0011	0.0073	-0.1492	0.8814
Large Course	-0.0189	0.0080	-2.3654	0.0180

Table C.32. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0856	0.0059	-14.5062	0.0000
Meets a Gen Ed Requirement	0.0856	0.0059	14.5062	0.0000
Course Format				
Classroom	-0.0625	0.0106	-5.9142	0.0000
Distance	-0.0071	0.0164	-0.4352	0.6634
Other Format	0.0696	0.0136	5.1268	0.0000
Course Load	0.0431	0.0056	7.6311	0.0000
Years of Teaching Experience	-0.0472	0.0061	-7.7954	0.0000
Employment Status				
Part-Time	0.0126	0.0085	1.4811	0.1386
Full-Time	-0.0126	0.0085	-1.4811	0.1386
Rank				
Professor	-0.0195	0.0116	-1.6742	0.0941
Associate Professor	-0.0055	0.0105	-0.5219	0.6017
Assistant Professor	0.0396	0.0109	3.6406	0.0003
Instructor/Lecturer	-0.0274	0.0110	-2.4840	0.0130
Other Rank	0.0127	0.0166	0.7663	0.4435
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0221	0.0210	-1.0568	0.2906
Black or African American	0.1469	0.0226	6.5139	0.0000
Hispanic or Latinx	0.0958	0.0260	3.6835	0.0002
White	-0.1694	0.0115	-14.7433	0.0000
Another race/ethnicity	0.0532	0.0329	1.6191	0.1054
Multiracial	-0.0041	0.0263	-0.1566	0.8756
Preferred not to respond	-0.1003	0.0217	-4.6205	0.0000
Gender				
Man	-0.0525	0.0111	-4.7273	0.0000
Woman	0.0510	0.0113	4.5123	0.0000
Preferred not to respond	0.0015	0.0195	0.0776	0.9382
Sexual Orientation				
Straight (Heterosexual)	-0.0012	0.0104	-0.1113	0.9114
LGBQ+	0.0276	0.0155	1.7827	0.0746
Preferred not to respond	-0.0264	0.0153	-1.7313	0.0834
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0410	0.0116	-3.5233	0.0005
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0008	0.0106	-0.0731	0.9417
Percent of Instructional Staff that Are Full-Time	-0.0385	0.0113	-3.3953	0.0007
Percent of Expenditures on Instruction	-0.0097	0.0114	-0.8496	0.3960
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2726	0.0624	-4.3660	0.0000
Hard-Pure-Nonlife (HPN) Discipline	-0.5849	0.0749	-7.8078	0.0000
Hard-Applied-Life (HAL) Discipline	0.0403	0.0781	0.5156	0.6069
Hard-Applied-Nonlife (HAN) Discipline	-0.4543	0.0585	-7.7633	0.0000
Soft-Pure-Life (SPL) Discipline	0.4618	0.0861	5.3646	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2453	0.0584	4.2009	0.0001
Soft-Applied-Life (SAL) Discipline	0.3283	0.0458	7.1694	0.0000
Soft-Applied-Nonlife (SAN) Discipline	0.2361	0.0526	4.4912	0.0000

Table C.32. cont.

Fixed Effects	Est.	SE	t	p two-tailed
<i>Interaction Terms</i>				
HPL x Institutional Mean Time on Teaching	-0.0282	0.0168	-1.6807	0.0928
HPN x Institutional Mean Time on Teaching	-0.0168	0.0149	-1.1230	0.2615
HAL x Institutional Mean Time on Teaching	-0.0171	0.0343	-0.4967	0.6194
HAN x Institutional Mean Time on Teaching	-0.0283	0.0190	-1.4850	0.1375
SPL x Institutional Mean Time on Teaching	0.0454	0.0170	2.6700	0.0076
SPN x Institutional Mean Time on Teaching	-0.0225	0.0117	-1.9231	0.0545
SAL x Institutional Mean Time on Teaching	0.0161	0.0137	1.1815	0.2374
SAN x Institutional Mean Time on Teaching	0.0512	0.0145	3.5379	0.0004
HPL x Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0203	0.0162	-1.2580	0.2084
HPN x Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0018	0.0151	-0.1206	0.9040
HAL x Percent of Full-Time Faculty that Are Tenured/Tenure-Track	0.0252	0.0337	0.7481	0.4544
HAN x Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0177	0.0194	-0.9117	0.3619
SPL x Percent of Full-Time Faculty that Are Tenured/Tenure-Track	0.0187	0.0165	1.1375	0.2553
SPN x Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0127	0.0113	-1.1194	0.2630
SAL x Percent of Full-Time Faculty that Are Tenured/Tenure-Track	0.0050	0.0117	0.4310	0.6664
SAN x Percent of Full-Time Faculty that Are Tenured/Tenure-Track	0.0035	0.0135	0.2624	0.7930
HPL x Percent of Instructional Staff that Are Full-Time	-0.0183	0.0174	-1.0549	0.2915
HPN x Percent of Instructional Staff that Are Full-Time	0.0057	0.0158	0.3635	0.7162
HAL x Percent of Instructional Staff that Are Full-Time	0.0264	0.0393	0.6717	0.5018
HAN x Percent of Instructional Staff that Are Full-Time	-0.0481	0.0204	-2.3546	0.0186
SPL x Percent of Instructional Staff that Are Full-Time	0.0209	0.0170	1.2302	0.2186
SPN x Percent of Instructional Staff that Are Full-Time	0.0286	0.0120	2.3773	0.0174
SAL x Percent of Instructional Staff that Are Full-Time	0.0157	0.0134	1.1781	0.2388
SAN x Percent of Instructional Staff that Are Full-Time	-0.0309	0.0143	-2.1566	0.0310
HPL x Percent of Expenditures on Instruction	0.0315	0.0174	1.8101	0.0703
HPN x Percent of Expenditures on Instruction	-0.0190	0.0163	-1.1669	0.2433
HAL x Percent of Expenditures on Instruction	0.0270	0.0346	0.7827	0.4338
HAN x Percent of Expenditures on Instruction	-0.0200	0.0203	-0.9893	0.3225
SPL x Percent of Expenditures on Instruction	0.0121	0.0176	0.6871	0.4920
SPN x Percent of Expenditures on Instruction	-0.0016	0.0120	-0.1311	0.8957
SAL x Percent of Expenditures on Instruction	-0.0091	0.0125	-0.7273	0.4670
SAN x Percent of Expenditures on Instruction	-0.0209	0.0141	-1.4834	0.1380

Table C.33. *Model CL-2.11*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9102	0.0075	121.1741	0.0000
Institution (Intercept)	0.0115	0.0019	6.1654	0.0000
Discipline (Intercept)	0.0221	0.0040	5.4532	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0354	0.0269	-1.3145	0.1893
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.0313	0.0100	-3.1298	0.0018
Upper Division	0.0154	0.0099	1.5525	0.1206

Table C.33. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Other Division	0.0159	0.0145	1.0957	0.2732
Course Enrollment Size				
Small Course	-0.0327	0.0089	-3.6876	0.0002
Medium Course	0.0004	0.0081	0.0474	0.9622
Large Course	0.0323	0.0088	3.6635	0.0002
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0175	0.0066	-2.6681	0.0076
Meets a Gen Ed Requirement	0.0175	0.0066	2.6681	0.0076
Course Format				
Classroom	0.1764	0.0117	15.0200	0.0000
Distance	-0.3726	0.0183	-20.3747	0.0000
Other Format	0.1962	0.0152	12.9397	0.0000
Course Load	0.0395	0.0063	6.2919	0.0000
Years of Teaching Experience	-0.0539	0.0068	-7.9772	0.0000
Employment Status				
Part-Time	-0.0147	0.0095	-1.5547	0.1200
Full-Time	0.0147	0.0095	1.5547	0.1200
Rank				
Professor	-0.0377	0.0130	-2.9031	0.0037
Associate Professor	-0.0008	0.0117	-0.0674	0.9463
Assistant Professor	0.0350	0.0121	2.8836	0.0039
Instructor/Lecturer	-0.0110	0.0123	-0.8926	0.3721
Other Rank	0.0144	0.0185	0.7769	0.4372
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0054	0.0234	-0.2318	0.8167
Black or African American	0.0633	0.0248	2.5489	0.0108
Hispanic or Latinx	0.0647	0.0289	2.2398	0.0251
White	-0.0959	0.0128	-7.5175	0.0000
Another race/ethnicity	-0.0123	0.0368	-0.3343	0.7382
Multiracial	0.0284	0.0294	0.9639	0.3351
Preferred not to respond	-0.0428	0.0243	-1.7646	0.0776
Gender				
Man	-0.0372	0.0124	-2.9935	0.0028
Woman	0.0401	0.0126	3.1721	0.0015
Preferred not to respond	-0.0029	0.0218	-0.1329	0.8942
Sexual Orientation				
Straight (Heterosexual)	-0.0126	0.0116	-1.0856	0.2777
LGBQ+	0.0303	0.0173	1.7538	0.0795
Preferred not to respond	-0.0177	0.0171	-1.0377	0.2994
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0005	0.0111	-0.0486	0.9613
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0053	0.0102	-0.5249	0.5999
Percent of Instructional Staff that Are Full-Time	-0.0044	0.0110	-0.4038	0.6865
Percent of Expenditures on Instruction	-0.0031	0.0110	-0.2793	0.7801
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	0.1389	0.0473	2.9372	0.0039
Hard-Pure-Nonlife (HPN) Discipline	0.2893	0.0550	5.2551	0.0000
Hard-Applied-Life (HAL) Discipline	-0.0298	0.0628	-0.4743	0.6358

Table C.33. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Hard-Applied-Nonlife (HAN) Discipline	0.1366	0.0448	3.0495	0.0028
Soft-Pure-Life (SPL) Discipline	-0.2324	0.0618	-3.7594	0.0003
Soft-Pure-Nonlife (SPN) Discipline	-0.1692	0.0415	-4.0769	0.0001
Soft-Applied-Life (SAL) Discipline	-0.0467	0.0340	-1.3737	0.1724
Soft-Applied-Nonlife (SAN) Discipline	-0.0866	0.0387	-2.2373	0.0274
<i>Interaction Terms</i>				
HPL x Institutional Mean Time on Teaching	-0.0050	0.0187	-0.2681	0.7886
HPN x Institutional Mean Time on Teaching	0.0497	0.0167	2.9817	0.0029
HAL x Institutional Mean Time on Teaching	-0.0093	0.0380	-0.2447	0.8067
HAN x Institutional Mean Time on Teaching	0.0170	0.0211	0.8054	0.4206
SPL x Institutional Mean Time on Teaching	-0.0002	0.0190	-0.0116	0.9908
SPN x Institutional Mean Time on Teaching	-0.0464	0.0130	-3.5604	0.0004
SAL x Institutional Mean Time on Teaching	-0.0269	0.0152	-1.7700	0.0767
SAN x Institutional Mean Time on Teaching	0.0211	0.0161	1.3066	0.1914
HPL x Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0263	0.0180	-1.4549	0.1457
HPN x Percent of Full-Time Faculty that Are Tenured/Tenure-Track	0.0280	0.0168	1.6620	0.0965
HAL x Percent of Full-Time Faculty that Are Tenured/Tenure-Track	0.0409	0.0370	1.1041	0.2696
HAN x Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0187	0.0216	-0.8692	0.3848
SPL x Percent of Full-Time Faculty that Are Tenured/Tenure-Track	0.0084	0.0184	0.4590	0.6462
SPN x Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0173	0.0126	-1.3745	0.1693
SAL x Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0159	0.0130	-1.2230	0.2213
SAN x Percent of Full-Time Faculty that Are Tenured/Tenure-Track	0.0009	0.0150	0.0591	0.9529
HPL x Percent of Instructional Staff that Are Full-Time	-0.0418	0.0194	-2.1548	0.0312
HPN x Percent of Instructional Staff that Are Full-Time	0.0010	0.0176	0.0569	0.9547
HAL x Percent of Instructional Staff that Are Full-Time	0.0316	0.0435	0.7249	0.4685
HAN x Percent of Instructional Staff that Are Full-Time	0.0287	0.0227	1.2650	0.2059
SPL x Percent of Instructional Staff that Are Full-Time	-0.0056	0.0190	-0.2965	0.7669
SPN x Percent of Instructional Staff that Are Full-Time	-0.0085	0.0134	-0.6373	0.5239
SAL x Percent of Instructional Staff that Are Full-Time	-0.0052	0.0148	-0.3501	0.7263
SAN x Percent of Instructional Staff that Are Full-Time	-0.0001	0.0160	-0.0067	0.9946
HPL x Percent of Expenditures on Instruction	-0.0277	0.0194	-1.4286	0.1531
HPN x Percent of Expenditures on Instruction	-0.0423	0.0182	-2.3239	0.0201
HAL x Percent of Expenditures on Instruction	0.0700	0.0383	1.8274	0.0676
HAN x Percent of Expenditures on Instruction	0.0309	0.0226	1.3712	0.1703
SPL x Percent of Expenditures on Instruction	-0.0072	0.0196	-0.3662	0.7142
SPN x Percent of Expenditures on Instruction	0.0015	0.0134	0.1103	0.9122
SAL x Percent of Expenditures on Instruction	-0.0110	0.0140	-0.7916	0.4286
SAN x Percent of Expenditures on Instruction	-0.0142	0.0157	-0.9046	0.3657

Table C.34. *Model DAL-3.1*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7276	0.0060	120.6773	0.0000
Institution (Intercept)	0.0178	0.0024	7.4057	0.0000
Institution (Intercept) – Black or African American (Slope)	-0.0041	0.0025	-1.6336	0.0512
Covariance				

Table C.34. cont.

Random Effects	Est.	SE	Wald Z	p one-tailed
Black or African American (Slope)	0.0020	0.0043	0.4577	0.3236
Discipline (Intercept)	0.0480	0.0075	6.3942	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1147	0.0306	3.7509	0.0002
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.1509	0.0090	-16.8568	0.0000
Upper Division	0.1038	0.0089	11.7007	0.0000
Other Division				
Course Enrollment Size				
Small Course	0.0209	0.0080	2.6066	0.0092
Medium Course	0.0014	0.0073	0.1891	0.8500
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0859	0.0059	-14.5659	0.0000
Meets a Gen Ed Requirement				
Course Format				
Classroom	-0.0619	0.0106	-5.8604	0.0000
Distance	-0.0084	0.0164	-0.5137	0.6075
Other Format				
Course Load	0.0439	0.0056	7.7961	0.0000
Years of Teaching Experience	-0.0469	0.0061	-7.7535	0.0000
Employment Status				
Part-Time	0.0124	0.0085	1.4610	0.1440
Full-Time				
Rank				
Professor	-0.0204	0.0116	-1.7549	0.0793
Associate Professor	-0.0063	0.0105	-0.6006	0.5481
Assistant Professor	0.0395	0.0109	3.6298	0.0003
Instructor/Lecturer	-0.0270	0.0110	-2.4532	0.0142
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0218	0.0209	-1.0397	0.2985
Black or African American	0.1551	0.0225	6.8813	0.0000
Hispanic or Latinx	0.0945	0.0260	3.6351	0.0003
White	-0.1698	0.0115	-14.8046	0.0000
Another race/ethnicity	0.0521	0.0329	1.5835	0.1133
Multiracial	-0.0080	0.0263	-0.3037	0.7614
Preferred not to respond				
Gender				
Man	-0.0525	0.0111	-4.7220	0.0000
Woman	0.0510	0.0113	4.5005	0.0000
Preferred not to respond				
Sexual Orientation				
Straight (Heterosexual)	-0.0018	0.0104	-0.1689	0.8658
LGBQ+	0.0271	0.0155	1.7521	0.0798
Preferred not to respond				

Table C.34. cont.

Fixed Effects	Est.	SE	t	p two-tailed
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0377	0.0105	-3.5818	0.0004
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0040	0.0094	-0.4295	0.6679
Percent of Instructional Staff that Are Full-Time	-0.0341	0.0098	-3.4748	0.0006
Percent of Expenditures on Instruction	-0.0135	0.0102	-1.3168	0.1890
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2758	0.0618	-4.4651	0.0000
Hard-Pure-Nonlife (HPN) Discipline	-0.5822	0.0742	-7.8490	0.0000
Hard-Applied-Life (HAL) Discipline	0.0423	0.0753	0.5615	0.5753
Hard-Applied-Nonlife (HAN) Discipline	-0.4506	0.0577	-7.8067	0.0000
Soft-Pure-Life (SPL) Discipline	0.4624	0.0852	5.4255	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2446	0.0578	4.2326	0.0001
Soft-Applied-Life (SAL) Discipline	0.3274	0.0453	7.2266	0.0000
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.35. *Model DAL-3.2*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7275	0.0060	120.8380	0.0000
Institution (Intercept)	0.0182	0.0024	7.4646	0.0000
Institution (Intercept) – Hispanic or Latinx (Slope) Covariance	0.0013	0.0024	0.5282	0.2987
Hispanic or Latinx (Slope)	0.0033	0.0043	0.7699	0.2207
Discipline (Intercept)	0.0481	0.0075	6.3937	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1140	0.0306	3.7219	0.0002
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.1512	0.0090	-16.8888	0.0000
Upper Division	0.1041	0.0089	11.7315	0.0000
Other Division				
Course Enrollment Size				
Small Course	0.0207	0.0080	2.5814	0.0098
Medium Course	0.0014	0.0073	0.1955	0.8450
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0860	0.0059	-14.5815	0.0000
Meets a Gen Ed Requirement				
Course Format				
Classroom	-0.0620	0.0106	-5.8673	0.0000
Distance	-0.0085	0.0164	-0.5196	0.6034
Other Format				

Table C.35. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Course Load	0.0436	0.0056	7.7405	0.0000
Years of Teaching Experience	-0.0470	0.0061	-7.7644	0.0000
Employment Status				
Part-Time	0.0126	0.0085	1.4811	0.1386
Full-Time				
Rank				
Professor	-0.0206	0.0116	-1.7727	0.0763
Associate Professor	-0.0063	0.0105	-0.5990	0.5492
Assistant Professor	0.0392	0.0109	3.6023	0.0003
Instructor/Lecturer	-0.0274	0.0110	-2.4805	0.0131
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0203	0.0210	-0.9707	0.3317
Black or African American	0.1475	0.0226	6.5312	0.0000
Hispanic or Latinx	0.0951	0.0267	3.5566	0.0004
White	-0.1689	0.0115	-14.6616	0.0000
Another race/ethnicity	0.0534	0.0329	1.6224	0.1047
Multiracial	-0.0066	0.0263	-0.2503	0.8023
Preferred not to respond				
Gender				
Man	-0.0523	0.0111	-4.7014	0.0000
Woman	0.0513	0.0113	4.5336	0.0000
Preferred not to respond				
Sexual Orientation				
Straight (Heterosexual)	-0.0019	0.0104	-0.1861	0.8524
LGBQ+	0.0274	0.0155	1.7730	0.0762
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0397	0.0106	-3.7553	0.0002
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0033	0.0095	-0.3520	0.7251
Percent of Instructional Staff that Are Full-Time	-0.0354	0.0099	-3.5853	0.0004
Percent of Expenditures on Instruction	-0.0149	0.0103	-1.4428	0.1502
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2763	0.0618	-4.4706	0.0000
Hard-Pure-Nonlife (HPN) Discipline	-0.5821	0.0742	-7.8451	0.0000
Hard-Applied-Life (HAL) Discipline	0.0413	0.0753	0.5483	0.5844
Hard-Applied-Nonlife (HAN) Discipline	-0.4512	0.0577	-7.8143	0.0000
Soft-Pure-Life (SPL) Discipline	0.4634	0.0853	5.4358	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2451	0.0578	4.2410	0.0001
Soft-Applied-Life (SAL) Discipline	0.3273	0.0453	7.2218	0.0000
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.36. Model DAL-3.3

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7273	0.0060	120.6484	0.0000
Institution (Intercept)	0.0228	0.0034	6.7088	0.0000
Institution (Intercept) – White (Slope) Covariance	-0.0042	0.0019	-2.2084	0.0136
White (Slope)	0.0014	0.0015	0.9296	0.1763
Discipline (Intercept)	0.0482	0.0075	6.3962	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1131	0.0309	3.6551	0.0003
<i>Course and Professional Control Variables</i>				
<i>Course Division</i>				
Lower Division	-0.1510	0.0089	-16.8717	0.0000
Upper Division	0.1041	0.0089	11.7370	0.0000
Other Division				
<i>Course Enrollment Size</i>				
Small Course	0.0208	0.0080	2.6053	0.0092
Medium Course	0.0013	0.0073	0.1818	0.8558
Large Course				
<i>Course Meets a General Education Requirement</i>				
Does Not Meet a Gen Ed Requirement	-0.0859	0.0059	-14.5737	0.0000
Meets a Gen Ed Requirement				
<i>Course Format</i>				
Classroom	-0.0619	0.0106	-5.8622	0.0000
Distance	-0.0084	0.0164	-0.5146	0.6068
Other Format				
<i>Course Load</i>				
Years of Teaching Experience	0.0435	0.0056	7.7183	0.0000
Employment Status	-0.0471	0.0061	-7.7824	0.0000
<i>Employment Status</i>				
Part-Time	0.0127	0.0085	1.4989	0.1339
Full-Time				
<i>Rank</i>				
Professor	-0.0204	0.0116	-1.7515	0.0799
Associate Professor	-0.0064	0.0105	-0.6134	0.5396
Assistant Professor	0.0396	0.0109	3.6355	0.0003
Instructor/Lecturer	-0.0274	0.0110	-2.4867	0.0129
Other Rank				
<i>Faculty Identities</i>				
<i>Race/Ethnicity</i>				
Asian, Native Hawaiian, or other Pacific Islander	-0.0194	0.0210	-0.9255	0.3547
Black or African American	0.1443	0.0227	6.3512	0.0000
Hispanic or Latinx	0.0927	0.0261	3.5509	0.0004
White	-0.1678	0.0118	-14.2656	0.0000
Another race/ethnicity	0.0550	0.0329	1.6706	0.0948
Multiracial	-0.0059	0.0264	-0.2234	0.8232
Preferred not to respond				
<i>Gender</i>				
Man	-0.0526	0.0111	-4.7307	0.0000
Woman	0.0509	0.0113	4.4939	0.0000
Preferred not to respond				

Table C.36. cont.

Fixed Effects	Est.	SE	t	p two-tailed
<i>Sexual Orientation</i>				
Straight (Heterosexual)	-0.0019	0.0104	-0.1799	0.8572
LGBQ+	0.0275	0.0155	1.7796	0.0752
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0383	0.0104	-3.6737	0.0003
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0037	0.0094	-0.3935	0.6943
Percent of Instructional Staff that Are Full-Time	-0.0349	0.0098	-3.5711	0.0004
Percent of Expenditures on Instruction	-0.0143	0.0102	-1.4035	0.1616
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2761	0.0619	-4.4625	0.0000
Hard-Pure-Nonlife (HPN) Discipline	-0.5818	0.0743	-7.8324	0.0000
Hard-Applied-Life (HAL) Discipline	0.0409	0.0754	0.5425	0.5883
Hard-Applied-Nonlife (HAN) Discipline	-0.4501	0.0578	-7.7864	0.0000
Soft-Pure-Life (SPL) Discipline	0.4624	0.0854	5.4175	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2452	0.0579	4.2360	0.0001
Soft-Applied-Life (SAL) Discipline	0.3272	0.0454	7.2121	0.0000
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.37. *Model DAL-3.4*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7275	0.0060	120.6979	0.0000
Institution (Intercept)	0.0177	0.0024	7.3380	0.0000
Institution (Intercept) – Another race/ethnicity (Slope)	-0.0031	0.0027	-1.1228	
Covariance				0.1308
Another race/ethnicity (Slope)	0.0033	0.0053	0.6113	0.2705
Discipline (Intercept)	0.0481	0.0075	6.3945	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1143	0.0306	3.7376	0.0002
<i>Course and Professional Control Variables</i>				
<i>Course Division</i>				
Lower Division	-0.1510	0.0090	-16.8673	0.0000
Upper Division	0.1039	0.0089	11.7121	0.0000
Other Division				
<i>Course Enrollment Size</i>				
Small Course	0.0208	0.0080	2.6053	0.0092
Medium Course	0.0013	0.0073	0.1756	0.8606
Large Course				
<i>Course Meets a General Education Requirement</i>				
Does Not Meet a Gen Ed Requirement	-0.0859	0.0059	-14.5687	0.0000
Meets a Gen Ed Requirement				

Table C.37. cont.

Fixed Effects	Est.	SE	t	p two-tailed
<i>Course Format</i>				
Classroom	-0.0619	0.0106	-5.8644	0.0000
Distance	-0.0085	0.0164	-0.5179	0.6045
Other Format				
Course Load	0.0438	0.0056	7.7632	0.0000
Years of Teaching Experience	-0.0469	0.0061	-7.7545	0.0000
<i>Employment Status</i>				
Part-Time	0.0125	0.0085	1.4650	0.1429
Full-Time				
<i>Rank</i>				
Professor	-0.0204	0.0116	-1.7545	0.0794
Associate Professor	-0.0063	0.0105	-0.5979	0.5499
Assistant Professor	0.0394	0.0109	3.6220	0.0003
Instructor/Lecturer	-0.0273	0.0110	-2.4784	0.0132
Other Rank				
<i>Faculty Identities</i>				
<i>Race/Ethnicity</i>				
Asian, Native Hawaiian, or other Pacific Islander	-0.0208	0.0209	-0.9913	0.3215
Black or African American	0.1473	0.0225	6.5361	0.0000
Hispanic or Latinx	0.0954	0.0260	3.6706	0.0002
White	-0.1691	0.0115	-14.7133	0.0000
Another race/ethnicity	0.0548	0.0332	1.6514	0.0989
Multiracial	-0.0070	0.0263	-0.2659	0.7903
Preferred not to respond				
<i>Gender</i>				
Man	-0.0524	0.0111	-4.7132	0.0000
Woman	0.0511	0.0113	4.5095	0.0000
Preferred not to respond				
<i>Sexual Orientation</i>				
Straight (Heterosexual)	-0.0018	0.0104	-0.1742	0.8617
LGBQ+	0.0274	0.0155	1.7701	0.0767
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0395	0.0106	-3.7371	0.0002
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0035	0.0095	-0.3733	0.7092
Percent of Instructional Staff that Are Full-Time	-0.0351	0.0099	-3.5653	0.0004
Percent of Expenditures on Instruction	-0.0141	0.0103	-1.3703	0.1717
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2763	0.0618	-4.4710	0.0000
Hard-Pure-Nonlife (HPN) Discipline	-0.5818	0.0742	-7.8402	0.0000
Hard-Applied-Life (HAL) Discipline	0.0416	0.0753	0.5530	0.5812
Hard-Applied-Nonlife (HAN) Discipline	-0.4506	0.0577	-7.8019	0.0000
Soft-Pure-Life (SPL) Discipline	0.4628	0.0853	5.4285	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2447	0.0578	4.2319	0.0001
Soft-Applied-Life (SAL) Discipline	0.3274	0.0453	7.2219	0.0000
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.38. *Model DAL-3.5*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7276	0.0060	120.7233	0.0000
Institution (Intercept)	0.0180	0.0024	7.4373	0.0000
Institution (Intercept) – Multiracial (Slope) Covariance	-0.0017	0.0025	-0.6527	0.2570
Multiracial (Slope)	0.0014	0.0045	0.3229	0.3734
Discipline (Intercept)	0.0481	0.0075	6.3944	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1141	0.0306	3.7286	0.0002
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.1510	0.0090	-16.8725	0.0000
Upper Division	0.1039	0.0089	11.7123	0.0000
Other Division				
Course Enrollment Size				
Small Course	0.0208	0.0080	2.5969	0.0094
Medium Course	0.0013	0.0073	0.1824	0.8553
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0859	0.0059	-14.5730	0.0000
Meets a Gen Ed Requirement				
Course Format				
Classroom	-0.0619	0.0106	-5.8602	0.0000
Distance	-0.0085	0.0164	-0.5197	0.6033
Other Format				
Course Load	0.0438	0.0056	7.7691	0.0000
Years of Teaching Experience	-0.0469	0.0061	-7.7540	0.0000
Employment Status				
Part-Time	0.0124	0.0085	1.4561	0.1454
Full-Time				
Rank				
Professor	-0.0206	0.0116	-1.7682	0.0770
Associate Professor	-0.0064	0.0105	-0.6056	0.5448
Assistant Professor	0.0393	0.0109	3.6105	0.0003
Instructor/Lecturer	-0.0272	0.0110	-2.4638	0.0138
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0205	0.0209	-0.9778	0.3282
Black or African American	0.1473	0.0225	6.5311	0.0000
Hispanic or Latinx	0.0953	0.0260	3.6638	0.0002
White	-0.1688	0.0115	-14.6929	0.0000
Another race/ethnicity	0.0532	0.0329	1.6162	0.1061
Multiracial	-0.0059	0.0265	-0.2241	0.8227
Preferred not to respond				

Table C.38. cont.

Fixed Effects	Est.	SE	t	p two-tailed
<i>Gender</i>				
Man	-0.0524	0.0111	-4.7144	0.0000
Woman	0.0511	0.0113	4.5136	0.0000
Preferred not to respond				
<i>Sexual Orientation</i>				
Straight (Heterosexual)	-0.0019	0.0104	-0.1809	0.8564
LGBQ+	0.0272	0.0155	1.7591	0.0786
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0394	0.0106	-3.7218	0.0002
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0037	0.0095	-0.3875	0.6987
Percent of Instructional Staff that Are Full-Time	-0.0351	0.0099	-3.5483	0.0005
Percent of Expenditures on Instruction	-0.0138	0.0103	-1.3369	0.1823
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2760	0.0618	-4.4678	0.0000
Hard-Pure-Nonlife (HPN) Discipline	-0.5821	0.0742	-7.8467	0.0000
Hard-Applied-Life (HAL) Discipline	0.0416	0.0753	0.5526	0.5814
Hard-Applied-Nonlife (HAN) Discipline	-0.4509	0.0577	-7.8107	0.0000
Soft-Pure-Life (SPL) Discipline	0.4630	0.0852	5.4321	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2450	0.0578	4.2385	0.0001
Soft-Applied-Life (SAL) Discipline	0.3273	0.0453	7.2234	0.0000
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.39. *Model DAL-3.6*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7271	0.0060	120.6670	0.0000
Institution (Intercept)	0.0184	0.0027	6.6969	0.0000
Institution (Intercept) – Man (Slope) Covariance	-0.0005	0.0017	-0.3190	0.3749
Man (Slope)	0.0021	0.0017	1.1950	0.1160
Discipline (Intercept)	0.0481	0.0075	6.3926	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1135	0.0306	3.7034	0.0003
<i>Course and Professional Control Variables</i>				
<i>Course Division</i>				
Lower Division	-0.1510	0.0090	-16.8738	0.0000
Upper Division	0.1039	0.0089	11.7060	0.0000
Other Division				
<i>Course Enrollment Size</i>				
Small Course	0.0207	0.0080	2.5862	0.0097
Medium Course	0.0015	0.0073	0.2010	0.8407
Large Course				

Table C.39. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0859	0.0059	-14.5704	0.0000
Meets a Gen Ed Requirement				
Course Format				
Classroom	-0.0621	0.0106	-5.8789	0.0000
Distance	-0.0087	0.0164	-0.5300	0.5961
Other Format				
Course Load	0.0437	0.0056	7.7544	0.0000
Years of Teaching Experience	-0.0470	0.0061	-7.7634	0.0000
Employment Status				
Part-Time	0.0123	0.0085	1.4418	0.1494
Full-Time				
Rank				
Professor	-0.0205	0.0116	-1.7679	0.0771
Associate Professor	-0.0064	0.0105	-0.6097	0.5421
Assistant Professor	0.0391	0.0109	3.5912	0.0003
Instructor/Lecturer	-0.0272	0.0110	-2.4673	0.0136
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0203	0.0209	-0.9705	0.3318
Black or African American	0.1469	0.0226	6.5113	0.0000
Hispanic or Latinx	0.0953	0.0260	3.6626	0.0003
White	-0.1684	0.0115	-14.6556	0.0000
Another race/ethnicity	0.0535	0.0329	1.6268	0.1038
Multiracial	-0.0066	0.0263	-0.2493	0.8031
Preferred not to respond				
Gender				
Man	-0.0513	0.0115	-4.4497	0.0000
Woman	0.0512	0.0113	4.5210	0.0000
Preferred not to respond				
Sexual Orientation				
Straight (Heterosexual)	-0.0020	0.0104	-0.1960	0.8446
LGBQ+	0.0273	0.0155	1.7616	0.0781
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0400	0.0106	-3.7666	0.0002
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0033	0.0095	-0.3477	0.7283
Percent of Instructional Staff that Are Full-Time	-0.0355	0.0099	-3.5827	0.0004
Percent of Expenditures on Instruction	-0.0146	0.0103	-1.4094	0.1598
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2762	0.0618	-4.4681	0.0000
Hard-Pure-Nonlife (HPN) Discipline	-0.5817	0.0742	-7.8372	0.0000
Hard-Applied-Life (HAL) Discipline	0.0415	0.0753	0.5516	0.5821
Hard-Applied-Nonlife (HAN) Discipline	-0.4515	0.0578	-7.8172	0.0000
Soft-Pure-Life (SPL) Discipline	0.4629	0.0853	5.4279	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2451	0.0578	4.2395	0.0001
Soft-Applied-Life (SAL) Discipline	0.3273	0.0453	7.2201	0.0000
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.40. *Model DAL-3.7*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7271	0.0060	120.6670	0.0000
Institution (Intercept)	0.0184	0.0027	6.6969	0.0000
Institution (Intercept) – Preferred not to respond - Gender (Slope) Covariance	0.0005	0.0017	0.3190	0.3749
Preferred not to respond - Gender (Slope)	0.0021	0.0017	1.1950	0.1160
Discipline (Intercept)	0.0481	0.0075	6.3926	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1135	0.0306	3.7034	0.0003
<i>Course and Professional Control Variables</i>				
<i>Course Division</i>				
Lower Division				
Upper Division	0.1039	0.0089	11.7060	0.0000
Other Division	0.0472	0.0130	3.6269	0.0003
<i>Course Enrollment Size</i>				
Small Course				
Medium Course	0.0015	0.0073	0.2010	0.8407
Large Course	-0.0222	0.0080	-2.7859	0.0053
<i>Course Meets a General Education Requirement</i>				
Does Not Meet a Gen Ed Requirement				
Meets a Gen Ed Requirement	0.0859	0.0059	14.5704	0.0000
<i>Course Format</i>				
Classroom				
Distance	-0.0087	0.0164	-0.5300	0.5961
Other Format	0.0708	0.0136	5.2119	0.0000
Course Load	0.0437	0.0056	7.7544	0.0000
Years of Teaching Experience	-0.0470	0.0061	-7.7634	0.0000
<i>Employment Status</i>				
Part-Time				
Full-Time	-0.0123	0.0085	-1.4418	0.1494
<i>Rank</i>				
Professor				
Associate Professor	-0.0064	0.0105	-0.6097	0.5421
Assistant Professor	0.0391	0.0109	3.5912	0.0003
Instructor/Lecturer	-0.0272	0.0110	-2.4673	0.0136
Other Rank	0.0151	0.0166	0.9085	0.3636
<i>Faculty Identities</i>				
<i>Race/Ethnicity</i>				
Asian, Native Hawaiian, or other Pacific Islander				
Black or African American	0.1469	0.0226	6.5113	0.0000
Hispanic or Latinx	0.0953	0.0260	3.6626	0.0003
White	-0.1684	0.0115	-14.6556	0.0000
Another race/ethnicity	0.0535	0.0329	1.6268	0.1038
Multiracial	-0.0066	0.0263	-0.2493	0.8031

Table C.40. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Preferred not to respond	-0.1004	0.0217	-4.6212	0.0000
Gender				
Man				
Woman	0.0512	0.0113	4.5210	0.0000
Preferred not to respond	0.0001	0.0198	0.0067	0.9947
Sexual Orientation				
Straight (Heterosexual)				
LGBQ+	0.0273	0.0155	1.7616	0.0781
Preferred not to respond	-0.0252	0.0153	-1.6523	0.0985
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0400	0.0106	-3.7666	0.0002
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0033	0.0095	-0.3477	0.7283
Percent of Instructional Staff that Are Full-Time	-0.0355	0.0099	-3.5827	0.0004
Percent of Expenditures on Instruction	-0.0146	0.0103	-1.4094	0.1598
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline				
Hard-Pure-Nonlife (HPN) Discipline	-0.5817	0.0742	-7.8372	0.0000
Hard-Applied-Life (HAL) Discipline	0.0415	0.0753	0.5516	0.5821
Hard-Applied-Nonlife (HAN) Discipline	-0.4515	0.0578	-7.8172	0.0000
Soft-Pure-Life (SPL) Discipline	0.4629	0.0853	5.4279	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2451	0.0578	4.2395	0.0001
Soft-Applied-Life (SAL) Discipline	0.3273	0.0453	7.2201	0.0000
Soft-Applied-Nonlife (SAN) Discipline	0.2326	0.0520	4.4698	0.0000

Note. Since this model was examined for random effects only, both sets of effect codes were not used. Since analysis of the Preferred not to respond (Gender) category required the second set of Gender effect codes, the second set of effect codes for all categorical variables were used.

Table C.41. *Model DAL-3.8*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7276	0.0060	120.6752	0.0000
Institution (Intercept)	0.0210	0.0034	6.1080	0.0000
Institution (Intercept) – Straight (Slope) Covariance	-0.0021	0.0018	-1.1835	0.1183
Straight (Slope)	0.0002	0.0013	0.1600	0.4364
Discipline (Intercept)	0.0477	0.0074	6.4335	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1134	0.0307	3.6904	0.0003
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.1509	0.0090	-16.8643	0.0000
Upper Division	0.1039	0.0089	11.7125	0.0000
Other Division				

Table C.41. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Course Enrollment Size				
Small Course	0.0209	0.0080	2.6084	0.0091
Medium Course	0.0014	0.0073	0.1929	0.8471
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0859	0.0059	-14.5774	0.0000
Meets a Gen Ed Requirement				
Course Format				
Classroom	-0.0618	0.0106	-5.8489	0.0000
Distance	-0.0088	0.0164	-0.5344	0.5931
Other Format				
Course Load	0.0438	0.0056	7.7716	0.0000
Years of Teaching Experience	-0.0469	0.0061	-7.7450	0.0000
Employment Status				
Part-Time	0.0124	0.0085	1.4643	0.1431
Full-Time				
Rank				
Professor	-0.0205	0.0116	-1.7633	0.0779
Associate Professor	-0.0064	0.0105	-0.6076	0.5435
Assistant Professor	0.0395	0.0109	3.6301	0.0003
Instructor/Lecturer	-0.0271	0.0110	-2.4549	0.0141
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0205	0.0209	-0.9805	0.3269
Black or African American	0.1480	0.0225	6.5756	0.0000
Hispanic or Latinx	0.0959	0.0260	3.6879	0.0002
White	-0.1689	0.0115	-14.7081	0.0000
Another race/ethnicity	0.0529	0.0329	1.6078	0.1079
Multiracial	-0.0071	0.0263	-0.2687	0.7881
Preferred not to respond				
Gender				
Man	-0.0524	0.0111	-4.7140	0.0000
Woman	0.0511	0.0113	4.5152	0.0000
Preferred not to respond				
Sexual Orientation				
Straight (Heterosexual)	-0.0016	0.0104	-0.1521	0.8792
LGBQ+	0.0271	0.0155	1.7490	0.0803
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0384	0.0105	-3.6543	0.0003
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0035	0.0094	-0.3762	0.7070
Percent of Instructional Staff that Are Full-Time	-0.0339	0.0098	-3.4629	0.0006
Percent of Expenditures on Instruction	-0.0139	0.0102	-1.3540	0.1768
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2758	0.0616	-4.4761	0.0000
Hard-Pure-Nonlife (HPN) Discipline	-0.5824	0.0740	-7.8743	0.0000
Hard-Applied-Life (HAL) Discipline	0.0420	0.0751	0.5598	0.5765
Hard-Applied-Nonlife (HAN) Discipline	-0.4510	0.0576	-7.8334	0.0000

Table C.41. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Soft-Pure-Life (SPL) Discipline	0.4626	0.0850	5.4445	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2448	0.0576	4.2492	0.0000
Soft-Applied-Life (SAL) Discipline	0.3277	0.0452	7.2527	0.0000
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.42. *Model DAL-3.9*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7277	0.0060	120.7885	0.0000
Institution (Intercept)	0.0180	0.0024	7.4677	0.0000
Institution (Intercept) – LGBQ+ (Slope) Covariance	-0.0021	0.0022	-0.9792	0.1637
LGBQ+ (Slope)	0.0007	0.0028	0.2535	0.3999
Discipline (Intercept)	0.0481	0.0075	6.3942	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1142	0.0306	3.7306	0.0002
<i>Course and Professional Control Variables</i>				
<i>Course Division</i>				
Lower Division	-0.1511	0.0090	-16.8809	0.0000
Upper Division	0.1039	0.0089	11.7132	0.0000
Other Division				
<i>Course Enrollment Size</i>				
Small Course	0.0207	0.0080	2.5875	0.0097
Medium Course	0.0015	0.0073	0.2000	0.8415
Large Course				
<i>Course Meets a General Education Requirement</i>				
Does Not Meet a Gen Ed Requirement	-0.0859	0.0059	-14.5719	0.0000
Meets a Gen Ed Requirement				
<i>Course Format</i>				
Classroom	-0.0619	0.0106	-5.8608	0.0000
Distance	-0.0086	0.0164	-0.5218	0.6018
Other Format				
Course Load	0.0436	0.0056	7.7402	0.0000
Years of Teaching Experience	-0.0469	0.0061	-7.7550	0.0000
<i>Employment Status</i>				
Part-Time	0.0124	0.0085	1.4636	0.1433
Full-Time				
<i>Rank</i>				
Professor	-0.0206	0.0116	-1.7702	0.0767
Associate Professor	-0.0064	0.0105	-0.6121	0.5405
Assistant Professor	0.0393	0.0109	3.6155	0.0003
Instructor/Lecturer	-0.0270	0.0110	-2.4450	0.0145

Table C.42. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Other Rank				
<i>Faculty Identities</i>				
<i>Race/Ethnicity</i>				
Asian, Native Hawaiian, or other Pacific Islander	-0.0204	0.0209	-0.9754	0.3293
Black or African American	0.1474	0.0225	6.5399	0.0000
Hispanic or Latinx	0.0954	0.0260	3.6666	0.0002
White	-0.1687	0.0115	-14.6792	0.0000
Another race/ethnicity	0.0535	0.0329	1.6263	0.1039
Multiracial	-0.0071	0.0263	-0.2691	0.7879
Preferred not to respond				
<i>Gender</i>				
Man	-0.0524	0.0111	-4.7157	0.0000
Woman	0.0510	0.0113	4.5050	0.0000
Preferred not to respond				
<i>Sexual Orientation</i>				
Straight (Heterosexual)	-0.0020	0.0104	-0.1888	0.8503
LGBQ+	0.0277	0.0156	1.7816	0.0755
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0386	0.0106	-3.6456	0.0003
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0033	0.0095	-0.3499	0.7267
Percent of Instructional Staff that Are Full-Time	-0.0346	0.0099	-3.5094	0.0005
Percent of Expenditures on Instruction	-0.0151	0.0103	-1.4617	0.1449
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2759	0.0618	-4.4639	0.0000
Hard-Pure-Nonlife (HPN) Discipline	-0.5826	0.0742	-7.8490	0.0000
Hard-Applied-Life (HAL) Discipline	0.0419	0.0753	0.5571	0.5783
Hard-Applied-Nonlife (HAN) Discipline	-0.4509	0.0578	-7.8059	0.0000
Soft-Pure-Life (SPL) Discipline	0.4629	0.0853	5.4277	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2448	0.0578	4.2331	0.0001
Soft-Applied-Life (SAL) Discipline	0.3275	0.0453	7.2238	0.0000
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.43. *Model DAL-3.10*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7276	0.0060	120.6752	0.0000
Institution (Intercept)	0.0210	0.0034	6.1080	0.0000
Institution (Intercept) – Preferred not to respond – Sexual Orientation (Slope) Covariance	0.0021	0.0018	1.1835	0.1183
Preferred not to respond – Sexual Orientation (Slope)	0.0002	0.0013	0.1600	0.4364
Discipline (Intercept)	0.0477	0.0074	6.4335	0.0000

Table C.43. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1134	0.0307	3.6904	0.0003
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division				
Upper Division	0.1039	0.0089	11.7125	0.0000
Other Division	0.0470	0.0130	3.6143	0.0003
Course Enrollment Size				
Small Course				
Medium Course	0.0014	0.0073	0.1929	0.8471
Large Course	-0.0223	0.0079	-2.8017	0.0051
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement				
Meets a Gen Ed Requirement	0.0859	0.0059	14.5774	0.0000
Course Format				
Classroom				
Distance	-0.0088	0.0164	-0.5344	0.5931
Other Format	0.0705	0.0136	5.1940	0.0000
Course Load	0.0438	0.0056	7.7716	0.0000
Years of Teaching Experience	-0.0469	0.0061	-7.7450	0.0000
Employment Status				
Part-Time				
Full-Time	-0.0124	0.0085	-1.4643	0.1431
Rank				
Professor				
Associate Professor	-0.0064	0.0105	-0.6076	0.5435
Assistant Professor	0.0395	0.0109	3.6301	0.0003
Instructor/Lecturer	-0.0271	0.0110	-2.4549	0.0141
Other Rank	0.0144	0.0166	0.8698	0.3844
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander				
Black or African American	0.1480	0.0225	6.5756	0.0000
Hispanic or Latinx	0.0959	0.0260	3.6879	0.0002
White	-0.1689	0.0115	-14.7081	0.0000
Another race/ethnicity	0.0529	0.0329	1.6078	0.1079
Multiracial	-0.0071	0.0263	-0.2687	0.7881
Preferred not to respond	-0.1003	0.0217	-4.6130	0.0000
Gender				
Man				
Woman	0.0511	0.0113	4.5152	0.0000
Preferred not to respond	0.0013	0.0195	0.0676	0.9461
Sexual Orientation				
Straight (Heterosexual)				
LGBQ+	0.0271	0.0155	1.7490	0.0803
Preferred not to respond	-0.0255	0.0153	-1.6663	0.0958
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0384	0.0105	-3.6543	0.0003
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0035	0.0094	-0.3762	0.7070
Percent of Instructional Staff that Are Full-Time	-0.0339	0.0098	-3.4629	0.0006

Table C.43. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Percent of Expenditures on Instruction	-0.0139	0.0102	-1.3540	0.1768
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline				
Hard-Pure-Nonlife (HPN) Discipline	-0.5824	0.0740	-7.8743	0.0000
Hard-Applied-Life (HAL) Discipline	0.0420	0.0751	0.5598	0.5765
Hard-Applied-Nonlife (HAN) Discipline	-0.4510	0.0576	-7.8334	0.0000
Soft-Pure-Life (SPL) Discipline	0.4626	0.0850	5.4445	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2448	0.0576	4.2492	0.0000
Soft-Applied-Life (SAL) Discipline	0.3277	0.0452	7.2527	0.0000
Soft-Applied-Nonlife (SAN) Discipline	0.2320	0.0519	4.4753	0.0000

Note. Since this model was examined for random effects only, both sets of effect codes were not used. Since analysis of the Preferred not to respond (Sexual Orientation) category required the second set of Sexual Orientation effect codes, the second set of effect codes for all categorical variables were used.

Table C.44. *Model DAL-3.11*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7269	0.0060	120.9996	0.0000
Institution (Intercept)	0.0183	0.0024	7.5563	0.0000
Discipline (Intercept)	0.0478	0.0075	6.3854	0.0000
Discipline (Intercept) – Asian, Native Hawaiian, or other Pacific Islander (Slope) Covariance	-0.0054	0.0038	-1.4289	0.0765
Asian, Native Hawaiian, or other Pacific Islander (Slope)	0.0057	0.0029	1.9451	0.0259
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1132	0.0305	3.7060	0.0003
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.1507	0.0089	-16.8338	0.0000
Upper Division	0.1039	0.0089	11.7129	0.0000
Other Division				
Course Enrollment Size				
Small Course	0.0206	0.0080	2.5762	0.0100
Medium Course	0.0013	0.0073	0.1850	0.8532
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0860	0.0059	-14.5890	0.0000
Meets a Gen Ed Requirement				
Course Format				
Classroom	-0.0618	0.0106	-5.8486	0.0000
Distance	-0.0087	0.0164	-0.5302	0.5960

Table C.44. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Other Format				
Course Load	0.0437	0.0056	7.7481	0.0000
Years of Teaching Experience	-0.0469	0.0061	-7.7569	0.0000
Employment Status				
Part-Time	0.0123	0.0085	1.4415	0.1495
Full-Time				
Rank				
Professor	-0.0206	0.0116	-1.7736	0.0761
Associate Professor	-0.0063	0.0105	-0.5996	0.5488
Assistant Professor	0.0387	0.0109	3.5601	0.0004
Instructor/Lecturer	-0.0270	0.0110	-2.4516	0.0142
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0361	0.0232	-1.5528	0.1217
Black or African American	0.1495	0.0226	6.6250	0.0000
Hispanic or Latinx	0.0967	0.0260	3.7159	0.0002
White	-0.1668	0.0115	-14.4845	0.0000
Another race/ethnicity	0.0552	0.0329	1.6798	0.0930
Multiracial	-0.0048	0.0263	-0.1809	0.8564
Preferred not to respond				
Gender				
Man	-0.0527	0.0111	-4.7311	0.0000
Woman	0.0513	0.0113	4.5319	0.0000
Preferred not to respond				
Sexual Orientation				
Straight (Heterosexual)	-0.0018	0.0104	-0.1727	0.8629
LGBQ+	0.0273	0.0155	1.7647	0.0776
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0399	0.0106	-3.7551	0.0002
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0032	0.0095	-0.3337	0.7389
Percent of Instructional Staff that Are Full-Time	-0.0355	0.0099	-3.5855	0.0004
Percent of Expenditures on Instruction	-0.0144	0.0103	-1.3935	0.1645
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2800	0.0613	-4.5671	0.0000
Hard-Pure-Nonlife (HPN) Discipline	-0.5526	0.0731	-7.5581	0.0000
Hard-Applied-Life (HAL) Discipline	0.0416	0.0749	0.5558	0.5792
Hard-Applied-Nonlife (HAN) Discipline	-0.4472	0.0570	-7.8433	0.0000
Soft-Pure-Life (SPL) Discipline	0.4471	0.0841	5.3136	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2415	0.0571	4.2307	0.0001
Soft-Applied-Life (SAL) Discipline	0.3213	0.0450	7.1405	0.0000
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.45. Model DAL-3.12

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7269	0.0060	121.0048	0.0000
Institution (Intercept)	0.0182	0.0024	7.5485	0.0000
Discipline (Intercept)	0.0458	0.0076	6.0383	0.0000
Discipline (Intercept) – White (Slope) Covariance	0.0011	0.0023	0.4728	0.3182
White (Slope)	0.0021	0.0011	1.9848	0.0236
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1150	0.0303	3.7900	0.0002
<i>Course and Professional Control Variables</i>				
<i>Course Division</i>				
Lower Division	-0.1509	0.0090	-16.8584	0.0000
Upper Division	0.1039	0.0089	11.7090	0.0000
Other Division				
<i>Course Enrollment Size</i>				
Small Course	0.0208	0.0080	2.6041	0.0092
Medium Course	0.0015	0.0073	0.2044	0.8381
Large Course				
<i>Course Meets a General Education Requirement</i>				
Does Not Meet a Gen Ed Requirement	-0.0859	0.0059	-14.5789	0.0000
Meets a Gen Ed Requirement				
<i>Course Format</i>				
Classroom	-0.0624	0.0106	-5.9076	0.0000
Distance	-0.0082	0.0164	-0.4984	0.6182
Other Format				
<i>Course Load</i>				
Years of Teaching Experience	0.0436	0.0056	7.7345	0.0000
Employment Status	-0.0470	0.0061	-7.7734	0.0000
<i>Employment Status</i>				
Part-Time	0.0124	0.0085	1.4584	0.1447
Full-Time				
<i>Rank</i>				
Professor	-0.0203	0.0116	-1.7449	0.0810
Associate Professor	-0.0061	0.0105	-0.5819	0.5606
Assistant Professor	0.0397	0.0109	3.6464	0.0003
Instructor/Lecturer	-0.0279	0.0110	-2.5348	0.0113
Other Rank				
<i>Faculty Identities</i>				
<i>Race/Ethnicity</i>				
Asian, Native Hawaiian, or other Pacific Islander	-0.0240	0.0210	-1.1409	0.2539
Black or African American	0.1491	0.0226	6.6003	0.0000
Hispanic or Latinx	0.0953	0.0260	3.6589	0.0003
White	-0.1665	0.0130	-12.8166	0.0000
Another race/ethnicity	0.0549	0.0329	1.6708	0.0948
Multiracial	-0.0074	0.0263	-0.2820	0.7780
Preferred not to respond				
<i>Gender</i>				
Man	-0.0523	0.0111	-4.7053	0.0000
Woman	0.0509	0.0113	4.4933	0.0000
Preferred not to respond				

Table C.45. cont.

Fixed Effects	Est.	SE	t	p two-tailed
<i>Sexual Orientation</i>				
Straight (Heterosexual)	-0.0015	0.0104	-0.1402	0.8885
LGBQ+	0.0276	0.0155	1.7844	0.0744
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0397	0.0106	-3.7491	0.0002
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0034	0.0095	-0.3556	0.7224
Percent of Instructional Staff that Are Full-Time	-0.0353	0.0099	-3.5772	0.0004
Percent of Expenditures on Instruction	-0.0141	0.0103	-1.3642	0.1736
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2748	0.0615	-4.4682	0.0000
Hard-Pure-Nonlife (HPN) Discipline	-0.5578	0.0736	-7.5764	0.0000
Hard-Applied-Life (HAL) Discipline	0.0372	0.0751	0.4958	0.6208
Hard-Applied-Nonlife (HAN) Discipline	-0.4482	0.0573	-7.8219	0.0000
Soft-Pure-Life (SPL) Discipline	0.4624	0.0845	5.4721	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2414	0.0572	4.2170	0.0001
Soft-Applied-Life (SAL) Discipline	0.3194	0.0452	7.0705	0.0000
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.46. Model DAL-3.13

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7275	0.0060	121.0066	0.0000
Institution (Intercept)	0.0183	0.0024	7.5535	0.0000
Discipline (Intercept)	0.0468	0.0073	6.3667	0.0000
Discipline (Intercept) – Another race/ethnicity (Slope)	-0.0074	0.0038	-1.9595	0.0250
<i>Covariance</i>				
Another race/ethnicity (Slope)	0.0024	0.0031	0.7798	0.2178
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1109	0.0303	3.6571	0.0003
<i>Course and Professional Control Variables</i>				
<i>Course Division</i>				
Lower Division	-0.1511	0.0090	-16.8815	0.0000
Upper Division	0.1043	0.0089	11.7522	0.0000
Other Division				
<i>Course Enrollment Size</i>				
Small Course	0.0205	0.0080	2.5635	0.0104
Medium Course	0.0015	0.0073	0.2039	0.8384
Large Course				
<i>Course Meets a General Education Requirement</i>				
Does Not Meet a Gen Ed Requirement	-0.0862	0.0059	-14.6232	0.0000
Meets a Gen Ed Requirement				

Table C.46. cont.

Fixed Effects	Est.	SE	t	p two-tailed
<i>Course Format</i>				
Classroom	-0.0620	0.0106	-5.8663	0.0000
Distance	-0.0084	0.0164	-0.5137	0.6074
Other Format				
Course Load	0.0436	0.0056	7.7362	0.0000
Years of Teaching Experience	-0.0469	0.0061	-7.7546	0.0000
<i>Employment Status</i>				
Part-Time	0.0122	0.0085	1.4351	0.1513
Full-Time				
<i>Rank</i>				
Professor	-0.0206	0.0116	-1.7691	0.0769
Associate Professor	-0.0063	0.0105	-0.5970	0.5505
Assistant Professor	0.0391	0.0109	3.5975	0.0003
Instructor/Lecturer	-0.0272	0.0110	-2.4715	0.0135
Other Rank				
<i>Faculty Identities</i>				
<i>Race/Ethnicity</i>				
Asian, Native Hawaiian, or other Pacific Islander	-0.0212	0.0209	-1.0125	0.3113
Black or African American	0.1475	0.0226	6.5366	0.0000
Hispanic or Latinx	0.0947	0.0260	3.6389	0.0003
White	-0.1685	0.0115	-14.6594	0.0000
Another race/ethnicity	0.0520	0.0335	1.5539	0.1207
Multiracial	-0.0066	0.0263	-0.2493	0.8031
Preferred not to respond				
<i>Gender</i>				
Man	-0.0524	0.0111	-4.7139	0.0000
Woman	0.0514	0.0113	4.5417	0.0000
Preferred not to respond				
<i>Sexual Orientation</i>				
Straight (Heterosexual)	-0.0023	0.0104	-0.2188	0.8268
LGBQ+	0.0274	0.0155	1.7680	0.0771
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0401	0.0106	-3.7740	0.0002
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0032	0.0095	-0.3414	0.7330
Percent of Instructional Staff that Are Full-Time	-0.0356	0.0099	-3.5980	0.0004
Percent of Expenditures on Instruction	-0.0145	0.0103	-1.3987	0.1630
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2789	0.0609	-4.5833	0.0000
Hard-Pure-Nonlife (HPN) Discipline	-0.5735	0.0722	-7.9391	0.0000
Hard-Applied-Life (HAL) Discipline	0.0400	0.0748	0.5341	0.5941
Hard-Applied-Nonlife (HAN) Discipline	-0.4426	0.0569	-7.7795	0.0000
Soft-Pure-Life (SPL) Discipline	0.4375	0.0823	5.3184	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2419	0.0558	4.3321	0.0000
Soft-Applied-Life (SAL) Discipline	0.3340	0.0444	7.5141	0.0000
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.47. *Model DAL-3.14*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7269	0.0060	120.9996	0.0000
Institution (Intercept)	0.0183	0.0024	7.5563	0.0000
Discipline (Intercept)	0.0478	0.0075	6.3854	0.0000
Discipline (Intercept) – Preferred not to respond – Race/Ethnicity (Slope) Covariance	0.0054	0.0038	1.4289	0.0765
Preferred not to respond – Race/Ethnicity (Slope)	0.0057	0.0029	1.9451	0.0259
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1132	0.0305	3.7060	0.0003
<i>Course and Professional Control Variables</i>				
<i>Course Division</i>				
Lower Division				
Upper Division	0.1039	0.0089	11.7129	0.0000
Other Division	0.0467	0.0130	3.5936	0.0003
<i>Course Enrollment Size</i>				
Small Course				
Medium Course	0.0013	0.0073	0.1850	0.8532
Large Course	-0.0220	0.0079	-2.7613	0.0058
<i>Course Meets a General Education Requirement</i>				
Does Not Meet a Gen Ed Requirement				
Meets a Gen Ed Requirement	0.0860	0.0059	14.5890	0.0000
<i>Course Format</i>				
Classroom				
Distance	-0.0087	0.0164	-0.5302	0.5960
Other Format	0.0705	0.0136	5.1901	0.0000
Course Load	0.0437	0.0056	7.7481	0.0000
Years of Teaching Experience	-0.0469	0.0061	-7.7569	0.0000
<i>Employment Status</i>				
Part-Time				
Full-Time	-0.0123	0.0085	-1.4415	0.1495
<i>Rank</i>				
Professor				
Associate Professor	-0.0063	0.0105	-0.5996	0.5488
Assistant Professor	0.0387	0.0109	3.5601	0.0004
Instructor/Lecturer	-0.0270	0.0110	-2.4516	0.0142
Other Rank	0.0152	0.0166	0.9152	0.3601
<i>Faculty Identities</i>				
<i>Race/Ethnicity</i>				
Asian, Native Hawaiian, or other Pacific Islander				
Black or African American	0.1495	0.0226	6.6250	0.0000
Hispanic or Latinx	0.0967	0.0260	3.7159	0.0002
White	-0.1668	0.0115	-14.4845	0.0000
Another race/ethnicity	0.0552	0.0329	1.6798	0.0930
Multiracial	-0.0048	0.0263	-0.1809	0.8564

Table C.47. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Preferred not to respond	-0.0938	0.0239	-3.9237	0.0001
Gender				
Man				
Woman	0.0513	0.0113	4.5319	0.0000
Preferred not to respond	0.0013	0.0195	0.0686	0.9453
Sexual Orientation				
Straight (Heterosexual)				
LGBQ+	0.0273	0.0155	1.7647	0.0776
Preferred not to respond	-0.0255	0.0153	-1.6707	0.0948
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0399	0.0106	-3.7551	0.0002
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0032	0.0095	-0.3337	0.7389
Percent of Instructional Staff that Are Full-Time	-0.0355	0.0099	-3.5855	0.0004
Percent of Expenditures on Instruction	-0.0144	0.0103	-1.3935	0.1645
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline				
Hard-Pure-Nonlife (HPN) Discipline	-0.5526	0.0731	-7.5581	0.0000
Hard-Applied-Life (HAL) Discipline	0.0416	0.0749	0.5558	0.5792
Hard-Applied-Nonlife (HAN) Discipline	-0.4472	0.0570	-7.8433	0.0000
Soft-Pure-Life (SPL) Discipline	0.4471	0.0841	5.3136	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2415	0.0571	4.2307	0.0001
Soft-Applied-Life (SAL) Discipline	0.3213	0.0450	7.1405	0.0000
Soft-Applied-Nonlife (SAN) Discipline	0.2283	0.0514	4.4439	0.0000

Note. Since this model was examined for random effects only, both sets of effect codes were not used. Since analysis of the Preferred not to respond (Race/Ethnicity) category required the second set of Race/Ethnicity effect codes, the second set of effect codes for all categorical variables were used.

Table C.48. *Model DAL-3.15*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7272	0.0060	120.9775	0.0000
Institution (Intercept)	0.0182	0.0024	7.5455	0.0000
Discipline (Intercept)	0.0527	0.0085	6.1806	0.0000
Discipline (Intercept) – Man (Slope) Covariance	-0.0052	0.0027	-1.9494	0.0256
Man (Slope)	0.0018	0.0013	1.3837	0.0832
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1174	0.0314	3.7422	0.0002
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.1508	0.0090	-16.8453	0.0000

Table C.48. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Upper Division	0.1040	0.0089	11.7207	0.0000
Other Division				
Course Enrollment Size				
Small Course	0.0205	0.0080	2.5664	0.0103
Medium Course	0.0012	0.0073	0.1713	0.8640
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0860	0.0059	-14.5892	0.0000
Meets a Gen Ed Requirement				
Course Format				
Classroom	-0.0624	0.0106	-5.9063	0.0000
Distance	-0.0079	0.0164	-0.4827	0.6293
Other Format				
Course Load	0.0438	0.0056	7.7643	0.0000
Years of Teaching Experience	-0.0471	0.0061	-7.7733	0.0000
Employment Status				
Part-Time	0.0120	0.0085	1.4052	0.1600
Full-Time				
Rank				
Professor	-0.0209	0.0116	-1.8008	0.0717
Associate Professor	-0.0062	0.0105	-0.5858	0.5580
Assistant Professor	0.0391	0.0109	3.5967	0.0003
Instructor/Lecturer	-0.0268	0.0110	-2.4338	0.0149
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0206	0.0209	-0.9830	0.3256
Black or African American	0.1469	0.0226	6.5095	0.0000
Hispanic or Latinx	0.0951	0.0260	3.6560	0.0003
White	-0.1689	0.0115	-14.7020	0.0000
Another race/ethnicity	0.0530	0.0329	1.6100	0.1074
Multiracial	-0.0058	0.0263	-0.2212	0.8249
Preferred not to respond				
Gender				
Man	-0.0546	0.0125	-4.3662	0.0000
Woman	0.0516	0.0113	4.5450	0.0000
Preferred not to respond				
Sexual Orientation				
Straight (Heterosexual)	-0.0016	0.0104	-0.1556	0.8764
LGBQ+	0.0272	0.0155	1.7601	0.0784
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0399	0.0106	-3.7653	0.0002
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0034	0.0095	-0.3620	0.7176
Percent of Instructional Staff that Are Full-Time	-0.0356	0.0099	-3.6011	0.0004
Percent of Expenditures on Instruction	-0.0144	0.0103	-1.3969	0.1635
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2791	0.0610	-4.5765	0.0000
Hard-Pure-Nonlife (HPN) Discipline	-0.5506	0.0722	-7.6250	0.0000

Table C.48. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Hard-Applied-Life (HAL) Discipline	0.0357	0.0754	0.4736	0.6365
Hard-Applied-Nonlife (HAN) Discipline	-0.4332	0.0565	-7.6668	0.0000
Soft-Pure-Life (SPL) Discipline	0.4627	0.0840	5.5075	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2271	0.0566	4.0122	0.0001
Soft-Applied-Life (SAL) Discipline	0.3110	0.0452	6.8744	0.0000
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.49. *Model DAL-3.16*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7272	0.0060	120.9775	0.0000
Institution (Intercept)	0.0182	0.0024	7.5455	0.0000
Discipline (Intercept)	0.0527	0.0085	6.1806	0.0000
Discipline (Intercept) – Preferred not to respond – Gender (Slope) Covariance	0.0052	0.0027	1.9494	0.0256
Preferred not to respond – Gender (Slope)	0.0018	0.0013	1.3837	0.0832
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1174	0.0314	3.7422	0.0002
<i>Course and Professional Control Variables</i>				
<i>Course Division</i>				
Lower Division				
Upper Division	0.1040	0.0089	11.7207	0.0000
Other Division	0.0468	0.0130	3.5981	0.0003
<i>Course Enrollment Size</i>				
Small Course				
Medium Course	0.0012	0.0073	0.1713	0.8640
Large Course	-0.0218	0.0080	-2.7387	0.0062
<i>Course Meets a General Education Requirement</i>				
Does Not Meet a Gen Ed Requirement				
Meets a Gen Ed Requirement	0.0860	0.0059	14.5892	0.0000
<i>Course Format</i>				
Classroom				
Distance	-0.0079	0.0164	-0.4827	0.6293
Other Format	0.0703	0.0136	5.1766	0.0000
Course Load	0.0438	0.0056	7.7643	0.0000
Years of Teaching Experience	-0.0471	0.0061	-7.7733	0.0000
<i>Employment Status</i>				
Part-Time				
Full-Time	-0.0120	0.0085	-1.4052	0.1600
<i>Rank</i>				
Professor				

Table C.49. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Associate Professor	-0.0062	0.0105	-0.5858	0.5580
Assistant Professor	0.0391	0.0109	3.5967	0.0003
Instructor/Lecturer	-0.0268	0.0110	-2.4338	0.0149
Other Rank	0.0148	0.0166	0.8908	0.3731
<i>Faculty Identities</i>				
<i>Race/Ethnicity</i>				
Asian, Native Hawaiian, or other Pacific Islander				
Black or African American	0.1469	0.0226	6.5095	0.0000
Hispanic or Latinx	0.0951	0.0260	3.6560	0.0003
White	-0.1689	0.0115	-14.7020	0.0000
Another race/ethnicity	0.0530	0.0329	1.6100	0.1074
Multiracial	-0.0058	0.0263	-0.2212	0.8249
Preferred not to respond	-0.0996	0.0217	-4.5832	0.0000
<i>Gender</i>				
Man				
Woman	0.0516	0.0113	4.5450	0.0000
Preferred not to respond	0.0030	0.0204	0.1476	0.8827
<i>Sexual Orientation</i>				
Straight (Heterosexual)				
LGBQ+	0.0272	0.0155	1.7601	0.0784
Preferred not to respond	-0.0256	0.0153	-1.6787	0.0932
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0399	0.0106	-3.7653	0.0002
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0034	0.0095	-0.3620	0.7176
Percent of Instructional Staff that Are Full-Time	-0.0356	0.0099	-3.6011	0.0004
Percent of Expenditures on Instruction	-0.0144	0.0103	-1.3969	0.1635
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline				
Hard-Pure-Nonlife (HPN) Discipline	-0.5506	0.0722	-7.6250	0.0000
Hard-Applied-Life (HAL) Discipline	0.0357	0.0754	0.4736	0.6365
Hard-Applied-Nonlife (HAN) Discipline	-0.4332	0.0565	-7.6668	0.0000
Soft-Pure-Life (SPL) Discipline	0.4627	0.0840	5.5075	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2271	0.0566	4.0122	0.0001
Soft-Applied-Life (SAL) Discipline	0.3110	0.0452	6.8744	0.0000
Soft-Applied-Nonlife (SAN) Discipline	0.2264	0.0511	4.4325	0.0000

Note. Since this model was examined for random effects only, both sets of effect codes were not used. Since analysis of the Preferred not to respond (Gender) category required the second set of Gender effect codes, the second set of effect codes for all categorical variables were used.

Table C.50. Model DAL-3.17

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7276	0.0060	120.9700	0.0000
Institution (Intercept)	0.0183	0.0024	7.5556	0.0000
Discipline (Intercept)	0.0497	0.0082	6.0646	0.0000
Discipline (Intercept) – Straight (Slope) Covariance	-0.0013	0.0020	-0.6745	0.2500
Straight (Slope)	0.0005	0.0009	0.6125	0.2701
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1139	0.0309	3.6807	0.0003
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.1512	0.0090	-16.8895	0.0000
Upper Division	0.1040	0.0089	11.7216	0.0000
Other Division				
Course Enrollment Size				
Small Course	0.0207	0.0080	2.5911	0.0096
Medium Course	0.0014	0.0073	0.1967	0.8441
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0861	0.0059	-14.5992	0.0000
Meets a Gen Ed Requirement				
Course Format				
Classroom	-0.0621	0.0106	-5.8825	0.0000
Distance	-0.0084	0.0164	-0.5086	0.6111
Other Format				
Course Load				
Years of Teaching Experience	0.0437	0.0056	7.7490	0.0000
Employment Status	-0.0469	0.0061	-7.7440	0.0000
Part-Time	0.0123	0.0085	1.4488	0.1474
Full-Time				
Rank				
Professor	-0.0206	0.0116	-1.7722	0.0764
Associate Professor	-0.0063	0.0105	-0.5994	0.5489
Assistant Professor	0.0393	0.0109	3.6142	0.0003
Instructor/Lecturer	-0.0272	0.0110	-2.4661	0.0137
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0204	0.0209	-0.9753	0.3294
Black or African American	0.1475	0.0226	6.5369	0.0000
Hispanic or Latinx	0.0950	0.0260	3.6518	0.0003
White	-0.1687	0.0115	-14.6739	0.0000
Another race/ethnicity	0.0533	0.0329	1.6204	0.1052
Multiracial	-0.0067	0.0263	-0.2539	0.7995
Preferred not to respond				
Gender				
Man	-0.0526	0.0111	-4.7261	0.0000
Woman	0.0510	0.0113	4.5021	0.0000
Preferred not to respond				

Table C.50. cont.

Fixed Effects	Est.	SE	t	p two-tailed
<i>Sexual Orientation</i>				
Straight (Heterosexual)	-0.0019	0.0109	-0.1728	0.8631
LGBQ+	0.0267	0.0155	1.7204	0.0854
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0400	0.0106	-3.7670	0.0002
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0033	0.0095	-0.3484	0.7278
Percent of Instructional Staff that Are Full-Time	-0.0355	0.0099	-3.5894	0.0004
Percent of Expenditures on Instruction	-0.0145	0.0103	-1.3988	0.1629
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.5825	0.0741	-7.8619	0.0000
Hard-Pure-Nonlife (HPN) Discipline	0.0450	0.0752	0.5984	0.5506
Hard-Applied-Life (HAL) Discipline	-0.4512	0.0577	-7.8248	0.0000
Hard-Applied-Nonlife (HAN) Discipline	0.4571	0.0851	5.3713	0.0000
Soft-Pure-Life (SPL) Discipline	0.2485	0.0577	4.3060	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.3269	0.0452	7.2262	0.0000
Soft-Applied-Life (SAL) Discipline	-0.5825	0.0741	-7.8619	0.0000
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.51. *Model DAL-3.18*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7276	0.0060	120.9700	0.0000
Institution (Intercept)	0.0183	0.0024	7.5556	0.0000
Discipline (Intercept)	0.0497	0.0082	6.0646	0.0000
Discipline (Intercept) – Preferred not to respond – Sexual Orientation (Slope) Covariance	0.0013	0.0020	0.6745	0.2500
Preferred not to respond – Sexual Orientation (Slope)	0.0005	0.0009	0.6125	0.2701
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1139	0.0309	3.6807	0.0003
<i>Course and Professional Control Variables</i>				
<i>Course Division</i>				
Lower Division				
Upper Division	0.1040	0.0089	11.7216	0.0000
Other Division	0.0472	0.0130	3.6263	0.0003
<i>Course Enrollment Size</i>				
Small Course				
Medium Course	0.0014	0.0073	0.1967	0.8441
Large Course	-0.0222	0.0080	-2.7870	0.0053
<i>Course Meets a General Education Requirement</i>				
Does Not Meet a Gen Ed Requirement				
Meets a Gen Ed Requirement	0.0861	0.0059	14.5992	0.0000

Table C.51. cont.

Fixed Effects	Est.	SE	t	p two-tailed
<i>Course Format</i>				
Classroom				
Distance	-0.0084	0.0164	-0.5086	0.6111
Other Format	0.0705	0.0136	5.1896	0.0000
Course Load	0.0437	0.0056	7.7490	0.0000
Years of Teaching Experience	-0.0469	0.0061	-7.7440	0.0000
<i>Employment Status</i>				
Part-Time				
Full-Time	-0.0123	0.0085	-1.4488	0.1474
<i>Rank</i>				
Professor				
Associate Professor	-0.0063	0.0105	-0.5994	0.5489
Assistant Professor	0.0393	0.0109	3.6142	0.0003
Instructor/Lecturer	-0.0272	0.0110	-2.4661	0.0137
Other Rank	0.0148	0.0166	0.8889	0.3741
<i>Faculty Identities</i>				
<i>Race/Ethnicity</i>				
Asian, Native Hawaiian, or other Pacific Islander				
Black or African American	0.1475	0.0226	6.5369	0.0000
Hispanic or Latinx	0.0950	0.0260	3.6518	0.0003
White	-0.1687	0.0115	-14.6739	0.0000
Another race/ethnicity	0.0533	0.0329	1.6204	0.1052
Multiracial	-0.0067	0.0263	-0.2539	0.7995
Preferred not to respond	-0.1001	0.0217	-4.6046	0.0000
<i>Gender</i>				
Man				
Woman	0.0510	0.0113	4.5021	0.0000
Preferred not to respond	0.0016	0.0195	0.0821	0.9346
<i>Sexual Orientation</i>				
Straight (Heterosexual)				
LGBQ+	0.0267	0.0155	1.7204	0.0854
Preferred not to respond	-0.0248	0.0156	-1.5857	0.1136
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0400	0.0106	-3.7670	0.0002
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0033	0.0095	-0.3484	0.7278
Percent of Instructional Staff that Are Full-Time	-0.0355	0.0099	-3.5894	0.0004
Percent of Expenditures on Instruction	-0.0145	0.0103	-1.3988	0.1629
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline				
Hard-Pure-Nonlife (HPN) Discipline	-0.5825	0.0741	-7.8619	0.0000
Hard-Applied-Life (HAL) Discipline	0.0450	0.0752	0.5984	0.5506
Hard-Applied-Nonlife (HAN) Discipline	-0.4512	0.0577	-7.8248	0.0000
Soft-Pure-Life (SPL) Discipline	0.4571	0.0851	5.3713	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2485	0.0577	4.3060	0.0000
Soft-Applied-Life (SAL) Discipline	0.3269	0.0452	7.2262	0.0000
Soft-Applied-Nonlife (SAN) Discipline	0.2321	0.0519	4.4702	0.0000

Note. Since this model was examined for random effects only, both sets of effect codes were not used. Since analysis of the Preferred not to respond (Sexual Orientation) category required the second set of Sexual Orientation effect codes, the second set of effect codes for all categorical variables were used.

Table C.52. Model CL-3.1

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9102	0.0075	120.8317	0.0000
Institution (Intercept)	0.0119	0.0019	6.2366	0.0000
Institution (Intercept) – Asian, Native Hawaiian, or other Pacific Islander (Slope) Covariance	0.0035	0.0023	1.5716	0.0580
Asian, Native Hawaiian, or other Pacific Islander (Slope)	0.0058	0.0051	1.1499	0.1251
Discipline (Intercept)	0.0219	0.0040	5.4732	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0379	0.0268	-1.4145	0.1579
<i>Course and Professional Control Variables</i>				
<i>Course Division</i>				
Lower Division	-0.0313	0.0100	-3.1295	0.0018
Upper Division	0.0155	0.0099	1.5691	0.1166
Other Division				
<i>Course Enrollment Size</i>				
Small Course	-0.0330	0.0088	-3.7273	0.0002
Medium Course	0.0026	0.0081	0.3202	0.7488
Large Course				
<i>Course Meets a General Education Requirement</i>				
Does Not Meet a Gen Ed Requirement	-0.0170	0.0066	-2.5914	0.0096
Meets a Gen Ed Requirement				
<i>Course Format</i>				
Classroom	0.1757	0.0117	14.9801	0.0000
Distance	-0.3721	0.0183	-20.3661	0.0000
Other Format				
Course Load	0.0413	0.0063	6.5971	0.0000
Years of Teaching Experience	-0.0541	0.0068	-8.0098	0.0000
<i>Employment Status</i>				
Part-Time	-0.0143	0.0095	-1.5082	0.1315
Full-Time				
<i>Rank</i>				
Professor	-0.0388	0.0130	-2.9921	0.0028
Associate Professor	-0.0001	0.0117	-0.0090	0.9928
Assistant Professor	0.0356	0.0121	2.9359	0.0033
Instructor/Lecturer	-0.0116	0.0123	-0.9442	0.3451
Other Rank				
<i>Faculty Identities</i>				
<i>Race/Ethnicity</i>				
Asian, Native Hawaiian, or other Pacific Islander	-0.0078	0.0243	-0.3218	0.7477

Table C.52. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Black or African American	0.0632	0.0249	2.5406	0.0111
Hispanic or Latinx	0.0651	0.0289	2.2563	0.0241
White	-0.0963	0.0128	-7.5433	0.0000
Another race/ethnicity	-0.0101	0.0367	-0.2742	0.7839
Multiracial	0.0295	0.0294	1.0019	0.3164
Preferred not to respond				
Gender				
Man	-0.0377	0.0124	-3.0326	0.0024
Woman	0.0406	0.0126	3.2170	0.0013
Preferred not to respond				
Sexual Orientation				
Straight (Heterosexual)	-0.0123	0.0116	-1.0642	0.2872
LGBQ+	0.0301	0.0173	1.7449	0.0810
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0088	0.0097	-0.9080	0.3646
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0129	0.0087	-1.4720	0.1420
Percent of Instructional Staff that Are Full-Time	-0.0089	0.0091	-0.9751	0.3302
Percent of Expenditures on Instruction	-0.0121	0.0095	-1.2740	0.2037
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	0.1421	0.0470	3.0235	0.0030
Hard-Pure-Nonlife (HPN) Discipline	0.2930	0.0548	5.3495	0.0000
Hard-Applied-Life (HAL) Discipline	-0.0469	0.0597	-0.7862	0.4329
Hard-Applied-Nonlife (HAN) Discipline	0.1354	0.0442	3.0635	0.0027
Soft-Pure-Life (SPL) Discipline	-0.2272	0.0615	-3.6916	0.0004
Soft-Pure-Nonlife (SPN) Discipline	-0.1662	0.0413	-4.0251	0.0001
Soft-Applied-Life (SAL) Discipline	-0.0438	0.0338	-1.2963	0.1976
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.53. *Model CL-3.2*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9108	0.0075	120.9655	0.0000
Institution (Intercept)	0.0119	0.0019	6.2002	0.0000
Institution (Intercept) – Hispanic or Latinx (Slope) Covariance	0.0024	0.0023	1.0191	0.1541
Hispanic or Latinx (Slope)	0.0017	0.0048	0.3541	0.3616
Discipline (Intercept)	0.0219	0.0040	5.4733	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0392	0.0268	-1.4640	0.1438
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.0312	0.0100	-3.1232	0.0018

Table C.53. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Upper Division	0.0155	0.0099	1.5709	0.1162
Other Division				
Course Enrollment Size				
Small Course	-0.0332	0.0088	-3.7491	0.0002
Medium Course	0.0026	0.0081	0.3226	0.7470
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0171	0.0066	-2.6004	0.0093
Meets a Gen Ed Requirement				
Course Format				
Classroom	0.1755	0.0117	14.9614	0.0000
Distance	-0.3719	0.0183	-20.3529	0.0000
Other Format				
Course Load	0.0413	0.0063	6.5944	0.0000
Years of Teaching Experience	-0.0541	0.0068	-8.0181	0.0000
Employment Status				
Part-Time	-0.0144	0.0095	-1.5162	0.1295
Full-Time				
Rank				
Professor	-0.0389	0.0130	-2.9969	0.0027
Associate Professor	-0.0004	0.0117	-0.0371	0.9704
Assistant Professor	0.0359	0.0121	2.9544	0.0031
Instructor/Lecturer	-0.0113	0.0123	-0.9186	0.3583
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0101	0.0234	-0.4334	0.6647
Black or African American	0.0644	0.0249	2.5877	0.0097
Hispanic or Latinx	0.0630	0.0294	2.1455	0.0323
White	-0.0956	0.0128	-7.4836	0.0000
Another race/ethnicity	-0.0094	0.0368	-0.2553	0.7985
Multiracial	0.0301	0.0294	1.0237	0.3060
Preferred not to respond				
Gender				
Man	-0.0375	0.0124	-3.0184	0.0025
Woman	0.0408	0.0126	3.2292	0.0012
Preferred not to respond				
Sexual Orientation				
Straight (Heterosexual)	-0.0122	0.0116	-1.0545	0.2916
LGBQ+	0.0299	0.0173	1.7288	0.0838
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0076	0.0097	-0.7778	0.4373
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0132	0.0088	-1.5079	0.1326
Percent of Instructional Staff that Are Full-Time	-0.0093	0.0092	-1.0165	0.3102
Percent of Expenditures on Instruction	-0.0118	0.0095	-1.2359	0.2175
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	0.1417	0.0470	3.0155	0.0031
Hard-Pure-Nonlife (HPN) Discipline	0.2923	0.0548	5.3367	0.0000

Table C.53. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Hard-Applied-Life (HAL) Discipline	-0.0462	0.0597	-0.7748	0.4395
Hard-Applied-Nonlife (HAN) Discipline	0.1356	0.0442	3.0678	0.0026
Soft-Pure-Life (SPL) Discipline	-0.2275	0.0615	-3.6964	0.0004
Soft-Pure-Nonlife (SPN) Discipline	-0.1659	0.0413	-4.0175	0.0001
Soft-Applied-Life (SAL) Discipline	-0.0436	0.0338	-1.2890	0.2001
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.54. *Model CL-3.3*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9108	0.0075	120.7857	0.0000
Institution (Intercept)	0.0134	0.0027	5.0000	0.0000
Institution (Intercept) – White (Slope) Covariance	-0.0015	0.0017	-0.8727	0.1914
White (Slope)	0.0003	0.0017	0.1894	0.4249
Discipline (Intercept)	0.0219	0.0040	5.4706	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0394	0.0269	-1.4653	0.1435
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.0309	0.0100	-3.0968	0.0020
Upper Division	0.0156	0.0099	1.5764	0.1150
Other Division				
Course Enrollment Size				
Small Course	-0.0331	0.0088	-3.7392	0.0002
Medium Course	0.0024	0.0081	0.2929	0.7696
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0170	0.0066	-2.5959	0.0094
Meets a Gen Ed Requirement				
Course Format				
Classroom	0.1758	0.0117	14.9861	0.0000
Distance	-0.3722	0.0183	-20.3713	0.0000
Other Format				
Course Load				
Years of Teaching Experience	0.0412	0.0063	6.5743	0.0000
Employment Status				
Part-Time	-0.0145	0.0095	-1.5268	0.1268
Full-Time				
Rank				
Professor	-0.0385	0.0130	-2.9688	0.0030
Associate Professor	-0.0005	0.0117	-0.0385	0.9693

Table C.54. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Assistant Professor	0.0362	0.0121	2.9776	0.0029
Instructor/Lecturer	-0.0112	0.0123	-0.9095	0.3631
Other Rank				
<i>Faculty Identities</i>				
<i>Race/Ethnicity</i>				
Asian, Native Hawaiian, or other Pacific Islander	-0.0103	0.0234	-0.4421	0.6584
Black or African American	0.0618	0.0249	2.4797	0.0132
Hispanic or Latinx	0.0645	0.0289	2.2281	0.0259
White	-0.0957	0.0128	-7.4693	0.0000
Another race/ethnicity	-0.0090	0.0368	-0.2447	0.8067
Multiracial	0.0296	0.0294	1.0056	0.3146
Preferred not to respond				
<i>Gender</i>				
Man	-0.0377	0.0124	-3.0339	0.0024
Woman	0.0404	0.0126	3.1947	0.0014
Preferred not to respond				
<i>Sexual Orientation</i>				
Straight (Heterosexual)	-0.0122	0.0116	-1.0547	0.2916
LGBQ+	0.0300	0.0173	1.7388	0.0821
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0079	0.0097	-0.8136	0.4166
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0126	0.0088	-1.4375	0.1516
Percent of Instructional Staff that Are Full-Time	-0.0093	0.0091	-1.0124	0.3121
Percent of Expenditures on Instruction	-0.0114	0.0095	-1.1959	0.2327
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	0.1416	0.0470	3.0143	0.0031
Hard-Pure-Nonlife (HPN) Discipline	0.2924	0.0548	5.3384	0.0000
Hard-Applied-Life (HAL) Discipline	-0.0460	0.0597	-0.7709	0.4418
Hard-Applied-Nonlife (HAN) Discipline	0.1362	0.0442	3.0814	0.0025
Soft-Pure-Life (SPL) Discipline	-0.2276	0.0615	-3.6983	0.0004
Soft-Pure-Nonlife (SPN) Discipline	-0.1662	0.0413	-4.0248	0.0001
Soft-Applied-Life (SAL) Discipline	-0.0439	0.0338	-1.2975	0.1972
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.55. *Model CL-3.4*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9105	0.0075	120.7874	0.0000
Institution (Intercept)	0.0119	0.0019	6.1982	0.0000
Institution (Intercept) – Multiracial (Slope) Covariance	0.0023	0.0025	0.9325	0.1755
Multiracial (Slope)	0.0040	0.0062	0.6391	0.2614
Discipline (Intercept)	0.0219	0.0040	5.4710	0.0000

Table C.55. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0388	0.0268	-1.4499	0.1477
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.0313	0.0100	-3.1306	0.0017
Upper Division	0.0155	0.0099	1.5670	0.1171
Other Division				
Course Enrollment Size				
Small Course	-0.0332	0.0088	-3.7519	0.0002
Medium Course	0.0026	0.0081	0.3245	0.7455
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0171	0.0066	-2.6006	0.0093
Meets a Gen Ed Requirement				
Course Format				
Classroom	0.1757	0.0117	14.9766	0.0000
Distance	-0.3721	0.0183	-20.3657	0.0000
Other Format				
Course Load	0.0414	0.0063	6.6086	0.0000
Years of Teaching Experience	-0.0541	0.0068	-8.0097	0.0000
Employment Status				
Part-Time	-0.0143	0.0095	-1.5139	0.1301
Full-Time				
Rank				
Professor	-0.0387	0.0130	-2.9851	0.0028
Associate Professor	-0.0002	0.0117	-0.0177	0.9859
Assistant Professor	0.0359	0.0121	2.9535	0.0031
Instructor/Lecturer	-0.0114	0.0123	-0.9267	0.3541
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0108	0.0234	-0.4624	0.6438
Black or African American	0.0641	0.0249	2.5776	0.0100
Hispanic or Latinx	0.0654	0.0289	2.2666	0.0234
White	-0.0962	0.0128	-7.5389	0.0000
Another race/ethnicity	-0.0098	0.0367	-0.2660	0.7903
Multiracial	0.0297	0.0299	0.9936	0.3207
Preferred not to respond				
Gender				
Man	-0.0375	0.0124	-3.0231	0.0025
Woman	0.0406	0.0126	3.2153	0.0013
Preferred not to respond				
Sexual Orientation				
Straight (Heterosexual)	-0.0122	0.0116	-1.0512	0.2932
LGBQ+	0.0298	0.0173	1.7265	0.0843
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0080	0.0097	-0.8211	0.4123
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0129	0.0088	-1.4696	0.1427
Percent of Instructional Staff that Are Full-Time	-0.0098	0.0092	-1.0741	0.2836

Table C.55. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Percent of Expenditures on Instruction	-0.0112	0.0095	-1.1790	0.2393
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	0.1417	0.0470	3.0163	0.0031
Hard-Pure-Nonlife (HPN) Discipline	0.2926	0.0547	5.3469	0.0000
Hard-Applied-Life (HAL) Discipline	-0.0464	0.0596	-0.7780	0.4376
Hard-Applied-Nonlife (HAN) Discipline	0.1360	0.0442	3.0784	0.0025
Soft-Pure-Life (SPL) Discipline	-0.2280	0.0615	-3.7067	0.0004
Soft-Pure-Nonlife (SPN) Discipline	-0.1661	0.0413	-4.0255	0.0001
Soft-Applied-Life (SAL) Discipline	-0.0435	0.0338	-1.2871	0.2008
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.56. *Model DAL-3.5*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9102	0.0075	120.8317	0.0000
Institution (Intercept)	0.0119	0.0019	6.2366	0.0000
Institution (Intercept) – Preferred not to respond – Race/Ethnicity (Slope) Covariance	-0.0035	0.0023	-1.5716	0.0580
Preferred not to respond – Race/Ethnicity (Slope)	0.0058	0.0051	1.1499	0.1251
Discipline (Intercept)	0.0219	0.0040	5.4732	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0379	0.0268	-1.4145	0.1579
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division				
Upper Division	0.0155	0.0099	1.5691	0.1166
Other Division	0.0157	0.0145	1.0842	0.2783
Course Enrollment Size				
Small Course				
Medium Course	0.0026	0.0081	0.3202	0.7488
Large Course	0.0304	0.0088	3.4577	0.0005
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement				
Meets a Gen Ed Requirement	0.0170	0.0066	2.5914	0.0096
Course Format				
Classroom				
Distance	-0.3721	0.0183	-20.3661	0.0000
Other Format	0.1963	0.0152	12.9568	0.0000
Course Load	0.0413	0.0063	6.5971	0.0000
Years of Teaching Experience	-0.0541	0.0068	-8.0098	0.0000

Table C.56. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Employment Status				
Part-Time				
Full-Time	0.0143	0.0095	1.5082	0.1315
Rank				
Professor				
Associate Professor	-0.0001	0.0117	-0.0090	0.9928
Assistant Professor	0.0356	0.0121	2.9359	0.0033
Instructor/Lecturer	-0.0116	0.0123	-0.9442	0.3451
Other Rank	0.0148	0.0185	0.8014	0.4229
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander				
Black or African American	0.0632	0.0249	2.5406	0.0111
Hispanic or Latinx	0.0651	0.0289	2.2563	0.0241
White	-0.0963	0.0128	-7.5433	0.0000
Another race/ethnicity	-0.0101	0.0367	-0.2742	0.7839
Multiracial	0.0295	0.0294	1.0019	0.3164
Preferred not to respond	-0.0436	0.0248	-1.7585	0.0789
Gender				
Man				
Woman	0.0406	0.0126	3.2170	0.0013
Preferred not to respond	-0.0030	0.0218	-0.1370	0.8910
Sexual Orientation				
Straight (Heterosexual)				
LGBQ+	0.0301	0.0173	1.7449	0.0810
Preferred not to respond	-0.0178	0.0171	-1.0434	0.2968
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0088	0.0097	-0.9080	0.3646
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0129	0.0087	-1.4720	0.1420
Percent of Instructional Staff that Are Full-Time	-0.0089	0.0091	-0.9751	0.3302
Percent of Expenditures on Instruction	-0.0121	0.0095	-1.2740	0.2037
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline				
Hard-Pure-Nonlife (HPN) Discipline	0.2930	0.0548	5.3495	0.0000
Hard-Applied-Life (HAL) Discipline	-0.0469	0.0597	-0.7862	0.4329
Hard-Applied-Nonlife (HAN) Discipline	0.1354	0.0442	3.0635	0.0027
Soft-Pure-Life (SPL) Discipline	-0.2272	0.0615	-3.6916	0.0004
Soft-Pure-Nonlife (SPN) Discipline	-0.1662	0.0413	-4.0251	0.0001
Soft-Applied-Life (SAL) Discipline	-0.0438	0.0338	-1.2963	0.1976
Soft-Applied-Nonlife (SAN) Discipline	-0.0864	0.0385	-2.2475	0.0267

Note. Since this model was examined for random effects only, both sets of effect codes were not used. Since analysis of the Preferred not to respond (Race/Ethnicity) category required the second set of Race/Ethnicity effect codes, the second set of effect codes for all categorical variables were used.

Table C.57. Model CL-3.6

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9108	0.0075	120.8243	0.0000
Institution (Intercept)	0.0106	0.0021	5.0473	0.0000
Institution (Intercept) – Man (Slope) Covariance	0.0011	0.0015	0.7401	0.2296
Man (Slope)	0.0006	0.0019	0.3017	0.3814
Discipline (Intercept)	0.0219	0.0040	5.4712	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0388	0.0267	-1.4549	0.1464
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.0312	0.0100	-3.1258	0.0018
Upper Division	0.0155	0.0099	1.5711	0.1162
Other Division				
Course Enrollment Size				
Small Course	-0.0334	0.0088	-3.7790	0.0002
Medium Course	0.0026	0.0081	0.3203	0.7487
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0170	0.0066	-2.5883	0.0097
Meets a Gen Ed Requirement				
Course Format				
Classroom	0.1758	0.0117	14.9873	0.0000
Distance	-0.3722	0.0183	-20.3760	0.0000
Other Format				
Course Load	0.0412	0.0063	6.5795	0.0000
Years of Teaching Experience	-0.0541	0.0068	-8.0150	0.0000
Employment Status				
Part-Time	-0.0143	0.0095	-1.5104	0.1310
Full-Time				
Rank				
Professor	-0.0385	0.0130	-2.9697	0.0030
Associate Professor	-0.0005	0.0117	-0.0437	0.9651
Assistant Professor	0.0359	0.0121	2.9578	0.0031
Instructor/Lecturer	-0.0112	0.0123	-0.9093	0.3632
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0107	0.0234	-0.4560	0.6484
Black or African American	0.0630	0.0248	2.5374	0.0112
Hispanic or Latinx	0.0651	0.0289	2.2562	0.0241
White	-0.0957	0.0128	-7.5071	0.0000
Another race/ethnicity	-0.0095	0.0368	-0.2587	0.7959
Multiracial	0.0300	0.0294	1.0179	0.3087
Preferred not to respond				
Gender				
Man	-0.0367	0.0125	-2.9304	0.0035
Woman	0.0406	0.0126	3.2133	0.0013
Preferred not to respond				

Table C.57. cont.

Fixed Effects	Est.	SE	t	p two-tailed
<i>Sexual Orientation</i>				
Straight (Heterosexual)	-0.0125	0.0116	-1.0733	0.2832
LGBQ+	0.0299	0.0173	1.7307	0.0835
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0077	0.0097	-0.7913	0.4294
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0132	0.0088	-1.5017	0.1342
Percent of Instructional Staff that Are Full-Time	-0.0096	0.0092	-1.0510	0.2940
Percent of Expenditures on Instruction	-0.0116	0.0095	-1.2156	0.2251
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	0.1419	0.0470	3.0215	0.0031
Hard-Pure-Nonlife (HPN) Discipline	0.2924	0.0547	5.3406	0.0000
Hard-Applied-Life (HAL) Discipline	-0.0463	0.0596	-0.7760	0.4388
Hard-Applied-Nonlife (HAN) Discipline	0.1353	0.0442	3.0612	0.0027
Soft-Pure-Life (SPL) Discipline	-0.2270	0.0615	-3.6907	0.0004
Soft-Pure-Nonlife (SPN) Discipline	-0.1659	0.0413	-4.0199	0.0001
Soft-Applied-Life (SAL) Discipline	-0.0439	0.0338	-1.2985	0.1969
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.58. *Model DAL-3.7*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9108	0.0075	120.8243	0.0000
Institution (Intercept)	0.0106	0.0021	5.0473	0.0000
Institution (Intercept) – Preferred not to respond – Gender (Slope) Covariance	-0.0011	0.0015	-0.7401	0.2296
Preferred not to respond – Gender (Slope)	0.0006	0.0019	0.3017	0.3814
Discipline (Intercept)	0.0219	0.0040	5.4712	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0388	0.0267	-1.4549	0.1464
<i>Course and Professional Control Variables</i>				
<i>Course Division</i>				
Lower Division				
Upper Division	0.0155	0.0099	1.5711	0.1162
Other Division	0.0157	0.0145	1.0802	0.2801
<i>Course Enrollment Size</i>				
Small Course				
Medium Course	0.0026	0.0081	0.3203	0.7487
Large Course	0.0308	0.0088	3.5092	0.0005
Course Meets a General Education Requirement Does Not Meet a Gen Ed Requirement				

Table C.58. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Meets a Gen Ed Requirement	0.0170	0.0066	2.5883	0.0097
Course Format				
Classroom				
Distance	-0.3722	0.0183	-20.3760	0.0000
Other Format	0.1965	0.0152	12.9641	0.0000
Course Load	0.0412	0.0063	6.5795	0.0000
Years of Teaching Experience	-0.0541	0.0068	-8.0150	0.0000
Employment Status				
Part-Time				
Full-Time	0.0143	0.0095	1.5104	0.1310
Rank				
Professor				
Associate Professor	-0.0005	0.0117	-0.0437	0.9651
Assistant Professor	0.0359	0.0121	2.9578	0.0031
Instructor/Lecturer	-0.0112	0.0123	-0.9093	0.3632
Other Rank	0.0143	0.0185	0.7714	0.4405
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander				
Black or African American	0.0630	0.0248	2.5374	0.0112
Hispanic or Latinx	0.0651	0.0289	2.2562	0.0241
White	-0.0957	0.0128	-7.5071	0.0000
Another race/ethnicity	-0.0095	0.0368	-0.2587	0.7959
Multiracial	0.0300	0.0294	1.0179	0.3087
Preferred not to respond	-0.0422	0.0243	-1.7418	0.0816
Gender				
Man				
Woman	0.0406	0.0126	3.2133	0.0013
Preferred not to respond	-0.0039	0.0218	-0.1793	0.8577
Sexual Orientation				
Straight (Heterosexual)				
LGBQ+	0.0299	0.0173	1.7307	0.0835
Preferred not to respond	-0.0174	0.0171	-1.0231	0.3062
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0077	0.0097	-0.7913	0.4294
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0132	0.0088	-1.5017	0.1342
Percent of Instructional Staff that Are Full-Time	-0.0096	0.0092	-1.0510	0.2940
Percent of Expenditures on Instruction	-0.0116	0.0095	-1.2156	0.2251
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline				
Hard-Pure-Nonlife (HPN) Discipline	0.2924	0.0547	5.3406	0.0000
Hard-Applied-Life (HAL) Discipline	-0.0463	0.0596	-0.7760	0.4388
Hard-Applied-Nonlife (HAN) Discipline	0.1353	0.0442	3.0612	0.0027
Soft-Pure-Life (SPL) Discipline	-0.2270	0.0615	-3.6907	0.0004
Soft-Pure-Nonlife (SPN) Discipline	-0.1659	0.0413	-4.0199	0.0001
Soft-Applied-Life (SAL) Discipline	-0.0439	0.0338	-1.2985	0.1969
Soft-Applied-Nonlife (SAN) Discipline	-0.0866	0.0384	-2.2523	0.0264

Note. Since this model was examined for random effects only, both sets of effect codes were not used. Since analysis of the Preferred not to respond (Gender) category required the second set of Gender effect codes, the second set of effect codes for all categorical variables were used.

Table C.59. *Model CL-3.8*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9107	0.0075	120.7891	0.0000
Institution (Intercept)	0.0117	0.0019	6.1927	0.0000
Institution (Intercept) – LGBQ+ (Slope) Covariance	0.0010	0.0020	0.4948	0.3104
LGBQ+ (Slope)	0.0015	0.0042	0.3594	0.3597
Discipline (Intercept)	0.0219	0.0040	5.4723	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0390	0.0268	-1.4565	0.1459
<i>Course and Professional Control Variables</i>				
<i>Course Division</i>				
Lower Division	-0.0311	0.0100	-3.1102	0.0019
Upper Division	0.0156	0.0099	1.5735	0.1156
Other Division				
<i>Course Enrollment Size</i>				
Small Course	-0.0333	0.0088	-3.7592	0.0002
Medium Course	0.0027	0.0081	0.3282	0.7428
Large Course				
<i>Course Meets a General Education Requirement</i>				
Does Not Meet a Gen Ed Requirement	-0.0171	0.0066	-2.6080	0.0091
Meets a Gen Ed Requirement				
<i>Course Format</i>				
Classroom	0.1757	0.0117	14.9738	0.0000
Distance	-0.3720	0.0183	-20.3547	0.0000
Other Format				
<i>Course Load</i>				
Years of Teaching Experience	-0.0541	0.0068	-8.0138	0.0000
<i>Employment Status</i>				
Part-Time	-0.0144	0.0095	-1.5218	0.1281
Full-Time				
<i>Rank</i>				
Professor	-0.0387	0.0130	-2.9874	0.0028
Associate Professor	-0.0004	0.0117	-0.0384	0.9694
Assistant Professor	0.0359	0.0121	2.9553	0.0031
Instructor/Lecturer	-0.0112	0.0123	-0.9136	0.3609
Other Rank				
<i>Faculty Identities</i>				
<i>Race/Ethnicity</i>				
Asian, Native Hawaiian, or other Pacific Islander	-0.0109	0.0234	-0.4661	0.6411
Black or African American	0.0637	0.0249	2.5609	0.0104
Hispanic or Latinx	0.0650	0.0289	2.2526	0.0243
White	-0.0959	0.0128	-7.5216	0.0000
Another race/ethnicity	-0.0095	0.0368	-0.2595	0.7953

Table C.59. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Multiracial	0.0297	0.0294	1.0098	0.3126
Preferred not to respond				
Gender				
Man	-0.0375	0.0124	-3.0242	0.0025
Woman	0.0406	0.0126	3.2177	0.0013
Preferred not to respond				
Sexual Orientation				
Straight (Heterosexual)	-0.0121	0.0116	-1.0418	0.2975
LGBQ+	0.0299	0.0175	1.7013	0.0898
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0078	0.0097	-0.8039	0.4221
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0132	0.0088	-1.5056	0.1332
Percent of Instructional Staff that Are Full-Time	-0.0097	0.0092	-1.0562	0.2916
Percent of Expenditures on Instruction	-0.0118	0.0095	-1.2396	0.2161
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	0.1416	0.0470	3.0149	0.0031
Hard-Pure-Nonlife (HPN) Discipline	0.2923	0.0548	5.3379	0.0000
Hard-Applied-Life (HAL) Discipline	-0.0462	0.0596	-0.7739	0.4401
Hard-Applied-Nonlife (HAN) Discipline	0.1358	0.0442	3.0717	0.0026
Soft-Pure-Life (SPL) Discipline	-0.2273	0.0615	-3.6949	0.0004
Soft-Pure-Nonlife (SPN) Discipline	-0.1661	0.0413	-4.0235	0.0001
Soft-Applied-Life (SAL) Discipline	-0.0437	0.0338	-1.2926	0.1989
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.60. *Model CL-3.9*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9107	0.0075	121.1713	0.0000
Institution (Intercept)	0.0116	0.0019	6.2101	0.0000
Discipline (Intercept)	0.0218	0.0040	5.4600	0.0000
Discipline (Intercept) – Black or African American (Slope)	-0.0011	0.0028	-0.3746	0.3540
Covariance				
Black or African American (Slope)	0.0018	0.0022	0.8127	0.2082
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0387	0.0267	-1.4469	0.1486
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.0310	0.0100	-3.1018	0.0019
Upper Division	0.0156	0.0099	1.5800	0.1141
Other Division				

Table C.60. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Course Enrollment Size				
Small Course	-0.0333	0.0088	-3.7585	0.0002
Medium Course	0.0025	0.0081	0.3120	0.7550
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0171	0.0066	-2.6068	0.0091
Meets a Gen Ed Requirement				
Course Format				
Classroom	0.1757	0.0117	14.9693	0.0000
Distance	-0.3721	0.0183	-20.3592	0.0000
Other Format				
Course Load	0.0413	0.0063	6.5936	0.0000
Years of Teaching Experience	-0.0541	0.0068	-8.0172	0.0000
Employment Status				
Part-Time	-0.0145	0.0095	-1.5339	0.1251
Full-Time				
Rank				
Professor	-0.0385	0.0130	-2.9732	0.0029
Associate Professor	-0.0003	0.0117	-0.0269	0.9785
Assistant Professor	0.0358	0.0121	2.9495	0.0032
Instructor/Lecturer	-0.0111	0.0123	-0.9067	0.3646
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0109	0.0234	-0.4683	0.6396
Black or African American	0.0669	0.0256	2.6171	0.0092
Hispanic or Latinx	0.0654	0.0289	2.2648	0.0235
White	-0.0960	0.0128	-7.5218	0.0000
Another race/ethnicity	-0.0096	0.0367	-0.2600	0.7948
Multiracial	0.0297	0.0294	1.0080	0.3135
Preferred not to respond				
Gender				
Man	-0.0373	0.0124	-3.0029	0.0027
Woman	0.0409	0.0126	3.2381	0.0012
Preferred not to respond				
Sexual Orientation				
Straight (Heterosexual)	-0.0124	0.0116	-1.0685	0.2853
LGBQ+	0.0300	0.0173	1.7372	0.0824
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0076	0.0097	-0.7828	0.4344
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0126	0.0088	-1.4381	0.1514
Percent of Instructional Staff that Are Full-Time	-0.0098	0.0092	-1.0679	0.2864
Percent of Expenditures on Instruction	-0.0118	0.0095	-1.2329	0.2186
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	0.1410	0.0470	3.0002	0.0033
Hard-Pure-Nonlife (HPN) Discipline	0.2947	0.0548	5.3808	0.0000
Hard-Applied-Life (HAL) Discipline	-0.0440	0.0596	-0.7373	0.4619
Hard-Applied-Nonlife (HAN) Discipline	0.1372	0.0442	3.1042	0.0024

Table C.60. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Soft-Pure-Life (SPL) Discipline	-0.2288	0.0614	-3.7264	0.0003
Soft-Pure-Nonlife (SPN) Discipline	-0.1682	0.0413	-4.0747	0.0001
Soft-Applied-Life (SAL) Discipline	-0.0446	0.0337	-1.3226	0.1888
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.61. *Model CL-3.10*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9105	0.0075	121.1356	0.0000
Institution (Intercept)	0.0117	0.0019	6.2166	0.0000
Discipline (Intercept)	0.0226	0.0044	5.1251	0.0000
Discipline (Intercept) – Man (Slope) Covariance	-0.0012	0.0021	-0.5556	0.2893
Man (Slope)	0.0015	0.0013	1.1871	0.1176
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0407	0.0270	-1.5108	0.1316
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.0314	0.0100	-3.1393	0.0017
Upper Division	0.0154	0.0099	1.5526	0.1205
Other Division				
Course Enrollment Size				
Small Course	-0.0333	0.0088	-3.7691	0.0002
Medium Course	0.0026	0.0081	0.3180	0.7505
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0169	0.0066	-2.5800	0.0099
Meets a Gen Ed Requirement				
Course Format				
Classroom	0.1758	0.0117	14.9777	0.0000
Distance	-0.3718	0.0183	-20.3475	0.0000
Other Format				
Course Load	0.0415	0.0063	6.6212	0.0000
Years of Teaching Experience	-0.0543	0.0068	-8.0375	0.0000
Employment Status				
Part-Time	-0.0142	0.0095	-1.4971	0.1344
Full-Time				
Rank				
Professor	-0.0380	0.0130	-2.9307	0.0034
Associate Professor	-0.0003	0.0117	-0.0235	0.9813
Assistant Professor	0.0361	0.0121	2.9711	0.0030
Instructor/Lecturer	-0.0119	0.0123	-0.9677	0.3332

Table C.61. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Other Rank				
<i>Faculty Identities</i>				
<i>Race/Ethnicity</i>				
Asian, Native Hawaiian, or other Pacific Islander	-0.0109	0.0234	-0.4649	0.6420
Black or African American	0.0639	0.0248	2.5697	0.0102
Hispanic or Latinx	0.0656	0.0289	2.2717	0.0231
White	-0.0960	0.0127	-7.5327	0.0000
Another race/ethnicity	-0.0101	0.0367	-0.2740	0.7841
Multiracial	0.0296	0.0294	1.0060	0.3144
Preferred not to respond				
<i>Gender</i>				
Man	-0.0329	0.0136	-2.4147	0.0172
Woman	0.0406	0.0127	3.2030	0.0014
Preferred not to respond				
<i>Sexual Orientation</i>				
Straight (Heterosexual)	-0.0121	0.0116	-1.0466	0.2953
LGBQ+	0.0302	0.0173	1.7446	0.0811
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0078	0.0097	-0.7980	0.4255
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0126	0.0088	-1.4288	0.1541
Percent of Instructional Staff that Are Full-Time	-0.0098	0.0092	-1.0687	0.2860
Percent of Expenditures on Instruction	-0.0116	0.0095	-1.2188	0.2239
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	0.1412	0.0469	3.0086	0.0032
Hard-Pure-Nonlife (HPN) Discipline	0.2901	0.0546	5.3094	0.0000
Hard-Applied-Life (HAL) Discipline	-0.0445	0.0597	-0.7456	0.4570
Hard-Applied-Nonlife (HAN) Discipline	0.1352	0.0441	3.0666	0.0027
Soft-Pure-Life (SPL) Discipline	-0.2244	0.0616	-3.6464	0.0004
Soft-Pure-Nonlife (SPN) Discipline	-0.1677	0.0413	-4.0637	0.0001
Soft-Applied-Life (SAL) Discipline	-0.0436	0.0339	-1.2882	0.2004
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.62. *Model CL-3.11*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9098	0.0075	121.1213	0.0000
Institution (Intercept)	0.0116	0.0019	6.2037	0.0000
Discipline (Intercept)	0.0188	0.0039	4.8822	0.0000
Discipline (Intercept) – Woman (Slope) Covariance	0.0026	0.0022	1.2078	0.1136
Woman (Slope)	0.0042	0.0020	2.1389	0.0162

Table C.62. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0361	0.0262	-1.3751	0.1698
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.0315	0.0100	-3.1542	0.0016
Upper Division	0.0153	0.0099	1.5494	0.1213
Other Division				
Course Enrollment Size				
Small Course	-0.0335	0.0088	-3.7861	0.0002
Medium Course	0.0028	0.0081	0.3443	0.7306
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0167	0.0066	-2.5488	0.0108
Meets a Gen Ed Requirement				
Course Format				
Classroom	0.1755	0.0117	14.9630	0.0000
Distance	-0.3717	0.0183	-20.3450	0.0000
Other Format				
Course Load	0.0413	0.0063	6.6031	0.0000
Years of Teaching Experience	-0.0544	0.0068	-8.0519	0.0000
Employment Status				
Part-Time	-0.0140	0.0095	-1.4769	0.1397
Full-Time				
Rank				
Professor	-0.0379	0.0130	-2.9221	0.0035
Associate Professor	-0.0004	0.0117	-0.0306	0.9756
Assistant Professor	0.0366	0.0121	3.0157	0.0026
Instructor/Lecturer	-0.0121	0.0123	-0.9888	0.3228
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	-0.0108	0.0234	-0.4614	0.6445
Black or African American	0.0662	0.0248	2.6636	0.0077
Hispanic or Latinx	0.0649	0.0289	2.2496	0.0245
White	-0.0959	0.0127	-7.5240	0.0000
Another race/ethnicity	-0.0107	0.0367	-0.2909	0.7712
Multiracial	0.0288	0.0294	0.9777	0.3282
Preferred not to respond				
Gender				
Man	-0.0383	0.0125	-3.0779	0.0021
Woman	0.0396	0.0153	2.5905	0.0107
Preferred not to respond				
Sexual Orientation				
Straight (Heterosexual)	-0.0132	0.0116	-1.1335	0.2570
LGBQ+	0.0315	0.0173	1.8203	0.0687
Preferred not to respond				
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0076	0.0097	-0.7809	0.4355
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0126	0.0088	-1.4311	0.1534
Percent of Instructional Staff that Are Full-Time	-0.0098	0.0092	-1.0666	0.2870

Table C.62. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Percent of Expenditures on Instruction	-0.0116	0.0095	-1.2138	0.2258
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	0.1365	0.0456	2.9922	0.0034
Hard-Pure-Nonlife (HPN) Discipline	0.2726	0.0521	5.2310	0.0000
Hard-Applied-Life (HAL) Discipline	-0.0402	0.0595	-0.6754	0.5003
Hard-Applied-Nonlife (HAN) Discipline	0.1373	0.0425	3.2317	0.0016
Soft-Pure-Life (SPL) Discipline	-0.2014	0.0600	-3.3533	0.0012
Soft-Pure-Nonlife (SPN) Discipline	-0.1758	0.0398	-4.4230	0.0000
Soft-Applied-Life (SAL) Discipline	-0.0458	0.0336	-1.3614	0.1761
Soft-Applied-Nonlife (SAN) Discipline				

Note. Since this model was examined for random effects only, the second set of effect-coded variables was not analyzed to produce a full set of estimates.

Table C.63. *Model CL-3.12*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9105	0.0075	121.1356	0.0000
Institution (Intercept)	0.0117	0.0019	6.2166	0.0000
Discipline (Intercept)	0.0226	0.0044	5.1251	0.0000
Discipline (Intercept) – Preferred not to respond – Gender (Slope) Covariance	0.0012	0.0021	0.5556	0.2893
Preferred not to respond – Gender (Slope)	0.0015	0.0013	1.1871	0.1176
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0407	0.0270	-1.5108	0.1316
<i>Course and Professional Control Variables</i>				
<i>Course Division</i>				
Lower Division				
Upper Division	0.0154	0.0099	1.5526	0.1205
Other Division	0.0160	0.0145	1.1020	0.2705
<i>Course Enrollment Size</i>				
Small Course				
Medium Course	0.0026	0.0081	0.3180	0.7505
Large Course	0.0308	0.0088	3.5022	0.0005
<i>Course Meets a General Education Requirement</i>				
Does Not Meet a Gen Ed Requirement				
Meets a Gen Ed Requirement	0.0169	0.0066	2.5800	0.0099
<i>Course Format</i>				
Classroom				
Distance	-0.3718	0.0183	-20.3475	0.0000
Other Format	0.1961	0.0152	12.9388	0.0000
Course Load	0.0415	0.0063	6.6212	0.0000
Years of Teaching Experience	-0.0543	0.0068	-8.0375	0.0000

Table C.63. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Employment Status				
Part-Time				
Full-Time	0.0142	0.0095	1.4971	0.1344
Rank				
Professor				
Associate Professor	-0.0003	0.0117	-0.0235	0.9813
Assistant Professor	0.0361	0.0121	2.9711	0.0030
Instructor/Lecturer	-0.0119	0.0123	-0.9677	0.3332
Other Rank	0.0141	0.0185	0.7611	0.4466
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander				
Black or African American	0.0639	0.0248	2.5697	0.0102
Hispanic or Latinx	0.0656	0.0289	2.2717	0.0231
White	-0.0960	0.0127	-7.5327	0.0000
Another race/ethnicity	-0.0101	0.0367	-0.2740	0.7841
Multiracial	0.0296	0.0294	1.0060	0.3144
Preferred not to respond	-0.0421	0.0243	-1.7339	0.0830
Gender				
Man				
Woman	0.0406	0.0127	3.2030	0.0014
Preferred not to respond	-0.0077	0.0225	-0.3417	0.7327
Sexual Orientation				
Straight (Heterosexual)				
LGBQ+	0.0302	0.0173	1.7446	0.0811
Preferred not to respond	-0.0180	0.0171	-1.0555	0.2912
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching	-0.0078	0.0097	-0.7980	0.4255
Percent of Full-Time Faculty that Are Tenured/Tenure-Track	-0.0126	0.0088	-1.4288	0.1541
Percent of Instructional Staff that Are Full-Time	-0.0098	0.0092	-1.0687	0.2860
Percent of Expenditures on Instruction	-0.0116	0.0095	-1.2188	0.2239
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline				
Hard-Pure-Nonlife (HPN) Discipline	0.2901	0.0546	5.3094	0.0000
Hard-Applied-Life (HAL) Discipline	-0.0445	0.0597	-0.7456	0.4570
Hard-Applied-Nonlife (HAN) Discipline	0.1352	0.0441	3.0666	0.0027
Soft-Pure-Life (SPL) Discipline	-0.2244	0.0616	-3.6464	0.0004
Soft-Pure-Nonlife (SPN) Discipline	-0.1677	0.0413	-4.0637	0.0001
Soft-Applied-Life (SAL) Discipline	-0.0436	0.0339	-1.2882	0.2004
Soft-Applied-Nonlife (SAN) Discipline	-0.0863	0.0384	-2.2466	0.0268

Note. Since this model was examined for random effects only, both sets of effect codes were not used. Since analysis of the Preferred not to respond (Gender) category required the second set of Gender effect codes, the second set of effect codes for all categorical variables were used.

Table C.64. Model DAL-3.19

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.7251	0.0060	120.8805	0.0000
Institution (Intercept)	0.0180	0.0024	7.4660	0.0000
Discipline (Intercept)	0.0481	0.0075	6.3683	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	0.1060	0.0337	3.1477	0.0018
<i>Course and Professional Control Variables</i>				
<i>Course Division</i>				
Lower Division	-0.1498	0.0090	-16.7201	0.0000
Upper Division	0.1030	0.0089	11.6054	0.0000
Other Division				
<i>Course Enrollment Size</i>				
Small Course	0.0197	0.0080	2.4608	0.0139
Medium Course	0.0017	0.0073	0.2383	0.8116
Large Course				
<i>Course Meets a General Education Requirement</i>				
Does Not Meet a Gen Ed Requirement	-0.0861	0.0059	-14.5880	0.0000
Meets a Gen Ed Requirement				
<i>Course Format</i>				
Classroom	-0.0632	0.0106	-5.9849	0.0000
Distance	-0.0081	0.0164	-0.4955	0.6203
Other Format				
<i>Course Load</i>				
Years of Teaching Experience	0.0431	0.0056	7.6296	0.0000
Employment Status	-0.0476	0.0061	-7.8539	0.0000
<i>Employment Status</i>				
Part-Time	0.0110	0.0085	1.2883	0.1976
Full-Time				
<i>Rank</i>				
Professor	-0.0205	0.0116	-1.7650	0.0776
Associate Professor	-0.0051	0.0105	-0.4896	0.6244
Assistant Professor	0.0398	0.0109	3.6613	0.0003
Instructor/Lecturer	-0.0275	0.0110	-2.4922	0.0127
Other Rank				
<i>Faculty Identities</i>				
<i>Race/Ethnicity</i>				
Asian, Native Hawaiian, or other Pacific Islander	-0.0311	0.0268	-1.1589	0.2465
Black or African American	0.2500	0.0305	8.1855	0.0000
Hispanic or Latinx	0.0870	0.0393	2.2142	0.0268
White	-0.1779	0.0155	-11.5120	0.0000
Another race/ethnicity	-0.0381	0.0466	-0.8173	0.4137
Multiracial	-0.0117	0.0367	-0.3184	0.7502
Preferred not to respond	-0.0783	0.0291	-2.6927	0.0071
<i>Gender</i>				
Man	-0.0414	0.0148	-2.7964	0.0052
Woman	0.0538	0.0154	3.4918	0.0005
Preferred not to respond	-0.0123	0.0264	-0.4667	0.6407
<i>Sexual Orientation</i>				
Straight (Heterosexual)	-0.0025	0.0154	-0.1646	0.8693
LGBQ+	0.0558	0.0246	2.2721	0.0231

Table C.64. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Preferred not to respond	-0.0533	0.0212	-2.5094	0.0121
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching (MTmTeach)	-0.0313	0.0173	-1.8039	0.0714
Percent of Full-Time Faculty that Are Tenured/Tenure-Track (Pct_TTr)	-0.0034	0.0165	-0.2037	0.8386
Percent of Instructional Staff that Are Full-Time (Pct_FT)	-0.0313	0.0170	-1.8379	0.0662
Percent of Expenditures on Instruction (Pct_ExInstr)	-0.0172	0.0174	-0.9911	0.3217
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	-0.2463	0.0746	-3.3025	0.0011
Hard-Pure-Nonlife (HPN) Discipline	-0.5075	0.0846	-5.9956	0.0000
Hard-Applied-Life (HAL) Discipline	0.0212	0.1189	0.1784	0.8585
Hard-Applied-Nonlife (HAN) Discipline	-0.4886	0.0761	-6.4214	0.0000
Soft-Pure-Life (SPL) Discipline	0.4351	0.0941	4.6224	0.0000
Soft-Pure-Nonlife (SPN) Discipline	0.2316	0.0634	3.6524	0.0004
Soft-Applied-Life (SAL) Discipline	0.2886	0.0553	5.2220	0.0000
Soft-Applied-Nonlife (SAN) Discipline	0.2660	0.0627	4.2450	0.0000
<i>Interaction Terms</i>				
Asian, Native Hawaiian, or other Pacific Islander x HPL	-0.0555	0.0697	-0.7956	0.4263
Asian, Native Hawaiian, or other Pacific Islander x HPN	0.1392	0.0528	2.6371	0.0084
Asian, Native Hawaiian, or other Pacific Islander x HAL	0.0571	0.1177	0.4854	0.6274
Asian, Native Hawaiian, or other Pacific Islander x HAN	0.0463	0.0532	0.8695	0.3846
Asian, Native Hawaiian, or other Pacific Islander x SPL	-0.0237	0.0762	-0.3105	0.7562
Asian, Native Hawaiian, or other Pacific Islander x SPN	-0.0285	0.0524	-0.5442	0.5863
Asian, Native Hawaiian, or other Pacific Islander x SAL	-0.1076	0.0561	-1.9172	0.0552
Asian, Native Hawaiian, or other Pacific Islander x SAN	-0.0274	0.0484	-0.5658	0.5715
Asian, Native Hawaiian, or other Pacific Islander x MTmTeach	0.0603	0.0229	2.6403	0.0083
Asian, Native Hawaiian, or other Pacific Islander x Pct_FT	0.0219	0.0229	0.9556	0.3393
Asian, Native Hawaiian, or other Pacific Islander x Pct_TTr	-0.0073	0.0220	-0.3315	0.7403
Asian, Native Hawaiian, or other Pacific Islander x Pct_ExInstr	0.0113	0.0237	0.4780	0.6327
Black or African American x HPL	0.1675	0.0783	2.1401	0.0324
Black or African American x HPN	0.0072	0.0668	0.1084	0.9137
Black or African American x HAL	0.2610	0.1221	2.1382	0.0325
Black or African American x HAN	0.0640	0.0703	0.9108	0.3624
Black or African American x SPL	-0.0869	0.0634	-1.3709	0.1704
Black or African American x SPN	-0.1821	0.0510	-3.5715	0.0004
Black or African American x SAL	-0.1414	0.0449	-3.1472	0.0017
Black or African American x SAN	-0.0893	0.0528	-1.6905	0.0909
Black or African American x MTmTeach	0.0406	0.0277	1.4623	0.1437
Black or African American x Pct_FT	0.0033	0.0248	0.1342	0.8933
Black or African American x Pct_TTr	-0.0258	0.0232	-1.1096	0.2672
Black or African American x Pct_ExInstr	0.0113	0.0247	0.4564	0.6481
Hispanic or Latinx x HPL	-0.0098	0.0881	-0.1114	0.9113
Hispanic or Latinx x HPN	0.0645	0.0851	0.7583	0.4483
Hispanic or Latinx x HAL	0.0461	0.1976	0.2336	0.8153
Hispanic or Latinx x HAN	-0.1070	0.0899	-1.1893	0.2343
Hispanic or Latinx x SPL	-0.0709	0.0797	-0.8893	0.3738
Hispanic or Latinx x SPN	0.0833	0.0554	1.5034	0.1327
Hispanic or Latinx x SAL	-0.0657	0.0601	-1.0932	0.2743
Hispanic or Latinx x SAN	0.0594	0.0746	0.7969	0.4255

Table C.64. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Hispanic or Latinx x MTmTeach	-0.0361	0.0274	-1.3203	0.1867
Hispanic or Latinx x Pct_FT	-0.0041	0.0283	-0.1462	0.8838
Hispanic or Latinx x Pct_TTr	0.0005	0.0279	0.0182	0.9855
Hispanic or Latinx x Pct_Exlnstr	-0.0003	0.0299	-0.0099	0.9921
White x HPL	-0.0360	0.0370	-0.9724	0.3309
White x HPN	-0.1788	0.0340	-5.2612	0.0000
White x HAL	0.0825	0.0724	1.1405	0.2541
White x HAN	-0.0586	0.0374	-1.5651	0.1176
White x SPL	0.0304	0.0344	0.8830	0.3772
White x SPN	0.0514	0.0246	2.0879	0.0368
White x SAL	0.0554	0.0262	2.1145	0.0345
White x SAN	0.0536	0.0292	1.8385	0.0660
White x MTmTeach	0.0028	0.0124	0.2219	0.8244
White x Pct_FT	0.0022	0.0124	0.1802	0.8570
White x Pct_TTr	-0.0046	0.0118	-0.3871	0.6987
White x Pct_Exlnstr	-0.0057	0.0129	-0.4436	0.6574
Another race/ethnicity x HPL	-0.0715	0.1185	-0.6034	0.5462
Another race/ethnicity x HPN	0.3118	0.1061	2.9387	0.0033
Another race/ethnicity x HAL	-0.7191	0.2366	-3.0398	0.0024
Another race/ethnicity x HAN	0.1578	0.1012	1.5591	0.1190
Another race/ethnicity x SPL	-0.0004	0.0924	-0.0048	0.9961
Another race/ethnicity x SPN	0.0017	0.0742	0.0232	0.9815
Another race/ethnicity x SAL	0.1894	0.0796	2.3794	0.0173
Another race/ethnicity x SAN	0.1303	0.0849	1.5344	0.1249
Another race/ethnicity x MTmTeach	-0.0563	0.0357	-1.5784	0.1145
Another race/ethnicity x Pct_FT	-0.0373	0.0376	-0.9930	0.3207
Another race/ethnicity x Pct_TTr	0.0370	0.0362	1.0221	0.3067
Another race/ethnicity x Pct_Exlnstr	-0.0356	0.0400	-0.8920	0.3724
Multiracial x HPL	-0.0114	0.0827	-0.1373	0.8908
Multiracial x HPN	-0.2055	0.0820	-2.5061	0.0122
Multiracial x HAL	0.1347	0.1795	0.7500	0.4532
Multiracial x HAN	-0.0749	0.0951	-0.7881	0.4306
Multiracial x SPL	0.0858	0.0775	1.1062	0.2687
Multiracial x SPN	0.0646	0.0554	1.1664	0.2435
Multiracial x SAL	0.0395	0.0642	0.6145	0.5389
Multiracial x SAN	-0.0326	0.0762	-0.4280	0.6686
Multiracial x MTmTeach	0.0036	0.0284	0.1253	0.9003
Multiracial x Pct_FT	0.0227	0.0293	0.7720	0.4401
Multiracial x Pct_TTr	-0.0151	0.0287	-0.5261	0.5988
Multiracial x Pct_Exlnstr	0.0446	0.0302	1.4748	0.1403
Preferred not to respond (Race/ethnicity) x HPL	0.0166	0.0741	0.2241	0.8226
Preferred not to respond (Race/ethnicity) x HPN	-0.1385	0.0653	-2.1219	0.0339
Preferred not to respond (Race/ethnicity) x HAL	0.1376	0.1354	1.0164	0.3095
Preferred not to respond (Race/ethnicity) x HAN	-0.0275	0.0691	-0.3985	0.6903
Preferred not to respond (Race/ethnicity) x SPL	0.0658	0.0769	0.8553	0.3924
Preferred not to respond (Race/ethnicity) x SPN	0.0096	0.0450	0.2128	0.8315
Preferred not to respond (Race/ethnicity) x SAL	0.0305	0.0531	0.5744	0.5657
Preferred not to respond (Race/ethnicity) x SAN	-0.0941	0.0563	-1.6711	0.0947
Preferred not to respond (Race/ethnicity) x MTmTeach	-0.0148	0.0241	-0.6134	0.5396

Table C.64. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Preferred not to respond (Race/ethnicity) x Pct_FT	-0.0086	0.0234	-0.3698	0.7115
Preferred not to respond (Race/ethnicity) x Pct_TTr	0.0153	0.0223	0.6843	0.4938
Preferred not to respond (Race/ethnicity) x Pct_ExInstr	-0.0256	0.0246	-1.0404	0.2982
Man x HPL	0.0060	0.0352	0.1708	0.8643
Man x HPN	0.0314	0.0322	0.9751	0.3295
Man x HAL	-0.0826	0.0693	-1.1933	0.2328
Man x HAN	0.1186	0.0383	3.0959	0.0020
Man x SPL	0.0452	0.0402	1.1245	0.2608
Man x SPN	-0.0558	0.0228	-2.4486	0.0143
Man x SAL	-0.0318	0.0288	-1.1025	0.2702
Man x SAN	-0.0310	0.0280	-1.1079	0.2679
Man x MTmTeach	-0.0242	0.0122	-1.9790	0.0478
Man x Pct_FT	-0.0221	0.0120	-1.8341	0.0666
Man x Pct_TTr	0.0033	0.0114	0.2886	0.7729
Man x Pct_ExInstr	0.0090	0.0123	0.7299	0.4655
Woman x HPL	0.0475	0.0361	1.3148	0.1886
Woman x HPN	-0.0659	0.0339	-1.9448	0.0518
Woman x HAL	-0.0372	0.0718	-0.5183	0.6042
Woman x HAN	0.0283	0.0429	0.6608	0.5088
Woman x SPL	0.0341	0.0401	0.8503	0.3951
Woman x SPN	-0.0329	0.0232	-1.4191	0.1559
Woman x SAL	0.0500	0.0281	1.7835	0.0745
Woman x SAN	-0.0240	0.0292	-0.8234	0.4103
Woman x MTmTeach	-0.0181	0.0125	-1.4511	0.1468
Woman x Pct_FT	-0.0147	0.0121	-1.2161	0.2240
Woman x Pct_TTr	0.0105	0.0115	0.9190	0.3581
Woman x Pct_ExInstr	-0.0013	0.0125	-0.1019	0.9189
Preferred not to respond (Gender) x HPL	-0.0535	0.0630	-0.8489	0.3959
Preferred not to respond (Gender) x HPN	0.0345	0.0581	0.5937	0.5527
Preferred not to respond (Gender) x HAL	0.1198	0.1229	0.9749	0.3296
Preferred not to respond (Gender) x HAN	-0.1470	0.0683	-2.1513	0.0315
Preferred not to respond (Gender) x SPL	-0.0793	0.0731	-1.0846	0.2781
Preferred not to respond (Gender) x SPN	0.0887	0.0397	2.2364	0.0253
Preferred not to respond (Gender) x SAL	-0.0182	0.0500	-0.3650	0.7151
Preferred not to respond (Gender) x SAN	0.0550	0.0500	1.0987	0.2719
Preferred not to respond (Gender) x MTmTeach	0.0423	0.0221	1.9183	0.0551
Preferred not to respond (Gender) x Pct_FT	0.0368	0.0214	1.7162	0.0861
Preferred not to respond (Gender) x Pct_TTr	-0.0138	0.0203	-0.6811	0.4958
Preferred not to respond (Gender) x Pct_ExInstr	-0.0077	0.0221	-0.3486	0.7274
Straight x HPL	-0.0214	0.0351	-0.6108	0.5413
Straight x HPN	0.0737	0.0345	2.1368	0.0326
Straight x HAL	0.0157	0.0761	0.2061	0.8367
Straight x HAN	-0.0240	0.0448	-0.5356	0.5922
Straight x SPL	-0.0274	0.0326	-0.8410	0.4004
Straight x SPN	0.0285	0.0222	1.2819	0.1999
Straight x SAL	-0.0090	0.0256	-0.3515	0.7252
Straight x SAN	-0.0360	0.0297	-1.2130	0.2251
Straight x MTmTeach	0.0114	0.0113	1.0107	0.3122
Straight x Pct_FT	0.0158	0.0113	1.3911	0.1642

Table C.64. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Straight x Pct_TTr	-0.0019	0.0108	-0.1757	0.8605
Straight x Pct_ExInstr	0.0038	0.0116	0.3269	0.7438
LGBQ+ x HPL	0.0279	0.0537	0.5196	0.6034
LGBQ+ x HPN	-0.1523	0.0564	-2.6988	0.0070
LGBQ+ x HAL	0.2443	0.1214	2.0121	0.0442
LGBQ+ x HAN	-0.0375	0.0771	-0.4859	0.6270
LGBQ+ x SPL	-0.0340	0.0459	-0.7404	0.4591
LGBQ+ x SPN	-0.0320	0.0329	-0.9729	0.3306
LGBQ+ x SAL	-0.0264	0.0395	-0.6699	0.5029
LGBQ+ x SAN	0.0100	0.0472	0.2124	0.8318
LGBQ+ x MTmTeach	0.0215	0.0165	1.3047	0.1920
LGBQ+ x Pct_FT	0.0130	0.0168	0.7745	0.4386
LGBQ+ x Pct_TTr	0.0090	0.0163	0.5563	0.5780
LGBQ+ x Pct_ExInstr	-0.0222	0.0170	-1.3042	0.1922
Preferred not to respond (Sexual Orientation) x HPL	-0.0065	0.0519	-0.1249	0.9006
Preferred not to respond (Sexual Orientation) x HPN	0.0786	0.0475	1.6555	0.0978
Preferred not to respond (Sexual Orientation) x HAL	-0.2600	0.1012	-2.5698	0.0102
Preferred not to respond (Sexual Orientation) x HAN	0.0615	0.0581	1.0591	0.2896
Preferred not to respond (Sexual Orientation) x SPL	0.0614	0.0506	1.2142	0.2247
Preferred not to respond (Sexual Orientation) x SPN	0.0035	0.0320	0.1101	0.9124
Preferred not to respond (Sexual Orientation) x SAL	0.0354	0.0370	0.9569	0.3386
Preferred not to respond (Sexual Orientation) x SAN	0.0260	0.0418	0.6204	0.5350
Preferred not to respond (Sexual Orientation) x MTmTeach	-0.0329	0.0169	-1.9478	0.0514
Preferred not to respond (Sexual Orientation) x Pct_FT	-0.0288	0.0167	-1.7178	0.0858
Preferred not to respond (Sexual Orientation) x Pct_TTr	-0.0072	0.0158	-0.4533	0.6504
Preferred not to respond (Sexual Orientation) x Pct_ExInstr	0.0184	0.0174	1.0593	0.2895

Note. Since this model was examined for the fixed main effects and interactions of the primary variables of interest, the second set of effect codes for the course and professional control variables were not used.

Table C.65. *Model CL-3.13*

Random Effects	Est.	SE	Wald Z	p one-tailed
Individual (Residual)	0.9107	0.0075	121.0090	0.0000
Institution (Intercept)	0.0112	0.0018	6.0983	0.0000
Discipline (Intercept)	0.0211	0.0039	5.4005	0.0000
Fixed Effects	Est.	SE	t	p two-tailed
Intercept	-0.0348	0.0309	-1.1268	0.2601
<i>Course and Professional Control Variables</i>				
Course Division				
Lower Division	-0.0304	0.0100	-3.0388	0.0024
Upper Division	0.0165	0.0099	1.6683	0.0953

Table C.65. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Other Division				
Course Enrollment Size				
Small Course	-0.0333	0.0089	-3.7613	0.0002
Medium Course	0.0031	0.0081	0.3787	0.7049
Large Course				
Course Meets a General Education Requirement				
Does Not Meet a Gen Ed Requirement	-0.0179	0.0066	-2.7148	0.0066
Meets a Gen Ed Requirement				
Course Format				
Classroom	0.1757	0.0118	14.9494	0.0000
Distance	-0.3733	0.0183	-20.4021	0.0000
Other Format				
Course Load	0.0412	0.0063	6.5593	0.0000
Years of Teaching Experience	-0.0550	0.0068	-8.1304	0.0000
Employment Status				
Part-Time	-0.0143	0.0095	-1.5032	0.1328
Full-Time				
Rank				
Professor	-0.0367	0.0130	-2.8202	0.0048
Associate Professor	0.0005	0.0117	0.0390	0.9689
Assistant Professor	0.0348	0.0122	2.8582	0.0043
Instructor/Lecturer	-0.0129	0.0123	-1.0522	0.2927
Other Rank				
<i>Faculty Identities</i>				
Race/Ethnicity				
Asian, Native Hawaiian, or other Pacific Islander	0.0068	0.0299	0.2274	0.8201
Black or African American	0.1035	0.0340	3.0462	0.0023
Hispanic or Latinx	-0.0402	0.0439	-0.9157	0.3598
White	-0.0957	0.0172	-5.5579	0.0000
Another race/ethnicity	0.0058	0.0521	0.1120	0.9108
Multiracial	0.0643	0.0410	1.5678	0.1169
Preferred not to respond	-0.0445	0.0325	-1.3698	0.1708
Gender				
Man	-0.0285	0.0166	-1.7217	0.0851
Woman	0.0328	0.0172	1.9084	0.0564
Preferred not to respond	-0.0043	0.0295	-0.1443	0.8853
Sexual Orientation				
Straight (Heterosexual)	-0.0207	0.0172	-1.1981	0.2309
LGBQ+	0.0427	0.0275	1.5559	0.1197
Preferred not to respond	-0.0221	0.0238	-0.9282	0.3533
<i>Institutional Variables</i>				
Institutional Mean Time on Teaching (MTmTeach)	-0.0123	0.0181	-0.6790	0.4972
Percent of Full-Time Faculty that Are Tenured/Tenure-Track (Pct_TTr)	-0.0010	0.0175	-0.0549	0.9562
Percent of Instructional Staff that Are Full-Time (Pct_FT)	-0.0212	0.0180	-1.1788	0.2386
Percent of Expenditures on Instruction (Pct_ExInstr)	-0.0186	0.0183	-1.0125	0.3114
<i>Disciplinary Variables</i>				
Hard-Pure-Life (HPL) Discipline	0.1328	0.0660	2.0129	0.0447
Hard-Pure-Nonlife (HPN) Discipline	0.3314	0.0708	4.6809	0.0000

Table C.65. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Hard-Applied-Life (HAL) Discipline	-0.0967	0.1187	-0.8147	0.4153
Hard-Applied-Nonlife (HAN) Discipline	0.1246	0.0705	1.7665	0.0777
Soft-Pure-Life (SPL) Discipline	-0.1747	0.0757	-2.3079	0.0219
Soft-Pure-Nonlife (SPN) Discipline	-0.1746	0.0501	-3.4855	0.0006
Soft-Applied-Life (SAL) Discipline	-0.0792	0.0487	-1.6272	0.1043
Soft-Applied-Nonlife (SAN) Discipline	-0.0637	0.0546	-1.1667	0.2440
<i>Interaction Terms</i>				
Asian, Native Hawaiian, or other Pacific Islander x HPL	-0.1720	0.0780	-2.2062	0.0274
Asian, Native Hawaiian, or other Pacific Islander x HPN	-0.0934	0.0591	-1.5813	0.1138
Asian, Native Hawaiian, or other Pacific Islander x HAL	0.1809	0.1313	1.3778	0.1683
Asian, Native Hawaiian, or other Pacific Islander x HAN	-0.0454	0.0595	-0.7625	0.4458
Asian, Native Hawaiian, or other Pacific Islander x SPL	-0.0017	0.0853	-0.0200	0.9840
Asian, Native Hawaiian, or other Pacific Islander x SPN	-0.0085	0.0586	-0.1447	0.8850
Asian, Native Hawaiian, or other Pacific Islander x SAL	0.0689	0.0628	1.0971	0.2726
Asian, Native Hawaiian, or other Pacific Islander x SAN	0.0712	0.0541	1.3168	0.1879
Asian, Native Hawaiian, or other Pacific Islander x MTmTeach	0.0241	0.0255	0.9425	0.3459
Asian, Native Hawaiian, or other Pacific Islander x Pct_FT	-0.0507	0.0256	-1.9827	0.0474
Asian, Native Hawaiian, or other Pacific Islander x Pct_TTr	-0.0245	0.0246	-0.9945	0.3200
Asian, Native Hawaiian, or other Pacific Islander x Pct_Exlnstr	0.0197	0.0265	0.7423	0.4579
Black or African American x HPL	-0.0110	0.0876	-0.1253	0.9003
Black or African American x HPN	-0.0680	0.0748	-0.9088	0.3635
Black or African American x HAL	0.2856	0.1365	2.0928	0.0364
Black or African American x HAN	0.0128	0.0785	0.1627	0.8707
Black or African American x SPL	0.0674	0.0710	0.9492	0.3426
Black or African American x SPN	-0.1243	0.0570	-2.1793	0.0293
Black or African American x SAL	-0.0385	0.0503	-0.7668	0.4432
Black or African American x SAN	-0.1240	0.0591	-2.0979	0.0359
Black or African American x MTmTeach	-0.0204	0.0308	-0.6619	0.5080
Black or African American x Pct_FT	-0.0102	0.0274	-0.3717	0.7101
Black or African American x Pct_TTr	0.0270	0.0257	1.0517	0.2930
Black or African American x Pct_Exlnstr	-0.0008	0.0273	-0.0294	0.9765
Hispanic or Latinx x HPL	0.0482	0.0986	0.4896	0.6244
Hispanic or Latinx x HPN	0.1294	0.0953	1.3584	0.1743
Hispanic or Latinx x HAL	-0.6990	0.2209	-3.1640	0.0016
Hispanic or Latinx x HAN	0.0823	0.1006	0.8174	0.4137
Hispanic or Latinx x SPL	0.0811	0.0892	0.9091	0.3633
Hispanic or Latinx x SPN	0.1575	0.0619	2.5453	0.0109
Hispanic or Latinx x SAL	0.1038	0.0673	1.5426	0.1229
Hispanic or Latinx x SAN	0.0967	0.0834	1.1587	0.2466
Hispanic or Latinx x MTmTeach	-0.0119	0.0303	-0.3924	0.6947
Hispanic or Latinx x Pct_FT	-0.0226	0.0315	-0.7172	0.4733
Hispanic or Latinx x Pct_TTr	0.0218	0.0311	0.7010	0.4833
Hispanic or Latinx x Pct_Exlnstr	0.0123	0.0330	0.3734	0.7089
White x HPL	-0.0096	0.0414	-0.2329	0.8158
White x HPN	-0.0398	0.0380	-1.0466	0.2953
White x HAL	0.0167	0.0809	0.2069	0.8361
White x HAN	0.0546	0.0419	1.3052	0.1918
White x SPL	-0.0011	0.0384	-0.0293	0.9766
White x SPN	-0.0025	0.0275	-0.0906	0.9278

Table C.65. cont.

Fixed Effects	Est.	SE	t	p two-tailed
White x SAL	0.0056	0.0293	0.1923	0.8475
White x SAN	-0.0240	0.0326	-0.7341	0.4629
White x MTmTeach	-0.0169	0.0138	-1.2266	0.2200
White x Pct_FT	0.0006	0.0138	0.0401	0.9680
White x Pct_TTr	-0.0166	0.0132	-1.2578	0.2085
White x Pct_Exlnstr	0.0195	0.0143	1.3618	0.1733
Another race/ethnicity x HPL	0.0063	0.1326	0.0474	0.9622
Another race/ethnicity x HPN	0.2399	0.1188	2.0196	0.0434
Another race/ethnicity x HAL	-0.0102	0.2646	-0.0386	0.9692
Another race/ethnicity x HAN	-0.0293	0.1133	-0.2589	0.7958
Another race/ethnicity x SPL	-0.1931	0.1035	-1.8670	0.0619
Another race/ethnicity x SPN	-0.0448	0.0830	-0.5393	0.5897
Another race/ethnicity x SAL	-0.0241	0.0891	-0.2709	0.7865
Another race/ethnicity x SAN	0.0554	0.0950	0.5830	0.5599
Another race/ethnicity x MTmTeach	-0.0320	0.0399	-0.8018	0.4227
Another race/ethnicity x Pct_FT	0.0719	0.0420	1.7097	0.0873
Another race/ethnicity x Pct_TTr	-0.0085	0.0405	-0.2106	0.8332
Another race/ethnicity x Pct_Exlnstr	-0.0110	0.0447	-0.2471	0.8048
Multiracial x HPL	0.0448	0.0926	0.4838	0.6285
Multiracial x HPN	-0.1056	0.0918	-1.1499	0.2502
Multiracial x HAL	0.3002	0.2007	1.4958	0.1347
Multiracial x HAN	-0.0426	0.1064	-0.4006	0.6887
Multiracial x SPL	-0.0447	0.0868	-0.5144	0.6070
Multiracial x SPN	0.0162	0.0620	0.2623	0.7931
Multiracial x SAL	-0.1426	0.0718	-1.9845	0.0472
Multiracial x SAN	-0.0258	0.0853	-0.3028	0.7620
Multiracial x MTmTeach	0.0417	0.0318	1.3108	0.1900
Multiracial x Pct_FT	0.0096	0.0328	0.2918	0.7705
Multiracial x Pct_TTr	-0.0023	0.0321	-0.0709	0.9435
Multiracial x Pct_Exlnstr	-0.0461	0.0339	-1.3622	0.1731
Preferred not to respond (Race/ethnicity) x HPL	0.0933	0.0830	1.1249	0.2606
Preferred not to respond (Race/ethnicity) x HPN	-0.0626	0.0731	-0.8568	0.3916
Preferred not to respond (Race/ethnicity) x HAL	-0.0742	0.1514	-0.4901	0.6241
Preferred not to respond (Race/ethnicity) x HAN	-0.0323	0.0774	-0.4180	0.6759
Preferred not to respond (Race/ethnicity) x SPL	0.0922	0.0860	1.0713	0.2841
Preferred not to respond (Race/ethnicity) x SPN	0.0062	0.0504	0.1239	0.9014
Preferred not to respond (Race/ethnicity) x SAL	0.0269	0.0594	0.4536	0.6501
Preferred not to respond (Race/ethnicity) x SAN	-0.0495	0.0630	-0.7858	0.4320
Preferred not to respond (Race/ethnicity) x MTmTeach	0.0155	0.0269	0.5753	0.5651
Preferred not to respond (Race/ethnicity) x Pct_FT	0.0016	0.0261	0.0597	0.9524
Preferred not to respond (Race/ethnicity) x Pct_TTr	0.0030	0.0249	0.1221	0.9028
Preferred not to respond (Race/ethnicity) x Pct_Exlnstr	0.0065	0.0275	0.2355	0.8139
Man x HPL	0.0121	0.0394	0.3064	0.7593
Man x HPN	-0.0494	0.0360	-1.3709	0.1704
Man x HAL	-0.0114	0.0773	-0.1479	0.8824
Man x HAN	0.1008	0.0429	2.3535	0.0186
Man x SPL	-0.0062	0.0449	-0.1372	0.8909
Man x SPN	-0.0328	0.0255	-1.2882	0.1977
Man x SAL	-0.0137	0.0322	-0.4259	0.6702

Table C.65. cont.

Fixed Effects	Est.	SE	t	p two-tailed
Man x SAN	0.0006	0.0313	0.0195	0.9845
Man x MTmTeach	0.0030	0.0137	0.2203	0.8257
Man x Pct_FT	-0.0009	0.0135	-0.0690	0.9450
Man x Pct_TTr	0.0138	0.0127	1.0886	0.2763
Man x Pct_ExInstr	-0.0111	0.0138	-0.8021	0.4225
Woman x HPL	0.0510	0.0404	1.2624	0.2068
Woman x HPN	0.0468	0.0379	1.2365	0.2163
Woman x HAL	-0.0547	0.0798	-0.6855	0.4931
Woman x HAN	0.0040	0.0480	0.0831	0.9338
Woman x SPL	-0.0609	0.0449	-1.3549	0.1755
Woman x SPN	0.0031	0.0259	0.1191	0.9052
Woman x SAL	0.0189	0.0313	0.6026	0.5468
Woman x SAN	-0.0083	0.0326	-0.2532	0.8001
Woman x MTmTeach	0.0115	0.0140	0.8201	0.4122
Woman x Pct_FT	0.0117	0.0135	0.8668	0.3861
Woman x Pct_TTr	0.0078	0.0128	0.6100	0.5419
Woman x Pct_ExInstr	-0.0037	0.0140	-0.2616	0.7936
Preferred not to respond (Gender) x HPL	-0.0631	0.0705	-0.8941	0.3713
Preferred not to respond (Gender) x HPN	0.0025	0.0650	0.0386	0.9692
Preferred not to respond (Gender) x HAL	0.0661	0.1374	0.4810	0.6305
Preferred not to respond (Gender) x HAN	-0.1048	0.0764	-1.3715	0.1702
Preferred not to respond (Gender) x SPL	0.0670	0.0819	0.8187	0.4129
Preferred not to respond (Gender) x SPN	0.0298	0.0444	0.6700	0.5029
Preferred not to respond (Gender) x SAL	-0.0052	0.0559	-0.0923	0.9265
Preferred not to respond (Gender) x SAN	0.0076	0.0560	0.1365	0.8914
Preferred not to respond (Gender) x MTmTeach	-0.0145	0.0247	-0.5866	0.5575
Preferred not to respond (Gender) x Pct_FT	-0.0108	0.0240	-0.4509	0.6521
Preferred not to respond (Gender) x Pct_TTr	-0.0217	0.0227	-0.9545	0.3398
Preferred not to respond (Gender) x Pct_ExInstr	0.0147	0.0248	0.5944	0.5522
Straight x HPL	-0.0051	0.0393	-0.1290	0.8974
Straight x HPN	0.0269	0.0386	0.6981	0.4851
Straight x HAL	0.0614	0.0851	0.7223	0.4701
Straight x HAN	-0.1063	0.0501	-2.1214	0.0339
Straight x SPL	-0.0348	0.0364	-0.9560	0.3391
Straight x SPN	0.0286	0.0249	1.1503	0.2500
Straight x SAL	0.0312	0.0287	1.0895	0.2759
Straight x SAN	-0.0020	0.0332	-0.0616	0.9508
Straight x MTmTeach	0.0137	0.0126	1.0911	0.2752
Straight x Pct_FT	0.0121	0.0127	0.9570	0.3386
Straight x Pct_TTr	-0.0096	0.0121	-0.7991	0.4242
Straight x Pct_ExInstr	-0.0024	0.0129	-0.1846	0.8536
LGBQ+ x HPL	0.0375	0.0601	0.6227	0.5335
LGBQ+ x HPN	0.0071	0.0632	0.1126	0.9104
LGBQ+ x HAL	-0.1203	0.1356	-0.8872	0.3750
LGBQ+ x HAN	0.1168	0.0862	1.3552	0.1754
LGBQ+ x SPL	0.0704	0.0513	1.3718	0.1701
LGBQ+ x SPN	-0.0335	0.0368	-0.9104	0.3626
LGBQ+ x SAL	-0.0777	0.0442	-1.7587	0.0786
LGBQ+ x SAN	-0.0004	0.0528	-0.0067	0.9946

Table C.65. cont.

Fixed Effects	Est.	SE	t	p two-tailed
LGBQ+ x MTmTeach	0.0013	0.0184	0.0680	0.9458
LGBQ+ x Pct_FT	-0.0101	0.0188	-0.5366	0.5916
LGBQ+ x Pct_TTr	0.0492	0.0182	2.7059	0.0068
LGBQ+ x Pct_ExInstr	0.0010	0.0190	0.0536	0.9573
Preferred not to respond (Sexual Orientation) x HPL	-0.0324	0.0581	-0.5573	0.5773
Preferred not to respond (Sexual Orientation) x HPN	-0.0340	0.0532	-0.6402	0.5220
Preferred not to respond (Sexual Orientation) x HAL	0.0589	0.1132	0.5200	0.6030
Preferred not to respond (Sexual Orientation) x HAN	-0.0106	0.0650	-0.1629	0.8706
Preferred not to respond (Sexual Orientation) x SPL	-0.0356	0.0566	-0.6285	0.5297
Preferred not to respond (Sexual Orientation) x SPN	0.0049	0.0358	0.1370	0.8910
Preferred not to respond (Sexual Orientation) x SAL	0.0464	0.0415	1.1195	0.2629
Preferred not to respond (Sexual Orientation) x SAN	0.0024	0.0468	0.0513	0.9591
Preferred not to respond (Sexual Orientation) x MTmTeach	-0.0150	0.0189	-0.7942	0.4271
Preferred not to respond (Sexual Orientation) x Pct_FT	-0.0021	0.0187	-0.1097	0.9126
Preferred not to respond (Sexual Orientation) x Pct_TTr	-0.0396	0.0177	-2.2417	0.0250
Preferred not to respond (Sexual Orientation) x Pct_ExInstr	0.0014	0.0195	0.0703	0.9439

Note. Since this model was examined for the fixed main effects and interactions of the primary variables of interest, the second set of effect codes for the course and professional control variables were not used.

Curriculum Vitae

Stephen Craig Hiller

EDUCATION

Ph.D. in Higher Education , Indiana University Bloomington Minor in Learning and Developmental Sciences Dissertation: <i>College Teaching at the Intersections of Institutional and Disciplinary Cultures and Faculty Identities</i>	2023
Graduate Certificate in College Pedagogy , Indiana University Bloomington	2023
Graduate Certificate in Institutional Research , Indiana University Bloomington	2022
M.A. in Italian , Indiana University Bloomington	2012
B.A. in Italian , Indiana University Bloomington High Distinction Phi Beta Kappa	2010
B.S.Ed. in Spanish Education , Indiana University Bloomington High Distinction	2010

PROFESSIONAL AND TEACHING EXPERIENCE

Research Associate Center for Evaluation, Policy, & Research, Indiana University Bloomington	2019 – Present
Graduate Intern Office of the Vice Provost for Faculty and Academic Affairs, Indiana University Bloomington	2021
Teaching Assistant Higher Education and Student Affairs Program, Indiana University Bloomington C664 Higher Education Administration and Organization C655 Higher Education and Public Policy	2020
Group Assessment Project Mentor Higher Education and Student Affairs Program, Indiana University Bloomington U594 Environmental Theory and Assessment in Higher Education	2020
Project Associate Center for Evaluation, Policy, & Research, Indiana University Bloomington	2018 – 2019
Project Associate Center for Evaluation & Education Policy, Indiana University Bloomington	2012 – 2018

Research Assistant 2007 – 2012
Center for Evaluation & Education Policy, Indiana University Bloomington

Associate Instructor 2010 – 2012
Department of French and Italian, Indiana University Bloomington

EVALUATION AND RESEARCH EXPERIENCE

Kentucky 21st Century Community Learning Centers Evaluation and Technical Assistance 2015 – Present

National Association of Independent Schools (NAIS) Surveys of Student Engagement 2019 – Present

Teacher Shortage in the Wake of COVID-19, Social Science Research Funding Program, Indiana University 2021 – Present

Indiana Family and Social Services Administration Office of Early Childhood and Out-of-School Learning (OECOSL), Evaluation of SPARK Learning Lab Initiatives 2022 – Present

Pew Charitable Trusts, Civil Legal Modernization Framework Study 2022 – Present

Title VI National Resource Center (NRC) and Foreign Language and Area Studies Fellowship (FLAS) Grant Evaluation 2018-2022 Grant Cycle (Columbia University South Asia Institute) 2018 – 2022

Purdue University Center for Science and Information Science and Technology Center (STC) Professional Development Workshop Evaluation 2016 – 2019

INSITE Statewide District Data Collaborative Action Research and Evaluation 2018 – 2019

Title VI National Resource Center (NRC) and Foreign Language and Area Studies Fellowship (FLAS) Grant Evaluations 2014-2018 Grant Cycle (IU, Columbia) 2014 – 2018

Institute for Curriculum and Campus Internationalization Program Evaluation, Center for the Study of Global Change (IU) 2012 – 2018

Integrative Graduate Education and Research Traineeship (IGERT) Program Evaluations (IU, Penn State, Carnegie Mellon University) 2013 – 2018

Institute of International Education (IIE) Fulbright Distinguished Alumni in Teaching Program Program Evaluation 2016 – 2017

National Science Foundation (NSF) Science and Technology Center (STC) Grant Evaluation Center for Science of Information, Purdue University 2016

Global Learning Across Indiana (GLAI/UISFL) Program Evaluation (IU-Ivy Tech) 2013 – 2016

M.S.D. Warren Township Race to the Top Grant Evaluation 2013 – 2016

IU Mellon Innovating International Research, Teaching and Collaboration (MIIRT) Program Evaluation	2013 – 2016
Public Education Evaluation Commission (Saudi Arabia) Directorates Education Evaluation Project	2014 – 2015
Science of Sustainability Grant Evaluation	2014 – 2015
Title VI National Resource Center (NRC) and Foreign Language and Area Studies Fellowship (FLAS) Grant Evaluations 2010-2014 Grant Cycle (IU, Georgetown, Harvard)	2012 – 2014
Internationalization Collaborative Across Bloomington Program Evaluation, Center for the Study of Global Change (IU)	2012 – 2014
Improving Teacher Quality: Writing and Reading Alignment Project Grant Evaluation	2014
Alaska Administrator Coaching Project Grant Evaluation	2013 – 2014
IU Center for International Education, Development & Research Afghanistan Project Technical Assistance	2013 – 2014
M.S.D. Lawrence Township Magnet Schools Assistance Program Grant Evaluation	2012 – 2014
New York State Education Department Charter School Office Grant Evaluation	2012 – 2014
IU Summer Language Workshop Language Training Center (LTC) Grant Evaluation	2013
Shoring Up STEM Project Evaluation	2013
Miami-Dade Teacher Incentive Fund Grant Evaluation	2012 – 2013
Indiana Department of Education Indicator 14 Post-High School Survey	2010 – 2012
Power Up for Science 2 Project Evaluation	2011
Indiana Education Service Centers Insurance Expenditure Study	2008

CONFERENCE PRESENTATIONS

- Hiller, S. C.** (2023, Apr.). *Faculty teaching at the intersections of institutional and disciplinary cultures* [Accepted paper presentation]. American Educational Research Association 2023 Annual Meeting, Chicago, IL.
- Hiller, S. C.**, Hu, T., Nelson Laird, T. F., & BrckaLorenz, A. (2022, Nov.). *Institutional environments for diverse and inclusive college teaching: Exploring disciplinary variation* [Accepted paper presentation]. Association for the Study of Higher Education 2022 Annual Meeting, Las Vegas, NV.

- Hiller, S. C.** & Nelson Laird, T. F. (2021, Apr.) *Disciplinary differences in faculty emphasis on deep approaches to learning: Comparing conceptualizations of academic discipline* [Paper presentation]. American Educational Research Association 2021 Annual Meeting, Virtual Conference.
- Hiller, S. C.** & Nelson Laird, T. F. (2020, Nov.) *Faculty use of collaborative learning and approaches to learning: Examining social aspects of online learning* [Roundtable paper presentation]. Association for the Study of Higher Education 2020 Annual Meeting, Virtual Conference.
- Fassett, K. T., **Hiller, S., C.**, BrckaLorenz, A., & Nelson Laird, T. F. (2020). *A multi-institutional study of teaching development opportunities & faculty practice* [Accepted paper presentation]. American Educational Research Association 2020 Annual Meeting [cancelled due to COVID], San Francisco, CA.
- Hiller, S.** & Andresen, J. (2019, Nov.). *Engaging students with disabilities in higher-order learning: Exploring students' intersectional identities* [Paper presentation]. Association for the Study of Higher Education 2019 Annual Meeting, Portland, OR.
- Hiller, S.**, BrckaLorenz, A., & Nelson Laird, T. (2019, Nov.). *Aligning deep learning with classroom time use: A view of disciplinary variations among faculty* [Poster presentation]. Association for the Study of Higher Education 2019 Annual Meeting, Portland, OR.
- Hiller, S.**, BrckaLorenz, A., Priddie, C., & Nelson Laird, T. (2019, Nov.). *Exploring intersections of race and discipline in teaching practices: Focusing on faculty of color in STEM* [Paper presentation]. Association for the Study of Higher Education 2019 Annual Meeting, Portland, OR.
- BrckaLorenz, A., Nelson Laird, T., Fassett, K., & **Hiller, S.** (2019, Oct.). *Assessing environmental factors that promote quality collegiate teaching* [Presentation]. Assessment Institute 2019, Indianapolis, IN.
- Hiller, S.** & Ruddy, A. (2018, Nov.). *Engaging first-generation Latino seniors: An intersectional view of participation in high-impact practices and their impact on student engagement* [Paper presentation]. Association for the Study of Higher Education 2018 Annual Meeting, Tampa, FL.
- Hiller, S.** & Ruddy, A. (2016, Nov.). *Reflective and integrative learning: Examining the impact of study abroad participation in the context of high-impact practices* [Paper presentation]. Association for the Study of Higher Education 2016 Annual Meeting, Columbus, OH.
- Ruddy, A., Chesnut, C. & **Hiller, S.** (2015, Oct.). *Participating in the global education system: Implications of study abroad* [Paper presentation]. Midwest Education Research Association 2015 Annual Meeting, Evanston, IL.

PUBLICATIONS

*Denotes peer-reviewed

*Fassett, K.T., **Hiller, S.C.**, BrckaLorenz, A., & Nelson Laird, T.F. (2021). Teaching development opportunities & faculty practice at four-year institutions. *College Teaching*. DOI: <https://doi.org/10.1080/87567555.2021.1999894>.

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- Billick, R., **Hiller, S.** & Spradlin, T. (2011). *School Choice Issues in Indiana: Sifting through the Rhetoric*. Bloomington, IN: Center for Evaluation & Education Policy.
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- Spradlin, T., Kashima, Y., Schleich, B., Chang, Y., Hansen, J. & **Hiller, S.** (2009). *Indiana's Vision of Response to Intervention: Results of the 2009 Survey of Indiana Educators' Views, Implementation Activities, and Sustained RTI Practices*. Bloomington, IN: Center for Evaluation & Education Policy.
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- Muller, P., Ruddy, A., Moss, M., Chesnut, C., Simmons Thatcher, L., Hiller, S., & Sinders, R. (2022, Nov.). *Civil Legal Modernization Framework Study*. Report for Pew Charitable Trusts. CEPR.
- Chesnut, C. & Hiller, S., (2022, Nov.). *Kentucky 21st Century Community Learning Centers Initiative: 2021-2022 Center Profiles*. Reports for the Kentucky Department of Education and 21st Century Community Learning Center grantees. CEPR.
- Hiller, S. & Simmons Thatcher, L. (2022, Sept.). *National Association of Independent Schools – Total Aggregate, High School Survey of Student Engagement Spring 2022*. Report for the National Association of Independent Schools. CEPR.

- Hiller, S. & Simmons Thatcher, L. (2022, Sept.). *National Association of Independent Schools – Total Aggregate, Middle Grades Survey of Student Engagement Spring 2022*. Report for the National Association of Independent Schools. CEPR.
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- Simmons Thatcher, L., & Hiller, S. (2022, Aug.). *High School Survey of Student Engagement: Spring 2022 Report*. Reports for 20 schools affiliated with the National Association of Independent Schools. CEPR.
- Chesnut, C., Hiller, S., & Simmons Thatcher, L. (2022, Mar.). *Evaluation of the Kentucky 21st Century Community Learning Centers Initiative: Spring 2022 Virtual Quality Site Visit Results*. Reports for 12 sites for the Kentucky Department of Education. CEPR.
- Simmons Thatcher, L., & Hiller, S. (2022, Feb.). *Middle Grades Survey of Student Engagement: Fall 2021 Report*. Reports for 15 schools affiliated with the National Association of Independent Schools. CEPR.
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- Chesnut, C. & Hiller, S. (2019, Nov.). *Kentucky 21st Century Community Learning Centers Initiative: 2018-2019 Center Profiles*. Reports for the Kentucky Department of Education and 21st Century Community Learning Center grantees. CEPR.
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PROFESSIONAL SERVICE

Indiana University Bloomington 2030 Strategic Plan, Curricula, Pedagogy, and Inclusive Teaching Practices Working Group	2022
American Educational Research Association Conference Session Chair	2021
Conference Proposal Reviewer	2020
Association for the Study of Higher Education Conference Session Chair	2020, 2022
Conference Proposal Reviewer	2019 - 2022
Graduate Studies Committee, Indiana University Bloomington School of Education	2020 – 2021
Higher Education and Student Affairs Doctoral Recruitment Committee	2018 – 2019
Indiana University Bloomington School of Education Policy Council	2018 – 2019
Indiana University School of Education Staff Recognition Award Committee	2018

HONORS AND AWARDS

Staff Development Grant, School of Education, Indiana University	2018
Phi Beta Kappa, Honors Society	2010
Gamma Kappa Alpha, Italian Honors Society	2010
Pi Lambda Theta, Education Honors Society	2010
Founders' Scholar, Indiana University	2009 – 2010