

**How faculty differ: Examining college faculty members' expectations, teaching styles,
and behavior using Holland's theory of careers**

by

Mark Longley

A dissertation submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Major: Education (Educational Leadership)

Program of Study Committee:
Daniel C. Robinson, Major Professor
George A. Jackson
Patricia Leigh
John H. Schuh
Mack C. Shelley, II

Iowa State University
Ames, Iowa

2007

UMI Number: 3274846



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DEDICATION

To
my mom
Frances Wilson Longley,
a life-long teacher,
who instilled her 12 children
with these words:
“You have a good mind,”
and found a way
to enroll each of us
in college.

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ABSTRACT

This research was an empirical study incorporating a path analysis methodology to further explore differences in faculty behavior in higher education. *Academic disciplines* (Smart, Feldman, & Ethington, 2000) served as a model for the study. To complement the research questions, a literature review was conducted to explore specific items related to faculty performance, including faculty attitudes regarding how students learn best, teaching practices, and faculty-student interaction. Data were used from the 2003 Faculty Survey of Student Engagement (FSSE). Faculty members were grouped by their course listing according to *The College Majors Finder* (Rosen, Holmberg, & Holland, 1989). Holland (1973, 1985, 1997) classified academic majors into one of six faculty groups (environments): Social, Investigative, Artistic, Conventional, Realistic, and Enterprising. In addition, Holland's theory of careers served as the theoretical framework for the study. For example, stereotypes exist regarding faculty members who teach subjects in the natural sciences (Investigative) as faculty interested primarily in conducting research, as opposed to faculty who teach subjects in the social sciences (Social) and prefer student interaction to research.

Results of the study revealed differences in faculty teaching practices, student interaction, and attitudes about learning across the Holland environments. Common perceptions about natural science (Investigative) faculty's preference for conducting research over teaching undergraduate students was supported. Faculty in this group displayed interest in "student interaction only for the purpose of conducting research." Faculty in Conventional groups which included accounting members, also demonstrated little interest in student interaction. Faculty in Social and Enterprising (business) majors displayed the highest level

of interest in student interaction and teaching. These groups had low scores for their interest in “student interaction solely for the purpose of conducting research.”

One topic examined briefly in this research was faculty expectations. Future studies should include additional areas about faculty differences and expectations. Successful educators have long recognized the importance of teachers who have high expectations for students to achieve. Recommendations for practice include the need for professionals who advise undergraduates in selecting a major to be mindful of the differences among faculty groups regarding attitudes about learning, teaching practices, and levels of student interaction.

CHAPTER 1. INTRODUCTION

Background of the Study

“You are a diverse group, a community of scholars....”
(N. C. Francis, Sept. 6, 1998)

How faculty differ

This statement is made annually to the members of faculty by their university president at the beginning school year faculty gathering. Acknowledging the diverse backgrounds of faculty, the speaker also recognizes the sometimes vast differences in the attitudes, behavior, and practices of faculty members across academic departments. Faculty members are both similar and different. On the one hand, they are similar in that they teach, interact with students, and maintain goals and expectations. On the other hand, they are different in their teaching styles level of interaction with students, and often in their opinions on how learning occurs best.

Knowledge about faculty differences in attitude, behavior, and practices is valuable information because faculty members have a significant role in the undergraduate's collegiate experience. Thompson (2003) stated, “The potential influence of academic departments on patterns of change and stability of college students is assumed to be carried out in large part through student interaction with departmental faculty” (p. 409). To understand better the importance of faculty in the collegiate experience of students, this study's theoretical framework is introduced briefly.

Theoretical Framework

The theoretical framework that best supports the ideal of differences in the attitudes and practices of faculty members by discipline (and groups of disciplines) is Holland's

(1973, 1985, 1997) theory of careers. Holland's theory focuses on the individual, the environment, and the interaction of the two within a particular setting (1997, p. 2). Holland (1997) contended, "The behavior of an individual is determined by the interaction of the [individual's] personality with the environment" (p. 4). Additionally, central to the theory and to this study is the pursuit of congruency, or fit, between the individual and the environment. Congruency between the two, according to Holland (1997), leads to human behavior that is both predictable and generally positive. Focusing exclusively on students in higher education, Smart et al. (2000) proposed that, "specific outcomes of congruency include higher levels of educational stability, satisfaction, and achievement" (p. 179).

The theoretical framework of this study was based on Holland's (1973, 1985, 1997) theory of careers. The theory of careers was devised initially to explain vocational patterns of behavior. Holland's system for classifying academic majors was introduced to classify faculty members into discipline groups. An example of the Holland types with corresponding majors and vocations is presented in Table 1). Holland (1997, as cited in Smart et al., 2000) purported, "the basic assumptions are equally valid in an educational setting" (p. 51). Holland's theory is based on four primary assumptions:

Table 1. Holland types with corresponding majors and vocations

Choice of...	Personality Types					
	Realistic	Investigative	Artistic	Social	Enterprising	Conventional
Major	Engineering	Physics	Art	Education	Business Administration	Accounting
	Agriculture	Biology	Music	Social Service	Political Science	Economics
Vocation	Surveyor	Chemist	Artist	Teacher	Salesman	Accountant
	Mechanic	Physicist	Writer	Counselor	Executive	Clerk

Source: Taken from Holland, 1973, p. 20.

1. Most people can be identified as having one of six types of personalities: Investigative, Realistic, Conventional, Enterprising, Social, or Artistic. The type is a model against which we can measure the real person.
2. The types correspond to the six environments of Investigative, Realistic, Conventional, Enterprising, Social, or Artistic. The environment may be defined as the situation or atmosphere created by the people who dominate an environment. For example, a social environment would be an environment dominated by social types.
3. People search for environments that will let them exercise their skills and abilities, express their attitudes and values, and take on agreeable problems and roles. Additionally, by choosing one environment, the individual is able to avoid activities and situations that one dislikes.
4. Behavior is determined by an interaction between personality and environment. (Holland, 1997, pp. 2-4)

In addition to his primary assumptions, Holland's theory provides principles that are important to the current study. One principle holds "the selection of an academic major is an extension of an individual's personality" (p. 8). Holland (1997) provided a more thorough understanding of his reasoning for this belief: "The choice of an occupation is an expressive act which reflects the person's motivation, knowledge, personality, and ability." He continued, "Occupations represent a way of life, an environment, rather than a set of isolated work functions or skills" (p. 9). Holland (1997) credited Forer (1948) "as the first to illustrate how responses [to survey instruments] could be viewed as expressions of various dimensions of personality" (p. 8). This view differs from other vocational theories which generally minimize vocational theories as one of many personal interests.

Another Holland principle involves attraction. According to Holland (1997), "Each model environment attracts its associated personality type" (p. 52). Consequently, individual personality types are attracted to the corresponding environment. Along with a particular interest and exposure to an environment, an individual may recognize that, in his or her preferred environment, certain attitudes, skills, and behavior are rewarded and encouraged.

For example, in an artistic environment the individual is encouraged to use creativity, freedom of expression, and imagination. Obviously, this environment appeals to the Artistic type of individual in that it enables artistic individuals to use their natural abilities, interests, and skills.

However, an artistic environment would not appeal to the Conventional type of individual. Conventional types are characterized by Holland (1997) as “inflexible, unimaginative, obedient, conforming, and methodical” (p. 28). Bowen and Schuster (1986) supported Holland’s point by noting that, “Each discipline attracts individuals of particular talents and interests, and the experience of working in each field places its mark on their personality” (p. 49). This concept of fit also supports a final principle Holland offered, particularly for students. According to Holland (1997), “Vocation satisfaction, stability, and achievement depend on the congruence between one’s personality and the environment in which one works” (p. 11). Thus, in the empirical component of the study, Holland’s theory was used to measure the attitudes and behavior of faculty regarding teaching and learning.

Why Apply Holland’s Theory?

Holland’s (1997) typology was selected for this study for several reasons. First is its resourcefulness. In addition to being very logical and appropriate for this type of study, Holland also provided a well-developed classification system for organizing hundreds of occupations and the more than 100 academic majors. As mentioned previously, Holland also devised several instruments to assist in categorizing occupations, majors, and personality types. In general, Holland’s thoroughness and dominance within the fields of vocation, majors, and personality types made using his framework an easy choice for the current

research. In addition, in terms of credibility, Holland's theory has been cited as one of the most frequently used by other researchers for studying vocations and classifying academic disciplines. Smart et al. (2000) used Holland's theory in their groundbreaking work, *Academic disciplines*, which inspired this researcher to use this theory.

On a more personal note, what appealed to the researcher about Holland's (1997) theory, specifically, was the belief that a person's type is an extension of that person's personality (p. 7), and not simply a person's interest or score on an interest inventory. This researcher noticed that, based on a student's academic major or the professor's discipline, the individual seemed to possess a particular orientation in how he or she viewed and functioned in life. In effect, the student's behavior and perspectives were strongly influenced by his or her major or discipline. For example, accounting majors tend to be frugal and very organized both in their work and studies, which filters into other aspects of their existence. Sociologists commonly are regarded as people-oriented, nurturing, and unconventional in their work. These personality traits also tend to be exhibited in their personal lives outside of work. Both individual types appear to live their lives through a particular outlook largely flavored by their major or occupation. In addition, their behaviors support personality type characteristics listed among Holland's traits for personality types of conventional and social, respectively.

Similarly, Holland (1997) postulated that Investigative types often do not have as well-developed social skills as investigative skills, and art and music majors are often creative and unconventional. Despite the commonness of these observations, these universal tendencies are often derided as stereotypes.

As a young professional, this researcher did not have a theoretical framework to apply to recognize the different academic or professional orientations of individuals. While

studying for the Master's degree, Holland's theory seemed to provide a logical explanation regarding the personality, behavior, and vocation of individuals. When examining my own personality type, I recognized my personality as "Social type" agreed very strongly with Holland's (1997) list of traits characteristic of social type (e.g., values people situations, competency as parent, teacher, and traditional values). In addition, another trait of "Social type" in Holland's that these people tend to avoid occupations that work primarily with machines that require technical precision (pp. 7-8).

On a professional note, several researchers in the field of higher education and student affairs have used Holland's typology for their studies. Smart et al. (2000) used Holland's theory in his seminal work, *Academic disciplines*, as well as in several research articles. In their journal article, "Goal priorities of academic departments," Smart and McLaughlin (1974), stated:

Holland's theory has been subjected to extensive empirical assessment on samples of college students by Elton and Rose (1970), Elton (1971), Morrow (1971), Walsh et al. (1972), and others whose findings tend to support his basic tenets ... the theory contributed to the creation of Holland and Astin's Environmental Assessment Technique (EAT) which was designed to assess environmental characteristics of colleges and universities (1974, p. 379). The EAT has also demonstrated its reliability. (p. 379)

Classifying faculty by Holland type

Holland's theory of careers (1973, 1985, 1997) served as the theoretical foundation for the current study. Although created for the purpose of helping individuals find suitable vocations, Holland (1997) maintained his theory is applicable to educational environments (p. 213). In addition, higher education scholars such as Smart (1974, 1978, 1985, 1999, 2001, 2005), Thompson (1999, 2003), Astin (1993), and several others have relied on Holland's

theory for its practical application, and because of its ease in explaining variation among faculty in their thought and behavior (Smart et al., 1997, p. 2). Therefore, this study provides a background of the assumptions and principles in Holland's theory to clarify challenges regarding differential practices of faculty in the teaching/learning process.

Purpose of the Study

The purpose of this study was to explore the concept that differences in the attitudes, teaching practices, and behavior of faculty in higher education, in general, are a possible cause of differential experiences of college students at four-year colleges and universities. Possible consequences of these differential experiences of college students include student attrition, low achievement, and lower satisfaction with college experiences.

This research was comprised of a literature review and empirical study incorporating path analysis to explore further the issue of differential faculty. Smart et al. (2000) recommended a path analysis study to continue their seminal research in the relationship between student learning and differential faculty in higher education. In the current study, relevant literature was examined first to reveal whether differences in faculty attitudes and behavior are dependent on the members' academic discipline or related group of disciplines. Second, a path analysis was conducted to ascertain the results of a national study of student engagement, entitled the Faculty Survey of Student Engagement (FSSE), by the National Survey of Student Engagement (NSSE) (2003). The FSSE has been used in 2003, 2005, and 2006 to reveal the attitudes, behaviors, and practices of faculty members. The next section reviews the theoretical foundation for the study and relevant theoretical philosophies that provided a rationale for the methods selected for data collection and statistical analysis.

A secondary purpose of the study was to apply Holland's (1997) vocational theory of careers to higher education. According to Smart et al. (2000), Holland "...has noted repeatedly that the basic assumptions of the theory are equally valid in educational settings" (p. 51). Holland explained human behavior using a commonsense approach in which each aspect of his theory uses descriptive terms to describe human behavior. According to Holland, these behaviors also can be used to explain variations among faculty teaching practices based on the uniqueness of each individual personality. For example, "each type is the product of a characteristic interaction among a variety of cultural and personal forces including peers, biological heredity, parents, social class, culture, and physical environment" (Holland, p. 2).

The practical manner in which Holland's classification system organized major fields of study was also useful to the current study. Whereas previous classification theories, such as Lodahl and Gordon's "paradigm development" (1972) or Biglan's "classification model" (1973), used subject knowledge, Holland classified academic fields and careers by using job characteristics the individual performed in a specific occupation. Holland also matched an individual's personality with his or her profession from a holistic viewpoint. Holland (1997) contended:

The choice of an occupation is an expressive act which reflects the person's motivation, knowledge, personality, and ability. Occupations represent a way of life, an environment rather than a set of isolated work functions or skills. To work as a carpenter means not only to use tools but also to have a certain status, community role, and a special pattern of living. (p. 9, as cited in Holland 1977, p. 5)

A key principle to Holland's theory (1997) is that "those who perform vocations are similar in their particular personality and history" (p. 10). In this passage, Holland purported

that “each vocation attracts and retains people with similar personalities.” Thus, the current researcher felt confident in applying Holland’s there in this study.

Research Questions

The following research questions were used to guide this study:

1. Are there statistically significant differences among college faculty members in faculty-student interaction, expectations of students, teaching practices, and attitudes about learning, based on their disciplinary areas as defined by Holland? Light (1974, as cited in Smart et al., 2000) stated: “the profession of college faculty should be looked on as several professions instead of one” (p. 8).
2. Are these differences in faculty practices and attitudes attributable to outliers among faculty responses or isolated to specific disciplines?
3. Will the results of the study support the traditional views of the existence of distinct types of faculty mindsets? For example, will the results reveal that faculty in the natural science are interested primarily in conducting research, while social science professors are interested primarily in the personal development of their students, and that art professors are interested primarily in the creative development of their students?
4. How consistent will the differences in the practices and attitudes of faculty members be when controlling for the type of institutions in which they work (i.e., four-year public institutions versus four-year private ones or by Carnegie type)?

Rationale

The purpose of this study was to explore the concept that differences in the attitudes, practices, and, in general, behavior of faculty in higher education are a possible cause of differential experiences of college students at four-year colleges and universities. As mentioned previously, possible consequences of these differential experiences of college students include student attrition, low achievement, and lower satisfaction with college experiences. Smart et al. (2000) stated, “Faculty presumably are the primary representatives of the academic environments and the primary contributors to differential patterns of change and stability in students” (p. 80). The researcher examined this concept of faculty differences to reveal the extent of difference in the practices, attitudes, and behaviors of faculty members.

Bowen and Schuster (1986) defined faculty as “a corps of professional persons of substantial learning who are employed within American institutions of higher education and are engaged directly in teaching, research, related public service, institutional service, or combinations of these” (p. 11). Although the researcher recognizes the common responsibilities of collegiate faculty extend beyond teaching, for the purpose of this study and its focus, in the current study faculty examined full-time instructors employed by their institution for the primary purpose of teaching.

Need for the Study

One of the most consistent themes across the study of faculty differentiation is the centrality of the actual discipline to the faculty member. In terms of importance, disciplines generally are more important to faculty members than are the institutions that employ them.

Supporting the centrality of disciplines to faculty, Clark (1987a) stated, “There is no more stunning fact about the academic profession anywhere in the world than the simple one that academics are possessed by disciplines, fields of study, even as they are located in institutions” (p. 25). Clark attributed this partly to each discipline having its own culture: “Organized around individual subjects, the disciplines have their own histories and trajectories, their own habits and practices” (p. 25). In addition, within the history of a discipline, there are the heroes of the discipline. Regarding the culture of a discipline, Clark noted: “The culture of a discipline even includes idols: the office of the physicist often has pictures on the wall of such greats as Albert Einstein and Robert Oppenheimer: the sociologist with all due respect to Einstein and Oppenheimer pays homage to Max Weber and Emile Durkheim” (p. 77).

Another avenue regarding why the discipline is what Clark (1983) called the “environment of first importance,” has to do with entry into the profession of the discipline. “From their initial faculty appointment, faculty members often possess stronger allegiance to their discipline than to the institution employing them. ... As recruits to different academic specialties, they enter different cultural houses, there to share beliefs about theory, methodology, techniques, and problems” (p. 76).

According to Clark (1983), faculty hold such passion for their discipline as opposed to their institution or the teaching profession, because of their involvement in academic-related professional organizations. Clark pointed out that, “members of disciplines promote conferences and organizations that “turn ‘locals’ into ‘cosmopolitans’” (p. 25). Concerning faculty involvement in national organizations, Gouldner (1958, as cited in Clark, 1983)

stated, “Professors are never the same after they have tasted the delights of subject specialties that join them to far-flung peers” (p. 26).

Significance

There are several reasons this study may be significant. First, the study provides a continuum to the studies conducted by Smart, Feldman, and Ethington (2000), and others on the practices of faculty in higher education. More specifically, this study updates the studies conducted on the differences among faculty members. In addition, this topic of differences in faculty in higher education is an understudied one (Light, 1974, p. 4). Subsequently, the notion of students having varying collegiate experiences as a result of faculty differences could potentially be threatening to the academic success of college students. Smart et al. (2000) stated, “Faculty create the respective norms and values in college environments” (p. 81). Last, this study might help those advising undergraduates in choosing their primary discipline of study. By understanding systematic differences among faculty across academic disciplines, advisors can more accurately predict the type of experience students will have in a particular discipline and advise the students accordingly. Student awareness of certain faculty groups’ practices and expectations should enable them to make more informed decisions when selecting a major course of study, thus resulting in a greater congruency between students and their selected academic disciplines (environment). Holland (1997) postulates, “Satisfaction, stability, and achievement depend on congruency between one’s personality and environment” (p. 11).

Limitations

This study was conducted with the following limitations:

1. The research used national faculty survey of student engagement (2003 FSSE Survey) that classified faculty asks the respondent for the general area of their selected course. Faculty members were grouped by their course placement using Holland's environment types of Social, Investigative, Artistic, Conventional, Realistic, and Enterprising taken from Holland's theory of careers (1973, 1985, 1997). Occasionally, classifying faculty members in this manner becomes a problem when members teach courses outside of the general area of their training or appointment. For example, a professor may have training and began a teaching appointment in the social science discipline. The same professor may also be an expert in statistics. After teaching for a period of time, a need arises in a neighboring department for someone to teach statistics. The professor's new appointment could be to teach only courses in the new department, one outside his or her training and original appointment. Still, because FSSE advises users of its (FSSE) data to place faculty respondents according to the course they currently teach, rather than according to their original appointment or general areas of classification, some faculty responses may be placed among the wrong faculty group. With these considerations in mind, some faculty may be classified outside their actual discipline, hence differing slightly the purposes of the current study.
2. There is an absence of measurable student performance outcomes. Studies have shown that students acquire particular skills and abilities as part of the emphasis and encouragement they receive from members of faculty endemic to a particular

academic environment. Adding a student outcomes component to the study would have provided empirical evidence of the effects of an academic environment on students in that department along with establishing the credibility of the study's results.

Definition Terms

The following terms were defined for use in this study:

Congruence: Refers to the level of fit between an individual and the environment (Holland, 1997).

Consistency: The degree of relatedness between personality types or between environmental models (Holland, 1997).

Differentiation: "The degree to which a person or environment is well defined" (Holland, 1997, p. 4).

Endogenous variables: Variables that serve as dependent variables but, in a path analysis, also act as independent variables.

Exogenous variables: Variables functioning as independent variables in path analysis.

Multiple regressions: A mathematical research process where two or more variables attempt to predict another variable (Grimm & Yarhold, 1995, p. 10).

Path analysis: An extension to normal multiple regressions in which some variables possess both direct and indirect effects.

Personal identify: Defined by Holland (1997) "as the possession of a clear and stable picture of one's goals, interests, and talents" (p. 5).

Personality theory: The primary assumption is that most people fit into one of six personality types: realistic, investigative, artistic, social, enterprising, and conventional (Holland, 1997).

Summary

This chapter introduced the concept that faculty differences exist regarding attitude, behavior, and practices across academic disciplines. Knowledge of this is potentially valuable due to the significant role faculty have in the undergraduate experience. The theoretical framework of the study was based on Holland's (1973, 1985, 1997) theory of careers. Holland's system for classifying academic majors was introduced to classify faculty members into discipline groups. The purpose of the study was to expand previous research on faculty differences and the use of Holland theory in higher education. Smart, Feldman, and Ethington's groundbreaking *Academic differences* (2000) was identified as a model study for this study.

Two areas were identified in previous literature related to the study of faculty differences and early systems employed to classify academic subjects. Path analysis, a form of multiple regressions, was introduced as the method to conduct empirical research in the study. The Faculty Survey for Student Engagement (2003) was introduced as the survey instrument to provide data for path analysis. The research questions were identified, as well as the rationale and the significance of the study. Finally, limitations and definitions of the study were presented.

The review of the literature will be presented in Chapter 2. It provides an in-depth examination of faculty differences and classification of academic disciplines.

CHAPTER 2. REVIEW OF LITERATURE

The purpose of this study was to explore the concept that differences in the attitudes, teaching practices, and behavior of faculty in higher education, in general, are a possible cause of differential experiences of college students at four-year colleges and universities. The researcher examined this concept to reveal the extent of difference in the practices, attitudes, and behaviors of faculty members. A review of related literature was conducted on faculty differences. To support the research, classification theories were also reviewed, specifically addressing Holland's (1973, 1985, 1998) theory of classification, and personality and environment (i.e., disciplines) types.

Faculty Differences

Prior to the 1960s, very few studies conducted have examined the field of higher education in the United States (Clark, 1983, pp. 1-2). Even scarcer were studies targeting specific differences in the professional practices of university faculty (p. 3). Concerning the shortage of studies on faculty differences, Clark (1987b) stated, "Observers have long noted that academicians study everything but themselves" (p. 2). Wilson's *Academic Man* (1942) was an exception to the rule. It explored both the world of higher education generally, and particularly the lifestyle, of a university professor. It was the first recognized study that addressed faculty differences across various disciplines.

Academic Marketplace, by Caplow and McGee (1958, as cited in Braxton & Hargens, 1996), documented differences in faculty practices based on discipline. Weisz and Krutybosch (1982, as cited in Braxton & Hargens, 1996) surveyed faculty differences, providing descriptive accounts of individual differences and specialties rather than

summarizing the existing literature on disciplinary differences Still, like the previous ones, it failed to explain why disciplines differed and the extent of the differences (p. 3).

As a result of his interaction with faculty in various fields, Snow (1959) began to document the differences in the practices of faculty. Originally trained as a scientist, Snow (1959) later wrote science books while spending time with literary writers during the process (p. 4). Afterwards, he documented differences he observed among faculty types. He referred to natural science and social science faculty as “two cultures” (p. 2). Further illustrating the differences between the two, Snow (1959) commented, “Literary intellectuals at one pole—at the other scientist ... physical scientists; between the two a gulf of mutual incomprehension—sometimes hostility and dislike, but most of all, a lack of understanding” (p. 4).

Cohesiveness and unity among researchers was also lacking regarding study of variations across the disciplines. This spawned problems for researchers in the developmental study of academic life in general. Among these problems were “the absence of a theory or conceptual framework, in which the various fields could be ordered along some relevant dimension or dimensions” (Lodahl & Gordon, 1973, p. 192). Storer (1966) clarified a field’s need for a framework, stating, “A field of knowledge can develop coherently only when an adequate conceptual framework is available” (p. vii). As a result, advancement in the study of faculty differences was inconsistent. Most researchers, including Clark (1983) and Light (1974), agreed “the work that was done was disorganized, fragmented, and disjointed (Light, pp. 2-3). For example, scholars conducting studies on faculty differences often failed to reference the previous work of others (Light, p. 2). This weakened momentum that may have accumulated with a research breakthrough, and slowed advancement in the field. Light (1974) attributed these problems to the egos of researchers studying faculty and the self-

interests of organizations funding the studies (p. 3). Two organizations funding the research were the Carnegie Foundation for the Advancement of Teaching and the American Council on Education (Smart et al., 2000, p. 7).

In the 1960s researchers studying higher education began to merge conceptual research with empirical studies on faculty differentiation (Braxton & Hargens, 1996, p. 2). Lodahl and Gordon (1973) conducted one of the first studies of this type, a longitudinal study that began in 1968 (p. 2). This study surveyed faculty members at 80 graduate departments around the country. It compared two social science and two physical science disciplines. The authors (1973) state, the purpose of the study was “to explore how the structure of knowledge in scientific fields might affect university departments and the activities of individual scientists” (p. 192). The study was based on the concept “paradigm development,” which was used to differentiate academic disciplines and their stage of development. According to Kuhn (1970), paradigm was “the entire constellation of beliefs, values, techniques, and so on shared by the members of a given community” (p. 175). Kuhn (1970) further added, “A paradigm is what members of a scientific community share, and conversely, a scientific community consisting of men who share a paradigm” (p. 176).

Lodahl and Gordon (1973) used Kuhn’s (1970) “paradigm development concept to express the level of consensus” in comparing the four disciplines in the study (p. 192). Among their findings was that all faculty agreed on ranking the physical sciences over the social ones in terms of consensus. Lodahl and Gordon (1973) offered this explanation of the differences in consensus:

Consensus refers to certain theories and findings [that] have been accepted as proven and can be used as the basis for future investigations that have been proven. These established findings ... suggest further lines of inquiry. As the

paradigm is developed, the standards by which results are to be judged also become clearer. This gives the scientist of high paradigm high visibility of consequence – he knows how well he has done. By contrast – the low paradigm scientist has to choose between an array of competing theories and methodologies. ...the standards by which results are to be judged, also the worth of various findings may vary with the ‘school’ from which the research has been done. Members of one school will not accept the standards by which the others perform and judges its research. Since findings cannot be established, visibility of consequences is low ... his work cannot be considered visible or certain. (p. 193)

Results of the study confirmed the paradigm concept (1973). Lodahl and Gordon found social science faculty had less agreement on course content, graduate degree requirements, and content of survey courses in their field than did physical science faculty (p. 193). In addition, physical science disciplines had greater reputations, more autonomy, and maintained a more collegial structure than did social science faculty.

Merton and Zuckerman studied faculty variation through comparing publication rejection rates of articles submitted by faculty across various disciplines. Their study (1973) consisted of 83 journals from the humanities, social and behavioral sciences, mathematics, biology, chemistry, and physical sciences (p. 470). The results of their study concluded:

Journals in the humanities had the highest rate of rejection, followed by the social and behavioral sciences, mathematics, and statistics next in line. The physical, chemical, and biological sciences have the lowest rates, running to no more than a third of the rates founding in the humanities. (p. 470)

They identified a definite pattern of rejection. The differences between fields and within fields, they concluded, was that “The more humanistically-oriented the journal, the higher the rate of rejecting manuscripts for publication; the more experimentally and observationally oriented, with an emphasis on rigor or observation and analysis, the lower the rate of rejection” (p. 472). Such discrepancies in the amount of science manuscripts accepted for publication in comparison to so few social or behavioral ones being accepted may be

attributed to the 1970s period. During the 70's, social and behavioral sciences were still gaining acceptance as legitimate academic disciplines, and their publications as academic research. Among many editors and publishers at the time, scientific topics and work written in the scientific manner was the standard of the day.

Other researchers who studied differences among faculty groups included Hagstrom (1964), and much later, Hargens and Kelly-Wilson (1994) who advanced Hagstrom's findings. Hagstrom (1964) recognized differences in the practices of faculty among various departments. Much of his research examined academic disciplines under the sociological concepts of famed sociologist and early pioneer Emile Durkheim. Although himself a scholar on the topic of variations among college disciplines, Durkheim (1947) coined the term "Anomy" to describe the disorganization of the division of labor in the society in which he lived (p. 358). For his purposes, based on his interviews with mathematicians, Hagstrom (1964) defined anomy [or anomie] as "the loss of solidarity following a general breakdown in the exchange of the information and recognition" (p. 187). According to Hagstrom, "an indicator that anomy is present is the absence of accepted criteria for ranking specialties" (p. 189).

Hargens and Kelly-Wilson (1994) expanded Hagstrom's work. Their empirical study "examined discipline variation in faculty assessment of recent research development in their fields in order to (1) assess whether pessimistic assessments are prevalent in anomic and low-consensus fields, and (2) determine if other characteristics of disciplines are associated with pessimism" (p. 1179). They compared the responses of faculty who conduct research by discipline using Biglan's (1973) hard/soft typology to categorize disciplines. Biglan's hard/soft typology distinguished between disciplines with a single knowledge paradigm (i.e.,

hard) and multi-paradigm disciplines (i.e., soft). Natural science disciplines such as biology represent Biglan's hard disciplines, and social sciences soft disciplines. Primary responses for participants were the statements "Exciting developments are taking place in my field" and "The new developments in my field are not very interesting to me" as criteria for measuring the level of faculty pessimism about their particular discipline (p. 1180). Their results revealed:

1. A strong association between Biglan's hard/soft dichotomy and average disciplinary excitement scores.
2. High scholarly anomie and low levels of disciplinary consensus produce pessimistic assessments of the vitality of one's field.
3. Fields vary substantially in the levels of excitement their members have about recent developments in their field.

Perhaps the most prolific scholar on the topic of faculty differences and differential experiences of undergraduates within the last 30 years has been John Smart (1974, 1978, 1985, 1986, 1997, 1998, 2000, 2005). Specific topics of Smart's research have been: variations in goal priorities of academic departments (Smart & McLaughlin, 1974), reward structures of academic disciplines (Smart & McLaughlin, 1978), Holland environments as reinforcement environments (Smart, 1985), college effects on occupational status attainment (Smart, 1986), academic sub-environments and differential patterns of self-perceived growth during college (Smart, 1997), accentuation effects of dissimilar academic departments (Smart & Feldman, 1998), and student competences emphasized by faculty in disparate academic environments (Thompson & Smart, 1999). In much of his research Smart has used Holland's theoretical framework as the basis for examining differences in the academic departments.

Some of Smart's more current research is also on the topic of faculty and department variations while once again relying on Holland's theory. More recent areas of study by Smart are major field and person-environments fit (Feldman, Ethington, & Smart, 2001), student outcomes of differences in person-environments fits (Feldman, Ethington, & Smart, 2004), and differential practices of faculty in structuring undergraduate courses (Smart & Umbach, 2005).

Academic disciplines (Smart et al., 2000) and Holland's (1997) work were the main sources for the current research. This work endeavors to capture the essence of the differences in the attitudes and practices of academic departments, while blending in Holland's rationale for the situation. *Academic disciplines* is a classic because it first uncovered the differences among college and university departments regarding teaching and faculty behavior, and identified reasons for these differences.

Classification

Some of the most recognized research in the history of higher education as a field of study involved efforts to devise an acceptable framework for classifying disciplines. In today's university catalogs academic majors are classified as arts, sciences, social sciences, and humanities. Prior to the 1960s, no such divisions existed. Many educators simply referred to all academic disciplines at this time as the "sciences." During the 1960s higher education scholars first began to devise classification criteria and to reference the advances of previous researchers, although not always in the successive order of the developments in the field. Similar to the study of faculty differences, progress was slow toward creating a system of classification for academic disciplines. Still, some progress was made, and

researchers began to devise criteria for classifying fields of study. Smart et al. (2000) referred to initial attempts in the 1960s to classify disciplines as “alternative governance models” (p. 8). Some of the efforts (2000) were “Goodman and Millet’s (1962) community of scholars, the bureaucratic model proposed initially by Weber (1947) and modified by Stroup (1968), and the politics of academic life advanced by Foster (1968) and Baldrige (1971)” (Smart, p. 9). As mentioned previously, these various efforts to conceptualize a framework for studying academic disciplines further reveals the lack of consensus among researchers (2000). Smart et al. (2000) referred to this as “conceptual disarray and a dominant condition facing researchers of faculty prior to the 1970s” (p. 8).

Despite this lack of uniformity and success in identifying lasting classification frameworks, some important frameworks for categorizing disciplines were developed. These include Kuhn’s paradigm development (1962), Patin’s “restricted versus unrestricted sciences” (1968), Biglan’s Model (1973a), Collins (1975), and Holland’s Typography (1973). The following is a more in-depth look at the more accepted classification constructs in the field. Theories and conceptual frameworks to guide studies of college faculty began in earnest in the 1960s and continue today (Smart et al., 2000, p. 9).

Kuhn, like Snow, initially was trained as a natural scientist, in Kuhn’s case as a physicist. Later, he also began to spend time with faculty from humanities and social sciences while documenting the history of his discipline. Kuhn (1962) devised the concept of “paradigm development” as a means to explain the source of differences between natural sciences and social sciences (p. x). Disciplines with theoretical paradigms established and widely accepted by the particular academic community were deemed as developed and as “normal science” (Kuhn, 1962). Kuhn defined normal science as “research firmly based upon

one or more past scientific achievements, achievements that some particular scientific community acknowledge for a time as supplying the foundation for its further practice” (p.

10). Kuhn distinguished the type of researcher and practices he had in mind:

Men whose research is based on shared paradigms are committed to the same rules and standards for scientific practice. That commitment and the apparent consensus it produces are prerequisites for normal science, i.e., for the genesis and continuation of a particular research tradition. (p. 1)

Like Kuhn, Patin (1968) was concerned primarily with the science disciplines (Becher, 1989, p. 8). Patin (1968) defined science in its strictest sense as “all knowledge” or “departments of knowledge” (p. 2). He classified departments of knowledge as either “unrestricted or restricted sciences.” According to Patin,

biology is an unrestricted science and it differs from restricted sciences such as physical science, in that the researchers with restricted sciences must be prepared to follow the analysis of their problem into any other kind of science, whereas restricted sciences such as ‘physical science’ are restricted in the field of phenomena to which they are devoted. They do not require the investigator to traverse all other sciences. (p. 18)

While efforts were being made to categorize academic disciplines (Smart et al., 2000), theoretical distinctions were devised on the basis of several dimensions (p. 9), including the discipline’s level of codification (Zuckerman & Merton, 1971), the previously-mentioned paradigm development extended by Lodahl and Gordon (1972), normative and functional integration by Hagstrom (1964, 1965), knowledge domains and social features of knowledge communities by Becher (1989), and consensus by Hargens and Kelly-Wilson (1994) (Smart et al., 2000, p. 9).

One of the most respected systems for classifying academic disciplines and one still being used by scholars to classify disciplines, is Biglan’s (1973a) model. Like Lodahl and Gordon, Biglan (as cited by Becher, 1989) concerned himself with how academics

themselves perceived the characteristics of knowledge fields using survey techniques. Biglan (1973a) used non-metric multidimensional scaling to analyze the relationship between subject matter characteristics and departments organization. Biglan's acted off the primary assumption that scholars or faculty members would be the best source of information about academic areas (environments). He offered three dimensions to classify disciplines. The first, "hard versus soft," distinguished between disciplines with a single knowledge paradigm (i.e., hard) and multi-paradigm disciplines (i.e., soft). The second dimension, "pure versus applied" categorized disciplines based on the extent to which they emphasized application of knowledge. The final dimension, life versus non-life, focused on disciplinary concern with life systems (p. 204). Finally, Biglan (1973b) concluded that university-wide guidelines for evaluating faculty were impossible because areas (disciplines) differ in their norms concerning commitment to research, teaching, and service (p. 212).

Early scholars studying differences in disciplines observed or surveyed faculty to acquire data about them. Kolb's (1981) work was unique because he examined differences across academic disciplines from the perspective of the [student] learner and learning (p. 234). In an initial study (1981) using his Learning Style Inventory (LSI), Kolb examined student perceptions about faculty. He (1981) examined academic disciplines along the classifications of Concrete-Abstract and Active-Reflective. This classification was similar to Biglan's Hard-Soft and Pure-Applied typology, and resulted in similar results to Biglan's (p. 240). Kolb classified a nearly identical list of disciplines in his classification system as Biglan. For example, Biglan's "Hard" disciplines corresponded with Kolb's abstract-reflective disciplines; Biglan's "Applied" disciplines corresponded to Kolb's "Abstract-Active" disciplines; Biglan's "Soft" disciplines corresponded to Kolb's "Concrete-Active" (as

(Kolb, 1981, as cited in Becher, 1989, p. 12). A second study of Kolb's surveying graduate students and faculty, "proved highly consistent with Biglan and his own learning style data" (p. 243). Kolb stated, "the results suggests that the commonly accepted division of academic fields into two camps, the scientific and the artistic, or abstract and concrete (for example, Snow, 1963; Hudson, 1966), might be usefully enriched by the addition of a second dimension, namely, actively-reflective or applied-basic" (Kolb, 1981, p. 243).

While studying variations in knowledge communities, Collins focused on the organizational structure of intellectual communities. Collins (1975) initially tried to classify academic disciplines using "hard" and "soft" classifications. He (1975) proposed that "hard sciences are organized around a paradigm that provides for cumulative development through routine puzzle-solving. ... [Soft sciences] are much more diffusely organized and relatively non cumulative because they lack a paradigm" (p. 506). Later, he (1975) found the hard-soft classification did not work well enough with the paradigm-non paradigm distinction, nor with the degree of advancement in the field (p. 506). Ultimately, Collins (1975) found other elements that are determinates of organizational structure. These include:

The degree of uncertainty of the task outcomes; the degree to which there are problems of coordination based on the need to bring together the results of many separate tasks, work places, or large numbers of workers; and the availability of communication technology, including writing, money, and the hardware of communication and transportation (1975, p. 507).

In addition to his typology of academic communities, Braxton and Hargens (1996) credit Collins with "advancing twenty hypotheses about relations between the two dimensions and various disciplinary characteristics" (p. 7). Whitley (1984) and Fuchs (1992)

built on the work of Collins. Possibly because of its unique manner of classifying academic disciplines, the organizational structure approach has not been as widely received by higher education scholars.

Becher (1989) conducted a longitudinal study interviewing graduate students and faculty from twelve academic disciplines, to gain insight into the particularities of different knowledge communities. He differed from many others studying academic differences because he recognized that (in addition to disciplinary knowledge) cultural aspects of academic communities also distinguished one group from another. Becher (1989) contended: “Among disciplinary communities’ more powerful integrating forces are their more explicitly cultural elements: their traditions, customs and practices, transmitted knowledge, beliefs, morals and rules of conduct, as well as their linguistic and symbolic forms of communication and the meaning they share.” Reflecting of these views, he referred to disciplines as “tribes.” Becher (1989) further described his focus on disciplinary culture sharing:

It [discipline’s culture] ... involves artifacts – a chemist’s desk is prone to display three-dimensional models of complex molecular structures, an anthropologist’s walls are commonly adorned with colorful tapestries and enlarged photographic prints of beautiful black people, while a mathematician may boast no more than a chalkboard scribbled over with algebraic symbols.
(p. 23)

A second area of disciplinary differences, according to Becher, involved the discipline’s language. Disciplines possess words or phrases sometimes commonly used in society, but holding special meanings in the particular environment. Also endemic of the environment is the manner of using these words or phrases. Becher (1989) stated, “It is possible to ... distinguish differences in the modes in which arguments are generated, enveloped, expressed and reported, and to tease out the epistemological implications of the

ways in which others' work is evaluated" (p. 23). Similar to the individual culture of an environment, is its use of language.

A final system of classification of academic disciplines presented is Holland's theory of careers. Holland's classification system using "The Occupations Finder" (1978) is a classification of vocations, rather than academic disciplines. Nevertheless, Holland's theory of personality types and environments can be matched with faculty and academic environment. In his most recent edition (1997), Holland stated, "principles [of this theory] are also applicable to educational environments" (p. 149). Holland's theory is reviewed in detail because it best fit the purposes of the current research.

Holland's theory of classification

Holland's theory of careers (1973, 1985, 1997) served as the theoretical foundation for the current study. Although created for the purpose of helping individuals find suitable vocations, Holland (1997) maintained his theory is applicable to educational environments (p. 213). In addition, higher education scholars such as Smart (1974, 1978, 1985, 1999, 2001, 2005), Thompson (1999, 2003), Astin (1993), and several others have relied on Holland's theory for its practical application, and because of its ease in explaining variation among faculty in their thought and behavior (Smart et al., 1997, p. 2). Therefore, this study provides a background of the assumptions and principles in Holland's theory to clarify challenges regarding differential practices of faculty in the teaching/learning process.

Holland's (1973, 1985, 1997) theory of vocational careers is based on three important entities: the individual, the environment, and the interaction of the individual and the environment (see Figure 1). Holland proposed that most individual personalities resemble

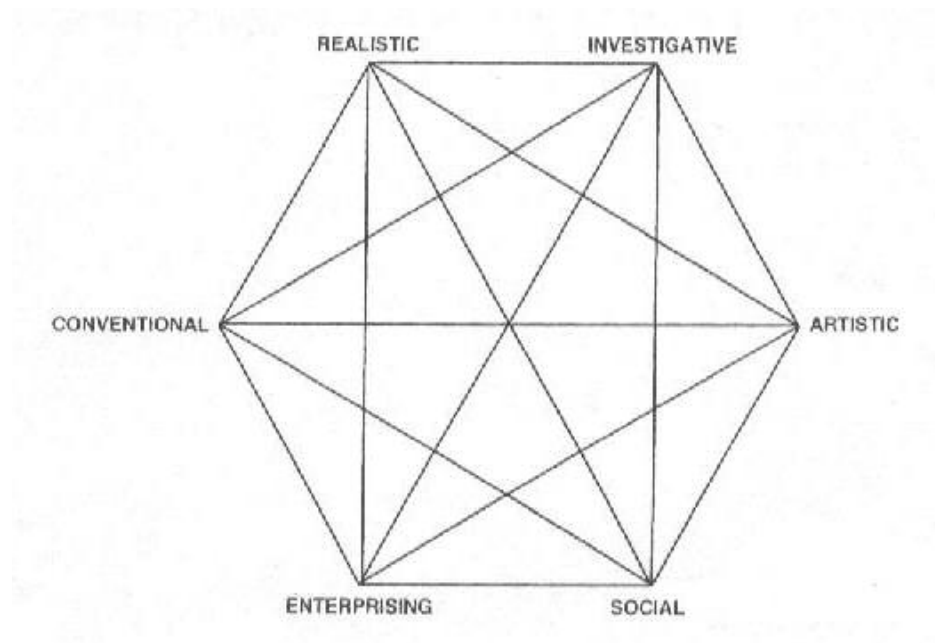


Figure 1. Hexagonal model for defining the psychological resemblances among personality types and environments, and their interactions (also called the RIESAC hexagon) (Holland, 1997, p. 6)

one of six types: Realistic, Investigative, Enterprising, Social, Artistic, and Conventional.

With the first letter taken from each type—Holland R, I, E, S, A, C—the types are often referred to as “RIESAC.” Holland developed the REISAC hexagon to illustrate the different types and their relationships to one another. Although the direction of the arrangement of types can be reversed, the proximity of one type to another cannot. Types closest to one another on the hexagon are those most similar to each other; those opposite of each other are the least alike and have the least in common.

In addition, there are six corresponding environments with the same names that most environments resemble. An environment is a type because of the dominant number of personality types in the environment. For example, because a social agency is comprised

largely of social types it is usually a social-type environment. Similarly, art environments are dominated by artistic types and investigative environments by investigative types. A fundamental consequence of types of environments is that the types are comprised of people with similar personalities, values, attractions, and goals. According to Holland (1997), “It is the interaction between the individual and the environment that determines behavior...knowledge about the individual and the environment enables one to predict human behavior as they interact” (p. 4).

Three additional assumptions in Holland’s theory are well recognized in higher education (1997). Smart and associates (2000) referred to them as the self-selection, congruence, and socialization assumptions. For the first assumption, self-selection, Holland (1997) posited that “besides resembling a personality type, people search for environments that will allow them to practice their skills and abilities, express their attitudes and values, and take on an agreeable problems and roles” (p. 4). The second assumption – congruence refers to “particular personality types flourishing because they are in matching or congruent environments” (p. 42). Holland (1997) further expounded on congruency environments sharing, “environments in which a person’s preferred activities and special competencies are required and his or her personal disposition and its associated characteristics—a special outlook on the world, role preferences, values, and personal traits—are reinforced” (p. 11). The third assumption, the one which this study primarily focused is the “socialization” assumption of Holland’s theory. This assumption posits that “each model environment reinforces a characteristic group of activities, competencies, predispositions, or behavior repertoires. Smart and associates (2000) related this assumption to faculty’s influence on undergraduates, stating, “The distinctive orientation of the faculty who constitute these

environments and their disciplines lead to different students outcomes” (p. 140). In spite of this, particularly within their discipline, many undergraduates initially will view their collegiate professor to be their mentor, model, and expert in their field of choice.

Altbach (1976), Beardslee and O’Dowd (1961), Copp (1967), Currie et al. (1968), Demos and Belok (1963), ten Hoor (1962), and Startup (1972), as cited in Best (1978) provided an impression on the manner in which college students view the college professor:

They [college students] see a college professor as intelligent, rationalistic (unemotional), individualistic, and radical personally and socially. He may be slightly introverted, if not indifferent or antisocial. Respect for the faculty member is high, based on in part on his contribution to society. Professors are thought to be self-sufficient and persevering. (p. 294)

Largely because of this initial respect and admiration from undergraduates, the disparate practices, attitudes, and behavior of college faculty are generally overlooked. In their campus report, “Holland’s Theory and Implications for Academic Advising and Career Counseling,” Dr. Robert Reardon, Director of Florida State University’s (FSU) Career Center, along with FSU’s career advisor, Emily Bullock, offered: “If students can recognize, differentiate, and understand these diverse academic environments and the faculty who dominate them ... we believe they are more likely to find a place within the university that will increase their satisfaction, involvement, and persistence” (Reardon & Bullock, 2004, pp. 2-3).

Nevertheless, when choosing an academic major, undergraduates rarely consider the teaching practices, expectations, and attitudes of faculty within their preferred academic disciplines. In their seminal work, *Academic Disciplines*, Smart, Feldman, and Ethington (2000) stated, “choosing an academic major involves students’ perceptions of their own interests and abilities, their career aspirations, the availability of desired majors at specific institutions, their career aspirations, encouragement of family and friends, and student

assessments of opportunities ... at the completion of studies” (p. 104). Confirming the difficulty students have in selecting an appropriate major to match their skills and abilities, Reardon and Bullock (2004) perceived it is the educators’ and campus professionals’ responsibility to inform students about the variation among faculty practices. They explained, “It is important for counselors and advisors to inform students about the impact of majors and academic disciplines on the development of student interests and skills” (p. 19).

However, few scholars studying the difficulty students have in selecting an appropriate major to match their skills and abilities have associated differential attitudes and behavior of faculty as contributors to problems students encounter in their studies. Smart, Feldman, and Ethington (2000) suggested the differential attitudes and practices of faculty across academic disciplines are related to student attrition. Thus, departments and faculty unwittingly may be creating dissimilar experiences for students related to their differential practices within the same institution. As a result, many colleges and universities experience difficulty retaining their undergraduates.

In addition to many career counseling and job placement offices that use Holland’s principles, many higher educational scholars use Holland’s theory as well. Its origin as a vocational typology instead of an academic theory may be more beneficial to those using it because Holland’s theory looks at what the individual will be doing or does, as opposed to being based on the knowledge content (of the environment) like most of the previous classifications. Holland’s classification of academic disciplines is based on the primary assumptions and principles of his typology of six personalities and their corresponding environments. This is a logical step since faculty members are themselves “types” who make up the environments. In fact, Holland (1997) states, “Because many psychologically

important features of the environment consist of or are transmitted by the people within it, we can characterize an environment by assessing its population” (p. 46). In addition, Holland’s Environmental Assessment Technique (EAT; Holland, 1997) was created as a means to assessing an environment based on the dominant population types present (p. 48). Holland further states, “If we know what kind of people make up a group, we can infer the climate that the group creates” (pp. 41-42).

Finally, Holland suggested academic departments and colleges restructure their arrangement of disciplines using his “Classification” of academic disciplines. Included in Holland’s plan is a means for disciplines of the same environmental type to be housed within the same unit. In a brief synopsis of the problem with current classification of higher educational disciplines, Smart et al. (2000) posited:

- (a) Colleges are organized with the assumption that there are more common interests than across them.
- (b) Colleges are structured along lines of external accreditation agencies and general professional associations (e.g., colleges of business, education, engineering, etc.).
- (c) Disciplines’ assignments are made without theory-based understanding of the similarities and differences among academic departments.
- (d) Currently college units often include academic departments whose orientations are markedly dissimilar. (2000, p. 250)

Smart et al. (2000) supported Holland’s suggestion for restructuring higher education. In fact, they suggested, “because Holland’s plan is theory-based, if implemented, it offers the promise of improving the professional stability, satisfaction, and success of faculty within these institutions” (p. 253). Few higher educational institutions have followed Holland’s recommendations for restructuring their disciplines. An exception is Conary (1969, as cited by Holland, 1997), who used Holland’s classification in restructuring its two-year college’s academic structure into four institutes: (a) Applied Humanities (Artistic types), (b) Business

and Management (Social-Conventional and Social-Enterprising types), (c) Human Affairs (Social-Conventional and Social-Artistic types), and (d) Natural and Applied Sciences (Realistic and Investigative types) (p. 216). According to Holland, the plan has worked well and he recommended further study evaluating the program be conducted (p. 216). A central part of his plan is “pairing students and teachers according to types, or if teachers adopt their teaching styles to fit students types” (1997, p. 215). Holland offered, “Teachers do this now, but the theoretical formulations would provide more explicit guidelines” (p. 215). In addition, in an unpublished manuscript by Whitney and Holland (1969), Holland suggested [other] colleges and universities restructure their academic departments and colleges along the guidelines offered by their classification.

Personality type

Holland’s (1973) typology consists of six personality types, which correspond to six matching environment types. Holland (1997) posited, “The merger of personality with corresponding environment provides congruence, and makes human behavior predictable” (p. 21). Holland’s (1997, pp. 21-28) six personality types are briefly paraphrased in the following subsections:

Realistic: These persons prefer activities that entail the explicit, ordered, or systematic manipulation of objects, tools, machines, and animals, and to an aversion to educational or therapeutic activities. Personality traits are opposite those of Social type. Realistic types have a closed system of beliefs and a narrow arrange of interests.

Investigative: Individuals who are investigative prefer activities that entail the observational, symbolic, systematic, and creative investigation of physical, biological,

and cultural phenomena and aversion to persuasive, social, and repetitive activities.

This type is the opposite of enterprising.

Artistic: People who are artistic prefer ambiguous, free, unsystematized activities that entail the manipulation of physical, verbal, or human materials to create art forms or products and an aversion to explicit, systematic, and ordered activities. These behavioral tendencies lead in turn to an acquisition of artistic competencies (i.e., language, art, music, drama, writing) and to a deficit in clerical or business system competencies. This type is the opposite of conventional.

Social: People who are social prefer activities that entail the manipulation of others to inform, train, develop, cure, or enlighten. They have an aversion to explicit, ordered, systematic activities involving materials, tools, or machines. They value social and ethical activities and problems and are most gratified by helping or teaching others.

Enterprising: Enterprising individuals prefer activities that entail the manipulation of others to attain organizational goals or economic gain and an aversion to observational, symbolic, and systematized activities. These behavioral tendencies lead, in turn, to an acquisition of leadership, interpersonal, and persuasive competencies and to a deficit in scientific competencies.

Conventional: Individuals who are conventional prefer activities that entail the explicit, ordered, systematic manipulation of data (e.g., keeping records, filing materials, reproducing materials, organizing business machines and data processing equipment to attain organizational or economic goals) and to an aversion to ambiguous, free, exploratory, or un-

systematized activities. This leads to an acquisition of clerical, computational, and business system competencies and to a deficit in artistic competencies.

Holland (1997) designed personality types along a hexagonal scale to illustrate the relationship between different types (see Figure 1). Types closest to each other on the hexagon are most similar in characteristic traits, whereas types directly opposite each other have the least in common. For example, investigative types have an aversion to persuasive, leadership, and social activities, yet these same skills are strongest among the enterprising type. Similarly, investigative and enterprising types are in opposite locations on the hexagon.

The direction of the scale—left or right—is unimportant, but the place or location of the types to one another is held constant (see Figure 1). For example, enterprising is located on the hexagon between social and conventional. This is fitting since these two types are also most similar to enterprising types. Those farthest away are least similar.

In addition, Holland (1997) offered supplemental concepts for predicting the behavior of individuals in environments. The first addresses the notion that the typology possesses only six personality types. Holland (1997) stated, “The six personality types are dominant personality type models which people can be compared against” (p. 3). They are not meant to be the sole means of identifying individuals. People also have traits from the other five types. In fact, a more complete profile of an individual would list at least the first three types through which the individual’s personality is most similar. The Holland career resources use the second and third most dominant type preference (along with the first) to form a type “consistency.” Holland defined consistency as the degree of relatedness between personality types or between environmental models. For example, a person whose dominant personality type is first enterprising (E), then social (S), and third, conventional (C) would be identified

as ESC among the Holland vocational resources. Because these three types possess similar traits and are located near to each other on the hexagon, this person would be considered consistent and, therefore, her behavior would be much more predictable. This profile contrasts with an enterprising (E) type whose second and tertiary most (EA) dominant type is artistic and realistic (EAR). Because this person's second and third type traits are opposite her primary personality type, her behavior would be less predictable.

Differentiation is a second concept by Holland (1997), and defined as "The degree to which a persona or environment is well defined" (p. 4). An undefined person is one who resembles more than one personality type equally. This person would also be less predictable than one who resembles just one type. Holland characterized an environment as a type based on the greatest frequency of a personality type. An undifferentiated environment is one with equal or near equal numbers of personality types. As a result, the goals and values of this environment would not be clear or defined as a differentiated one.

Identity is another concept of Holland's that affects the profile of an individual or environment. Holland (1997) defined personal identity "as the possession of a clear and stable picture of one's goals, interests, and talents" (p. 5). Like differentiation, identity has to do with the clearness of a person and environment's goals and interests.

Congruence is the cornerstone of Holland's concepts and upon which his assumptions are based. Congruence refers to the level of fit between an individual and the environment. As shown in the hexagon (see Figure 1), the most congruent individual type and its corresponding environment type is social type in a social environment. A second, but less congruent, match is social type in an enterprising environment. In this example, the individual has similar traits with, perhaps, social qualities, but it is not an identical match.

Even less similar, but with some similar traits, is social type in an investigative environment. The least congruent type for social type is a realistic environment. Holland (1997) would likely identify this situation as incongruent and unpredictable, with the individual likely to be dissatisfied and unlikely to persist.

Holland (1997) used calculus to show relationships between and among factors. Accordingly, he posited “the relationships within and between personality types or environments can be ordered according to a hexagonal model in which the distances among the types or environments are inversely proportional to the theoretical relationships between them” (p. 5).

Holland and his colleagues (as cited in Smart et al., 2000, p. 39) designed a number of instruments and inventories to assess personalities, environments, and occupations. Consistent among Holland’s assessment tools is the identification of types according to the three types most dominant in the individual. Generally, this is represented by the three first initials of the types. For example, in Holland’s Occupational Finder (1978) an educational training manager’s personality type is listed as “EIS” (p. 270). The acronym “EIS” denotes that this individual’s dominant personality type is first enterprising, second investigative, and third social.

Along with the occupational finder, other resources are: the Self-Directed Search for identifying career vocations (Holland, Fritzsche, & Powell, 1994); the Vocational Presence Inventory for assessing personalities (Holland, 1985b); the Environmental Assessment Inventory for assessing environments, and the Dictionary of Holland Occupation Codes for assessing vocations (Holland & Gottfredson, 1994); and the College Majors Finders which classify academic disciplines (Rosen, Holmberg, & Holland, 1989).

Holland (1997) attributed one's heritage, life experiences, work experiences, and parental types as playing important roles in the development of that person's type. Concerning parental influence, Holland remarked, "Types produce types" (pp. 17-18). Holland clarified this point by stating, "Parents reward and encourage the behavior characteristic of the type" (p. 96). For example, conventional types spend time with people who are conventional types and do conventional type activities, while avoiding the activities conventional types do not prefer.

Summary

This chapter explored the concept that differences in the attitudes, practices and, in general, behavior of faculty in higher education are a possible cause of differential experiences of college students at four-year colleges and universities. The literature was reviewed relating to classification and personality types in education. Holland's (1973, 1985, 1997) theory of careers and personality type were the specific focus to extend previous research conducted by Smart et al. (2000) on faculty differentials in higher education. This researcher sought to validate the findings by Smart and others in higher educational settings nationwide from a nationwide survey conducted by FSSE, and applying path analysis to analyze the data on specific practices, attitudes, and behavior of faculty regarding student learning. Chapter 3 will address specifically the theoretical framework of the study and path analysis is carried out to answer the research questions of the study.

CHAPTER 3. METHODOLOGY

The purpose of this study was to explore the concept that differences in the attitudes, practices, and, in general, the behavior of faculty in higher education are a possible cause of differential experiences of college students at four-year colleges and universities. As was mentioned previously, these differences in faculty practices could result in overall differential collegiate experiences for students. This study was conducted to provide a comparison of the differential practices of faculty in higher education by examining the practices of faculty within the four academic areas. The study used Holland's theory (1966, 1973, 1992, 1997) of careers both as a theoretical framework and for categorizing the academic disciplines of the participating faculty members. Holland's theory is primarily a personality theory (Smart, Feldman, & Ethington, 2000). Holland's (1997) primary assumption is that most people fit into one of six personality types: realistic, investigative, artistic, social, enterprising, and conventional. In addition, there are six corresponding types of environments.

An environment's type, according to Holland (1997), is determined and labeled as such because of the dominant presence of a particular personality type (p. 41). Holland credited Linton (1945) with the idea that the nature and character of an environment is determined by the nature and character of the people inhabiting the environment as the basis for his model of environment types (p. 41). A third assumption is that people are attracted to environments and individuals similar to their type. For example, an artistic environment is made of a dominance of artistic types who support and reward traits common to artistic types. These traits include creativity, freedom or expression, and a less structured environment. Equally important to the artistic type, by being in an artistic type environment,

the individual is also able to avoid certain behaviors and expectations required within another environment (Holland, 1997).

An important component to this study and one that adds credibility to its results will be the inclusion of an empirical statistical procedure. Structural equation modeling is used to estimate a path to examine the effects of different faculty practices on student learning. In this section, the researcher introduces the sample used for analysis, the survey instrument used to collect data, the structural equation procedure used to analyze the sample data, and the statistical analysis undertaken.

Survey Instrument

The Center for Postsecondary Research, Indiana University Bloomington provided this researcher with the results from the 2003 Faculty Study of Student Engagement or (FSSE) – the survey instrument used in this study. Forty-six questions were used from FSSE. These questions were placed among the five variables groups of demographic, faculty mindset, Holland type, faculty behavior, and differential outcomes originating from the empirical study. Specific faculty background characteristics of race, sex, and academic rank along with the participant's institutional type (Carnegie) and institutional control type (public or private) were included. FSSE solicited responses of faculty members at four-year institutions only in its 2003 survey. Permission to conduct the study was given by the Iowa State University Institutional Review Board and the NSSE (see Appendix A1 and A2).

Variables of the Study

Three previous studies addressing the areas of teaching goals, teaching styles, and student interaction utilizing Holland theory confirmed the validity of Holland's theory. These

studies reflected differences among faculty dependent on their academic disciplines. In this section the results of each study are described.

Teaching goals

Smart and McLaughlin (1974) examined differences among faculty in the goals they have for students in two areas:

1. Graduate programs, research and teaching practices; 2. Congenial work environment of faculty, maintaining a spirit of inquiry, and academic freedom. Results revealed faculty from Investigative and Realistic departments place more emphasis on goals of graduate programs, research, and teaching, while Social, Artistic and Conventional tended to emphasize goals of congenial work environment of faculty, maintaining a spirit of inquiry and academic freedom. (p. 387)

These results are consistent with traits assigned to Holland's personality types. Holland listed research and traditional teaching as common to Investigative and Realistic department faculty. Since Social and Artistic faculty place most emphasis on people skills, these results concerning the two types are consistent. Smart and McLaughlin concluded their study by stating, "these primary differences in the current goal priorities of academic departments appear to be quite consistent with the underlying personality patterns associated with the six model environments as specified in Holland's theoretical model" (p. 387).

Teaching styles

Smart et al. (2000) examined the teaching style of faculty through participants completing a survey. Results from this study indicate,

Realistic and Investigative faculty are more oriented than their colleagues in other academic environments toward student achievement of career-related, a priori goals and student acquisition of specific skills and credentials (Achievement scale); prefer goals and student acquisition of specific skills and credentials, (Achievement scale); prefer more formal and structured teaching-

learning arrangements and feel that students learn best by meeting specific, clear-cut requirements (Assignments Learning scale); and place a high value on grades and examinations (Assessment scale). (p. 84)

Results from a study by Smart et al. (2000) not only support Holland's theory of personality types but also, like the previous study, confirm even traditional stereotypes about natural science disciplines. Common stereotypes are that science faculty members provide a very traditional lecture teaching format with clear expectations. This has been such a tradition in science departments that science students often expect and are comfortable with this style of teaching.

The remaining faculty survey results (Smart et al., 2000) also confirmed Holland's theory of personality types:

The Social and Artistic faculty scored low in the areas of "traditional teaching methods and with clear-cut objectives." Their results indicated they "prefer more informal, unstructured teaching-learning arrangements in which students set their own goals and pursue their own interests. They place a high value on student freedom and independence in the learning process and believe that students do their best work when they are on their own (Independent). (Smart et al., 2000, p. 84)

These results were also consistent with traditional stereotypical behavior. The stereotype is that art and social science professors teach in an unconventional manner. Classes are largely unstructured, and the professor allows the direction of the class to flow according to the mood of the class. Once again, the results strongly support Holland.

Student interaction

Addressing this last variable, based on their empirical findings, Smart et al. (2000) stated their preferences about the accessibility of faculty to students:

Little variation occurred across the faculty groups in this final area. ... access of faculty members to students do[es] not vary across the academic

disciplines. The authors mention that previous research for decades has indicated that faculty interaction is important (both in and out of class) to be beneficial to student outcomes (Pascarella & Terenzini) [1991]. They conclude there was no differentiation in this study. (Smart et al., p. 97)

The results from Smart's (2000) study met neither Holland's nor traditional stereotypical results. Previous studies revealed that natural science faculty or, in this case, Investigative and Realistic faculty, are not as interested in student interaction as are Social, Artistic, and Enterprising faculty. This variable was monitored closely in the current study to determine whether it follows or disputes findings by Smart et al.

Figure 2 illustrates the variables of the current study and their path analysis movement patterns. Variables of the study included demographic variables, faculty mindset, Holland type, behavioral variables, and the differential outcome variable—differential learning. The beginning step in creating the empirical component to the study was to recode the variables using dichotomous or “dummy” variables. This procedure is commonly used in studies in order to simplify the study's results. Demographic variables “sex, rank, institutional control, race/ethnicity, and Carnegie types were recoded as “sexnew,” “ranknew,” “control,” “race2,” and “carnegienew,” respectively. In each instance, faculty responses were given a value of “0” or “1.” For example, choices for sexnew were “0” for male, and “1” for female; ranknew choices were “0” for Teaching Assistant (TA) and/or other (faculty) and “1” for lecturer, adjunct, assistant, associate, or full professor. The researcher decided on these two classifications for the variable because he wanted to exclude less regular members of faculty such as TAs. The variable “control” was identified as “0” for public, and “1” for private. Race2 choice answers were “0” for majority and “1” for nonmajority. The general grouping and labeling faculty of color as “nonmajority” was

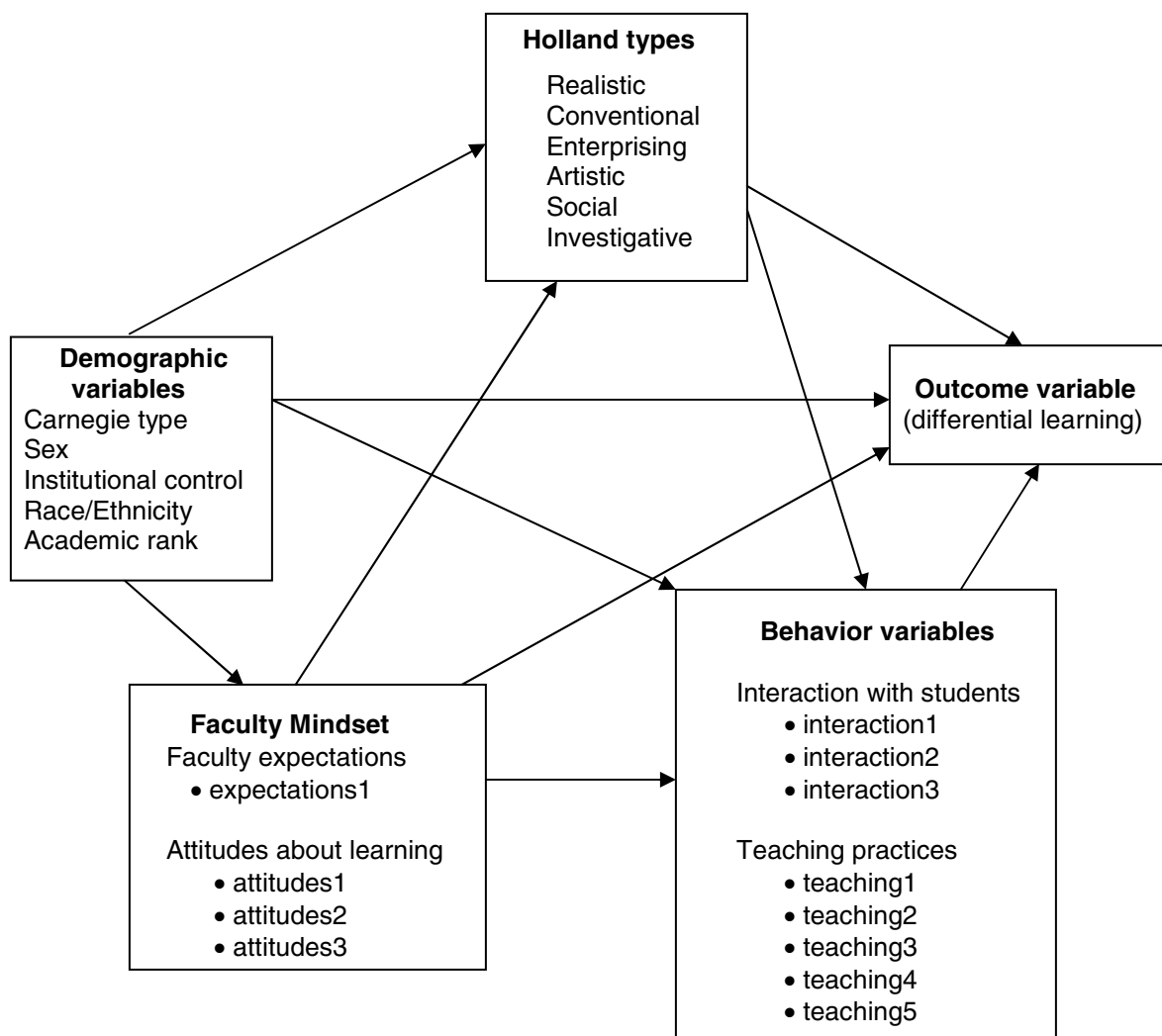


Figure 2. Study variables and path patterns

selected because of the small numbers of faculty groups including African American, Latino, and other faculty populations.

Direct paths leading from demographic exogenous variables to endogenous variables include (renamed) carnegienew to (renamed) expectations1. Similarly, direct paths leading from demographic exogenous variables to endogenous variables include attitudes about learning (renamed) to attitude1, attitude2, and attitude3.

The survey instrument consisted of 28 sets of questions for faculty members. FSSE data were used with permission from the Indiana University Bloomington's Center for Postsecondary Research. A sample of the questions used from the FSSE is shown in Appendix B. According to the FSSE Website (2007), "it [the survey] includes special emphasis on faculty student interaction and undergraduate teaching." Twenty-two of the questions (and their responses) can be categorized into Holland's list of characterization traits of a particular type. For example, one of the survey's beginning questions asks faculty respondents to list the academic major in which they teach. Based on the response to this question, faculty members will be placed in the environmental type that best fits the academic discipline using Holland classification of academic majors.

In addition, Holland produced resources for individuals to determine their career vocation or the classification of an occupation with assistance from Astin (Astin & Holland, 1961), *The environmental assessment technique*; Gottfredson (Holland & Gottfredson, 1994), *The career attitudes and strategy inventory*; and Rosen and Holmberg (1989), *The college majors finder*. In the current research, faculty responses to succeeding questions were matched to traits Holland identified as characteristic of one of the types. For example, the first question asked participants their primary responsibility in their current position. Possible answers included teaching, research, and administration. Faculty answers of members who teach in the natural sciences were compared to those in other disciplines such as social sciences and arts. The obvious reason for this is because natural science faculty members stereotypically are recognized as preferring to conduct research over teaching. The survey uses between 4 – 8 responses for each question.

Statistical Analysis

Next, the researcher applied path analysis in an experimental study on faculty differences. The empirical component of the study used Indiana University Bloomington's Center for Postsecondary Research's 2003 Faculty Survey of Students Engagement (FSSE). This faculty survey has been widely used by institutions and researchers to study faculty practices in higher education. The FSSE Overview (2006) noted: "Over 21,000 faculty members from 130 institutions participated in its most recent 2006 Survey." The Website further stated, "the survey is designed to measure faculty expectations of student engagement ... [and] collects information about how faculty members spend their time related to professional activities and the kinds of learning experiences their institutions emphasizes" (Retrieved 2/4/07, from <http://fsse.iub.edu/pdf/FSSE%202006>). According to FSSE, "its information is intended to be a catalyst for productive discussions related to teaching, learning, and the quality of student's educational experiences" (p. 1). FSSE was selected for the current study because it closely examines faculty teaching practices, faculty-student interaction and, in general, faculty behavior. In addition, this survey best met the needs of this study.

Smart et al. (2000) applied Holland's theory and reported the results in *Academic disciplines*, used as a model text for this study. The current study attempted to duplicate one part of two studies by Smart et al., however, with two exceptions. First, the current study examined the 2003 FSSE, unlike Smart's study (2000) which applied the Carnegie faculty survey. In addition, this study used path analysis recommended by Smart et al. for further study. Thus, the current study was applied to validate and extend the work of Smart et al. using a different population.

This study was based on the empirical test of causal relationships between variables. The outcomes of the study were postulated to result from the differential practices, interactions, expectations, and attitudes of faculty. The statistical type of research often used to study complex social behavior and the one best suited to analyze this problem is structural equation modeling, which is an enhanced form of multiple regressions. Multiple linear regressions are a logical extension of bivariate regression, where multiple predictor variables are used to create a more complete explanation of the one criterion measure (Coughlin, 2005, p. 170).

Path analysis is a form of multiple regressions and the specific statistical procedure within structural equation modeling that was used to conduct this empirical study. Path analysis (Bohrnstedt & Knoke, 1988) is defined as “a method for the analysis of quantitative data which yields empirical estimates of the effects of variables in a hypothesized casual system” (pp. 439-440), and is the appropriate form of structural equation models when all variables in the model are measured directly. The primary reason for selecting this procedure for the present study is that path analysis is generally used when there may be reciprocal relationships between the endogenous and exogenous variables. For example, this study sought to determine if the resulting student learning outcomes are a result of attitudes of faculty members in certain academic disciplines, or if the attitudes of faculty members are a result of the learning outcomes. Answers to this and similar types of questions can be sought through path analysis. Path analysis is used to estimate direct and indirect relationships among all of the variables, with exogenous variables predicting endogenous variables, and endogenous variables predicting other endogenous variables.

The independent or exogenous variables that were used in the study included faculty discipline type and faculty expectations. Additional variables of gender and race were explored. A mediating variable of faculty attitudes was also included. The endogenous or dependent variables were student learning, faculty differences, and faculty discipline behavior. To reduce the numbers of variables, exploratory and confirmatory factor analysis were used as needed. Effort was made to ensure the validity and reliability of the study data; this included guarding against spurious relationships by considering all possibly confounding variables. Finally, SPSS statistical software was used to store and analyze the data, in combination with AMOS software to estimate the structural equation model.

CHAPTER 4. RESULTS

The purpose of this study was to explore the concept that differences in the attitudes, teaching practices, and, in general, behavior of faculty in higher education are a possible cause of differential experiences of college students at four-year colleges and universities. Possible consequences of these differential experiences of college students include student attrition, low achievement, and lower satisfaction with college experiences.

This component of the study entails a statistical path analysis carried out to analyze the results of a faculty survey. This survey was carried out to reveal the attitudes, behavior, and practices of current faculty members. Before revealing the results of the study, a re-introduction of the study's research questions is necessary. The results of the study addressed these four research questions:

1. Are there statistically significant differences among college faculty members in quality of faculty-student interaction, faculty expectations of students, faculty teaching practices, and members' attitudes about learning, based on their disciplinary areas as defined by Holland? Light (1974, as cited in Smart et al., 2000) stated: "the profession of college faculty should be looked on as several professions instead of one" (p. 8).
2. Are these differences in faculty practices and attitudes attributable to outliers among faculty responses or isolated to specific disciplines?
3. Will the results of the study support the traditional views of the existence of distinct types of faculty mindsets? For example, will the results reveal that faculty in the natural sciences are interested primarily in conducting research, while social science

- professors are interested primarily in the personal development of their students, and that art professors are interested primarily in the creative development of their students?
4. How consistent will the differences in the practices and attitudes of faculty members be when controlling for the type of institutions in which they work (i.e., four-year public institutions versus four-year private ones or Carnegie type)?

Recoding

A total of 18 variables were measured in the study. Three of the five demographic were exogenous or independent variables: (a) sex, (b) race/ethnicity, and (c) academic rank of faculty. The remaining two exogenous variables were (a) institutional control, and (b) Carnegie type of institution where faculty members taught. All five of the variable responses were recoded (renamed) to provide the study with answer choices of 0 and 1, or 1 and 2. This process is beneficial for the study's purposes because it simplifies empirical studies giving respondents a choice of "either – or," and it works best when using the SPSS and AMOS software packages applied in this research.

The demographic variables were the first group of variables recoded: (a) sex of faculty to "sexnew" with answer choices of 1 = male, and 2 = female. The race and ethnicity of faculty was coded "race2" with non-majority or faculty of color identified as "1" and white faculty as "2." The distinction of faculty by majority and minority statuses was used to observe if faculty respondents had a consistent profile. Because minority faculty respondents by individual racial groups were so small, all faculty of color were collapsed into a single group. Faculty rank was similarly coded with lecturers, assistant professors, associate

professors, and full professors categorized as “2”, whereas the remaining teaching assistants (TAs) as “1.” This distinction was created to distinguish the responses of permanent faculty member from those of temporary members such as teaching assistants (TAs). Institutional control was another variable devised to identify faculty from public versus private institutions, with “control” as 1 = public and 2 = private. Finally, faculty member’s institution’s Carnegie type was included to enable viewers to distinguish the type of institution where the respondents were faculty. This type was renamed to “carnegienew”, with response choices 2 = “low research pressure,” and 1 = “high research pressure.” Institutions classified as “high research pressure” represented universities that were categorized by the Carnegie classification as either “research intensive” or “research extensive.” The remaining liberal arts and public institutions were coded “low research pressure.” Although certainly both of the latter types contain their share of research being conducted, the amount of research emphasis was determined to be more similar among the decided sets. To compare faculty responses from faculty of similar institutions only faculty members from four-year institutions were included in the study. A total of 2,890 faculty members participated in the study.

Twelve additional variables and a Holland environment (disciplinary) pairing identified different sequences to measure the variables. A total of 18 variables were measured. According to path analysis design, variables flowed directly and indirectly to other variables in a left to right manner (see Figure 2). These variables were factors representing groups of questions for the study. One section examined faculty mindset, and included faculty members’ attitudes about learning, which contained three factors, and faculty expectations, which contained one factor. Factors under the variable “attitudes about

learning” asked respondents (faculty) how they felt their students learned best. Topics for this variable were faculty preferences of traditional liberal arts education, technical education, challenging students to think critically and analytically.

Behavior variables were divided into two sections that explored faculty behavior, with two factorial groups “faculty teaching practices” and “faculty interaction with students.” Teaching practices were comprised of factors “lecture versus small groups,” and “memorization versus applying theories and concepts.” The second part on faculty behavior examined faculty views on faculty-student interaction.

The final variable comprised Holland’s six environments (disciplines), in which participating faculty members were asked to identify the general area of the course they teach. The response to this question was used to categorize members according to Holland’s theory of careers. *The college major finder* (Rosen, Holmberg, & Holland, 1989) was used to determine classification of faculty courses. Responses of faculty members whose course was not listed in the *College major finder*, such as gender studies, were removed from the study. Remaining faculty participants were classified into one of the six Holland environment types: Realistic (R), Investigative (I), Social (S), Artistic (A), Enterprising (E), and Conventional (C). The following list of Holland environments (disciplinary area) and undergraduate majors listed among the environments were taken from *The college major finder*: “Realistic (R) – Disciplines of Industrial, vocational education; Investigative (I) –Biology, chemistry, medicine and most engineering courses; Artistic (A) – Art, music and theater; Social (S) – Social sciences, history, education, and nursing; Enterprising – Business administration, law, and communication; Conventional (C) – Accounting and office management” (Rosen et al., 1989, pp. 14-21).

Results from the Path Analysis

Responses were divided by sectional topics to provide the reader with clarity for viewing. A total of 2,890 faculty responded to the entire survey, although each question incurred missing answers. [Results of the survey were grouped in categories of the number of responses as: 1 = 0%; 2 = 1–24%; 3 = 25–49%; 4 = 50–74%; and 5 = 75% or higher.]

Results recorded were the number of respondents n , mean score M , and standard deviation SD . Estimated scores and the path coefficients were also identified to reveal the strength of correlation and whether the direction was negative or positive to determine the direction of its effect. The p value of the path was used to indicate statistical significance, which was quantified as $p \leq .05$; the strongest confidence recognized was quantified as $p < .001$. For the purpose of brevity, only primarily paths displaying “statistical significance” were included, with the exception of faculty expectation because it had only one factor. Similar results for other factors were included in the results depending on their importance to the study. Appendix C lists the results of the path analysis.

Faculty expectations

The first variable in the study was faculty expectations. Because expectations consisted of only one factor, unlike the others which contained three to five factors, all of its path effects are included. The single faculty expectation asked respondents: “What percent of students in your selected course do the following: work harder than they usually do to meet your standards” represented this factor.”

Expectations1

Out of a possible 2,890 respondents participating in the survey, 2,776 answered this question with 114 missing ($m = 3.11$; $SD = 1.028$). Renamed to expectation1, results varied more across the six environmental (disciplinary) types than most other factors. Estimated scores for expectation1 were similarly low, from .005 to .009 for all six Holland types. Investigative and Social faculty types exhibited high scores of .009, whereas Realistic and Conventional types had lower scores of .005. For the factor expectation1, only one Holland type, Conventional, was statistically significant. Correlations with expectation1 were evenly split among Holland types, with three positive and three negative. Nevertheless, scores were low and the correlation was minimal for each Holland type.

Controls placed for Carnegie type, sex, race, control, and faculty rank produced higher scores, although they were still not significant. Carnegie scores had negative correlations with expectation1, which indicate the faculty responding were more likely to be from institutions with a low emphasis on research. A second control, sex of faculty member, had positive correlations with this factor, which indicate that female faculty members were more likely to hold this value. Other controls measured the rank and race of the faculty with expectation1. Positive correlations with regards to faculty rank were negative for race, indicating the respondents were likely to be regular faculty members as opposed to TAs and of non-majority race.

A control for type of institution faculty respondents yielded similar results. There were weak estimates for each faculty group and scores were negatively correlated ($-.011$), revealing faculty responding to this factor more likely to be from public institutions. The control for race yielded similar results, with small variations across Holland types from .102

to .105. Their negative correlation revealed faculty holding this expectation were more likely to be faculty of color.

Faculty/student interaction

The level of faculty-student interaction was an area of the study of interest to the researcher, particularly outside of the classroom. Partly this was the opportunity to observe whether the stereotypical natural science or in this case the “Investigative” faculty member would display little personal interest in students in comparison to faculty from other discipline groups “thought to be more people friendly,” such as faculty members of Social disciplines. Measurement of student interaction consisted of three interaction factors. The first interaction effect was identified as interaction1, which asked faculty members “What percent of students in your selected course do the following use e-mail to communicate with you, discuss grades, and discuss ideas from class.”

Interaction1

Interaction1 consisted of four questions from which responses varied greatly. Of a total of 2,890, approximately 20 answers were missing, with a total 2,870 usable responses ($M = 2.74$; $SD = 1.052$). Estimate scores for interaction1 across all six Holland types also varied. Artistic and Enterprising faculty had the lowest scores at .017 and .97, respectively. Investigative faculty had the highest estimate at .236, and the other three type scores were between .146 and .168. Three Investigative, Social, and Enterprising were statistically significant; the first two at the $p = <.001$ level. The others were not statistically significant, with $p = .642$ for Artistic faculty, which was opposite the others. Conventional and Investigative faculty groups were the only ones that were negatively correlated with

interaction1. Positive correlations with interaction1 for the others indicate that an increase in interaction1 behavior corresponds to an increase in faculty displaying traits of faculty from Social, Enterprising, Artistic, and Realistic groups. Controls placed for interaction1 across the Holland faculty types yielded a consistent profile. Faculty engaged in this type of student interaction were likely to be from low research pressure institutions, public institutions, female faculty members, lower rank such as TAs, and from the non-majority faculty population.

Interaction2

Interaction2 looked at non-classroom interaction, in which faculty respondents were asked about “the amount of time per week they spend ... advising undergraduates, supervising internships and field experiences, and working with students in non-course work activities outside of class.” This line of inquiry received fewer responses than the others. Approximately 176 of 2,890 responses were missing from each question, resulting in 2,714 usable responses per question ($M = 176$; $SD = 1.5$). Much like the first interaction, there was great variation among estimate scores. Enterprising and Realistic groups had the lowest scores of .048 and .051, respectively. Artistic, and Investigative had middle-range scores of .126 and .133, respectively, whereas Conventional and Social faculty had the highest estimates of .155 and .233, respectively. Social, Investigative and Artistic were statistically significant ($p < .001$), indicating the highest probability of accuracy for this score. Social and Enterprising were the only groups with positive correlations. Positive correlations with interaction2 for Social and Enterprising faculty indicate that an increase in interaction2

behavior corresponds to an increase in faculty displaying traits characteristic of these faculty groups.

Controls for interaction2 were equally revealing. Correlations for Carnegie type were negative, indicating a correlation with low research pressure, and private institutions. The remaining faculty profile for interaction2 across Holland types included regular professors rather than TAs, and female, non-majority race faculty.

Interaction3

Interaction3 varied more than the first two interaction effects. Interaction3 focused on solely student interaction for research purposes. Missing answers to these two items averaged 172, resulting in 2,818 of 2,890 responses ($M = 193$; $SD = 1.5$). Social and Realistic faculty had the lowest scores .079 and .114, respectively. Next, Artistic and Enterprising had estimates of .161 and .223, respectively. Finally, Investigative and Conventional had the highest scores at .366 and .444, respectively. Further substantiating the scores, four of the six Holland types were statistically significant at $p < .0001$. Social types were statistically significant ($p \leq .05$). Realistic types were the only types that were not statistically significant. Investigative faculty was the sole group with a positive correlation to interaction3, which indicates that an increase in interaction3 behavior corresponds to an increase in faculty displaying traits characteristic of Investigative faculty groups.

Carnegie and institutional control with interaction3 across all Holland types were positive, favoring faculty at private and high research pressure institutions. Results for controls for race, sex, and rank revealed a positive relationship with non-majority, female, and lower faculty members such as TAs.

Teaching practices

Measurements of the path of teaching practices and Holland type yielded an even greater variation in estimates. The purpose of this set of factors was to reveal the teaching practices of faculty by Holland group. Five paths examining teaching practices comprised this second part of “behavior variables.”

Teaching1

This factor explored traditional teaching practices. A total of six questions asked faculty members: “What percent of class time is spent on the following lecture, teacher-led discussion, and in-class writing, individual presentations, and small group activities?”

The faculty groups varied widely for this first teaching variable. An average of 125 out of 2,890 responses were missing, resulting in 2,765 responses ($M = 3.03$; $SD = 1.655$). Faculty groups who were Enterprising and Realistic had low scores of .026 and .080, respectively. Next were middle-range scores of Social and Artistic faculty .150 and .186, respectively. Conventional and Investigative faculty had the highest scores .243 and .260, respectively. Investigative, Social, Artistic, and Conventional faculty had statistically significant p values. The first three of four p values were very low, $p < .001$. The p values of Realistic and Enterprising were .284 and .478, respectively. Investigative, Conventional, and Realistic faculty had negative correlations with teaching1. Social, Artistic, and Enterprising faculty had positive correlations with teaching1, indicating that an increase occurs with the factor teaching1, which corresponds to an increase in faculty groups displaying traits characteristic of Social, Artistic, and Enterprising Holland types.

Controls were placed for the teaching1 variable across Holland faculty types. A negative correlation with Carnegie type and institutional control indicates an increase with this variable favors faculty at low research pressure and public institutions. Teaching1 also correlates positively with female, non-majority race, and lower-ranked faculty such as TAs.

Teaching2

The second teaching factor if diversity was instilled in the teaching practices of faculty. Three items asked the question, “How often do you engage in the following: have serious conversations, class discussions and writing assignments that included diverse perspectives.” An average of 54 out of 2,890 responses were missing resulting in a total of 2,836 usable responses ($M = 2.28$; $SD = .994$). Estimated scores for teaching2 covered a wide range. The lowest scores were for Enterprising faculty (.035) and Artistic faculty (.173). Middle-range scores were for Investigative faculty (.350), Realistic faculty (.376), and Social faculty (.394). Conventional faculty had the highest estimate score .731. All faculty types had p values that were statistically significant, except for Enterprising faculty whose p value was .397. Social and Artistic faculty had positive correlations with teaching2, indicating an increase in teaching2 practices corresponds to an increase in faculty types displaying traits characteristic of Social and Artistic faculty types.

Controls for teaching2 faculty were also placed across Holland faculty types. Results indicated an increase in the teaching2 factor means an increase for faculty at low research pressure and public institutions. This also corresponds to an increase with female, non-majority, and TAs instead of regular faculty.

Teaching3

Teaching3 asked faculty: “How much emphasis did they place on engaging students in cognitive activities: synthesize and analyze information, analyze the basic elements of an idea, making judgments, and apply theories or concepts?”

An average of 149 of 2,980 responses were missing from the questions, resulting in 2,741 usable responses ($M = 3.19$; $SD = 4$). Estimated scores covered a wide range.

Enterprising and Artistic faculty had the lowest scores, .012 and .026, respectively. Realistic and Investigative faculty had middle-range scores .058 and .122, respectively, whereas Social and Conventional faculty had the highest estimates, .182 and .265, respectively. The p values for Investigative, Social, and Conventional faculty were statistically significant. Social, Realistic, and Enterprising faculty had positive correlations with teaching3 indicating that as teaching3 increased, faculty groups displaying traits characteristic of Social, Realistic, and Enterprising will also increase.

Controls were placed for each Holland faculty group for the factor teaching3. Results for institutional control and Carnegie type indicate an increase in teaching3, corresponds to an increase for faculty at low research pressure and public institutions. Additional controls with teaching3 reveal increases with teaching3 correlates to increases for faculty who are female, non-majority, and higher ranked than TAs.

Teaching4

Teaching4 focused on small group experiences in class. Questions from this factor were “How often do students in your selected class engage in small group activities such as

experiments with lab partners, small group class projects, and community-based learning projects...”

The missing total for this factor averaged 67 of 2,890, resulting in a total of 2,823 usable responses ($M = 2.21$; $SD = 1.332$). Estimates for Enterprising and Investigative faculty had low scores .011 and .038, respectively. Middle-range scores were: Social faculty (.203), Artistic faculty (.243), and Realistic faculty (.299). Conventional faculty had the highest estimate .398. Investigative and Enterprising faculty had p values .314 and .815, respectively. The other four faculty groups had p values that were statistically significant. Finally, Social, Realistic, and Enterprising faculty had positive correlations with teaching4, indicating that, as teaching4 practices increase, so would faculty groups displaying traits characteristic of Social, Realistic, and Enterprising.

Controls for teaching4 were placed for all Holland faculty groups. Teaching4 correlates in a positive manner with faculty at low research pressure and private institutions. Faculty members corresponding positively with teaching2 were: female, non-majority race, and lower rank faculty such as TAs.

Teaching5

The last teaching factor asked respondents: “What percent of class time is spent on: computer-mediated activity; [percent of class time...] on teaching undergraduate students?” A third question asked: “How much emphasis faculty placed on students memorizing facts?”

Teaching5 had a wide range of responses. An average of 150 of 2,890 responses were missing, leaving 2,740 usable responses ($M = 2.52$; $SD = 1.181$). The lowest estimated scores were for Artistic faculty (.014), Investigative faculty (.019), and Realistic faculty (.045).

Middle-range scores for this section were for Social faculty (.157) and Enterprising faculty (.180). Conventional faculty had the highest estimate .398. Three faculty types—Enterprising, Conventional, and Social—had p values that were statistically significant whereas the others were not. Artistic, Conventional, Enterprising, and Investigative faculty had positive correlations with teaching5, indicating an increase in teaching5 practices corresponds to an increase in faculty groups whose traits are characteristic of these faculty types.

Controls were placed for all Holland types with the teaching5 factor, revealing positive correlations with low research pressure and private institutions. In addition, teaching5 corresponds positively to female, non-majority race, and TA-type faculty.

Attitudes about learning

Directly related to teaching were faculty members' attitude about learning. Faculty attitudes formed the second part of the variable set "faculty mindset."

Attitude1

For this factor, there was an average of 154 of 2,890 responses missing, leaving a number of 2,736 usable responses ($M = 2.531$, $SD 1.082$). Faculty groups with the lowest estimates were Conventional faculty with estimates .025, and Realistic faculty with estimates of .030. Faculty groups in the middle range were Enterprising and Social with estimates .095 and .130, respectively. Highest estimates were for Investigative (.144) and Artistic (.157). All six faculty types were statistically significant ($p = < .001$). Only Social and Artistic faculty had a positive correlation for attitude1, indicating an increase in attitude1 corresponds with an increase for faculty who display traits characteristic of Social and Artistic faculty groups.

Controls were placed for all six Holland faculty groups in conjunction with attitude1. Results indicated institutions with positive correlations for attitude1 are public institutions with low research pressure. Faculty members from all six Holland types who increase in attitude1 correlate to male, non-majority, and low-ranked faculty such as TAs.

Attitude2

Attitude2 focused on technical and practical education and asked respondents: “To what extent do [you] structure their course so students learn and develop in ... areas: using computer, job and work-related knowledge, solving complex problems and working with others.” Four questions were employed for this factor. Of a total of 2,980 responses, an average of 148 were missing, leaving a number of 2,742 usable responses ($M = 2.66$; $SD = 1.037$). The lowest estimates for attitude2 were for Social (.009) and Conventional (.015). Middle-range estimates were for Investigative (.034) and Realistic (.038), whereas the highest estimates were for Enterprising (.149) and Artistic (.168). The p values for five of the six faculty groups statistically significant. The p value for social was the only one not statistically significant. For attitude2, Realistic, Conventional, and Enterprising had a positive correlation, indicating increases in attitude2 practices correspond with an increase for faculty groups displaying traits characteristic of Realistic, Conventional, and Enterprising.

Controls were placed for attitude2 for all six Holland faculty groups. For attitude2, institutions correlating positively with this factor were low research pressure and public institutions. In addition, faculty members, themselves, with positive correlations with attitude2 were female, teaching assistants, and of non-majority race.

Attitude3

The final attitude factor consisted of three questions that focused on measuring cognitive skills: “to what extent do [you] structure [your] course so students learn and develop in ... areas: thinking critically analytically, learning effectively on their own.” A second question asked faculty “to mark the box that represents the extent...challenge students to do their best work.”

Of a total of 2,980, the average number of missing responses for attitude3 was 133, leaving a total of 2,757 usable responses ($M = 4.15$; $SD = .820$). The lowest mean estimates were for Realistic (.001) and Conventional faculty (.003). Both Enterprising and Investigative had middle-range estimates .010. The highest estimates were for Social (.015) and Artistic (.020). No faculty group had statistically significant p values. The lowest value was for Artistic faculty ($p = .089$), followed by Social ($p = .247$), Enterprising ($p = .328$), Conventional ($p = .347$), and Investigative ($p = .479$). The highest value was for Realistic faculty ($p = .904$). Only Realistic and Social had positive correlations with attitude3, indicating an increase in attitude3 corresponds to an increase in faculty demonstrating traits characteristic of Realistic and Social Holland types.

Controls were placed for the faculty groups with attitude3. Results indicated institutions with positive correlations with attitude3 were low research pressure and public. Faculty members with positive correlations with attitude3 were female, lecturers, and of non-majority race.

Results Based on the Research Questions

This section addresses the research questions. These questions are fundamental to the study and formed the basis for gathering data. The results are based on the path analysis empirical component of the study. Table 2 provides a summary of the Holland types and endogenous variables for statistically significant interrelationships. The sample survey questions from the FSSE questions are found in Appendix B. The complete statistical results of the path analysis are included in Appendix C.

Research Question 1: Are there statistically significant differences among college faculty members in quality of faculty-student interaction, faculty expectations of students, faculty teaching practices, and members' attitudes about learning, based on their disciplinary areas as defined by Holland? Light (1974, as cited in Smart et al., 2000) stated: "the profession of college faculty should be looked on as several professions instead of one" (p. 8).

To answer research question 1, there were significant differences among the Holland environments. Specific factors, such as attitude1 and attitude2, support this result. The average number of positive correlations of the six environments was three, which also supports this result. Nevertheless, are the results statistically significant for each variable? The answer is no. First, among the 12 variables, a number of factors had statistically significant scores. Second, there was a large amount of variation and correlation depending on environment type. The findings are discussed further according to the path analysis.

Quality of faculty-student interaction

Results of the study indicate that there are significant differences across Holland environments (disciplines) that pertain to the quality of faculty-student interaction. These differences and the extent of the differences vary among the three interaction factors and across the six disciplinary groups. Interaction1, which consisted of faculty inquiries about

Table 2. Summary of results for statistically significant Holland types and endogenous variables by FSSE question

FSSE survey question	Holland type					
	Realistic	Investigative	Artistic	Social	Enterprising	Conventional
Interaction1		<.001(-)		<.001(+)	.017*(+)	
2. About what percent of students in your course do the following						
a. Frequently ask questions in class or contribute to class discussion						
b. Use e-mail to communicate with you						
c. Discuss grades or assignments with you						
d. Talk about career plans with you						
e. Discuss ideas from readings or classes with you outside of class						
Interaction2		<.001(-)	<.001(+)	<.001(+)		
8. About how many hours do you spend in a typical seven-day week doing each of the following:						
b. Advising undergraduate students						
d. Supervising internships or other field experiences						
e. Working with students on activities other than coursework						
9. Other interactions with students outside of the classroom						
Interaction3		<.001(+)	<.001(+)	.040*(-)	<.001(-)	<.001(-)
8. About how many hours do you spend in a typical seven-day week doing each of the following:						
c. Working with undergraduates on research						
16. How important is it to you that undergraduates at your institution have the following experiences?						
a. Work on a research project with you outside of course program requirements.						
Expectation1						.027*(+)
2. About what percent of students in your course do the following						
f. Work harder than they usually do to meet your standards						
Teaching1		<.001(-)	<.001(+)	<.001(+)		.025*(-)
4. In your selected course, on average, what percent of class time is spent on the following?						
a. Ask questions in class or contribute to class discussions.						
b. Lecture						
c. Teacher-led discussion						
d. Teacher-student shared responsibility						
f. Small-group activities						
g. Student presentations						
h. In-class writing						

Table 1. (Continued).

FSSE survey question	Holland environment (type)					
	Realistic	Investigative	Artistic	Social	Enterprising	Conventional
Teaching2	<.001(-)	<.001(-)	<.001(+)	<.001(+)		<.001(-)
3. How often do students in your selected course engage in the following:						
a. Have class discussions or write assignments that include diverse perspectives						
d. Have serious conversations in your course with students of a different race or ethnicity than their own						
e. Have serious conversations in your course with students who are very different from them in terms of their religious beliefs, political opinions, and personal values						
Teaching3		<.001(-)		<.001(+)		.006*(-)
6. How much emphasis do you place on engaging students in each of these cognitive activities						
b. Analyzing the basic elements of an idea, experience or theory such as examining a particular case or situation in depth and considering its components						
c. Synthesizing and organizing ideas, information, or experiences into new, more complex interpretations and relationships						
d. Making judgments about the value of information, arguments or methods such as examining how others gathered and interpreted data and assessing the soundness of their conclusion						
e. Applying theories or concepts to practical problems or in new situations						
Teaching4	.002*(+)		<.001(-)	<.001(+)		.005*(-)
3. How often do students in your selected course engage in the following:						
b. Work with other students on projects during class						
c. Participate in a community-based project as part of your course						
4. In your selected course, on average, what percent of class time is spent on the following						
j. Experiential (labs, fieldwork, etc.)						
Teaching5				<.001(-)	<.001(+)	.005*(+)
4. In your selected course, on average, what percent of class time is spent on the following:						
e. Computer-mediated activities						

Table 1. (Continued).

FSSE survey question	Holland environment (type)					
	Realistic	Investigative	Artistic	Social	Enterprising	Conventional
8. About how many hours do you spend in a typical seven-day week doing each of the following: a. Teaching undergraduate students in class						
6. How much emphasis do you place on engaging students in each of these cognitive activities a. Memorizing facts, ideas, or methods from your course and readings so students can repeat them, pretty much in the same form						
Attitude1	<.001(-)	<.001(-)	<.001(+)	<.001(+)	<.001(-)	<.001*(-)
7. To what extent do you structure your selected course so that students learn and develop in the following areas a. Acquiring a broad general education c. Writing clearly and effectively d. Speaking clearly and effectively f. Analyzing quantitative problems j. Understanding themselves k. Understanding people of other racial and ethnic backgrounds						
Attitude2	<.001(+)	.007*(-)	<.001(-)		<.001(+)	<.001(+)
7. To what extent do you structure your selected course so that students learn and develop in the following areas: b. Acquiring a job or work-related knowledge and skills g. Using computing and information technology h. Working effectively with others l. Solving complex real-world problems						
Attitude3						
5. Mark the box that represents the extent to which your evaluations of student performance challenge students in your selected course to do their best work.						
7. To what extent do you structure your selected course so that students learn and develop in the following areas: e. Thinking critically and analytically i. Learning effectively on their own						

Level of Significance: * $p \leq .05$; ** $p < .001$; see Appendix C for complete list of FSSE questions.

faculty-students interaction both in-class and out, revealed statistically significant differences for three disciplinary groups: Investigative, Social, and Enterprising. Investigative and Social were significant even at the level $p < .001$. Investigative had a negative correlation which indicates interaction1 is aversive to its (Investigative) majors. Although close to the guidelines for significance .054, Realistic still fell short. Conventional was not only significant but it also had a negative correlation. Artistic had a p value .642. In response to the first research question, there were differences among the academic groups for this first interaction factor.

For the second factor, interaction2, the results contained substantial differences. First, three disciplinary groups—Social, Investigative, and Artistic—had statistically significant scores ($p < .001$). The remaining groups had scores of approximately 200 or above. In addition, among the six disciplinary groups, only Social had a positive correlation to interaction2. Interaction2 addressed only faulty-student interaction out of the classroom and, for the most part, the topic of interaction was not about class work. This factor revealed the greatest variation among the three interaction observations.

The last interaction, interaction3, surveyed faculty about their interaction for research purposes. Five of six disciplinary types had statistically significant scores; only the realistic score was not statistically significant. Interestingly, five of the six disciplinary types matched well to this type—Investigative, whose majors often are research-oriented. Overall, faculty-student interaction revealed major differences across disciplinary groups. Social disciplines are conducive for faculty/student interaction except when the interaction is for the purpose of conducting research. In the case of interaction for research purposes, Interaction3, Social faculty had a negative correlation. On the other hand, Investigative faculty had a negative

correlation with the first two interaction factors, and a positive one with interaction3- interaction for the purpose of conducting research. In the other disciplinary environments, each had its own degree of variation in relation to faculty-student interaction.

Faculty expectations

The variable faculty expectations, with just a single factor, contained the fewest factors among exogenous variables. Inquiry along the lines of expectations asked faculty, “What percent of the following work harder than they usually do to meet your standards?” Response to this factor also showed statistically significant differences. First, only faculty from conventional disciplines had scores that indicated significant differences. Second, correlations for the variable expectations were evenly divided; investigative, artistic, and conventional disciplines had a positive correlation with faculty expectations whereas the others did not. This observation supports the notion that there is significance for expectations¹.

Faculty teaching practices

Teaching practices of faculty across Holland discipline groups also revealed differences that were often statistically significant. The first teaching factor examined traditional teaching practices such as lecture, teacher-led discussion, and in-class writing. Only Realistic and Enterprising disciplines were not statistically significantly related to this factor. Even more important, half of the six—Realistic, Investigative, and Conventional—had negative correlations. The remaining Social, Enterprising, and Artistic disciplinary types correlated positively with this teaching factor. Teaching² addressed diversity of perspective in teaching. Only Enterprising disciplines were not statistically significant. Four out of the

six disciplines types had negative correlations, leaving only Social and Artistic, which positively correlated to the topic of diversity in the classroom. Teaching3, which introduced analyzing, synthesizing, and critical thinking, had only two that were statistically significant. This factor also had evenly-divided correlations. Only faculty from Social, Enterprising, and Realistic majors supported using these more advanced teaching practices and half of the six were evenly divided regarding correlations (i.e., Social, Enterprising, and Realistic disciplines had positive correlations). Teaching4, which introduced small groups teaching practices, also revealed variation among Holland types. Faculty scores from five Holland types were statistically significant. Only enterprising faculty was not statistically significant. Social, Enterprising, and Realistic groups had positive correlations.

Teaching 5, the final teaching factor, which examined a variety of teaching practices, was equally diverse. Three were statistically significant, and four had positive correlations. Realistic and Social had negative correlations to teaching5. Similar to faculty expectations, teaching practices consisted of obvious differences along the lines of Holland environments, with almost an even distribution of statistically significant observations and correlations.

Attitudes about learning

Faculty attitudes about learning were more consistent than the previous variables when combined solely with Holland type. Attitude1 provides a good example. It addresses learning values commonly found in liberal arts education such as writing and speaking clearly, and understanding people of other races. All six Holland environments were statistically significant ($p < .001$). Artistic and social were the only academic groups of the six with positive correlations. Attitude2 emphasized technical and practical education, in

which five of the six discipline areas were statistically significant. Only Social environments were not statistically significant. In terms of correlation, the academic groups were evenly divided. Realistic, Enterprising, and Conventional had positive correlations for this factor. The third factor, “challenging students,” varied more than the previous two factors in this group. None were statistically significant across the six discipline areas. Two were positively correlated: Social and Artistic. Results of these observations on faculty attitude about learning across Holland environments (discipline) varied by discipline group and specific attitude type. Social and often Artistic disciplines consistently correlated differently from the other four faculty types regarding attitude.

Research Question 2: Are these differences in faculty practices and attitudes attributable to outliers among faculty responses or isolated to specific disciplines?

To answer research question 2, the results appear to be inconclusive whether faculty practices and attitudes attributable to outliers can be isolated to specific disciplines. The findings are discussed related to Social and Investigative types.

At times social and Investigative environments appear to be outliers. The results of the two environments at times appear to be diametrically opposed to one another. Most stereotypes recognize Social disciplines such as history and social work as “people-oriented” and Investigative majors such as biology and chemistry as “research-oriented.” As indicated in the review of the literature, historically scholars such as Snow (1959, p. 4) originally referred to disciplines as the sciences and writers. As the results in this study revealed, many of the other disciplinary areas fall somewhere in natural science and history; in this case it is between investigative and social. To some degree, and in several cases, Social and Investigative acted as outliers.

Research Question 3: Will the results of the study support traditional views of the existence of distinct types of faculty mindsets? For example, will the results reveal faculty in the natural sciences are primarily interested in conducting research, while social science professors are primarily interested in the personal development of their students, and that faculty in the arts professions are primarily interested in the creative development of their students?

To answer research question 3, there were significant differences among the Holland faculty types. The results and findings are discussed related to endogenous variables: attitudes, interactions, and teaching.

For many of the observations, especially in the instances of strictly Holland environments and one of the endogenous variables, results support the traditional views of distinct types of faculty mindsets. For example, regarding faculty-student interaction, Social types were consistently statistically significant and with positive correlations, except for interaction³ which was for the purpose of conducting research. Whereas the first two interactions addressed faculty/student interaction in and out of class, the third interaction focused exclusively on interaction for the purpose of conducting research. The results of the latter reveal Investigative type faculty interact specifically for research purposes, and avoid tradition faculty-student interaction that occurs in most classroom settings.

Among the attitudes about learning for two of the three factors, Social types had positive correlations. Regarding the teaching practices, Social disciplines had positive correlations for all five teaching practices. Artistic types had positive correlations for one of the first two interaction factors. Similar to Social types for faculty-student interaction, Artistic groups had a negative correlation for the purpose of conducting research. For attitudes about learning, Artistic types had factors statistically significant and two with positive correlations. Artistic also had positive correlations for three of the five factors for teaching practices.

On the other hand, none of the three factors on faculty-student interaction had a positive correlation, with the exception of interaction3—for the purpose of conducting research had negative correlations for interactions1 and 2. Regarding attitudes about learning, only one of the three factors (attitude1) revealed statistical significance for Investigative, yet none of the three factors had a positive correlation. Finally, Investigative faculty was statically significant for three of the five teaching factors (teaching1, 2, & 3), and four of the same five factors Investigative types had negative correlations (whereas teaching5 had a positive correlation).

Research Question 4: How consistent will the differences in the practices and attitudes of faculty members be when controlling for the type of institutions in which they work (i.e., four-year public institutions versus four-year private ones or Carnegie type)?

To answer research question 4, there were significant differences among the Holland faculty types. The results and findings are discussed related to exogenous variables: institutional control and Carnegie type.

When controlling for public versus private institutions, differences in the practices and attitudes of faculty are observable among the estimates of teaching or attitudes variables. When using a control, one would expect the numbers to decrease since the population has been reduced. For example, the population for the study was faculty at universities. If a control is placed for institution type, the previous population will be reduced to professors at private or public colleges. In either case, some of the previous choices have been removed. For this study, the factor and Holland type often had a specific estimate for the observation. Next, after placing a control for Carnegie type, the estimate was reduced and generally varied from greater or lesser than the original value. Later, when controlling for institutional control

(control) the previous number was further reduced and varied from greater or lesser than the original value. In some cases, the percentages varied from $\frac{1}{3}$ to more than $\frac{1}{2}$ of the original number. For example, attitude1, Investigative, had an estimate of $-.144$. When controlling for Carnegie type, this estimate decreased to $-.085$, and, when controlling for institutional control, that estimate further decreased to $.008$. After placing in a control for institutional control, the estimate further diminished to $-.009$. Of course, if controls were placed in the opposite order, with institutional control first and then Carnegie type, there would be a greater directional variation of the estimate numbers.

In another example, for attitude1, Artistic had an estimate score of $.157$. With a Carnegie control, the estimate decreased to $-.083$. With institutional control, the estimate further reduced to $-.008$. In some cases the reverse happens where the controls actually increase the estimate. One example for Enterprising, attitude1, demonstrates a case in this study. The estimate for teaching1, Enterprising, was $-.026$. When placing a control for Carnegie type, the estimate decreased to $-.124$. When placing institution control, the estimate further diminished to $-.048$.

One final note, placing controls can also affect the correlation of the factor. This is because the correlation changes from the Holland type and the variable, to the variable's correlation to the new variable. In the case of attitude1, Social, either control changed its positive correlation to a negative one. Its estimate was $.130$. After controlling for Carnegie type, its estimate decreased to $-.084$, and after placing institutional control, it diminished further, to $-.009$.

Findings

The purpose of this study was to explore whether the concept that differences in the attitudes, teaching practices, and, in general, behavior of faculty in higher education are a possible cause of differential experiences of college students at four-year colleges and universities. Possible consequences of these differential experiences of college students include student attrition, low achievement, and lower satisfaction with college experiences. In addition to a review of recent literature on the topic of faculty differences in higher education, an empirical study was conducted to explore the notion of students having differential collegiate experiences because of the differences among faculty across academic disciplines in the way faculty teach, their level of interaction with students, and in their general attitudes about how students learn. The following section provides a summary of the results of the findings and compares the results with related literature on the study of faculty differences in higher education.

An examination of faculty teaching practices to this point has been a blend of the more recent studies such as that of Smart et al. (2000) who examined a survey of different dataset (from the one used in this study) and the common stereotypical beliefs of respective members of faculty. Smart and others concluded that faculty in Realistic and Investigative disciplines were more oriented than their colleagues in other academic environments toward student achievement of career-related, a priori goals and student acquisition of specific skills and credentials (Achievement scale). Faculty preferred more formal and structured teaching-learning arrangements and felt that students learn best by meeting specific, clear-cut requirements (Assignments Learning scale). Smart and others also recognized that faculty in these disciplines placed a high value on grades and examinations (Assessment scale) (p. 84).

The overarching goal for faculty within these academic majors, especially those in the natural science fields, was to prepare students for graduate school and, later, to seek careers in higher education research.

Common stereotypes are that natural science faculty members provide a very traditional lecture teaching format with clear expectations. Their classes typically are information-driven and presented to large classes in even larger auditoriums. This has been such a tradition in science departments that science students have come to expect it and many are comfortable with this style of teaching.

On the other side of the spectrum of teaching faculty, are those who teach in fields such as history, social sciences, and art. Smart et al. (2000) summarized their results for this group of faculty members:

Faculty in these departments scored low in traditional teaching methods and with clear-cut objectives. They preferred more informal, unstructured teaching-learning arrangements in which students set their own goals and pursue their own interests. They place a high value on student freedom and independence in the learning process and believe that students do their best work when they are on their own. (p. 84)

In addition, the results from Smart et al. concerning faculty in these disciplines support Holland's theory of careers regarding the personality types.

In general, results from the current study also support findings by Holland (1997) and Smart et al. (2000). More specifically, differences in faculty teaching practices revealed interesting differences across the disciplines. Faculty members in Social disciplines not only were statistically significant at the lowest possible level ($p \leq .001$) for all five factors, but they also had positive correlations with all five teaching factors. No other group of faculty members' results was as strong regarding teaching factors. Artistic faculty had positive

correlations for three of the five factors (teaching1, 2, & 5). Realistic faculty had a negative correlation for three of the five teaching factors (teaching1, 2, & 5). In addition, Enterprising faculty members held positive correlations for four of the five teaching factors (teaching1, 3, 4, & 5). Conventional faculty had negative correlations for four of the five teaching faculties (teaching1 – 4). Investigative faculty had negative correlations for all five teaching factors. Additionally, for Investigative faculty, the type of institutional control was almost even distributed among public and private. For this specific set of variables and others, Social and Investigative types served as outliers with the other faculty types between them.

A second comparison of previous studies involving faculty differences and the current research is related to attitudes about teaching. Smart and McLaughlin (1974, p. 387) examined differences among faculty in the goals they have for students. Results of their study revealed that faculty from Investigative and Realistic departments place more emphasis on goals of graduate programs, research, and teaching, while Social, Artistic and Conventional tend to emphasize goals of congenial work environment of faculty, maintaining a spirit of iniquity and academic freedom. These results are consistent with traits assigned to Holland's personality types. Holland (1997) listed research and traditional teaching as common traits among Investigative and Realistic departmental faculty.

The current study's results support previous findings for teaching goals of Investigative, Realistic, Social, and Artistic departments. In this study, faculty attitudes about learning corresponded to teaching goals in previous studies. For these factors, Social and Artistic faculty groups scored the highest. Enterprising, Realistic, and Conventional had negative correlations for two of the three variables. Investigative had the lowest scores, with negative correlations for all three attitudes. In addition, for Investigative, when controlling

for types of institutions, low research institutions had positive correlations with the variables of attitudes for learning.

Faculty-student interaction is the last area of comparison between previous research on faculty differences and the current study. This topic was of special interest to this researcher based on a statement by Smart et al. (2000): “faculty presumably are the primary representatives of the academic environments and the primary contributors to differential patterns of change and stability in students who choose those environments as majors” (p. 80). According to Smart et al. (2000) regarding preferences about the accessibility of faculty to students: “Little variation occurred across the faculty groups in this final area. ... access of faculty members to students do[es] not vary across the academic disciplines. The authors mentioned that previous research for decades has indicated that faculty interaction is important (both in and out of class) to be beneficial to student outcomes (Pascarella & Terenzini, 1991, as cited in Smart et al., 2000). They concluded the there was no differentiation in this study (p. 97). In the current study, the results met neither Holland’s nor traditional stereotypical results. Previous studies revealed that natural science faculty or, in this case, investigative and realistic faculty, are not as interested in student interaction as are Social, Artistic, and Enterprising faculty.

The results of the current study deviated from Smart et al. (2000), who found that “preferences about the accessibility of faculty members to students do not vary across the four academic environments [Investigative, Artistic, Social, and Enterprising]” (p. 97). The current study supported Holland’s (1997) theory regarding faculty types and student interaction. Most educators generally expect to find there would be obvious differences among faculty and student interactions across faculty groups. This study found that, among

the three variables for Interaction, Social and Enterprising faculty had the highest scores and correlation. Both had positive correlations for two (interaction1 and 2) out of three interaction factors, and also two (interaction 1 and 3 for Enterprising, and interaction 1 and 2 for Social) out three were statistically significant.

The lone factor in this group that was not a positive correlation for the two faculty types was student interaction3, which was added specifically for the purpose of conducting research. Nevertheless, even this result is logical since these faculty groups are not recognized for research prowess, especially in conjunction with undergraduate students.

Because Enterprising environments are located next to Social ones on Holland's hexagon, the similarity in the two groups' results are also not surprising. The close proximity is an indication that the two types share a lot of common traits, in fact, along with Artistic "for activities ... involving people for purposes of leadership" (Holland, 1997, p. 25). Realistic and Artistic faculty had results in the middle-range: one interaction factor was positive (interaction1), two were negative (interaction2 and 3), and the last, for purposes of research, was also negative (interaction3). Like Social and Enterprising, because these faculty groups are generally not known for producing large amounts of research, these results are also not surprising. Another group not known for research is Conventional, which had the lowest scores among all faculty groups, and had negative correlations for all three interaction factors. These results, in particular, strongly support Holland (1997) and the stereotype of accountants for preferring numbers over people.

Investigative was, again, at the opposite end of the list in comparison to social. For these factors, investigative faculty responses had negative correlations for the first two interactions which were for in-class and out-of-class but not for class purposes. The sole

positive interaction correlation was interaction for research purposes. Because faculty in this group are primarily known for research, these results strongly support most studies on faculty in this group, particularly those who are natural science faculty. These results also support Holland, and the general stereotypes about faculty in this group.

Overall, the results from this study support the majority of previous research on the topic of faculty differences, including Holland's theory of careers. The corresponding stereotypes that have sprung up about this group, probably have done so because of some common beliefs about faculty groups within this Holland type. The results counter Smart et al. (2000, p. 97) regarding faculty interaction in his seminal work, *Academic disciplines*, which found little variation among Holland faculty groups applied to student interaction.

Finally, results of this study support previous research on faculty differences across Holland disciplines which include teaching practices and faculty goals. A third variable, faculty-student interaction, has also been supported in most recent research on this topic with the exception of findings by Smart et al. study (2000). Additionally, Holland's theory of careers is strongly supported by the results of this study related to many of the traditional stereotypes about natural science faculty types.

CHAPTER 5. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This study began with the purpose of exploring the notion that differences in the attitudes, teaching practices, and behavior of faculty in higher education, in general, are a possible cause of differential experiences of college students at four-year colleges and universities. Possible consequences of these differential experiences of college students include student attrition, low achievement, and lower satisfaction with college experiences. This study sought to extend the research of Smart, Feldman, and Ethington (2000), published in *Academic discipline*, by examining the differences of faculty members across academic disciplines. The Faculty Survey of Students Engagement (FSSE) (2003) dataset was used as data for the study. Unlike general statistical measures applied in academic disciplines, a path analysis empirical study was implemented in this research to determine the behavior of faculty across disciplines.

It was essential to implement a credible theoretical framework to validate the outcomes of previous research. Thus, Holland's theory of careers was selected both as a theoretical framework to base this study, and as a means to categorize academic environments (disciplines). Holland's (1973, 1985, 1997) basic assumption is that most people resemble one of six personality types: Realistic, Investigative, Artistic, Social, Enterprising, Conventional. According to Holland's theory (1997), six environments types are similarly named (personality types) and correspond to the six personality types. "Congruence is dependent on the closeness the individual's personality is to their

corresponding environment or discipline. Likely outcomes of congruence with one's environment, include satisfaction, stability, and achievement" (Holland, 1997, p. 11).

Research on the study of faculty differences in higher education began in the 1960s. Critical to the study of faculty differences was the ability of early higher education scholars to classify academic disciplines in higher education. These efforts systems include Kolb's (1962) paradigm development and Biglan's hard-soft (1973) used by most. In some of today's institutions, educators continue to delineate, disciplines by paradigm development, or refer to disciplines as "hard and soft."

Topics such as faculty differences have become an intriguing topic for researchers. Researchers such as Smart and (1974, 2000) have produced several publications on the differences in faculty culture of academic departments. In addition, many are using Holland theory of careers as their theoretical framework or manner of classifying disciplines.

Empirical component results

The 2003 FSSE dataset provided a possible 2,890 faculty responses for 28 questions. Eighteen variables were included in the path study. Five demographic—(1) institutional control, (2) Carnegie type, (3) sex, (4) race, and (5) academic rank—exogenous variables were used as controls to determine if different institution types or faculty profile differences affected the results. The following endogenous variables and total for each were: faculty attitudes about learning (3); expectations (1); teaching practices (5); and faculty-student interactions (3). The final variable, "Holland type", matched the previously mentioned endogenous variables with each Holland type to identify differences among the paths.

Results of the study indicate that there were significant differences among the Holland types and endogenous variables. Although the paths were not statistically significant for each factor, among the 12 variables, a number of factors were statistically significant. In addition, there was a large amount of variation and correlation related to environment type. An example of this is for specific factors, such as attitude1 and attitude2. Attitude1 was statistically significant across all six Holland faculty types, and five of the six types were statistically significant for this factor. The average number of positive correlations of the six environments was three for the two attitude factors. Interestingly, for the third attitude factor attitude3, none of the six faculty types were statistically significant, and only two Artistic and Social had positive correlations with attitude3.

The average number of positive correlations of the six environments was three for the two attitude factors. Interestingly, for the third attitude factor attitude3, none of the six faculty types were statistically significant, and only two Artistic and Social had positive correlations with attitude3.

The most glaring differences in the study, and probably the most revealing, were found in interaction paths. Interaction1, which consisted of faculty inquiries about faculty-students interaction both in-class and out, revealed statistically significant differences for three disciplinary groups: Investigative, Social, and Enterprising. Investigative and Social were statistically significant ($p < .001$). Investigative had a negative correlation indicating, as practices of interaction1 increased, faculty groups displaying investigative practices would decrease. Another faculty group similar in personality to Investigative was Conventional which was not statistically significant but it had a negative correlation. On one hand, Realistic (.054) was close to being statistically significant. On the other hand, Social,

Enterprising and Artistic faculty types most similar to it had positive correlations with interaction1. The p value for artistic was very high (.642).

For the second factor, interaction2, results again varied greatly across the Holland types. First, three disciplinary groups—Social, Investigative, and Artistic—had statistically significant scores ($p < .001$). The remaining groups had scores of approximately 200 or above. In addition, among the six disciplinary groups, only social had a positive correlation to interaction2. Interaction2 addressed only faulty-student interaction out of the classroom and, for the most part, the topic of interaction was not about class work. This factor revealed the greatest variation among the three interaction observations.

The last factor, interaction3, surveyed faculty about their interaction for research purposes. Five of six disciplinary types were statistically significant; only realistic was not statistically significant. Interestingly, only Investigative, which had a negative correlation to the first two interaction factors, had a positive correlation with interaction3. This indicates that, as the factor interaction3 increased, faculty groups displaying traits characteristic of Investigative groups would also increase. Investigative is comprised of majors that tend to be research oriented, especially natural science majors.

Overall, faculty-student interaction revealed major differences across disciplinary groups. Social disciplines appeared to be perfect environments for interaction, except for the case of research in which the idea of research for any purpose may be aversive to social types and not interaction to conduct research. On the other hand, Investigative environments which are recognized for their preference for research over non- research student interaction seemed to confirm popular beliefs about this group.

Another area of study was faculty expectations, which contained a single factor. Response to this factor also showed statistically significant differences. Only faculty from Conventional disciplines statistically significant p values. In addition, correlations for the variable expectations were evenly divided; Investigative, Artistic, and Conventional disciplines had a positive correlation with faculty expectations whereas the others did not.

A final area of the study was teaching practices. Teaching practices of faculty across Holland discipline groups also revealed differences that were statistically significant. The first teaching factor examined traditional teaching practices such as lecture, teacher-led discussion, and in-class writing. Social, Investigative, Conventional, and Artistic were statistically significant. Even more important, half of the six—Realistic, Investigative, and Conventional—had negative correlations. The remaining Social, Enterprising, and Artistic disciplinary types correlated positively with this teaching factor. Teaching2 addressed diversity of perspective in teaching. Five of the six were statistically significant; only enterprising was not. Four of the six disciplines types had negative correlations, leaving only Social and Artistic, which positively correlated to the topic of diversity in the classroom. Teaching3, which introduced analyzing, synthesizing, and critical thinking, had only two of the six Holland faculty types that were statistically significant. This factor also had correlations that were divided evenly among the six faculty types. Faculty from Social, Enterprising, and Realistic majors held positive correlations with teaching3. Teaching4, which introduced small groups teaching practices, also revealed variation among Holland types. Faculty scores from the five of the six Holland types were statistically significant. Only Enterprising was not statistically significant. In addition, Social, Enterprising, and Realistic faculty had positive correlations.

Teaching 5, the final teaching factor, which examined a variety of teaching practices, was equally diverse. Three of the six Holland types were statistically significant, and four had positive correlations. Realistic and social had negative correlations to teaching5. Similar to faculty expectations, teaching practices revealed differences along the lines of Holland environments, with almost an even distribution of statistically significant observations and correlations among them.

Limitations

The findings and conclusions of this research should be viewed in light of the limitations in conducting this study. A major limitation of this study was the method used to classify faculty for the path analysis. The FSSE recommended classifying faculty by the general area of the course they (currently) teach instead of by their academic appointment. For example, a question in the survey (2003 FSSE Survey) asks the respondent for the general area of their selected course. Occasionally, classifying faculty members in this manner becomes a problem when members teach courses outside of the general area of their training or appointment. For example, a professor may have their educational background in a specific field and a teaching appointment in another discipline as categorized by Holland. The same professor may also be an expert in statistics. After teaching political science for a period of time, a need arises in another department for someone to teach statistics. The professor's new appointment is to teach only courses in the new department, one that is outside of their field and original appointment. Nevertheless, because FSSE advises users of their data to place faculty respondents according to the course they currently teach, rather

than according to their original appointment or general areas of classification, some faculty responses may be placed in the wrong faculty group.

In addition, Holland's theory majors using the FSSE are categorized differently ... teaching and interacting with students.

Conclusions

The purpose of this study was to explore the concept that differences in the attitudes, teaching practices, and, in general, behavior of faculty in higher education are a possible cause of differential experiences of college students at four-year colleges and universities. After a review of the previous literature on this topic followed by conducting a path analysis using a faculty survey, the results seemed to support this researcher's expectations. Few surprises were uncovered in the responses of faculty members regarding commonly observed behaviors and tendencies within their respective academic departments. For example, most educational studies related natural science disciplines have revealed faculty in these disciplines prefer conducting research to teaching. Interaction with students is not considered a lofty goal for teaching faculty in this Holland environment. Results of the current study support this view of investigative or scientific type disciplines. Investigative faculty generally scored low on teaching, student interaction except for the purpose of research, and in their attitude about learning. For the most part, faculty in these majors revealed negative correlations to these factors.

For other Holland faculty types, such as Conventional and Realistic, despite exhibiting more positive correlation and statistical significance for these factors than Investigative types, nevertheless, generally revealed scores and correlations that were more

like those of Social faculty than Investigative. In addition, Artistic and Enterprising, the two Holland faculty types most similar to Social, had scores and correlation more favorable to teaching practices, student-interaction, and attitudes about learning than the other types, with the exception of Social.

Finally, the paths of Social faculty types generally followed conclusions of previous research: higher scores and correlations for teaching, student-interaction (except for research purposes), and teaching attitudes. This is not surprisingly regarding preferences of teaching and interacting with students favor Social types. According to Holland (1997, p. 24), teaching and counseling are two occupations more aligned with Social type. In addition, when controls were used for types of institutions, these values also had positive correlations with faculty at low research pressure institutions. Generally, female, non-majority race, and low ranking faculty also had positive correlations with teaching and interacting with students. Institutional control had an almost equal correlation between public versus private institutions with teaching and interacting with students. Public had a slight edge in this study.

Overall results of this study were nearly identical to what one might suspect. The greatest surprise is that the results confirmed so well what most of the previous research including Holland's suggested would occur. The Holland faculty types generally stayed true to their nature.

Recommendations

Based on the results of this research, the following several recommendations are made for practice and further research.

Recommendations for practice

This study revealed significant differences and correlations between faculty type and teaching practices, level of student interaction and attitudes about student learning. There is a need for students and those advising students, such as high school guidance officers, orientation leaders, and academic advisors, to be knowledgeable of the differences among faculty groups in the afore –mentioned areas. Although many educators in academic and student affairs are aware of differences in the attitudes and practices of faculty in different disciplinary departments, these differences are often taken for granted, with students learning about the differences in a trial-by-error manner. Students and those helping students should apply this information strategically in selecting majors and in course selection. Students should be made aware of the kind of experiences they are likely to encounter based on the discipline and the culture of the discipline (environment). Hopefully, this will enable more students to persist and be successful.

Recommendations for research

Further study is warranted on the topic of faculty differences. The current study identified obvious differences in faculty teaching practices, student interaction, expectations, and attitudes about learning across the Holland environments. Additional areas of study about faculty should be examined. One topic examined briefly in this research was faculty expectations. Successful educators have long recognized the importance of teachers having high expectations for students in order for students to achieve. Many K-12 accounts of successful programs with underprivileged or under-prepared children reveal the presence of

teachers with high expectations. This area should be examined more thoroughly in a study about faculty differences.

A second recommendation is to conduct a study with student performance outcomes. Conducting a similar study to this one using the same methodology path analysis with performance outcomes might uncover students with differential collegiate experiences as suggested in this study. Previous studies such as Smart (2000) recommended development of specific skills as outcomes of different academic disciplines/majors. Future study enlisting performance outcomes as endogenous variables may provide significant empirical results. This will provide further documentation and advancement on the study of faculty differences.

Final Thoughts

This study began as a work to determine whether faculty members across disciplines are more different than they are similar. Was Light, Jr. (1974, as cited in Smart et al.) accurate in saying “the academic professorship was made up of not one occupation but several” (p. 8)? When I was an undergraduate student, I pondered the notion of different personalities and behaviors of other undergraduates, and wondered if academic major and, later, one’s profession, may help explain if there is a relationship or connection between an individual’s behavior and career preference. Later, I began to question what enables some students and faculty to relate well to one another. How accurate is the phrase “a community of scholars” in describing a college or university’s professoriate?

After beginning the empirical part of this study, probably the most anticipated result was to gain insight regarding general notions from faculty responses in particular academic majors to see if the results support previous literature and new ways of looking at

stereotypes. For example, Holland's classification of academic environments categorizes natural science programs/majors as Investigative environments (disciplines). Based on common notions and stereotypes about this group of faculty, on the one hand, I wondered if faculty in Investigative departments would be more interested in research and in mentoring graduate students to be scholars than in interacting with undergraduate students. On the other hand, would faculty in social sciences, history, or social work embrace interactions with undergraduate students in preference to research? Where would business and art professors be along the faculty spectrum as applied to teacher/student interaction and research? Along with those questions, would there be differences among faculty at research-oriented institution as opposed to a liberal arts one, and how would these differences affect faculty and students? In addition, would private colleges differ from public institutions? Would these factors affect faculty views by discipline types? These are some of the questions leading up to the decision to conduct this research.

Additional Concerns

By design, due to the researcher's intrigue with Holland's theory of careers, particularly Holland's resourcefulness and adaptability to explain types applied to explain faculty differences related to type, his theory was selected as the framework for this study. A critical component of his theory was Holland's classification system for academic disciplines. It would have been impractical and problematic for the researcher to use Holland's theory as the theoretical framework but not his classification of disciplines. Nevertheless, another system for classifying academic disciplines referred to in the study but not used was Biglan classification model. Biglan's model has been among the most respected

system's for classifying academic disciplines. In reference to Biglan's model, Smart (2000) stated, "Without question, Biglan's has been a major contributor to providing a common basis by which scholars classify and investigate differences among faculty in decidedly distinct clusters of academic disciplines"(p. 11). Just as Biglan's model corresponded to Kolb's classification, Biglan and Holland were equally similar. Like Holland, Biglan's model used practical labels, as mentioned in the study, for its disciplinary groupings. If not for the reason of practicality mentioned previously, the selection of Holland over the Biglan system for classification of majors would have been primarily a matter of preference.

A second matter concerns the scores of the Squared Multiple Correlations" shown in Appendix C. The squared multiple correlations were generally weak scores. Approximately half of the 13 *p* values were near or above the standard for displaying statistical significance ($<.05$). Nevertheless, the scores revealed the actual results of the study, regardless of the final statistics. The strength of the study's findings were not revealed in the full totals for each Holland type, but in the individual scores (*p* values) for particular variables for faculty types, such as factors Interaction 1 and 2 for Social faculty types those (interaction 1 and 2) versus Investigative, and interaction3 for Social and Investigative. These results confirm the results found in previous research studies augmenting the study's weak squared multiple correlations.

Future Direction

This study approached the subject of faculty differences. Due to demands for higher education institutions to be more accountable for student retention, attrition, and low graduation rates, this topic has recently become a focus in higher education. Previous studies

as well as public opinion regarding particular faculty groups has opened the door to investigate practices and attitudes among faculty groups about learning. Results of this study confirmed, in some instances, significant differences across disciplines. In most cases, the results of this study supported commonly held views about natural (Investigative) and social science (Social) faculty groups.

Future studies should seek through empirical study to explore outcomes of these differences. Smart et al. (2000) stipulated, "...faculty place different emphasis, encouraging and rewarding particular behavior endemic to the respective department" (p. 74). In actuality, different results among students should be the outcome of different faculty behavior. Finally, high-school counselors and college student-affairs advisors should consider the implications of the findings of this research and advise undergraduates accordingly. On the other hand, these findings should not be used to discourage students from selecting certain majors, rather aid them in making informed, personal decisions regarding course selection and academic major.

APPENDIX A. HUMAN SUBJECTS APPROVAL

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office of Research Assurances
Vice Provost for Research
1138 Pearson Hall
Ames, Iowa 50011-2207
515 294-4566
FAX 515 294-4267

DATE: March 6, 2007

TO: Mark B. Longley
c/o Dan Robinson. N24FA Lagomarcino Hall

CC: Dan Robinson
N24FA Lagomarcino Hall

FROM: Jan Canny, IRB Administrator
Office of Research Assurances

IRB ID: 06 -372 **Study Review Date:** 1 March 2007

Following assessment of the modification to the project, "How Faculty Differs," the Institutional Review Board (IRB) Co-Chair has declared the study exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101(b)(4). The applicable exemption category is provided below for your information. Please note that you must submit all research involving human participants for review by the IRB. Only the IRB may make the determination of exemption, even if you conduct a study in the future that is exactly like this study.

The IRB determination of exemption means that this project does not need to meet the requirements from the Department of Health and Human Service (DHHS) regulations for the protection of human subjects, unless required by the IRB. We do, however, urge you to protect the rights of your participants in the same ways that you would if the project was required to follow the regulations. This includes providing relevant information about the research to the participants.

Because your project is exempt, you do not need to submit an application for continuing review. However, you must carry out the research as proposed in the IRB application, including obtaining and documenting (signed) informed consent if you have stated in your application that you will do so or if required by the IRB.

Any modification of this research should be submitted to the IRB on a Continuation and/or Modification form, prior to making any changes, to determine if the project still meets the Federal criteria for exemption. If it is determined that exemption is no longer warranted, then an IRB proposal will need to be submitted and approved before proceeding with data collection.

Exemption Category

- (4) Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects.

APPENDIX B. SAMPLE SURVEY QUESTIONS FROM FSSE

1. What is the general area of your selected course?
2. About what percent of students in your course do the following:
 - a. Frequently ask questions in class or contribute to class discussions
 - b. Use e-mail to communicate with you
 - c. Discuss grades or assignments with you
 - d. Talk about career plans with you
 - e. Discuss ideas from readings or classes with you outside of class
 - f. Work harder than they usually do to meet your standards
3. How often do students in your selected course engage in the following:
 - a. Have class discussions or write assignments that include diverse perspectives
 - b. Work with other students on projects during class
 - c. Participate in a community-based project as part of your course
 - d. Have serious conversations in your course with students of a different race or ethnicity than their own
 - e. Have serious conversations in your course with students who are very different from them in terms of their religious beliefs, political opinions, and personal values
4. In your selected course, on average, what percent of class time is spent on the following:
 - a. Ask questions in class or contribute to class discussions
 - b. Lecture
 - c. Teacher-led discussion
 - d. Teacher-student shared responsibility
 - e. Computer-mediated activities
 - f. Small-group activities
 - g. Student presentations
 - h. In-class writing
 - i. Performance in applied and fine arts

- j. Experiential (labs, fieldwork, etc.)
5. Mark the box that represents the extent to which your evaluations of student performance challenge students in your selected course to do their best work.
6. How much emphasis do you place on engaging students in each of these cognitive activities:
- a. Memorizing facts, ideas, or methods from your course and readings so students can repeat them, pretty much in the same form
 - b. Analyzing the basic elements of an idea, experience or theory such as examining a particular case or situation in depth and considering its components
 - c. Synthesizing and organizing ideas, information, or experiences into new, more complex interpretations and relationships
 - d. Making judgments about the value of information, arguments or methods such as examining how others gathered and interpreted data and assessing the soundness of their conclusions
 - e. Applying theories or concepts to practical problems or in new situations
7. To what extent do you structure your selected course so that students learn and develop in the following areas:
- a. Acquiring a broad general education
 - b. Acquiring a job or work-related knowledge and skills
 - c. Writing clearly and effectively
 - d. Speaking clearly and effectively
 - e. Thinking critically and analytically
 - f. Analyzing quantitative problems
 - g. Using computing and information technology
 - h. Working effectively with others
 - i. Learning effectively on their own
 - j. Understanding themselves
 - k. Understanding people of other racial and ethnic backgrounds
 - l. Solving complex real-world problems

8. About how many hours do you spend in a typical seven-day week doing each of the following:
 - a. Teaching undergraduate students in class
 - b. Advising undergraduate students
 - c. Working with undergraduates on research
 - d. Supervising internships or other field experiences
 - e. Working with students on activities other than coursework
9. Other interactions with students outside of the classroom
10. Which of the following best describes your academic rank, title, or current position?
11. What is the general discipline of your academic appointment?
12. What is your sex?
13. What is your racial or ethnic identification?
14. What is your institutional type?
15. What is your Carnegie type?
16. How important is it to you that undergraduates at your institution have the following experiences?
 - a. Work on a research project with you outside of course program requirements.

APPENDIX C. RESULTS FROM THE PATH ANALYSIS

Amos Output

Realistic

Regression Weights

		Estimate	S.E.	C.R.	P Label
expectations1	<--- carnegienew	-.066	.040	-1.669	.095
attitude1	<--- carnegienew	-.083	.022	-3.741	<.001
attitude2	<--- carnegienew	-.026	.027	-.946	.344
attitude3	<--- carnegienew	-.046	.024	-1.946	.052
expectations1	<--- sexnew	.093	.040	2.322	.020
attitude1	<--- sexnew	.196	.022	8.949	<.001
attitude2	<--- sexnew	.153	.027	5.738	<.001
attitude3	<--- sexnew	.088	.024	3.727	<.001
expectations1	<--- ranknew	.092	.017	5.573	<.001
attitude1	<--- ranknew	-.019	.009	-2.038	.042
attitude2	<--- ranknew	-.013	.011	-1.178	.239
attitude3	<--- ranknew	.041	.010	4.145	<.001
expectations1	<--- control	-.011	.039	-.273	.785
attitude1	<--- control	-.007	.022	-.339	.735
attitude2	<--- control	-.008	.026	-.285	.776
attitude3	<--- control	-.018	.023	-.767	.443
expectations1	<--- race2	-.103	.057	-1.804	.071
attitude1	<--- race2	-.294	.031	-9.414	<.001
attitude2	<--- race2	-.280	.038	-7.334	<.001
attitude3	<--- race2	-.186	.034	-5.521	<.001
expectations1	<--- e1	1.020	.014	74.399	<.001
attitude1	<--- e2	.567	.008	73.916	<.001
attitude2	<--- e3	.692	.009	74.005	<.001
attitude3	<--- e4	.613	.008	74.621	<.001
realistic	<--- carnegienew	.051	.007	7.536	<.001
realistic	<--- sexnew	-.027	.007	-3.839	<.001
realistic	<--- ranknew	.007	.003	2.310	.021
realistic	<--- control	.007	.007	1.068	.285
realistic	<--- race2	-.006	.010	-.560	.576
realistic	<--- expectations1	-.005	.003	-1.592	.111
realistic	<--- attitude1	-.030	.006	-5.022	<.001
realistic	<--- attitude2	.038	.005	7.819	<.001
realistic	<--- attitude3	-.001	.005	-.120	.904
realistic	<--- e5	.175	.002	75.842	<.001
interaction1	<--- carnegienew	-.146	.031	-4.759	<.001
interaction2	<--- carnegienew	-.091	.028	-3.249	.001
interaction3	<--- carnegienew	.018	.033	.534	.593
teaching1	<--- carnegienew	-.121	.027	-4.417	<.001
teaching2	<--- carnegienew	-.129	.031	-4.112	<.001

		Estimate	S.E.	C.R.	P Label
teaching3	<--- carnegienew	-.064	.025	-2.623	.009
teaching4	<--- carnegienew	-.079	.036	-2.197	.028
teaching5	<--- carnegienew	-.188	.031	-6.045	<.001
interaction1	<--- sexnew	.269	.031	8.748	<.001
interaction2	<--- sexnew	.172	.027	6.297	<.001
interaction3	<--- sexnew	-.044	.032	-1.370	.171
teaching1	<--- sexnew	.266	.027	9.681	<.001
teaching2	<--- sexnew	.276	.031	8.800	<.001
teaching3	<--- sexnew	.126	.024	5.237	<.001
teaching4	<--- sexnew	.305	.036	8.537	<.001
teaching5	<--- sexnew	-.012	.031	-.400	.689
interaction1	<--- ranknew	-.014	.013	-1.079	.281
interaction2	<--- ranknew	.095	.011	8.377	<.001
interaction3	<--- ranknew	.094	.013	7.069	<.001
teaching1	<--- ranknew	-.031	.011	-2.753	.006
teaching2	<--- ranknew	-.010	.013	-.782	.434
teaching3	<--- control	-.016	.024	-.657	.511
teaching5	<--- ranknew	-.015	.013	-1.204	.229
teaching4	<--- ranknew	-.025	.015	-1.677	.093
teaching3	<--- ranknew	.020	.010	2.022	.043
interaction1	<--- control	-.031	.030	-1.035	.301
interaction2	<--- control	.035	.027	1.278	.201
interaction3	<--- control	.060	.032	1.892	.058
teaching1	<--- control	-.048	.027	-1.825	.068
teaching2	<--- control	-.016	.030	-.543	.587
teaching4	<--- control	.029	.035	.823	.411
teaching5	<--- control	.032	.030	1.074	.283
interaction1	<--- race2	-.174	.044	-3.974	<.001
interaction2	<--- race2	-.141	.039	-3.634	<.001
interaction3	<--- race2	-.258	.046	-5.629	<.001
teaching1	<--- race2	-.247	.039	-6.309	<.001
teaching2	<--- race2	-.191	.045	-4.271	<.001
teaching3	<--- race2	-.183	.034	-5.338	<.001
teaching4	<--- race2	-.250	.051	-4.905	<.001
teaching5	<--- race2	-.180	.044	-4.113	<.001
interaction1	<--- realistic	.161	.083	1.930	.054
interaction2	<--- realistic	-.051	.076	-.674	.500
interaction3	<--- realistic	-.114	.089	-1.276	.202
teaching1	<--- realistic	-.080	.075	-1.071	.284
teaching2	<--- realistic	-.376	.085	-4.409	<.001
teaching3	<--- realistic	.058	.067	.866	.386
teaching4	<--- realistic	.299	.097	3.079	.002
teaching5	<--- realistic	-.045	.084	-.529	.597
interaction1	<--- e6	.796	.011	75.586	<.001
interaction2	<--- e7	.704	.010	73.637	<.001
interaction3	<--- e8	.831	.011	73.902	<.001

		Estimate	S.E.	C.R.	P Label
teaching1	<--- e9	.710	.009	75.479	<.001
teaching2	<--- e10	.812	.011	75.479	<.001
teaching3	<--- e11	.622	.008	74.040	<.001
teaching4	<--- e12	.926	.012	75.520	<.001
teaching5	<--- e13	.794	.011	74.676	<.001

Standardized Regression Weights

	Estimate
expectations1 <--- carnegienew	-.031
attitude1 <--- carnegienew	-.069
attitude2 <--- carnegienew	-.018
attitude3 <--- carnegienew	-.036
expectations1 <--- sexnew	.045
attitude1 <--- sexnew	.168
attitude2 <--- sexnew	.109
attitude3 <--- sexnew	.071
expectations1 <--- ranknew	.110
attitude1 <--- ranknew	-.038
attitude2 <--- ranknew	-.023
attitude3 <--- ranknew	.080
expectations1 <--- control	-.005
attitude1 <--- control	-.006
attitude2 <--- control	-.005
attitude3 <--- control	-.014
expectations1 <--- race2	-.036
attitude1 <--- race2	-.178
attitude2 <--- race2	-.141
attitude3 <--- race2	-.107
expectations1 <--- e1	.992
attitude1 <--- e2	.966
attitude2 <--- e3	.983
attitude3 <--- e4	.988
realistic <--- carnegienew	.137
realistic <--- sexnew	-.074
realistic <--- ranknew	.044
realistic <--- control	.019
realistic <--- race2	-.011
realistic <--- expectations1	-.030
realistic <--- attitude1	-.096
realistic <--- attitude2	.147
realistic <--- attitude3	-.002
realistic <--- e5	.970
interaction1 <--- carnegienew	-.088
interaction2 <--- carnegienew	-.061
interaction3 <--- carnegienew	.010

		Estimate
teaching1	<--- carnegienew	-.081
teaching2	<--- carnegienew	-.076
teaching3	<--- carnegienew	-.050
teaching4	<--- carnegienew	-.041
teaching5	<--- carnegienew	-.114
interaction1	<--- sexnew	.166
interaction2	<--- sexnew	.120
interaction3	<--- sexnew	-.026
teaching1	<--- sexnew	.182
teaching2	<--- sexnew	.166
teaching3	<--- sexnew	.101
teaching4	<--- sexnew	.162
teaching5	<--- sexnew	-.008
interaction1	<--- ranknew	-.021
interaction2	<--- ranknew	.160
interaction3	<--- ranknew	.136
teaching1	<--- ranknew	-.052
teaching2	<--- ranknew	-.015
teaching3	<--- control	-.012
teaching5	<--- ranknew	-.023
teaching4	<--- ranknew	-.032
teaching3	<--- ranknew	.039
interaction1	<--- control	-.019
interaction2	<--- control	.024
interaction3	<--- control	.036
teaching1	<--- control	-.033
teaching2	<--- control	-.010
teaching4	<--- control	.015
teaching5	<--- control	.020
interaction1	<--- race2	-.076
interaction2	<--- race2	-.070
interaction3	<--- race2	-.109
teaching1	<--- race2	-.120
teaching2	<--- race2	-.081
teaching3	<--- race2	-.103
teaching4	<--- race2	-.094
teaching5	<--- race2	-.080
interaction1	<--- realistic	.036
interaction2	<--- realistic	-.013
interaction3	<--- realistic	-.024
teaching1	<--- realistic	-.020
teaching2	<--- realistic	-.082
teaching3	<--- realistic	.017
teaching4	<--- realistic	.057
teaching5	<--- realistic	-.010
interaction1	<--- e6	.979

		Estimate
interaction2	<--- e7	.975
interaction3	<--- e8	.984
teaching1	<--- e9	.970
teaching2	<--- e10	.974
teaching3	<--- e11	.988
teaching4	<--- e12	.980
teaching5	<--- e13	.990

Means

	Estimate	S.E.	C.R.	P	Label
carnegienew	.396	.009	43.476	<.001	
sexnew	.458	.010	47.164	<.001	
ranknew	3.459	.024	145.631	<.001	
control	1.493	.009	160.520	<.001	
race2	.852	.007	122.482	<.001	

Intercepts

	Estimate	S.E.	C.R.	P	Label
expectations1	2.882	.100	28.857	<.001	
attitude1	2.802	.055	50.752	<.001	
attitude2	2.891	.067	42.949	<.001	
attitude3	4.193	.059	70.583	<.001	
realistic	-.009	.037	-.243	.808	
interaction1	2.911	.077	37.960	<.001	
interaction2	1.663	.069	24.232	<.001	
interaction3	1.747	.081	21.589	<.001	
teaching1	3.423	.068	49.978	<.001	
teaching2	2.432	.078	31.058	<.001	
teaching3	3.266	.060	54.027	<.001	
teaching4	2.348	.089	26.299	<.001	
teaching5	2.749	.077	35.745	<.001	

Variances

	Estimate	S.E.	C.R.	P	Label
e1	1.000				
e2	1.000				
e3	1.000				
e4	1.000				
e5	1.000				
e6	1.000				
e7	1.000				
e8	1.000				
e9	1.000				
e10	1.000				

	Estimate	S.E.	C.R.	P	Label
e11	1.000				
e12	1.000				
e13	1.000				
carnegienew	.239	.006	38.007	<.001	
sexnew	.252	.007	36.420	<.001	
ranknew	1.483	.041	36.192	<.001	
control	.250	.007	38.007	<.001	
race2	.126	.004	35.989	<.001	

Squared Multiple Correlations

	Estimate
attitude3	.024
attitude2	.033
attitude1	.066
expectations1	.016
realistic	.059
teaching5	.021
teaching4	.039
teaching3	.025
teaching2	.051
teaching1	.059
interaction3	.032
interaction2	.049
interaction1	.041

Investigative

Regression Weights

		Estimate	S.E.	C.R.	P	Label
expectations1	<--- carnegienew	-.066	.040	-1.678	.093	
attitude1	<--- carnegienew	-.085	.022	-3.823	<.001	
attitude2	<--- carnegienew	-.024	.027	-.905	.365	
attitude3	<--- carnegienew	-.046	.024	-1.950	.051	
expectations1	<--- sexnew	.093	.040	2.337	.019	
attitude1	<--- sexnew	.195	.022	8.874	<.001	
attitude2	<--- sexnew	.152	.027	5.682	<.001	
attitude3	<--- sexnew	.088	.024	3.708	<.001	
expectations1	<--- ranknew	.095	.017	5.733	<.001	
attitude1	<--- ranknew	-.018	.009	-2.007	.045	
attitude2	<--- ranknew	-.012	.011	-1.119	.263	
attitude3	<--- ranknew	.041	.010	4.190	<.001	
expectations1	<--- control	-.011	.039	-.288	.773	
attitude1	<--- control	-.008	.022	-.358	.721	
attitude2	<--- control	-.007	.026	-.274	.784	
attitude3	<--- control	-.018	.023	-.770	.441	

		Estimate	S.E.	C.R.	P	Label
expectations1	<--- race2	-.105	.057	-1.843	.065	
attitude1	<--- race2	-.294	.031	-9.418	<.001	
attitude2	<--- race2	-.280	.038	-7.349	<.001	
attitude3	<--- race2	-.186	.034	-5.521	<.001	
expectations1	<--- e1	1.020	.014	74.395	<.001	
attitude1	<--- e2	.568	.008	73.917	<.001	
attitude2	<--- e3	.692	.009	74.004	<.001	
attitude3	<--- e4	.613	.008	74.622	<.001	
investigative	<--- carnegienew	.017	.017	.972	.331	
investigative	<--- sexnew	-.059	.018	-3.319	<.001	
investigative	<--- ranknew	.043	.007	5.806	<.001	
investigative	<--- control	.039	.017	2.302	.021	
investigative	<--- race2	-.057	.026	-2.208	.027	
investigative	<--- expectations1	.009	.008	1.048	.294	
investigative	<--- attitude1	-.144	.015	-9.441	<.001	
investigative	<--- attitude2	-.034	.012	-2.684	.007	
investigative	<--- attitude3	-.010	.014	-.708	.479	
investigative	<--- e5	.453	.006	75.730	<.001	
interaction1	<--- carnegienew	-.131	.030	-4.348	<.001	
interaction2	<--- carnegienew	-.090	.028	-3.276	.001	
interaction3	<--- carnegienew	.002	.032	.070	.944	
teaching1	<--- carnegienew	-.118	.027	-4.411	<.001	
teaching2	<--- carnegienew	-.139	.031	-4.534	<.001	
teaching3	<--- carnegienew	-.058	.024	-2.398	.017	
teaching4	<--- carnegienew	-.062	.035	-1.736	.083	
teaching5	<--- carnegienew	-.191	.031	-6.202	<.001	
interaction1	<--- sexnew	.241	.031	7.875	<.001	
interaction2	<--- sexnew	.161	.027	5.894	<.001	
interaction3	<--- sexnew	-.006	.032	-.185	.853	
teaching1	<--- sexnew	.241	.027	8.868	<.001	
teaching2	<--- sexnew	.251	.031	8.117	<.001	
teaching3	<--- sexnew	.113	.024	4.688	<.001	
teaching4	<--- sexnew	.295	.036	8.189	<.001	
teaching5	<--- sexnew	-.009	.031	-.303	.762	
interaction1	<--- ranknew	-.001	.013	-.061	.951	
interaction2	<--- ranknew	.101	.011	8.953	<.001	
interaction3	<--- ranknew	.077	.013	5.866	<.001	
teaching1	<--- ranknew	-.019	.011	-1.655	.098	
teaching2	<--- ranknew	.005	.013	.359	.720	
teaching3	<--- control	-.010	.024	-.437	.662	
teaching5	<--- ranknew	-.017	.013	-1.355	.175	
teaching4	<--- ranknew	-.019	.015	-1.292	.196	
teaching3	<--- ranknew	.027	.010	2.688	.007	
interaction1	<--- control	-.020	.030	-.690	.490	
interaction2	<--- control	.039	.027	1.465	.143	
interaction3	<--- control	.044	.031	1.421	.155	

		Estimate	S.E.	C.R.	P	Label
teaching1	<--- control	-.039	.026	-1.483	.138	
teaching2	<--- control	-.006	.030	-.188	.851	
teaching4	<--- control	.032	.035	.916	.359	
teaching5	<--- control	.031	.030	1.036	.300	
interaction1	<--- race2	-.175	.043	-4.042	<.001	
interaction2	<--- race2	-.141	.039	-3.633	<.001	
interaction3	<--- race2	-.260	.045	-5.789	<.001	
teaching1	<--- race2	-.248	.039	-6.428	<.001	
teaching2	<--- race2	-.187	.044	-4.262	<.001	
teaching3	<--- race2	-.184	.034	-5.409	<.001	
teaching4	<--- race2	-.255	.051	-4.993	<.001	
teaching5	<--- race2	-.178	.044	-4.079	<.001	
interaction1	<--- investigative	-.236	.032	-7.376	<.001	
interaction2	<--- investigative	-.133	.029	-4.565	<.001	
interaction3	<--- investigative	.366	.034	10.840	<.001	
teaching1	<--- investigative	-.260	.028	-9.152	<.001	
teaching2	<--- investigative	-.350	.032	-10.779	<.001	
teaching3	<--- investigative	-.122	.026	-4.769	<.001	
teaching4	<--- investigative	-.038	.038	-1.006	.314	
teaching5	<--- investigative	.019	.033	.586	.558	
interaction1	<--- e6	.789	.010	75.612	<.001	
interaction2	<--- e7	.701	.010	73.628	<.001	
interaction3	<--- e8	.814	.011	73.921	<.001	
teaching1	<--- e9	.701	.009	75.510	<.001	
teaching2	<--- e10	.799	.011	75.498	<.001	
teaching3	<--- e11	.619	.008	74.039	<.001	
teaching4	<--- e12	.928	.012	75.528	<.001	
teaching5	<--- e13	.794	.011	74.676	<.001	

Standardized Regression Weights

		Estimate
expectations1	<--- carnegienew	-.032
attitude1	<--- carnegienew	-.071
attitude2	<--- carnegienew	-.017
attitude3	<--- carnegienew	-.036
expectations1	<--- sexnew	.046
attitude1	<--- sexnew	.166
attitude2	<--- sexnew	.108
attitude3	<--- sexnew	.071
expectations1	<--- ranknew	.113
attitude1	<--- ranknew	-.038
attitude2	<--- ranknew	-.021
attitude3	<--- ranknew	.081
expectations1	<--- control	-.005
attitude1	<--- control	-.007

		Estimate
attitude2	<--- control	-.005
attitude3	<--- control	-.014
expectations1	<--- race2	-.036
attitude1	<--- race2	-.178
attitude2	<--- race2	-.142
attitude3	<--- race2	-.107
expectations1	<--- e1	.991
attitude1	<--- e2	.966
attitude2	<--- e3	.984
attitude3	<--- e4	.988
investigative	<--- carnegienew	.018
investigative	<--- sexnew	-.064
investigative	<--- ranknew	.111
investigative	<--- control	.042
investigative	<--- race2	-.043
investigative	<--- expectations1	.020
investigative	<--- attitude1	-.181
investigative	<--- attitude2	-.051
investigative	<--- attitude3	-.013
investigative	<--- e5	.969
interaction1	<--- carnegienew	-.079
interaction2	<--- carnegienew	-.061
interaction3	<--- carnegienew	.001
teaching1	<--- carnegienew	-.079
teaching2	<--- carnegienew	-.081
teaching3	<--- carnegienew	-.045
teaching4	<--- carnegienew	-.032
teaching5	<--- carnegienew	-.116
interaction1	<--- sexnew	.149
interaction2	<--- sexnew	.112
interaction3	<--- sexnew	-.003
teaching1	<--- sexnew	.165
teaching2	<--- sexnew	.151
teaching3	<--- sexnew	.090
teaching4	<--- sexnew	.156
teaching5	<--- sexnew	-.006
interaction1	<--- ranknew	-.001
interaction2	<--- ranknew	.171
interaction3	<--- ranknew	.111
teaching1	<--- ranknew	-.031
teaching2	<--- ranknew	.007
teaching3	<--- control	-.008
teaching5	<--- ranknew	-.026
teaching4	<--- ranknew	-.025
teaching3	<--- ranknew	.052
interaction1	<--- control	-.013

		Estimate
interaction2	<--- control	.027
interaction3	<--- control	.026
teaching1	<--- control	-.027
teaching2	<--- control	-.003
teaching4	<--- control	.017
teaching5	<--- control	.019
interaction1	<--- race2	-.077
interaction2	<--- race2	-.069
interaction3	<--- race2	-.109
teaching1	<--- race2	-.120
teaching2	<--- race2	-.080
teaching3	<--- race2	-.104
teaching4	<--- race2	-.096
teaching5	<--- race2	-.079
interaction1	<--- investigative	-.136
interaction2	<--- investigative	-.086
interaction3	<--- investigative	.202
teaching1	<--- investigative	-.166
teaching2	<--- investigative	-.196
teaching3	<--- investigative	-.091
teaching4	<--- investigative	-.019
teaching5	<--- investigative	.011
interaction1	<--- e6	.971
interaction2	<--- e7	.971
interaction3	<--- e8	.963
teaching1	<--- e9	.957
teaching2	<--- e10	.959
teaching3	<--- e11	.983
teaching4	<--- e12	.982
teaching5	<--- e13	.990

Means

	Estimate	S.E.	C.R.	P	Label
carnegienew	.396	.009	43.476	<.001	
sexnew	.458	.010	47.224	<.001	
ranknew	3.458	.024	145.602	<.001	
control	1.493	.009	160.520	<.001	
race2	.852	.007	122.446	<.001	

Intercepts

	Estimate	S.E.	C.R.	P	Label
expectations1	2.876	.100	28.810	<.001	
attitude1	2.803	.055	50.796	<.001	
attitude2	2.889	.067	42.919	<.001	
attitude3	4.192	.059	70.587	<.001	
investigative	.659	.095	6.909	<.001	
interaction1	2.941	.076	38.645	<.001	
interaction2	1.679	.068	24.527	<.001	
interaction3	1.694	.079	21.362	<.001	
teaching1	3.459	.068	51.145	<.001	
teaching2	2.479	.077	32.149	<.001	
teaching3	3.282	.060	54.442	<.001	
teaching4	2.349	.090	26.235	<.001	
teaching5	2.748	.077	35.688	<.001	

Variances

	Estimate	S.E.	C.R.	P	Label
e1	1.000				
e2	1.000				
e3	1.000				
e4	1.000				
e5	1.000				
e6	1.000				
e7	1.000				
e8	1.000				
e9	1.000				
e10	1.000				
e11	1.000				
e12	1.000				
e13	1.000				
carnegienew	.239	.006	38.007	<.001	
sexnew	.251	.007	36.415	<.001	
ranknew	1.485	.041	36.193	<.001	
control	.250	.007	38.007	<.001	
race2	.126	.004	35.990	<.001	

Squared Multiple Correlations

	Estimate
attitude3	.025
attitude2	.033
attitude1	.066
expectations1	.017
investigative	.061
teaching5	.021
teaching4	.037
teaching3	.033
teaching2	.081
teaching1	.085
interaction3	.072
interaction2	.057
interaction1	.058

Social

Regression Weights

			Estimate	S.E.	C.R.	P	Label
expectations1	<---	carnegienew	-.067	.040	-1.682	.093	
attitude1	<---	carnegienew	-.084	.022	-3.807	<.001	
attitude2	<---	carnegienew	-.024	.027	-.893	.372	
attitude3	<---	carnegienew	-.046	.024	-1.953	.051	
expectations1	<---	sexnew	.092	.040	2.299	.021	
attitude1	<---	sexnew	.194	.022	8.839	<.001	
attitude2	<---	sexnew	.152	.027	5.675	<.001	
attitude3	<---	sexnew	.087	.024	3.676	<.001	
expectations1	<---	ranknew	.093	.017	5.609	<.001	
attitude1	<---	ranknew	-.019	.009	-2.050	.040	
attitude2	<---	ranknew	-.013	.011	-1.176	.240	
attitude3	<---	ranknew	.041	.010	4.140	<.001	
expectations1	<---	control	-.011	.039	-.288	.773	
attitude1	<---	control	-.009	.022	-.395	.693	
attitude2	<---	control	-.007	.026	-.267	.790	
attitude3	<---	control	-.018	.023	-.771	.441	
expectations1	<---	race2	-.105	.057	-1.851	.064	
attitude1	<---	race2	-.294	.031	-9.420	<.001	
attitude2	<---	race2	-.282	.038	-7.392	<.001	
attitude3	<---	race2	-.186	.034	-5.511	<.001	
expectations1	<---	e1	1.020	.014	74.397	<.001	
attitude1	<---	e2	.568	.008	73.918	<.001	
attitude2	<---	e3	.692	.009	74.003	<.001	
attitude3	<---	e4	.613	.008	74.622	<.001	
Social	<---	carnegienew	-.035	.016	-2.282	.022	
Social	<---	sexnew	.079	.016	4.920	<.001	
Social	<---	ranknew	-.004	.007	-.581	.562	
Social	<---	control	-.033	.015	-2.163	.031	
Social	<---	race2	.070	.023	3.038	.002	
Social	<---	expectations1	-.006	.008	-.790	.430	
Social	<---	attitude1	.130	.014	9.527	<.001	
Social	<---	attitude2	-.009	.011	-.818	.413	
Social	<---	attitude3	.015	.013	1.158	.247	

Social	<---	e5	.406	.005	75.786	<.001
interaction1	<---	carnegienew	-.130	.030	-4.282	<.001
interaction2	<---	carnegienew	-.083	.027	-3.038	.002
interaction3	<---	carnegienew	.008	.033	.237	.813
teaching1	<---	carnegienew	-.118	.027	-4.369	<.001
teaching2	<---	carnegienew	-.130	.031	-4.261	<.001
teaching3	<---	carnegienew	-.053	.024	-2.204	.028
teaching4	<---	carnegienew	-.054	.035	-1.515	.130
teaching5	<---	carnegienew	-.197	.031	-6.425	<.001
interaction1	<---	sexnew	.245	.031	7.951	<.001
interaction2	<---	sexnew	.149	.027	5.464	<.001
interaction3	<---	sexnew	-.033	.032	-1.014	.310
teaching1	<---	sexnew	.249	.028	9.038	<.001
teaching2	<---	sexnew	.243	.031	7.825	<.001
teaching3	<---	sexnew	.104	.024	4.339	<.001
teaching4	<---	sexnew	.275	.036	7.645	<.001
teaching5	<---	sexnew	.007	.031	.240	.810
interaction1	<---	ranknew	-.012	.013	-.919	.358
interaction2	<---	ranknew	.096	.011	8.582	<.001
interaction3	<---	ranknew	.093	.013	7.002	<.001
teaching1	<---	ranknew	-.031	.011	-2.713	.007
teaching2	<---	ranknew	-.010	.013	-.789	.430
teaching3	<---	control	-.010	.024	-.408	.684
teaching5	<---	ranknew	-.016	.013	-1.288	.198
teaching4	<---	ranknew	-.022	.015	-1.461	.144
teaching3	<---	ranknew	.022	.010	2.192	.028
interaction1	<---	control	-.024	.030	-.817	.414
interaction2	<---	control	.041	.027	1.528	.126
interaction3	<---	control	.057	.032	1.788	.074
teaching1	<---	control	-.044	.027	-1.664	.096
teaching2	<---	control	-.006	.030	-.202	.840
teaching4	<---	control	.037	.035	1.076	.282
teaching5	<---	control	.027	.030	.900	.368
interaction1	<---	race2	-.183	.044	-4.190	<.001
interaction2	<---	race2	-.148	.038	-3.846	<.001
interaction3	<---	race2	-.256	.046	-5.599	<.001
teaching1	<---	race2	-.254	.039	-6.512	<.001
teaching2	<---	race2	-.201	.044	-4.575	<.001
teaching3	<---	race2	-.190	.034	-5.578	<.001
teaching4	<---	race2	-.261	.051	-5.143	<.001
teaching5	<---	race2	-.174	.044	-3.984	<.001
interaction1	<---	Social	.168	.036	4.674	<.001
interaction2	<---	Social	.232	.032	7.166	<.001
interaction3	<---	Social	-.079	.038	-2.055	.040
teaching1	<---	Social	.150	.032	4.684	<.001
teaching2	<---	Social	.394	.036	10.887	<.001
teaching3	<---	Social	.182	.029	6.383	<.001
teaching4	<---	Social	.205	.042	4.910	<.001
teaching5	<---	Social	-.157	.036	-4.319	<.001
interaction1	<---	e6	.793	.010	75.604	<.001
interaction2	<---	e7	.697	.009	73.637	<.001
interaction3	<---	e8	.831	.011	73.905	<.001
teaching1	<---	e9	.708	.009	75.490	<.001
teaching2	<---	e10	.798	.011	75.499	<.001
teaching3	<---	e11	.617	.008	74.042	<.001
teaching4	<---	e12	.924	.012	75.539	<.001
teaching5	<---	e13	.791	.011	74.678	<.001

Standardized Regression Weights

		Estimate
expectations1	<--- carnegienew	-.032
attitude1	<--- carnegienew	-.070
attitude2	<--- carnegienew	-.017
attitude3	<--- carnegienew	-.037
expectations1	<--- sexnew	.045
attitude1	<--- sexnew	.166
attitude2	<--- sexnew	.108
attitude3	<--- sexnew	.070
expectations1	<--- ranknew	.110
attitude1	<--- ranknew	-.039
attitude2	<--- ranknew	-.023
attitude3	<--- ranknew	.080
expectations1	<--- control	-.005
attitude1	<--- control	-.007
attitude2	<--- control	-.005
attitude3	<--- control	-.014
expectations1	<--- race2	-.036
attitude1	<--- race2	-.178
attitude2	<--- race2	-.142
attitude3	<--- race2	-.107
expectations1	<--- e1	.992
attitude1	<--- e2	.967
attitude2	<--- e3	.983
attitude3	<--- e4	.988
Social	<--- carnegienew	-.042
Social	<--- sexnew	.095
Social	<--- ranknew	-.011
Social	<--- control	-.039
Social	<--- race2	.060
Social	<--- expectations1	-.015
Social	<--- attitude1	.183
Social	<--- attitude2	-.015
Social	<--- attitude3	.022
Social	<--- e5	.973
interaction1	<--- carnegienew	-.078
interaction2	<--- carnegienew	-.056
interaction3	<--- carnegienew	.004
teaching1	<--- carnegienew	-.079
teaching2	<--- carnegienew	-.076
teaching3	<--- carnegienew	-.041
teaching4	<--- carnegienew	-.028
teaching5	<--- carnegienew	-.120
interaction1	<--- sexnew	.151
interaction2	<--- sexnew	.103
interaction3	<--- sexnew	-.020
teaching1	<--- sexnew	.170
teaching2	<--- sexnew	.146
teaching3	<--- sexnew	.083
teaching4	<--- sexnew	.146
teaching5	<--- sexnew	.005
interaction1	<--- ranknew	-.018
interaction2	<--- ranknew	.162
interaction3	<--- ranknew	.134
teaching1	<--- ranknew	-.051
teaching2	<--- ranknew	-.015
teaching3	<--- control	-.008
teaching5	<--- ranknew	-.025

teaching4	<--- ranknew	-.028
teaching3	<--- ranknew	.042
interaction1	<--- control	-.015
interaction2	<--- control	.028
interaction3	<--- control	.034
teaching1	<--- control	-.030
teaching2	<--- control	-.004
teaching4	<--- control	.020
teaching5	<--- control	.017
interaction1	<--- race2	-.080
interaction2	<--- race2	-.073
interaction3	<--- race2	-.108
teaching1	<--- race2	-.123
teaching2	<--- race2	-.086
teaching3	<--- race2	-.107
teaching4	<--- race2	-.098
teaching5	<--- race2	-.077
interaction1	<--- Social	.086
interaction2	<--- Social	.134
interaction3	<--- Social	-.039
teaching1	<--- Social	.086
teaching2	<--- Social	.197
teaching3	<--- Social	.121
teaching4	<--- Social	.091
teaching5	<--- Social	-.082
interaction1	<--- e6	.976
interaction2	<--- e7	.966
interaction3	<--- e8	.983
teaching1	<--- e9	.967
teaching2	<--- e10	.958
teaching3	<--- e11	.980
teaching4	<--- e12	.978
teaching5	<--- e13	.986

Means

	Estimate	S.E.	C.R.	P	Label
carnegienew	.396	.009	43.476	<.001	
sexnew	.458	.010	47.207	<.001	
ranknew	3.459	.024	145.608	<.001	
control	1.493	.009	160.520	<.001	
race2	.852	.007	122.404	<.001	

Intercepts

	Estimate	S.E.	C.R.	P	Label
expectations1	2.884	.100	28.881	<.001	
attitude1	2.805	.055	50.832	<.001	
attitude2	2.892	.067	42.964	<.001	
attitude3	4.193	.059	70.604	<.001	
Social	-.142	.086	-1.658	.097	
interaction1	2.873	.077	37.366	<.001	
interaction2	1.609	.068	23.514	<.001	
interaction3	1.766	.081	21.710	<.001	
teaching1	3.390	.069	49.376	<.001	
teaching2	2.338	.077	30.193	<.001	
teaching3	3.224	.060	53.395	<.001	
teaching4	2.301	.090	25.690	<.001	
teaching5	2.783	.077	36.093	<.001	

Variances

	Estimate	S.E.	C.R.	P	Label
e1	1.000				
e2	1.000				
e3	1.000				
e4	1.000				
e5	1.000				
e6	1.000				
e7	1.000				
e8	1.000				
e9	1.000				
e10	1.000				
e11	1.000				
e12	1.000				
e13	1.000				
carnegienew	.239	.006	38.007	<.001	
sexnew	.251	.007	36.416	<.001	
ranknew	1.484	.041	36.192	<.001	
control	.250	.007	38.007	<.001	
race2	.127	.004	35.991	<.001	

Squared Multiple Correlations

	Estimate
attitude3	.024
attitude2	.033
attitude1	.066
expectations1	.017
Social	.053
teaching5	.027
teaching4	.044
teaching3	.039
teaching2	.082
teaching1	.065
interaction3	.034
interaction2	.067
interaction1	.047

Artistic

Regression Weights:

		Estimate	S.E.	C.R.	P	Label
expectations1	<--- carnegienew	-.067	.040	-1.682	.093	
attitude1	<--- carnegienew	-.083	.022	-3.736	<.001	
attitude2	<--- carnegienew	-.026	.027	-.958	.338	
attitude3	<--- carnegienew	-.046	.024	-1.941	.052	
expectations1	<--- sexnew	.094	.040	2.361	.018	
attitude1	<--- sexnew	.196	.022	8.953	<.001	
attitude2	<--- sexnew	.153	.027	5.709	<.001	
attitude3	<--- sexnew	.088	.024	3.722	<.001	
expectations1	<--- ranknew	.093	.017	5.628	<.001	
attitude1	<--- ranknew	-.019	.009	-2.050	.040	
attitude2	<--- ranknew	-.013	.011	-1.212	.225	
attitude3	<--- ranknew	.041	.010	4.153	<.001	

		Estimate	S.E.	C.R.	P	Label
expectations1	<--- control	-.011	.039	-.282	.778	
attitude1	<--- control	-.008	.022	-.353	.724	
attitude2	<--- control	-.007	.026	-.267	.789	
attitude3	<--- control	-.018	.023	-.771	.441	
expectations1	<--- race2	-.103	.057	-1.800	.072	
attitude1	<--- race2	-.295	.031	-9.430	<.001	
attitude2	<--- race2	-.279	.038	-7.326	<.001	
attitude3	<--- race2	-.186	.034	-5.521	<.001	
expectations1	<--- e1	1.020	.014	74.397	<.001	
attitude1	<--- e2	.567	.008	73.920	<.001	
attitude2	<--- e3	.692	.009	74.016	<.001	
attitude3	<--- e4	.613	.008	74.621	<.001	
Artistic	<--- carnegienew	.020	.015	1.396	.163	
Artistic	<--- sexnew	.068	.015	4.532	<.001	
Artistic	<--- ranknew	-.019	.006	-3.022	.003	
Artistic	<--- control	.005	.014	.324	.746	
Artistic	<--- race2	.002	.022	.105	.916	
Artistic	<--- expectations1	.007	.007	.989	.322	
Artistic	<--- attitude1	.157	.013	12.275	<.001	
Artistic	<--- attitude2	-.168	.010	-16.037	<.001	
Artistic	<--- attitude3	.020	.012	1.701	.089	
Artistic	<--- e5	.381	.005	75.475	<.001	
interaction1	<--- carnegienew	-.138	.030	-4.533	<.001	
interaction2	<--- carnegienew	-.093	.028	-3.360	<.001	
interaction3	<--- carnegienew	.012	.032	.381	.703	
teaching1	<--- carnegienew	-.128	.027	-4.719	<.001	
teaching2	<--- carnegienew	-.150	.031	-4.845	<.001	
teaching3	<--- carnegienew	-.061	.024	-2.515	.012	
teaching4	<--- carnegienew	-.061	.035	-1.719	.086	
teaching5	<--- carnegienew	-.190	.031	-6.188	<.001	
interaction1	<--- sexnew	.264	.031	8.574	<.001	
interaction2	<--- sexnew	.183	.027	6.713	<.001	
interaction3	<--- sexnew	-.030	.032	-.920	.357	
teaching1	<--- sexnew	.253	.027	9.259	<.001	
teaching2	<--- sexnew	.273	.031	8.693	<.001	
teaching3	<--- sexnew	.127	.024	5.250	<.001	
teaching4	<--- sexnew	.317	.036	8.873	<.001	
teaching5	<--- sexnew	-.011	.031	-.369	.712	
interaction1	<--- ranknew	-.012	.013	-.965	.335	
interaction2	<--- ranknew	.092	.011	8.157	<.001	
interaction3	<--- ranknew	.090	.013	6.785	<.001	
teaching1	<--- ranknew	-.028	.011	-2.503	.012	
teaching2	<--- ranknew	-.009	.013	-.722	.470	
teaching3	<--- control	-.015	.024	-.634	.526	
teaching5	<--- ranknew	-.016	.013	-1.219	.223	
teaching4	<--- ranknew	-.028	.015	-1.871	.061	

		Estimate	S.E.	C.R.	P	Label
teaching3	<--- ranknew	.020	.010	2.002	.045	
interaction1	<--- control	-.030	.030	-.998	.318	
interaction2	<--- control	.035	.027	1.283	.199	
interaction3	<--- control	.060	.032	1.893	.058	
teaching1	<--- control	-.050	.026	-1.883	.060	
teaching2	<--- control	-.020	.030	-.654	.513	
teaching4	<--- control	.031	.035	.907	.364	
teaching5	<--- control	.032	.030	1.060	.289	
interaction1	<--- race2	-.175	.044	-3.991	<.001	
interaction2	<--- race2	-.141	.039	-3.629	<.001	
interaction3	<--- race2	-.258	.046	-5.636	<.001	
teaching1	<--- race2	-.246	.039	-6.329	<.001	
teaching2	<--- race2	-.188	.045	-4.198	<.001	
teaching3	<--- race2	-.183	.034	-5.348	<.001	
teaching4	<--- race2	-.252	.051	-4.968	<.001	
teaching5	<--- race2	-.179	.044	-4.100	<.001	
interaction1	<--- Artistic	.017	.036	.464	.642	
interaction2	<--- Artistic	-.126	.033	-3.821	<.001	
interaction3	<--- Artistic	-.161	.039	-4.133	<.001	
teaching1	<--- Artistic	.186	.032	5.728	<.001	
teaching2	<--- Artistic	.173	.037	4.646	<.001	
teaching3	<--- Artistic	-.029	.029	-.984	.325	
teaching4	<--- Artistic	-.243	.042	-5.743	<.001	
teaching5	<--- Artistic	.014	.037	.372	.710	
interaction1	<--- e6	.796	.011	75.592	<.001	
interaction2	<--- e7	.702	.010	73.637	<.001	
interaction3	<--- e8	.829	.011	73.907	<.001	
teaching1	<--- e9	.707	.009	75.496	<.001	
teaching2	<--- e10	.811	.011	75.483	<.001	
teaching3	<--- e11	.621	.008	74.040	<.001	
teaching4	<--- e12	.922	.012	75.506	<.001	
teaching5	<--- e13	.794	.011	74.676	<.001	

Standardized Regression Weights

		Estimate
expectations1	<--- carnegienew	-.032
attitude1	<--- carnegienew	-.069
attitude2	<--- carnegienew	-.018
attitude3	<--- carnegienew	-.036
expectations1	<--- sexnew	.046
attitude1	<--- sexnew	.168
attitude2	<--- sexnew	.109
attitude3	<--- sexnew	.071
expectations1	<--- ranknew	.111
attitude1	<--- ranknew	-.039

		Estimate
attitude2	<--- ranknew	-.023
attitude3	<--- ranknew	.080
expectations1	<--- control	-.005
attitude1	<--- control	-.007
attitude2	<--- control	-.005
attitude3	<--- control	-.014
expectations1	<--- race2	-.035
attitude1	<--- race2	-.178
attitude2	<--- race2	-.141
attitude3	<--- race2	-.107
expectations1	<--- e1	.992
attitude1	<--- e2	.966
attitude2	<--- e3	.984
attitude3	<--- e4	.988
Artistic	<--- carnegienew	.024
Artistic	<--- sexnew	.083
Artistic	<--- ranknew	-.055
Artistic	<--- control	.006
Artistic	<--- race2	.002
Artistic	<--- expectations1	.018
Artistic	<--- attitude1	.225
Artistic	<--- attitude2	-.288
Artistic	<--- attitude3	.030
Artistic	<--- e5	.927
interaction1	<--- carnegienew	-.083
interaction2	<--- carnegienew	-.063
interaction3	<--- carnegienew	.007
teaching1	<--- carnegienew	-.085
teaching2	<--- carnegienew	-.088
teaching3	<--- carnegienew	-.047
teaching4	<--- carnegienew	-.031
teaching5	<--- carnegienew	-.116
interaction1	<--- sexnew	.163
interaction2	<--- sexnew	.127
interaction3	<--- sexnew	-.018
teaching1	<--- sexnew	.173
teaching2	<--- sexnew	.164
teaching3	<--- sexnew	.101
teaching4	<--- sexnew	.168
teaching5	<--- sexnew	-.007
interaction1	<--- ranknew	-.018
interaction2	<--- ranknew	.155
interaction3	<--- ranknew	.130
teaching1	<--- ranknew	-.047
teaching2	<--- ranknew	-.014
teaching3	<--- control	-.012

		Estimate
teaching5	<--- ranknew	-.024
teaching4	<--- ranknew	-.036
teaching3	<--- ranknew	.039
interaction1	<--- control	-.018
interaction2	<--- control	.024
interaction3	<--- control	.035
teaching1	<--- control	-.034
teaching2	<--- control	-.012
teaching4	<--- control	.017
teaching5	<--- control	.020
interaction1	<--- race2	-.077
interaction2	<--- race2	-.069
interaction3	<--- race2	-.108
teaching1	<--- race2	-.119
teaching2	<--- race2	-.080
teaching3	<--- race2	-.104
teaching4	<--- race2	-.095
teaching5	<--- race2	-.079
interaction1	<--- Artistic	.009
interaction2	<--- Artistic	-.072
interaction3	<--- Artistic	-.078
teaching1	<--- Artistic	.104
teaching2	<--- Artistic	.085
teaching3	<--- Artistic	-.019
teaching4	<--- Artistic	-.106
teaching5	<--- Artistic	.007
interaction1	<--- e6	.980
interaction2	<--- e7	.972
interaction3	<--- e8	.981
teaching1	<--- e9	.965
teaching2	<--- e10	.974
teaching3	<--- e11	.987
teaching4	<--- e12	.976
teaching5	<--- e13	.990

Means:

	Estimate	S.E.	C.R.	P	Label
carnegienew	.396	.009	43.476	<.001	
sexnew	.457	.010	47.128	<.001	
ranknew	3.459	.024	145.655	<.001	
control	1.493	.009	160.520	<.001	
race2	.852	.007	122.474	<.001	

Intercepts

	Estimate	S.E.	C.R.	P	Label
expectations1	2.879	.100	28.823	<.001	
attitude1	2.802	.055	50.784	<.001	
attitude2	2.893	.067	43.024	<.001	
attitude3	4.193	.059	70.579	<.001	
Artistic	.164	.080	2.044	.041	
interaction1	2.906	.077	37.659	<.001	
interaction2	1.692	.069	24.570	<.001	
interaction3	1.785	.081	21.995	<.001	
teaching1	3.381	.069	49.352	<.001	
teaching2	2.393	.079	30.398	<.001	
teaching3	3.272	.061	53.823	<.001	
teaching4	2.403	.089	26.869	<.001	
teaching5	2.746	.077	35.500	<.001	

Variances

	Estimate	S.E.	C.R.	P	Label
e1	1.000				
e2	1.000				
e3	1.000				
e4	1.000				
e5	1.000				
e6	1.000				
e7	1.000				
e8	1.000				
e9	1.000				
e10	1.000				
e11	1.000				
e12	1.000				
e13	1.000				
carnegienew	.239	.006	38.007	<.001	
sexnew	.252	.007	36.420	<.001	
ranknew	1.483	.041	36.192	<.001	
control	.250	.007	38.007	<.001	
race2	.126	.004	35.989	<.001	

Squared Multiple Correlations

	Estimate
attitude3	.024
attitude2	.033
attitude1	.066
expectations1	.017
Artistic	.140
teaching5	.021
teaching4	.047
teaching3	.025
teaching2	.051
teaching1	.069
interaction3	.038
interaction2	.054
interaction1	.040

Enterprising

Regression Weights

			Estimate	S.E.	C.R.	P	Label
expectations1	<---	carnegienew	-.067	.040	-1.689	.091	
attitude1	<---	carnegienew	-.083	.022	-3.768	<.001	
attitude2	<---	carnegienew	-.025	.027	-.915	.360	
attitude3	<---	carnegienew	-.046	.024	-1.945	.052	
expectations1	<---	sexnew	.093	.040	2.329	.020	
attitude1	<---	sexnew	.196	.022	8.927	<.001	
attitude2	<---	sexnew	.154	.027	5.745	<.001	
attitude3	<---	sexnew	.088	.024	3.721	<.001	
expectations1	<---	ranknew	.093	.017	5.611	<.001	
attitude1	<---	ranknew	-.019	.009	-2.044	.041	
attitude2	<---	ranknew	-.013	.011	-1.166	.244	
attitude3	<---	ranknew	.040	.010	4.107	<.001	
expectations1	<---	control	-.011	.039	-.281	.779	
attitude1	<---	control	-.008	.022	-.372	.710	
attitude2	<---	control	-.006	.026	-.237	.813	
attitude3	<---	control	-.018	.023	-.771	.441	
expectations1	<---	race2	-.103	.057	-1.803	.071	
attitude1	<---	race2	-.294	.031	-9.408	<.001	
attitude2	<---	race2	-.281	.038	-7.359	<.001	
attitude3	<---	race2	-.186	.034	-5.520	<.001	
expectations1	<---	e1	1.020	.014	74.398	<.001	
attitude1	<---	e2	.567	.008	73.918	<.001	
attitude2	<---	e3	.692	.009	74.015	<.001	
attitude3	<---	e4	.613	.008	74.622	<.001	
enterprising	<---	carnegienew	-.048	.013	-3.625	<.001	
enterprising	<---	sexnew	-.080	.014	-5.820	<.001	
enterprising	<---	ranknew	-.021	.006	-3.749	<.001	
enterprising	<---	control	-.031	.013	-2.403	.016	
enterprising	<---	race2	-.006	.020	-.322	.747	
enterprising	<---	expectations1	-.008	.006	-1.283	.199	
enterprising	<---	attitude1	-.095	.012	-8.111	<.001	
enterprising	<---	attitude2	.149	.010	15.609	<.001	
enterprising	<---	attitude3	-.010	.011	-.978	.328	
enterprising	<---	e5	.346	.005	75.534	<.001	

interaction1	<---	carnegienew	-.133	.030	-4.384	<.001
interaction2	<---	carnegienew	-.091	.028	-3.307	<.001
interaction3	<---	carnegienew	.002	.032	.070	.944
teaching1	<---	carnegienew	-.124	.027	-4.568	<.001
teaching2	<---	carnegienew	-.150	.031	-4.809	<.001
teaching3	<---	carnegienew	-.061	.024	-2.495	.013
teaching4	<---	carnegienew	-.062	.036	-1.751	.080
teaching5	<---	carnegienew	-.183	.031	-5.956	<.001
interaction1	<---	sexnew	.272	.031	8.839	<.001
interaction2	<---	sexnew	.177	.027	6.455	<.001
interaction3	<---	sexnew	-.059	.032	-1.820	.069
teaching1	<---	sexnew	.269	.028	9.754	<.001
teaching2	<---	sexnew	.283	.032	8.951	<.001
teaching3	<---	sexnew	.125	.024	5.184	<.001
teaching4	<---	sexnew	.299	.036	8.330	<.001
teaching5	<---	sexnew	.005	.031	.149	.882
interaction1	<---	ranknew	-.011	.013	-.830	.406
interaction2	<---	ranknew	.096	.011	8.443	<.001
interaction3	<---	ranknew	.089	.013	6.676	<.001
teaching1	<---	ranknew	-.031	.011	-2.748	.006
teaching2	<---	ranknew	-.013	.013	-.999	.318
teaching3	<---	control	-.015	.024	-.623	.534
teaching5	<---	ranknew	-.011	.013	-.893	.372
teaching4	<---	ranknew	-.022	.015	-1.485	.138
teaching3	<---	ranknew	.021	.010	2.070	.038
interaction1	<---	control	-.027	.030	-.896	.370
interaction2	<---	control	.036	.027	1.319	.187
interaction3	<---	control	.052	.032	1.647	.100
teaching1	<---	control	-.048	.027	-1.815	.069
teaching2	<---	control	-.020	.031	-.670	.503
teaching4	<---	control	.031	.035	.892	.373
teaching5	<---	control	.038	.030	1.261	.207
interaction1	<---	race2	-.173	.044	-3.956	<.001
interaction2	<---	race2	-.140	.039	-3.602	<.001
interaction3	<---	race2	-.261	.046	-5.725	<.001
teaching1	<---	race2	-.246	.039	-6.290	<.001
teaching2	<---	race2	-.189	.045	-4.210	<.001
teaching3	<---	race2	-.183	.034	-5.342	<.001
teaching4	<---	race2	-.252	.051	-4.927	<.001
teaching5	<---	race2	-.176	.044	-4.035	<.001
interaction1	<---	enterprising	.097	.041	2.377	.017
interaction2	<---	enterprising	.048	.037	1.289	.198
interaction3	<---	enterprising	-.223	.043	-5.160	<.001
teaching1	<---	enterprising	.026	.036	.710	.478
teaching2	<---	enterprising	-.035	.042	-.847	.397
teaching3	<---	enterprising	.012	.032	.378	.706
teaching4	<---	enterprising	.011	.047	.234	.815
teaching5	<---	enterprising	.180	.041	4.385	<.001
interaction1	<---	e6	.795	.011	75.584	<.001
interaction2	<---	e7	.703	.010	73.634	<.001
interaction3	<---	e8	.828	.011	73.905	<.001
teaching1	<---	e9	.711	.009	75.476	<.001
teaching2	<---	e10	.814	.011	75.474	<.001
teaching3	<---	e11	.622	.008	74.040	<.001
teaching4	<---	e12	.928	.012	75.527	<.001
teaching5	<---	e13	.791	.011	74.679	<.001

Standardized Regression Weights

			Estimate
expectations1	<---	carnegienew	-.032
attitude1	<---	carnegienew	-.070
attitude2	<---	carnegienew	-.017
attitude3	<---	carnegienew	-.036
expectations1	<---	sexnew	.045
attitude1	<---	sexnew	.167
attitude2	<---	sexnew	.110
attitude3	<---	sexnew	.071
expectations1	<---	ranknew	.110
attitude1	<---	ranknew	-.039
attitude2	<---	ranknew	-.022
attitude3	<---	ranknew	.079
expectations1	<---	control	-.005
attitude1	<---	control	-.007
attitude2	<---	control	-.004
attitude3	<---	control	-.014
expectations1	<---	race2	-.036
attitude1	<---	race2	-.178
attitude2	<---	race2	-.142
attitude3	<---	race2	-.107
expectations1	<---	e1	.992
attitude1	<---	e2	.966
attitude2	<---	e3	.983
attitude3	<---	e4	.988
enterprising	<---	carnegienew	-.064
enterprising	<---	sexnew	-.108
enterprising	<---	ranknew	-.069
enterprising	<---	control	-.042
enterprising	<---	race2	-.006
enterprising	<---	expectations1	-.023
enterprising	<---	attitude1	-.150
enterprising	<---	attitude2	.283
enterprising	<---	attitude3	-.018
enterprising	<---	e5	.937
interaction1	<---	carnegienew	-.080
interaction2	<---	carnegienew	-.062
interaction3	<---	carnegienew	.001
teaching1	<---	carnegienew	-.083
teaching2	<---	carnegienew	-.088
teaching3	<---	carnegienew	-.047
teaching4	<---	carnegienew	-.032
teaching5	<---	carnegienew	-.111
interaction1	<---	sexnew	.168
interaction2	<---	sexnew	.123
interaction3	<---	sexnew	-.035
teaching1	<---	sexnew	.184
teaching2	<---	sexnew	.170
teaching3	<---	sexnew	.100
teaching4	<---	sexnew	.159
teaching5	<---	sexnew	.003
interaction1	<---	ranknew	-.016
interaction2	<---	ranknew	.161
interaction3	<---	ranknew	.128
teaching1	<---	ranknew	-.052
teaching2	<---	ranknew	-.019
teaching3	<---	control	-.012
teaching5	<---	ranknew	-.017

teaching4	<---	ranknew	-.029
teaching3	<---	ranknew	.040
interaction1	<---	control	-.016
interaction2	<---	control	.025
interaction3	<---	control	.031
teaching1	<---	control	-.033
teaching2	<---	control	-.012
teaching4	<---	control	.016
teaching5	<---	control	.024
interaction1	<---	race2	-.076
interaction2	<---	race2	-.069
interaction3	<---	race2	-.110
teaching1	<---	race2	-.119
teaching2	<---	race2	-.081
teaching3	<---	race2	-.103
teaching4	<---	race2	-.095
teaching5	<---	race2	-.078
interaction1	<---	enterprising	.044
interaction2	<---	enterprising	.024
interaction3	<---	enterprising	-.098
teaching1	<---	enterprising	.013
teaching2	<---	enterprising	-.016
teaching3	<---	enterprising	.007
teaching4	<---	enterprising	.004
teaching5	<---	enterprising	.083
interaction1	<---	e6	.979
interaction2	<---	e7	.975
interaction3	<---	e8	.979
teaching1	<---	e9	.970
teaching2	<---	e10	.978
teaching3	<---	e11	.988
teaching4	<---	e12	.982
teaching5	<---	e13	.986

Means

	Estimate	S.E.	C.R.	P	Label
carnegienew	.396	.009	43.476	<.001	
sexnew	.458	.010	47.217	<.001	
ranknew	3.460	.024	145.689	<.001	
control	1.493	.009	160.520	<.001	
race2	.852	.007	122.480	<.001	

Intercepts

	Estimate	S.E.	C.R.	P	Label
expectations1	2.880	.100	28.840	<.001	
attitude1	2.803	.055	50.793	<.001	
attitude2	2.888	.067	42.946	<.001	
attitude3	4.195	.059	70.601	<.001	
enterprising	.252	.073	3.444	<.001	
interaction1	2.876	.078	36.859	<.001	
interaction2	1.646	.070	23.563	<.001	
interaction3	1.825	.082	22.252	<.001	
teaching1	3.415	.070	48.967	<.001	
teaching2	2.444	.080	30.560	<.001	
teaching3	3.262	.062	53.001	<.001	
teaching4	2.341	.091	25.711	<.001	
teaching5	2.684	.078	34.394	<.001	

Variances

	Estimate	S.E.	C.R.	P	Label
e1	1.000				
e2	1.000				
e3	1.000				
e4	1.000				
e5	1.000				
e6	1.000				
e7	1.000				
e8	1.000				
e9	1.000				
e10	1.000				
e11	1.000				
e12	1.000				
e13	1.000				
carnegienew	.239	.006	38.007	<.001	
sexnew	.252	.007	36.423	<.001	
ranknew	1.483	.041	36.192	<.001	
control	.250	.007	38.007	<.001	
race2	.126	.004	35.989	<.001	

Squared Multiple Correlations

	Estimate
attitude3	.024
attitude2	.033
attitude1	.066
expectations1	.017
enterprising	.121
teaching5	.027
teaching4	.036
teaching3	.025
teaching2	.044
teaching1	.059
interaction3	.041
interaction2	.050
interaction1	.042

Enterprising

Regression Weights

			Estimate	S.E.	C.R.	P	Label
expectations1	<---	carnegienew	-.067	.040	-1.689	.091	
attitude1	<---	carnegienew	-.083	.022	-3.768	<.001	
attitude2	<---	carnegienew	-.025	.027	-.915	.360	
attitude3	<---	carnegienew	-.046	.024	-1.945	.052	
expectations1	<---	sexnew	.093	.040	2.329	.020	
attitude1	<---	sexnew	.196	.022	8.927	<.001	
attitude2	<---	sexnew	.154	.027	5.745	<.001	
attitude3	<---	sexnew	.088	.024	3.721	<.001	
expectations1	<---	ranknew	.093	.017	5.611	<.001	
attitude1	<---	ranknew	-.019	.009	-2.044	.041	
attitude2	<---	ranknew	-.013	.011	-1.166	.244	
attitude3	<---	ranknew	.040	.010	4.107	<.001	
expectations1	<---	control	-.011	.039	-.281	.779	
attitude1	<---	control	-.008	.022	-.372	.710	
attitude2	<---	control	-.006	.026	-.237	.813	
attitude3	<---	control	-.018	.023	-.771	.441	
expectations1	<---	race2	-.103	.057	-1.803	.071	

attitude1	<---	race2	-.294	.031	-9.408	<.001
attitude2	<---	race2	-.281	.038	-7.359	<.001
attitude3	<---	race2	-.186	.034	-5.520	<.001
expectations1	<---	e1	1.020	.014	74.398	<.001
attitude1	<---	e2	.567	.008	73.918	<.001
attitude2	<---	e3	.692	.009	74.015	<.001
attitude3	<---	e4	.613	.008	74.622	<.001
enterprising	<---	carnegienew	-.048	.013	-3.625	<.001
enterprising	<---	sexnew	-.080	.014	-5.820	<.001
enterprising	<---	ranknew	-.021	.006	-3.749	<.001
enterprising	<---	control	-.031	.013	-2.403	.016
enterprising	<---	race2	-.006	.020	-.322	.747
enterprising	<---	expectations1	-.008	.006	-1.283	.199
enterprising	<---	attitude1	-.095	.012	-8.111	<.001
enterprising	<---	attitude2	.149	.010	15.609	<.001
enterprising	<---	attitude3	-.010	.011	-.978	.328
enterprising	<---	e5	.346	.005	75.534	<.001
interaction1	<---	carnegienew	-.133	.030	-4.384	<.001
interaction2	<---	carnegienew	-.091	.028	-3.307	<.001
interaction3	<---	carnegienew	.002	.032	.070	.944
teaching1	<---	carnegienew	-.124	.027	-4.568	<.001
teaching2	<---	carnegienew	-.150	.031	-4.809	<.001
teaching3	<---	carnegienew	-.061	.024	-2.495	.013
teaching4	<---	carnegienew	-.062	.036	-1.751	.080
teaching5	<---	carnegienew	-.183	.031	-5.956	<.001
interaction1	<---	sexnew	.272	.031	8.839	<.001
interaction2	<---	sexnew	.177	.027	6.455	<.001
interaction3	<---	sexnew	-.059	.032	-1.820	.069
teaching1	<---	sexnew	.269	.028	9.754	<.001
teaching2	<---	sexnew	.283	.032	8.951	<.001
teaching3	<---	sexnew	.125	.024	5.184	<.001
teaching4	<---	sexnew	.299	.036	8.330	<.001
teaching5	<---	sexnew	.005	.031	.149	.882
interaction1	<---	ranknew	-.011	.013	-.830	.406
interaction2	<---	ranknew	.096	.011	8.443	<.001
interaction3	<---	ranknew	.089	.013	6.676	<.001
teaching1	<---	ranknew	-.031	.011	-2.748	.006
teaching2	<---	ranknew	-.013	.013	-.999	.318
teaching3	<---	control	-.015	.024	-.623	.534
teaching5	<---	ranknew	-.011	.013	-.893	.372
teaching4	<---	ranknew	-.022	.015	-1.485	.138
teaching3	<---	ranknew	.021	.010	2.070	.038
interaction1	<---	control	-.027	.030	-.896	.370
interaction2	<---	control	.036	.027	1.319	.187
interaction3	<---	control	.052	.032	1.647	.100
teaching1	<---	control	-.048	.027	-1.815	.069
teaching2	<---	control	-.020	.031	-.670	.503
teaching4	<---	control	.031	.035	.892	.373
teaching5	<---	control	.038	.030	1.261	.207
interaction1	<---	race2	-.173	.044	-3.956	<.001
interaction2	<---	race2	-.140	.039	-3.602	<.001
interaction3	<---	race2	-.261	.046	-5.725	<.001
teaching1	<---	race2	-.246	.039	-6.290	<.001
teaching2	<---	race2	-.189	.045	-4.210	<.001
teaching3	<---	race2	-.183	.034	-5.342	<.001
teaching4	<---	race2	-.252	.051	-4.927	<.001
teaching5	<---	race2	-.176	.044	-4.035	<.001
interaction1	<---	enterprising	.097	.041	2.377	.017
interaction2	<---	enterprising	.048	.037	1.289	.198
interaction3	<---	enterprising	-.223	.043	-5.160	<.001

teaching1	<---	enterprising	.026	.036	.710	.478
teaching2	<---	enterprising	-.035	.042	-.847	.397
teaching3	<---	enterprising	.012	.032	.378	.706
teaching4	<---	enterprising	.011	.047	.234	.815
teaching5	<---	enterprising	.180	.041	4.385	<.001
interaction1	<---	e6	.795	.011	75.584	<.001
interaction2	<---	e7	.703	.010	73.634	<.001
interaction3	<---	e8	.828	.011	73.905	<.001
teaching1	<---	e9	.711	.009	75.476	<.001
teaching2	<---	e10	.814	.011	75.474	<.001
teaching3	<---	e11	.622	.008	74.040	<.001
teaching4	<---	e12	.928	.012	75.527	<.001
teaching5	<---	e13	.791	.011	74.679	<.001

Standardized Regression Weights

			Estimate
expectations1	<---	carnegienew	-.032
attitude1	<---	carnegienew	-.070
attitude2	<---	carnegienew	-.017
attitude3	<---	carnegienew	-.036
expectations1	<---	sexnew	.045
attitude1	<---	sexnew	.167
attitude2	<---	sexnew	.110
attitude3	<---	sexnew	.071
expectations1	<---	ranknew	.110
attitude1	<---	ranknew	-.039
attitude2	<---	ranknew	-.022
attitude3	<---	ranknew	.079
expectations1	<---	control	-.005
attitude1	<---	control	-.007
attitude2	<---	control	-.004
attitude3	<---	control	-.014
expectations1	<---	race2	-.036
attitude1	<---	race2	-.178
attitude2	<---	race2	-.142
attitude3	<---	race2	-.107
expectations1	<---	e1	.992
attitude1	<---	e2	.966
attitude2	<---	e3	.983
attitude3	<---	e4	.988
Enterprising	<---	carnegienew	-.064
Enterprising	<---	sexnew	-.108
Enterprising	<---	ranknew	-.069
Enterprising	<---	control	-.042
Enterprising	<---	race2	-.006
Enterprising	<---	expectations1	-.023
Enterprising	<---	attitude1	-.150
Enterprising	<---	attitude2	.283
Enterprising	<---	attitude3	-.018
Enterprising	<---	e5	.937
interaction1	<---	carnegienew	-.080
interaction2	<---	carnegienew	-.062
interaction3	<---	carnegienew	.001
teaching1	<---	carnegienew	-.083
teaching2	<---	carnegienew	-.088
teaching3	<---	carnegienew	-.047
teaching4	<---	carnegienew	-.032
teaching5	<---	carnegienew	-.111
interaction1	<---	sexnew	.168
interaction2	<---	sexnew	.123

interaction3	<---	sexnew	-.035
teaching1	<---	sexnew	.184
teaching2	<---	sexnew	.170
teaching3	<---	sexnew	.100
teaching4	<---	sexnew	.159
teaching5	<---	sexnew	.003
interaction1	<---	ranknew	-.016
interaction2	<---	ranknew	.161
interaction3	<---	ranknew	.128
teaching1	<---	ranknew	-.052
teaching2	<---	ranknew	-.019
teaching3	<---	control	-.012
teaching5	<---	ranknew	-.017
teaching4	<---	ranknew	-.029
teaching3	<---	ranknew	.040
interaction1	<---	control	-.016
interaction2	<---	control	.025
interaction3	<---	control	.031
teaching1	<---	control	-.033
teaching2	<---	control	-.012
teaching4	<---	control	.016
teaching5	<---	control	.024
interaction1	<---	race2	-.076
interaction2	<---	race2	-.069
interaction3	<---	race2	-.110
teaching1	<---	race2	-.119
teaching2	<---	race2	-.081
teaching3	<---	race2	-.103
teaching4	<---	race2	-.095
teaching5	<---	race2	-.078
interaction1	<---	enterprising	.044
interaction2	<---	enterprising	.024
interaction3	<---	enterprising	-.098
teaching1	<---	enterprising	.013
teaching2	<---	enterprising	-.016
teaching3	<---	enterprising	.007
teaching4	<---	enterprising	.004
teaching5	<---	enterprising	.083
interaction1	<---	e6	.979
interaction2	<---	e7	.975
interaction3	<---	e8	.979
teaching1	<---	e9	.970
teaching2	<---	e10	.978
teaching3	<---	e11	.988
teaching4	<---	e12	.982
teaching5	<---	e13	.986

Means

	Estimate	S.E.	C.R.	P	Label
carnegienew	.396	.009	43.476	<.001	
sexnew	.458	.010	47.217	<.001	
ranknew	3.460	.024	145.689	<.001	
control	1.493	.009	160.520	<.001	
race2	.852	.007	122.480	<.001	

Intercepts

	Estimate	S.E.	C.R.	P	Label
expectations1	2.880	.100	28.840	<.001	
attitude1	2.803	.055	50.793	<.001	
attitude2	2.888	.067	42.946	<.001	
attitude3	4.195	.059	70.601	<.001	
enterprising	.252	.073	3.444	<.001	
interaction1	2.876	.078	36.859	<.001	
interaction2	1.646	.070	23.563	<.001	
interaction3	1.825	.082	22.252	<.001	
teaching1	3.415	.070	48.967	<.001	
teaching2	2.444	.080	30.560	<.001	
teaching3	3.262	.062	53.001	<.001	
teaching4	2.341	.091	25.711	<.001	
teaching5	2.684	.078	34.394	<.001	

Variances

	Estimate	S.E.	C.R.	P	Label
e1	1.000				
e2	1.000				
e3	1.000				
e4	1.000				
e5	1.000				
e6	1.000				
e7	1.000				
e8	1.000				
e9	1.000				
e10	1.000				
e11	1.000				
e12	1.000				
e13	1.000				
carnegienew	.239	.006	38.007	<.001	
sexnew	.252	.007	36.423	<.001	
ranknew	1.483	.041	36.192	<.001	
control	.250	.007	38.007	<.001	
race2	.126	.004	35.989	<.001	

Squared Multiple Correlations

	Estimate
attitude3	.024
attitude2	.033
attitude1	.066
expectations1	.017
enterprising	.121
teaching5	.027
teaching4	.036
teaching3	.025
teaching2	.044
teaching1	.059
interaction3	.041
interaction2	.050
interaction1	.042

Conventional

Regression Weights

			Estimate	S.E.	C.R.	P	Label
expectations1	<---	carnegienew	-.067	.040	-1.684	.092	
attitude1	<---	carnegienew	-.084	.022	-3.808	<.001	
attitude2	<---	carnegienew	-.024	.027	-.876	.381	
attitude3	<---	carnegienew	-.046	.024	-1.953	.051	
expectations1	<---	sexnew	.094	.040	2.350	.019	
attitude1	<---	sexnew	.196	.022	8.935	<.001	
attitude2	<---	sexnew	.153	.027	5.716	<.001	
attitude3	<---	sexnew	.088	.024	3.715	<.001	
expectations1	<---	ranknew	.093	.017	5.623	<.001	
attitude1	<---	ranknew	-.019	.009	-2.041	.041	
attitude2	<---	ranknew	-.013	.011	-1.184	.236	
attitude3	<---	ranknew	.041	.010	4.145	<.001	
expectations1	<---	control	-.011	.039	-.281	.779	
attitude1	<---	control	-.007	.022	-.332	.740	
attitude2	<---	control	-.008	.026	-.286	.775	
attitude3	<---	control	-.018	.023	-.766	.444	
expectations1	<---	race2	-.102	.057	-1.790	.073	
attitude1	<---	race2	-.294	.031	-9.409	<.001	
attitude2	<---	race2	-.280	.038	-7.334	<.001	
attitude3	<---	race2	-.186	.034	-5.504	<.001	
expectations1	<---	e1	1.020	.014	74.397	<.001	
attitude1	<---	e2	.567	.008	73.917	<.001	
attitude2	<---	e3	.692	.009	74.004	<.001	
attitude3	<---	e4	.613	.008	74.622	<.001	
conventional	<---	carnegienew	-.009	.005	-1.938	.053	
conventional	<---	sexnew	.004	.005	.926	.354	
conventional	<---	ranknew	.001	.002	.658	.511	
conventional	<---	control	.002	.005	.543	.587	
conventional	<---	race2	-.006	.007	-.820	.412	
conventional	<---	expectations1	.005	.002	2.215	.027	
conventional	<---	attitude1	-.025	.004	-6.135	<.001	
conventional	<---	attitude2	.015	.003	4.375	<.001	
conventional	<---	attitude3	-.003	.004	-.912	.362	
conventional	<---	e5	.121	.002	75.924	<.001	
interaction1	<---	carnegienew	-.139	.030	-4.563	<.001	
interaction2	<---	carnegienew	-.095	.028	-3.434	<.001	
interaction3	<---	carnegienew	.007	.032	.230	.818	
teaching1	<---	carnegienew	-.127	.027	-4.688	<.001	
teaching2	<---	carnegienew	-.154	.031	-4.976	<.001	
teaching3	<---	carnegienew	-.063	.024	-2.617	.009	
teaching4	<---	carnegienew	-.066	.035	-1.859	.063	
teaching5	<---	carnegienew	-.187	.031	-6.096	<.001	
interaction1	<---	sexnew	.265	.031	8.656	<.001	
interaction2	<---	sexnew	.174	.027	6.390	<.001	
interaction3	<---	sexnew	-.041	.032	-1.278	.201	
teaching1	<---	sexnew	.268	.027	9.795	<.001	
teaching2	<---	sexnew	.287	.031	9.206	<.001	
teaching3	<---	sexnew	.125	.024	5.215	<.001	
teaching4	<---	sexnew	.298	.036	8.359	<.001	
teaching5	<---	sexnew	-.010	.031	-.336	.737	
interaction1	<---	ranknew	-.012	.013	-.964	.335	
interaction2	<---	ranknew	.095	.011	8.405	<.001	
interaction3	<---	ranknew	.095	.013	7.101	<.001	
teaching1	<---	ranknew	-.031	.011	-2.731	.006	
teaching2	<---	ranknew	-.011	.013	-.846	.397	

teaching3	<---	control	-.014	.024	-.604	.546
teaching5	<---	ranknew	-.016	.013	-1.251	.211
teaching4	<---	ranknew	-.022	.015	-1.492	.136
teaching3	<---	ranknew	.021	.010	2.111	.035
interaction1	<---	control	-.029	.030	-.986	.324
interaction2	<---	control	.035	.027	1.278	.201
interaction3	<---	control	.061	.032	1.917	.055
teaching1	<---	control	-.049	.027	-1.826	.068
teaching2	<---	control	-.018	.030	-.582	.561
teaching4	<---	control	.032	.035	.912	.362
teaching5	<---	control	.031	.030	1.026	.305
interaction1	<---	race2	-.175	.044	-3.990	<.001
interaction2	<---	race2	-.141	.039	-3.634	<.001
interaction3	<---	race2	-.258	.046	-5.639	<.001
teaching1	<---	race2	-.247	.039	-6.312	<.001
teaching2	<---	race2	-.189	.045	-4.248	<.001
teaching3	<---	race2	-.183	.034	-5.355	<.001
teaching4	<---	race2	-.253	.051	-4.953	<.001
teaching5	<---	race2	-.179	.044	-4.097	<.001
interaction1	<---	conventional	-.146	.121	-1.202	.229
interaction2	<---	conventional	-.155	.110	-1.408	.159
interaction3	<---	conventional	-.444	.129	-3.436	<.001
teaching1	<---	conventional	-.243	.108	-2.241	.025
teaching2	<---	conventional	-.731	.123	-5.916	<.001
teaching3	<---	conventional	-.265	.097	-2.743	.006
teaching4	<---	conventional	-.398	.141	-2.816	.005
teaching5	<---	conventional	.343	.122	2.804	.005
interaction1	<---	e6	.796	.011	75.590	<.001
interaction2	<---	e7	.703	.010	73.635	<.001
interaction3	<---	e8	.830	.011	73.901	<.001
teaching1	<---	e9	.710	.009	75.475	<.001
teaching2	<---	e10	.810	.011	75.466	<.001
teaching3	<---	e11	.621	.008	74.040	<.001
teaching4	<---	e12	.926	.012	75.526	<.001
teaching5	<---	e13	.793	.011	74.676	<.001

Standardized Regression Weights

		Estimate
expectations1	<--- carnegienew	-.032
attitude1	<--- carnegienew	-.070
attitude2	<--- carnegienew	-.016
attitude3	<--- carnegienew	-.037
expectations1	<--- Sexnew	.046
attitude1	<--- Sexnew	.167
attitude2	<--- Sexnew	.109
attitude3	<--- Sexnew	.071
expectations1	<--- Ranknew	.110
attitude1	<--- Ranknew	-.039
attitude2	<--- Ranknew	-.023
attitude3	<--- Ranknew	.080
expectations1	<--- Control	-.005
attitude1	<--- Control	-.006
attitude2	<--- Control	-.005
attitude3	<--- Control	-.014
expectations1	<--- race2	-.035
attitude1	<--- race2	-.178
attitude2	<--- race2	-.141
attitude3	<--- race2	-.106
expectations1	<--- e1	.992
attitude1	<--- e2	.966

attitude2	<--- e3	.984
attitude3	<--- e4	.988
conventional	<--- carnegienew	-.036
conventional	<--- Sexnew	.018
conventional	<--- Ranknew	.013
conventional	<--- Control	.010
conventional	<--- race2	-.016
conventional	<--- expectations1	.042
conventional	<--- attitude1	-.120
conventional	<--- attitude2	.084
conventional	<--- attitude3	-.017
conventional	<--- e5	.988
interaction1	<--- carnegienew	-.084
interaction2	<--- carnegienew	-.064
interaction3	<--- carnegienew	.004
teaching1	<--- carnegienew	-.085
teaching2	<--- carnegienew	-.091
teaching3	<--- carnegienew	-.049
teaching4	<--- carnegienew	-.034
teaching5	<--- carnegienew	-.114
interaction1	<--- Sexnew	.164
interaction2	<--- Sexnew	.121
interaction3	<--- Sexnew	-.024
teaching1	<--- Sexnew	.183
teaching2	<--- Sexnew	.173
teaching3	<--- Sexnew	.100
teaching4	<--- Sexnew	.158
teaching5	<--- Sexnew	-.006
interaction1	<--- Ranknew	-.018
interaction2	<--- Ranknew	.160
interaction3	<--- Ranknew	.136
teaching1	<--- Ranknew	-.052
teaching2	<--- Ranknew	-.016
teaching3	<--- Control	-.011
teaching5	<--- Ranknew	-.024
teaching4	<--- Ranknew	-.029
teaching3	<--- Ranknew	.041
interaction1	<--- Control	-.018
interaction2	<--- Control	.024
interaction3	<--- Control	.036
teaching1	<--- Control	-.033
teaching2	<--- Control	-.011
teaching4	<--- Control	.017
teaching5	<--- Control	.019
interaction1	<--- race2	-.076
interaction2	<--- race2	-.070
interaction3	<--- race2	-.109
teaching1	<--- race2	-.120
teaching2	<--- race2	-.081
teaching3	<--- race2	-.104
teaching4	<--- race2	-.095
teaching5	<--- race2	-.079
interaction1	<--- conventional	-.022
interaction2	<--- conventional	-.026
interaction3	<--- conventional	-.065
teaching1	<--- conventional	-.041
teaching2	<--- conventional	-.108
teaching3	<--- conventional	-.052
teaching4	<--- conventional	-.052
teaching5	<--- conventional	.052

interaction1	<--- e6	.979
interaction2	<--- e7	.975
interaction3	<--- e8	.982
teaching1	<--- e9	.969
teaching2	<--- e10	.972
teaching3	<--- e11	.986
teaching4	<--- e12	.980
teaching5	<--- e13	.988

Means

	Estimate	S.E.	C.R.	P	Label
carnegienew	.396	.009	43.476	<.001	
sexnew	.457	.010	47.161	<.001	
ranknew	3.459	.024	145.611	<.001	
control	1.493	.009	160.520	<.001	
race2	.852	.007	122.498	<.001	

Intercepts

	Estimate	S.E.	C.R.	P	Label
expectations1	2.879	.100	28.823	<.001	
attitude1	2.802	.055	50.766	<.001	
attitude2	2.891	.067	42.940	<.001	
attitude3	4.193	.059	70.573	<.001	
conventional	.037	.026	1.435	.151	
interaction1	2.910	.077	37.938	<.001	
interaction2	1.664	.069	24.248	<.001	
interaction3	1.751	.081	21.677	<.001	
teaching1	3.424	.068	50.020	<.001	
teaching2	2.438	.078	31.220	<.001	
teaching3	3.267	.060	54.114	<.001	
teaching4	2.350	.089	26.317	<.001	
teaching5	2.744	.077	35.730	<.001	

Variances

	Estimate	S.E.	C.R.	P	Label
e1	1.000				
e2	1.000				
e3	1.000				
e4	1.000				
e5	1.000				
e6	1.000				
e7	1.000				
e8	1.000				
e9	1.000				
e10	1.000				
e11	1.000				
e12	1.000				
e13	1.000				
carnegienew	.239	.006	38.007	<.001	
sexnew	.252	.007	36.419	<.001	
ranknew	1.483	.041	36.192	<.001	
control	.250	.007	38.007	<.001	
race2	.126	.004	35.989	<.001	

Squared Multiple Correlations

	Estimate
attitude3	.024
attitude2	.033
attitude1	.066
expectations1	.017
conventional	.024
teaching5	.023
teaching4	.039
teaching3	.027
teaching2	.056
teaching1	.060
interaction3	.036
interaction2	.050
interaction1	.041

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ACKNOWLEDGMENTS

I am grateful to my major professor, Dr. Dan Robinson, and my committee members, Drs. John Schuh, Pat Leigh, George Jackson, and Mack Shelley, for their support of my research. I am especially thankful to Dr. Shelley for walking me through path analysis.

Special regards to Tony Stevens for his advice regarding statistical methodology and analysis, and his friendship. Thanks to Pat Hahn, my editor, for teaching me about research writing and formatting.

Finally, and most importantly, I am thankful to God and my family: Stacy, my wife, who has been there for me during stormy weather as well as the sunshine, and my children: Matt, Megan, and McCay. I love you so much, especially when you bring me down to earth to realize what life is all about. In a sense, we have been students together. Your persevering love, prayers and support have made a difference.

I am also thankful to my wife's family, the Blazios, for their support and encouragement over many years. To my family, especially my mom, Frances, who is watching me from above ... I am the product of her life-long wish for her children ... that we each embrace education, and go to college. "Mom, this is especially for you!" and my family (Longley) including my late Mom for whom this is dedicated. Finally, I am thankful to the Good Lord for providing for us, and enabling us to persevere to finish this degree.