FACULTY PREPARATION IN AMERICAN HIGHER EDUCATION:
ACADEMIC LINEAGE AS A PREDICTOR
OF CAREER SUCCESS

DISSERTATION

Presented to the Graduate Council of the
University of North Texas in Partial
Fulfillment of the Requirements

For the Degree of

DOCTOR OF PHILOSOPHY

By

Martha M. Ellis, B.A., M.S.
Denton, Texas
December, 1996
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The purposes of this research were to determine (1) the extent to which faculty are employed by the types of institutions from which they earned their doctorates in the United States, (2) the extent to which faculty have higher professional rank at employing institutions that are the same type of institutions as those from which they earned their doctorates, (3) the extent to which female faculty are employed by the types of institutions from which they earned their doctorates, (4) the extent to which female faculty have higher professional rank at employing institutions that are the same type of institutions as those from which they received their doctorates, and (5) the extent of variability across academic disciplines in which faculty are employed by types of institutions from which they earned their doctorates. An exhaustive review of the literature on academic lineage was used to develop this research.

All stratified random sample of 260 institutions from 2,873 colleges and universities was selected by Carnegie Foundation classification categories. Institutions were selected at random until the number of faculty members in each category corresponded to the estimated national distribution of faculty across Carnegie classification categories (n=3,940).
The analyses revealed that the majority of faculty (74%) employed at all types of higher education institutions obtained their doctoral degrees from research I institutions. Professional academic rank is an interaction between doctoral-granting institution and employing institution combined with gender. Male faculty are following the traditional "trickle down" theory of academic lineage while women faculty appear to be charting a different career path. Another unique finding was that there was not significant variability in the findings across academic disciplines. Academic success is a complex phenomenon that is not singularly explainable by academic lineage. As more women are entering into the academic ranks of higher education, changes in academic lineage are beginning to appear. The inflexibility and segmentation discussed in previous research is undergoing subtle but statistically noticeable modifications.
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To my parents, who have been supportive and encouraging in all the many years of my educational endeavors, I say thank you.

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CHAPTER 1

INTRODUCTION

A fundamental concept of academic philosophy is that truth is sought in an
independent and impartial manner through a system of pre-established impartial criteria.
This concept is operationalized through the norm of universalism in science, which
requires scholarly achievement to be the only criterion used to evaluate performance.
Selective standards such as personal or social attributes, age, race, gender, nationality,
class and personal qualities are proclaimed irrelevant (Merton, 1973). The ideological
pillar of career development in America, regardless of profession chosen, is that all
Americans have the opportunity to pursue their dreams, and, if they work hard enough,
can hope to achieve a reasonable measure of success (Hochschild, 1995).

Universalism is promoted as the foundation for the process of higher education
faculty employment. Theoretically, academic hiring practices follow a purely achievement
pattern which asserts that "scholarly performance is the only legitimate claim to
recognition" (Caplow and McGee, 1958, p.224). Based on this theory, faculty careers are
available to anyone with talent and education who has made original contributions to the
body of knowledge in the respective discipline. Talented college athletes are recruited by
professional teams regardless of the college or university where they played the sport.
Likewise, the talented graduate student should have the option to be recruited by any college or university for a faculty position.

How much of career success is attributable to the quality of a faculty member's research accomplishments? How much of career success is attributable to the quality of a faculty member's teaching accomplishments? Are other selective factors at work? For example, how important is the type of institution of one's doctoral degree granting university? A considerable amount of effort has been directed toward understanding the relative influence of individual productivity and accomplishment versus other selective criteria in determining who receives academic appointments at the most prestigious departments and institutions. Although the results are sometimes contradictory (Blackburn & Lawrence, 1995), the empirical evidence usually confirms the importance of institutional prestige. Only four studies (Caplow & McGee, 1958; Carrter, 1976; Burke, 1988, Blackburn & Lawrence, 1995) have included diverse academic disciplines. The bulk of previous studies have included only one to six discipline-specific populations. Most previous research on this topic has also focused only on male faculty members' career development. For example, one of the latest dissertations on career development and institutional prestige (Deitch, 1989) deleted female faculty because women were so underrepresented at every higher educational level. Deitch reported that "there are too few women to adequately study trends" (1989, p.12).

One area of contention pervading the previous research has been how to determine prestige of an institution. Various methods have been employed (Caplow & McGee, 1958; Carrter, 1976; Fogarty and Saftner, 1993). All of these classification systems are
value-laden based on research credentials of faculty or unique methods by the persons developing the prestige system. Only two of the studies (Hulbert & Rosenfeld, 1992; Youn, 1981) have used the well-recognized Carnegie Foundation’s Classification System of Higher Education which recognizes differences in missions of institutions and classifies accordingly. This classification system clusters institutions with similar programs and purposes with no intention of making qualitative distinctions (Boyer, 1994). When exploring the academic labor market what is needed is an examination of college mission and its relationship to hiring and promotion practices. Higher education researchers have reported on the segmentation of the academic labor market between research and teaching institutions (Burke, 1988; Crane, 1970; Youn, 1981). If mission statements reflect different purposes for existence, the segmentation may be inevitable. The segmentation that is mission based might not merely be viewed as a “trickle down” process. This study examined mission statements to triangulate the Carnegie classification types of the selected institutions.

What remains to be studied regarding the apparent class system in faculty development in American higher education is a comprehensive study of faculty members’ locus of employment, their rank, their gender, and their academic discipline as it relates to the type of institution from which they received their doctorates. Due to the severe data limitations and low generalizability of previous research, faculty in all discipline teaching fields must also be included in future studies (Breneman & Youn, 1988; Debackere & Rappa, 1995; Hubert & Rosenfeld, 1992). A random sample of all types of institutions including all disciplines was needed. Previous studies have not always included associate
of arts colleges, and no study has included private associate of arts colleges, because too little information was available on these faculty members (Blackburn & Lawrence, 1995, El-Khawas, 1995).

Several previous studies have recommended that this type of study needs to be completed in the mid-1990s due to the transition of older faculty retiring in large numbers (Smelser & Content, 1980; Youn, 1981). (Recent legislation that abolished mandatory retirement age for faculty may cause these transitions to be less than anticipated.) Also the impact of affirmative action and diversity practices should be evident by this same time period. A study to determine if these inclusion policies have negated results of previous research is needed. Following the multiple studies in the mid-1980s advancing reform in undergraduate education, the shift to valuing teaching may have changed the research and teaching segmentation of the academic labor market. As of 1993, 60% of research institutions reported a change in criteria for tenure and hiring practices to increase the importance of teaching (El-Khawas, 1995). A study is needed to determine if these changes in hiring and promotion practices are altering results of previous research of the academic labor market.

Statement of the Problem

The study examined the employment patterns of faculty in American higher education according to current employment and types of institutions from which faculty received their doctorates.
Purposes of the Study

The purposes of the study were to determine (1) the types of institutions from which contemporary faculty received their doctoral degrees, (2) the types of institutions at which contemporary faculty are teaching, (3) the association between types of institutions awarding doctorates to faculty and the types of employing institutions, (4) the current academic rank of subjects, (5) the disciplines taught by faculty, and (6) the association between gender of faculty, types of institutions awarding their doctorates, types of employing institutions, academic rank, and academic discipline.

Research Hypotheses

H1 Faculty are employed by the types of institutions from which they earned their doctorates.

H2 Faculty have higher professional rank at employing institutions that are the same type of institutions as those from which they earned their doctorate.

H3 Female faculty are employed by the types of institutions from which they earned their doctorate.

H4 Female faculty have higher professional rank at employing institutions that are the same type of institutions as those from which they received their doctorate.

H5 The relationship between doctorate-granting institutions and employing institutions of faculty varies across academic disciplines.

Significance of the Study

Recent research conspicuously overlooks faculty employment patterns at all types of institutions in all disciplines based on types of degree-awarding institutions and types of
institutions where faculty are currently employed. Specifically, this study examined the extent to which assistant, associate and full professors with a Ph.D. or Ed.D. are currently employed in institutions that are in the same Carnegie Foundation Classification level as the institution from which they received the degrees. The study also explored the academic rank and gender of these faculty at the employing institution in relationship to their doctoral granting institution.

This study included faculty across academic disciplines and all Carnegie Foundation classification levels except for professional schools and specialized institutions. The breadth of the sample population was advantageous as most previous research has been discipline specific. The use of the Carnegie classification system was a feature of this study. By focusing on an established and credible typology system that centers around the mission of an institution, many of the biases previously associated with prestige systems were eliminated. Blackburn & Lawrence conclude that the “Carnegie classification system depicts the hierarchical structure [of higher education] almost perfectly” (1995, p.9). The study also included private Associate of Arts Colleges which have been excluded from all previous studies.

This study is significant in providing information to universities and prospective faculty regarding hiring practices of faculty in academia in the United States.

Theoretical Constructs

Theories provide four functions for the researcher. First, theory synthesizes and generalizes a body of information; second, theory expedites understanding and explanation of complex phenomena; third, theory serves a predictive function in helping the researcher
estimate what will happen under certain conditions, and fourth, theory stimulates future quantitative and qualitative research efforts (Shertzer and Stone, 1980). The concept of career development is theorized by diverse disciplines in an effort to understand how a society helps its members “want to work, to acquire the necessary skills for work, and to find satisfaction in the work they do” (Isaacson & Brown, 1993, p.19). Career development is defined as “the total constellation of psychological sociological, educational, physical, economic, and chance factors that combine to shape the career of a given individual over the life span” (Sears, 1982, p.140). A brief overview of the theoretical constructs underlying faculty career development in history, psychology, sociology and economics will provide the foundation for this research.

Historical theory

According to anthropologists, the notion of career was born as social structures became more sophisticated during the social change from nomadic prehistoric lifestyles into culture of farmers and craftsmen (Isaacson & Brown, 1993). Many significant historical events provoked a change in the relationship between people and work. The medieval university was established to provide education for the elite in Europe by the dictates of the labor market (lawyers in Bologna), personal wishes of royalty, and church doctrine as seen in the early histories of Cambridge, Oxford and Paris (Kerr, Gade, & Kawaoke, 1994). The Protestant Reformation brought about the diversification of models of universities which included promoting national ideologies in the curriculum. Higher education was to provide the administrative and economic interests of individual nations as well as the development of national identity and citizenship within a society. The
Information Revolution has brought universities into a hybrid situation. Kerr states that universities are "involved in a second great transformation" as they move toward a universalism of learning while maintaining national identity (1994, p. 9). Each of these paradigm shifts in higher education has affected faculty hiring and reward practices. What changes in the academic labor market are evident during this second great transformation?

Psychological theory

Psychological theories of career development are subdivided into trait and factor theory, personality theories, developmental theories and social learning theories. The theme that pervades all these theories is the concern for individual development and career choice. The underpinnings of the trait and factor theory developed by Parsons (1909) and Williamson (1949) are that each individual has a unique combination of traits and that each job has requirements and conditions for success. Through individual assessment of traits and job analysis of factors, a decision can be made for a career based upon the relationship between these two sets of data. By matching a faculty candidate's traits with the requirements of the faculty position, a successful decision is made by the employing institution. An individual who receives a doctorate from a research university is assumed to have the personal and professional traits to do research. Institutions that require research as a significant part of the job requirements would presumably seek these graduates. Personality theories assume that a person chooses a career to express personality. Holland (1987) proposes that members of a career have similar personalities and that career satisfaction and success are dependent upon the extent to which the individual's personality and work environment are compatible. According to Holland's
classification system (Holland code) a researcher (I) and a teacher (S) are not the same personality type and a research I institution and an associate of arts college would not fall into the same occupation type (Holland, 1990). Therefore, graduates whose Holland code falls into the research typology would be best suited with a research I or II institution. Graduates whose Holland code reflects characteristics of a good teacher would predictably be more successful at a baccalaureate I or associate of arts college regardless of the type of institution from which they received their doctoral degree.

Development theories are dominated by the life span approach developed by Super (1990). The theory is a series of life stages based upon the suppositions that people differ in abilities and personalities, are qualified for a number of careers, and their self-concepts change with time and experience. Super also proposed that each career requires a pattern of abilities and traits for successful performance. The nature of the career pattern of an individual is determined by parental socioeconomic level, mental ability, education, skills, personality characteristics and career maturity (Super, 1990). This theory is the most comprehensive of the psychological theories and addresses the variability of the many facets of an individual, both internal and external. The idea of career maturity and the dichotomy of stability and change throughout the life span addresses the diversity seen in academic career mobility.

Social learning theory posits (Mitchell and Krumboltz, 1990) that an individual is born with genetic characteristics, encounters environmental, economic and social events that promote rewards and punishments which become learning experiences. The individual chooses courses of action based upon previous learning in order to maximize
success. A person who has the capability and opportunity to be in a research environment and is rewarded for success in this environment will seek a faculty career in a similar environment.

All of the psychological theories affirm that individuals wield some control over their lives. The goal of these theories is to understand the individual and promote career choice and growth based upon that understanding. Although referenced in each theory, the sociological forces influencing career development are minimized.

Sociological theories

Sociological research emphasizes how a conglomerate of social influences affects the career of individuals. Hotchkiss and Borow (1990) discuss how social institutions impact an individual’s career: (1) the socialization process of the individual into the work environment, (2) deciding on appropriate interpersonal interactions, (3) allowing pursuit of ascriptive material and social success, and (4) directing career pattern by entrance, mobility, and reward opportunities.

Sociology is dominated by the theory of status attainment and stratification. The sociological theory of prestige explains the social construction and maintenance of inequality in the society. Blau and Duncan (1967) have developed a scale of American occupational prestige. At the heart of prestige theory is the notion that some occupations are more valued than others and the majority within society consents to the inequality through dispersal of power and resources. The social exchange theory (Homans, 1961) states that outstanding contributions to a desired goal are rewarded by a continued right to participate and this participation is considered a valued reward. According to the prestige
and exchange theories an occupational segmentation of boundaries between research and teaching institutions has developed impacting faculty hiring and promotion. Through prestige rankings institutional sorting of higher education institutions has caused different labor markets to emerge. How this developed is referred to as institutional ascription theory which examines the relationship between institutional position of prestige and scientific productivity. Two theoretical explanations for institutional ascription are: (1) that prestigious institutions select the most productive scientists for academic appointments (Merton, 1973) and (2) the prestige of the doctoral granting institution has more influence on an individual's academic appointment than productivity (Crane, 1970).

Economic theory

Economists explore career development through the cycle of supply and demand. Demographic studies explore the changing complexion and size of the population and predict future graduates and employment needs of colleges and universities (Carrter, 1976, Youn, 1981). As demographics and the marketplace change, more prestigious universities will offer opportunities and/or advancement to attract the required number of faculty until all vacancies are filled. As opportunities or ranking escalate, more people are attracted to obtain Ph.D.s to fill the expected vacancies. When a surplus of qualified faculty is available the opportunities at prestigious universities are reduced and graduates seek employment elsewhere. The supply of qualified faculty is diminished and the cycle starts again.

The human capital theory of economics explains how personal abilities and education become valuable commodities in the marketplace. This theory postulates that
labor markets are equitable and that compensation is a function of education training, and individual ability. Most of the studies of human capital theory have explored the returns of graduate education and scholarly activity on annual earnings. Graduate education does offer significant returns while earnings related to research productivity tend to decline over the career cycle even with an increased rate of publication (Hansen, Weisbord, & Strauss, 1978).

The job competition model (Thurow, 1975) and the screening model (Niland, 1971) are more appropriate to the academic market than the wage competition model of economic theories. These models reflect the inflexibility and irrelevancy of wages in the academic labor market. The hiring institutions use screening devices, such as prestige of an institution, to induce future employees. Essentially there is an attractiveness to a given degree because of the advantage it has in a job market where education is differentiated in terms of "quality" (Niland, 1971). When the academic labor market has an ample supply of graduates, those with less prestigious Ph.D.s would be absorbed into new types of jobs. The result of this oversupply would be an upgrading of credentials required for academic positions (Thurow, 1975).

Higher education institutions, like corporations consider the "bottom line" of economic principles. If institutions are rewarded with research and development funds as they were in the 1950s through the 1970s then they will seek faculty who can assist in obtaining these dollars. Two-thirds of these moneys went to research I institutions in 1974-1976 (Youn, 1981). Likewise, increased enrollments in two-year colleges from 1967-1977 provided a powerful flow of resources to these institutions as the egalitarian
belief of opportunity to higher education for all led to funding based upon enrollment. As these funds for both enrollment and research began to decrease in the mid 1980s, changes in the academic marketplace were predicted. This study describes the academic marketplace ten years subsequent to the launching of economic decline.

As is witnessed by the complexity and diversity of these theories, understanding the career development of faculty is a difficult task. This study explored the academic lineage of faculty and how academic heredity relates to place and promotion in the academic arena. Studies on academic careers and academic labor markets have been fragmentary (Youn, 1988). One explanation for this fragmentation is the vicissitude of synthesizing theories from the diverse disciplines and applying these constructs to yet another discipline, higher education. Another component of the fragmentation centers around the disagreement on measurement of prestige institutions and career success of individuals. The goal of this research was to add to the body of knowledge about the academic marketplace in order to promote a more firmly established theory of systems and social processes within American higher education.

Definition of Terms

The Carnegie Foundation's Classification of Higher Education (1994) was used to designate type of institution. The Carnegie classification includes all colleges and universities in the United States that are degree-granting and accredited by an agency recognized by the U.S. Secretary of Education. The classification process utilizes survey data from the U.S. Department of Education's Integrated Postsecondary Education Data System (IPEDS), the National Science Foundation, The College Board, and the 1994
Higher Education Directory. The Carnegie Classification divides the 3,595 institutions of higher education into 10 types which include Research Universities I, Research Universities II, Doctoral Universities I, Doctoral Universities II, Master's Universities and Colleges I, Master's Universities and Colleges II, Baccalaureate Colleges I, Baccalaureate Colleges II, Associate of Arts Colleges, and Professional Schools and Specialized Institutions.

The meritocracy system is based on the theory that scholarly achievement is the only criterion used to evaluate performance. According to this theory, higher education faculty careers are available to those with talent and education who have made original contributions to the body of knowledge in their respective disciplines.

The academic prestige system is based on the sociological theory that explains the construction and perpetuation of inequality among participants in the academic labor market. These inequalities lead to differential patterns in recruiting and hiring that makes it difficult for others to enhance their academic positions. In the literature this pattern of inequality is also called academic stratification or the prestige continuum.

Academic lineage is educational ancestry and academic heredity of an individual. Academic lineage is traced through the lines of educational institutions attended and degrees conferred.

Academic rank is the traditional professional rank of instructor, assistant professor, associate professor, and professor held by the subjects at the time of the research project.

College or university mission represents the deeply shared values and vision of an institution. The mission is conveyed to internal and external constituents through a
mission statement that is widely published by the institution. The mission statement
delineates the uniqueness of and purpose for the institution.

Limitations
None

Delimitations

This national study included only faculty with the Doctor of Education or Doctor
of Philosophy degrees who have the academic rank of assistant professor, associate
professor, or professor.

The study did not include the Carnegie Foundation Classification of Professional
Schools and Specialized Institutions.
CHAPTER 2

SYNTHESIS OF RELATED LITERATURE

"The methods of social research have been applied by university professors to every important American institution except their own" (Caplow & McGee, 1958, p.3). Indeed the limited body of research surrounding the academic marketplace verifies Caplow's and McGee's opening statement in their seminal work on faculty hiring practices and career mobility. Virtually every other social institution from the family to businesses to religious and political organizations has an entire literature on the systems and social processes within the institution. "Universities are eager to do research on every institution in society except themselves" (Bok, 1992, p.3). Interestingly during the last forty years only a few empirical studies have been conducted on who, why, and how faculty are appointed to academic positions.

The earliest quantitative studies of faculty career development are dated in the 1930s and studied individual universities. For example, Chapin (1935) studied the turnover rates for faculty at the University of Minnesota. Hollingshead (1938) investigated all outside faculty appointments at Indiana University from 1885 to 1937 and found that forty-three percent of all appointees were Indiana alumni. He also found that the higher the academic rank, the lower the proportion of alumni appointments. One of the most thorough studies about the procedures of faculty recruitment at a specific university was
completed by Stouffer (1954) at Harvard. Harvard had an elaborate system of evaluating prospective candidates involving an ad hoc committee to find the best possible candidate. Interestingly, the best candidates were usually found at Harvard with 79% of associate professors and 88% of full professors filling positions in a four-year period.

Wilson (1942) studied the faculty profession from a sociological perspective. He commented that institutional or departmental prestige is vital. He explained this further: “Even the mediocre person from a major university or renowned department may be in a better bargaining position than a truly brilliant man from a less central place” (1942, p.50). Wilson reported that candidates from prestigious universities benefit from this “halo effect” (p.29).

In the 1950s several more comprehensive studies sought to compare universities to try to understand faculty hiring processes and patterns. Woodburne (1950) studied faculty personnel policies of 46 colleges and universities. His qualitative report contains information on appointments, promotions, salary, policies, tenure, and recommendations for staff development.

The seminal study for all future research on the academic labor market was done by Caplow and McGee (1958). Their unit of study was the vacancy and replacement of a full-time faculty position within institutions. The subjects of their study were institutions and not professors. In 1958 there were 141 institutions in the United States which called themselves universities (p.28). Caplow and McGee studied a sample of ten universities. This was a selected sample to "maximize diversity" as opposed to a random sample. All faculty studied in the research were men. The major finding of the work was the
overriding influence of the prestige system in the academic marketplace—especially the feature of closed and preferential hiring. In fact, candidates were frequently hired without a personal interview, entirely on the basis of secondhand reports, implying that who you knew was more important than what you knew and what you did. Universities recruited from other universities of like prestige ranking. Prestige was the premiere qualification, followed by perceived professional compatibility, and lastly any record of scholarly work.

Clark Kerr, in his article “The Balkanization of Labor Markets” (1954), explained that the academic market is segmented due to the sorting procedures of the labor pool. According to this article, the academic profession is not available to everyone who has knowledge and skills equal to those in the profession. Limited ports of entry are available only after the candidate has received appropriate credentials and survived the institutional sorting process. The academic labor market is segmented around the academic tasks of research and teaching (Blau, 1976; Trow, 1975).

Research after 1958 confirmed the influence of the prestige system in recruitment methods, job placement, and market interaction. Hargens and Hagstrom (1967) studied how prestige related to placement in first and later jobs in the physical and biological sciences. They found that an individual’s accomplishments are as important as academic background in securing an academic appointment. In a study a year later (1968), they found a correlation of .68 between the prestige of the first and current positions in four academic fields. What they also found was that most of the faculty remain in the same department for most of their careers (Long et al., 1979). In investigating the social structure of science, Merton (1968) identified a labyrinthine process that affects the
reward system of science. He referred to this process as the "Matthew effect" because the Gospel of Matthew states: "For unto everyone that hath shall be given and he shall have abundance: but from him that hath not shall be taken away even that which he hath" (Matthew 25:29). Merton explains that the Matthew effect consists of the accumulation of "greater increments of recognition for particular scientific contributions to scientists of considerable repute and the withholding of such recognition from scientists who have not yet made their mark" (1968, p. 57). The Matthew effect is involved in the processes that lead to the concentration of scientific resources and talent. Running counter to the principle of universalism, the Matthew principle delineates the inequities arising from differential opportunity, cumulative advantages and basic inequities in the reward system in the stratification of science. According to this principle, individual careers of scientists will be determined by their access to the centers of excellence which receive larger resources for scientific investigation. Breneman, in his 1970 study, found a relationship between prestige in preparation and placement of Ph.D.'s (Breneman, 1988). The relationship of prestige and placement for faculty in the disciplines of chemistry, physics, psychology, economics, English and philosophy were studied by Crane (1970). The discipline of sociology was explored by Stehr (1974) as well as Smelser and Content (1980). Long, Allison and McGinnis (1979) studied both graduate and undergraduate biochemistry faculty appointments and productivity and found a relationship to prestige of doctoral granting institution. All four of these studies found that prestige was significantly more influential than research accomplishments in securing a position. They also found immobility of most faculty and where a faculty member ends is largely where he
starts (Long et al., 1979). Shichor (1970) found that for the discipline of sociology, a curvilinear relationship exists for departmental inbreeding and the prestige of the department. He found that the highest ranking and lowest ranking departments had the most inbreeding because the lowest departments could not recruit Ph.D.s from higher ranking institutions and the highest ranking kept their best graduates. In 1982 Massengale and Sage found that prestige was related to placement in the first appointment of physical education departments but prestige was not as significant in later jobs. Moffatt (1976), Youn (1981) and Moore (1981) conducted research on the trickle-down effect of faculty mobility. Each study focused on different disciplines but they all found that a portion of Ph.D. faculty "trickle down" through the hierarchy of institutions. The extent of "trickling down" effects differs among the disciplines studied. The researchers hypothesized that these differences were related to supply and demand characteristics of the individual disciplines. They also proposed that this research should be replicated in the mid 1990s due to the projected demand for professors exceeding the supply. By the late 1980s the prestige system had become a synonym for quality and a primary element of the university social system.

The most recent comprehensive study was a replication of Caplow & McGee. Burke (1988) sought to discover if the academic social organization had changed since 1958. Burke concludes that prestige still plays a primary organizational role, sometimes more subtle, sometimes redefined, but always prominent in the thinking of academicians (1988).
A study of the disciplines of philosophy, English, history, psychology, chemistry, and physics was completed by Deitsch (1989) to examine prestige mobility in academic careers. The subjects in this study were all male and publication productivity was examined only in the discipline of psychology. Deitsch assessed academic prestige by looking at both baccalaureate and doctoral degree granting institutions. She found that the prestige of the baccalaureate college affected the prestige of the doctoral university which affected the prestige of later employment. When assessing the net direction of prestige mobility across the academic career, Deitsch concurred with Youn in that the trend in the academic marketplace is toward downward mobility. She defined downward mobility as moving in employment from a high prestige ranked graduate institution to a lower ranked graduate institution. Deitsch also found significant differences in the impact of doctoral prestige across the six disciplines. Psychology faculty were least impacted by academic prestige background while English faculty were impacted significantly.

A recent study on institutional inbreeding was explored by Stewart (1992). His research of 5,961 mathematics faculty members indicated that institutional inbreeding is on the decline in this discipline in American colleges and universities.

Fogarty and Saftner (1993) found new Ph.D. faculty in accounting are still dependent upon prestige of the doctoral institution for employment. They believe that more research needs to separate new Ph.D. faculty from the more seasoned faculty in studying prestige. Debackere and Rappa (1995) studied the career progress of scientists in the emerging field of neural networks. They found the prestige of a scientist's graduate school to be a significant indicator of the prestige of his or her academic appointment in the initial five
years after graduation. Beyond five years, the effect of graduate school prestige becomes non-significant. Hulbert and Rosenfeld (1992) found that institutional prestige is the most important variable in explaining academic rank of psychologists. The other variables they included in the study were gender, publication rate, and year the doctorate was received. They also pointed out that people change jobs to lower prestige institutions to obtain higher rank but rarely trade to higher prestige institutions for lower rank.

Blackburn and Lawrence (1995) have drawn together empirical evidence on faculty in order to suggest how college and university administrative practices and climate could be improved to motivate faculty and increase productivity. The authors proposed that what was needed in understanding faculty employment was a theoretical framework grounded in psychological and sociological theory. Through their survey methodology they sought to discover what motivates faculty. The theory they proposed was that “characteristics of individuals and their employing institution combine and lead to variations in faculty motivation, behavior, and productivity” (Blackburn and Lawrence, 1995, p. 15). Chapters 2 and 3 of Faculty at Work are devoted to describing the current faculty population at institutions of higher education in the United States. They report that faculty seeking positions where teaching receives the major emphasis go to institutions where research requirements are low. “Motivation for teaching is expressed in the institutional selection process” (Blackburn and Lawrence, 1995, p. 73). This is one of the few studies that recognizes candidates may choose to work at a teaching institution rather than a research institution. As witnessed in other studies, Blackburn and Lawrence found collineariety between publication rates and rank of a faculty member. They also
concorded with previous research that academic disciplines differ and they suggest “controlling” for discipline when examining publication rates because of the extreme variability. Finally, the authors report that U.S. higher education is stratified with research I institutions having the greatest physical and fiscal resources. Colleges and universities at all Carnegie classification levels seek graduates from research I universities because they believe these graduates are better trained to conduct research and will produce more scholarship than faculty graduating from any other category.

The literature from various academic disciplines is disjointed due to the diverse methodologies employed. Though these studies are somewhat inconsistent in levels of generality and criteria, the majority report some form of class system in the hiring practices in U.S. higher education. The previous studies also define an academic occupational structure that defines research and teaching as two separate tasks that determine the pattern of mobility of an academic career. The difficulty with the past studies is the disparity of agreement on prestige. All previous studies except one have used on questionnaire methodology. Few studies have included all academic disciplines and institutional types. The most noticeable omission in previous research is the lack of exploring the concept of academic lineage with women faculty.

Career Development of Women

Any study of the career development for women faculty necessarily begins with a description of their status within the profession. Women make up about 35 percent of the full-time faculty in the United States (Magner, 1996; Russell et al., 1990; Sax, 1996). Women full professors increased from 13% in 1969 to 25% in 1988. Men full professors
increased from 30% to 50% over the same time period (Blackburn & Lawrence, 1995). Women were less likely to be tenured than men and were paid less at every rank and in every type of institution (Annual Report of the Economic Status of the Profession, 1988; Blackburn & Lawrence, 1995; Magner, 1996).

Is there a difference in academic career development for men and women? One theoretical perspective states that important elements in women’s career development (timing of children, marriage, spouse’s attitudes) are not considered in theories of academic career development for men, and thus, separate concepts and studies are necessary to explain the process for women (Osipow, 1993). An opposing view is that a comparative approach to gender/sex research on ambiguous variables is all too common. This type of research reinforces the notion that men and women are homogeneous within their own sex but differ between the sexes. Furthermore, this type of research serves to deter rather than advance the understanding of career development stressing that women must change to compete (Towmbly, 1991). A third perspective encompasses the belief that there is no longer a difference in career development for men and women (Super, 1990). Based on the theory that academe is a pure meritocracy, discrimination against women should be nonexistent (Cole, 1979) and the third perspective would be applicable. If stratification is apparent in academic lineage leading to employment the first or second perspective would be more appropriate for research.

Several themes emerge in the literature related to academic career development of women that enlighten the researcher to the complexity of the topic and the need to examine women separately from and concurrently with men. A theoretical perspective
that pervades career development of women in academia is Astin's need-based
sociopsychological approach (1969). She proposes that motivation is the same for men
and women but due to sex-role socialization and opportunities being different for men and
women the expectations for career development are different for each gender. These
components may provide an indication of why women may choose not to attend more
prestigious universities (Blackburn & Lawrence, 1995). Women prefer the teaching role
more than men (Blackburn & Lawrence, 1995) which may be related to the socialization
process. This preference may also be a reflection of research opportunities being
exclusionary for women. Researchers study the variables that reflect who faculty were:
“Ph.D. as highest degree, national ranking of the graduate school, quality rating of their
place of work, parents education and social class, politically liberal orientation -- in short,
white Protestant and Jewish males” (Blackburn & Lawrence, 1995, p. 47). Women have
tended to lose on nearly every indicator of faculty productivity measures including fewer
publications, lower degrees, lower rank, fewer with tenure and "inferior" places of work.
Forty years ago, Caplow and McGee (1958) wrote that “women tend to be discriminated
against in the academic profession not because they have low prestige but because they are
outside of the prestige system entirely” (p.111). More recent research has focused on the
concept of accumulative disadvantage (Clark & Corcoran, 1986). An explanation of the
concept delineates the progression of disadvantage over time if women do not enroll in the
best graduate schools, become productive researchers, penetrate the collegial networks,
and have access to academic resources. Clark and Corcoran (1986) concluded that
women are not barred from academic careers but their progress is limited in a male-dominated occupation and culture.

Various explanations have been given for the differential progress of women. Women have been reported to spend more time teaching and conferencing with students which is not rewarded in the traditional university setting. When asked about career impediments, women mentioned male dominated departments, the good old boy network, undervalued research, family pressures, and personal sacrifice (Parsons, Sands, & Duane, 1991). Many research studies validate these responses (Blackburn & Lawrence, 1995; Finklestein, 1984; Menges & Exum, 1983; Sandler & Hall, 1986; Zuckerman, 1991). The issue of balancing family and career is an area that gains much attention. Often referred to as the "split dream" (Sullivan, 1992), 90% of adolescent girls report they anticipate this conflict and have concern over how they will resolve the conflict (Atwater, 1994).

Following a spouse's career mobility is one constraint women have faced. Burke (1988) found that mobility constraints affected men and women equally with 21% of women and 19% of men affected by spouse employment change. Interestingly the research on the impact of children on research productivity is mixed (Astin, 1984; Hargens, McCann, and Reskin, 1978; McElrath, 1992; Zuckerman, 1991). Long (1990) proposed that having children is not the issue but rather that women are less likely to be in regular contact with their dissertation chairs or have mentors in the discipline. Hence, the "who you know rather than what you know" factor contributes to employment possibilities.

In an analysis of national data from full-time faculty at four year colleges, Smart (1991) found that gender is more important to both faculty members' academic rank and
salary than their academic discipline, their research productivity, or the type of institution in which they work. When studying psychologists in academia, Hulbert and Rosenfeld (1994) found women at lower rank than men even when career and publication histories were controlled. They went on to state that "women's publications do not translate to higher professorial rank. The difference in women's rank is unexplained by our study" (p.204). If indeed meritocracy is not prevalent in the academy, but rather a class system, women are less likely to benefit from the system. In fact, Davis and Astin (1990) promote that women may have a double stratification to overcome. Cytrynbaum (1996) summarizes the literature on career development of women by stating that “for twenty-five years research results show that women have been devalued in the workplace and there is no indication that this has significantly changed.”

The question of type of doctoral granting institution predicting type of employing institution resurfaces. Massengale and Sage (1982) find little difference in career mobility of male and female physical education doctoral faculty with respect to doctoral granting institution and employing institution. Hulbert and Rosenfeld (1992) also found little difference between men and women in regard to the first job and prestige of employing institution for psychologists.

A review of the gender literature provides disappointing information. Since the onset of affirmative action in the 1960s, a plethora of statistics have flooded the databases. The multiple data sources reveal disparate numbers and most of the information has been used for nothing more than descriptive reports. A great amount of research remains to be
done. What changes in academic careers are evident thirty years since the onset of affirmative action?

Prestige Ranking Systems

Five different methods have been used to rank academic departments. Since prestige pertains to the status position afforded to the object by relevant others, the most direct approach would appear to elicit these evaluations (Fogarty and Saftner, 1993). The most notable among such approaches was Carrter (1966 and 1976). The original quality rankings study only included 106 universities. The later study included all 2500 institutions divided into 12 groups. How an institution was classified depended upon evaluations of perceived reputation similar to a compendium of gossip (Fogarty and Saftner, 1993). The process assumes that interviewees are unbiased by their current positions and past experiences within the very system they are evaluating. Secondly, the validity and reliability of the questions asked the subjects was questionable (Wilson, 1970). His system has been referred to as “a subjective gross categorization of institutions” (Deitsch, 1989, p.55).

Publication counts and page counts provide two related means of describing the stratification of prestige in academic communities. Both methods focus on the research role of faculties and attempt to depict the relative success of its accomplishment. These studies differ in research design, data, measures of scholarly productivity, and measures of institutional prestige. The large number of studies within most disciplines testifies to the equivocality of its methodology (Fogarty and Saftner, 1993). There are methodological issues surrounding these measures such as journal considered, co-authorship weighing,
faculty mobility, faculty size adjustment, and publication distribution within faculty (Cole
and Cole, 1967). Likewise, the quantitative measure of publication/page counts is
indifferent to qualitative aspects of the research. Although research is critical to the career
success of a faculty member, it is not all that is required of faculty within the modern
university department. Prestige would be a more holistic evaluation of faculty
performance in all roles. Furthermore, numerous studies (Cole & Cole, 1967; Crane,
1975; Deitsch, 1989; Hargens and Hagstrom, 1974; Storer, 1972; Zuckerman, 1970) have
indicated that the Matthew principle is relevant to publication rate research. These studies
explain that publication opportunities are constrained through a process that allocates
publication differentially for scientists at different strata in the system.

Citation analysis makes clearer use of quality dimensions since it is based on the
actions of disinterested others. It is also less obtrusive than the direct perception studies.
However, self-citation, frequency weighing, citation age, and skewed distributions point to
internal validity issues (Cole and Cole, 1973). Also, being cited may be an outcome of
prestige, rather than evidence of prestige.

Tallying journal editors and editorial board members within a department is an
additional way that prestige has been measured. This approach implicitly asserts that
power over important decisions can signal prestige differentials.

The final measure of prestige centers around the placement of graduates. This
process evaluates the percentage of graduates who go to non doctoral schools and the
distance they go from doctoral schools upon graduation. The prestige measure
concentrates only on new Ph.Ds. The difficulty with this measure is that it has only been tested in the discipline of accounting (Fogarty and Saftner, 1993).

To date, no study on placement of faculty has used the 1994 Carnegie classification system as a measure of typology. This classification system is used by the U.S. Department of Education for its studies of higher education faculty and administrators. The classification system is also recognized by academia as a viable system for classifying higher education into categories that reflect the diversity of the types of institutions.

This review of the literature is quite similar to any review of the literature on the topic of academic lineage in higher education. “A surprising finding of the literature review is the repetition in the reporting of old studies in current literature” (Deitsch, 1989, p. 62). Even when including recent research, this statement is still relevant in 1996. Perhaps the reliance on subsequent studies confirms the results of these studies, i.e. stratification in academia is a viable force in the hiring and career outcomes of faculty.

The primary focus of this study was to investigate the relationship of academic lineage and employment of faculty with a doctoral degree across all disciplines and all but one Carnegie classification type. The study included women and examined them in aggregate and separately from the male population. Academic rank was explored to ascertain a measurement of career success. The questions pervading the investigation were: (1) Have the inclusion practices of affirmative action and diversity negated the results of previous research on academic hiring and reward systems?
(2) Has the undergraduate reform movement changed the research and teaching segmentation of the academic labor market as witnessed by institutional hiring and reward systems?
CHAPTER 3

METHODOLOGY

Introduction

This study attempted to estimate (1) the extent to which faculty are employed by the types of institutions from which they earned their doctorates in the United States, (2) the extent to which faculty have higher professional rank at employing institutions that are the same type of institutions as those from which they earned their doctorates, (3) the extent to which female faculty are employed by the types of institutions from which they earned their doctorates, (4) the extent to which female faculty have higher professional rank at employing institutions that are the same type of institutions as those from which they received their doctorates and (5) the extent of variability across academic disciplines in which faculty are employed by types of institutions from which they earned their doctorates.

A description of the methods and procedures for the collection of data is delineated in this chapter. The procedures for collection of data, procedures for sample selection, classification of institutions, classification of academic disciplines, classification of faculty by gender, classification of faculty by rank, and procedures for coding and analysis of data are included.
Procedures for Collection of Data

A stratified random sample from 2,873 colleges and universities was selected. The stratification was based upon the Carnegie Foundation classification system with a representative number of institutions in each level of classification (with the exception of Professional Schools and Specialized Institutions). Catalogs for the academic years of 1994-1997 were obtained from each of the institutions in the random sample. These bulletins were used to obtain the institutional mission statement and all faculty information. Catalogs were chosen as the source for data collection rather than surveys because the information is based on human resources transcript files. Catalogs are diverse in format and require careful review, but they neither exaggerate nor forget credentials (Adelman, 1992). Also, there appears to be no need for more surveys on this topic (Blackburn & Lawrence, 1995). The faculty were studied in terms of (1) the institutions from which they received their Ph.D. or Ed.D. (2) the institutions which currently employ them (3) academic rank (4) their sex and (5) their academic discipline.

Instruments

No instruments were used as all information was obtained from data bases at colleges and universities and the U.S. Department of Education.

The Population

Assistant professors, associate professors and professors from 2,873 college and universities in the United States that are degree-granting and accredited by an agency recognized by the U.S. Secretary of Education were the population for the study. All types of institutions were included except for Professional Schools and Specialized
Institutions. Professional Schools and Specialized Institutions were not included because medical schools train faculty for medical schools and theological schools train faculty for theological schools. By the very nature of the missions of these institutions, these specialized institutions would hire graduates of specialized institutions and this would likely bias the findings.

Description and Selection of the Sample

The stratified random sample was selected from the 9 primary strata following the Carnegie Foundation (1994) classification system. A definitions of the categories included in this study are as follows (Boyer, 1994):

Research Universities I offer a full range of baccalaureate through doctoral programs with a commitment to research. They award 50 or more doctoral degrees and receive $40 million or more in federal support annually.

Research Universities II are identical to research universities I except they receive between $15.5 million and $40 million in federal support annually.

Doctoral Universities I offer a full range of baccalaureate through doctoral programs and are committed to graduate education. They award at least 40 doctoral degrees annually in at least five disciplines.

Doctoral Universities II are identical to doctoral universities I except they award at least ten doctoral degrees annually in three of more disciplines or 20 or more doctorates in one or more disciplines.
Master's Colleges and Universities I offer a full range of baccalaureate through master's programs. They award 40 or more master's degrees annually in three or more disciplines.

Master's Colleges and Universities II are identical to Master's colleges and universities I except they award 20 or more master's degrees annually in at least one discipline.

Baccalaureate Colleges I are primarily undergraduate colleges. They award 40 percent or more of their baccalaureate degrees in liberal arts fields and are restrictive in admissions.

Baccalaureate Colleges II are identical to baccalaureate colleges I except they awarded less than 40 percent of their baccalaureate degrees in liberal arts fields or are less restrictive in admissions.

Associate of Arts Colleges offer associate of arts certificates and degree programs.

In Table 1 below are the number of institutions in the population.

<table>
<thead>
<tr>
<th>Carnegie Category</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Universities I</td>
<td>88</td>
</tr>
<tr>
<td>Research Universities II</td>
<td>37</td>
</tr>
<tr>
<td>Doctoral Universities I</td>
<td>52</td>
</tr>
<tr>
<td>Doctoral Universities II</td>
<td>59</td>
</tr>
<tr>
<td>Master's I</td>
<td>436</td>
</tr>
<tr>
<td>Master's II</td>
<td>93</td>
</tr>
<tr>
<td>Baccalaureate Colleges I</td>
<td>165</td>
</tr>
<tr>
<td>Baccalaureate Colleges II</td>
<td>472</td>
</tr>
<tr>
<td>Associate of Arts Colleges</td>
<td>1,471</td>
</tr>
<tr>
<td>Total</td>
<td>2,873</td>
</tr>
</tbody>
</table>
All institutions were assigned a number and a table of random numbers (Spatz, 1993) was utilized for selection of the sample institution within each stratum. Institutions were selected at random until the number of faculty members in each category corresponded to the estimated national distribution of faculty across Carnegie classification categories (Blackburn & Lawrence, 1995).

A random sample of faculty with the rank of assistant professor, associate professor, or professor from each selected institution were subjects in the study. Again a table of random numbers (Spatz, 1993) was utilized for the selection of faculty within each institution. The following table shows the approximate number of full-time faculty with rank of assistant professor, associate professor or professor as of 1993 (U.S. Department of Education). The actual number of full-time faculty employed in colleges and universities remains unknown (Blackburn & Lawrence, 1995). Part of the reason for the inability to obtain an accurate count is that a definition of full-time is not established or accepted across institutions. The number of faculty at associate of arts colleges is especially difficult to calculate because these colleges are not always included in reference works, because some associate of arts colleges do not use academic rank, and part-time faculty are sometimes included in associate of arts college faculty without delineation that they are adjunct. For this reason all faculty with doctoral degrees employed at selected associate of arts colleges were originally included in the sample. Randomization of faculty, following the same procedures utilized for all other categories, was then completed.
Table 2
Population of Faculty

<table>
<thead>
<tr>
<th>Carnegie Category</th>
<th>Prof.</th>
<th>Assoc. Prof.</th>
<th>Asst. Prof.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research</td>
<td>54,800</td>
<td>36,990</td>
<td>32,534</td>
<td>124,314</td>
</tr>
<tr>
<td>Doctoral</td>
<td>18,360</td>
<td>12,960</td>
<td>13,160</td>
<td>44,480</td>
</tr>
<tr>
<td>Master's</td>
<td>42,340</td>
<td>35,925</td>
<td>36,387</td>
<td>114,652</td>
</tr>
<tr>
<td>Baccalaureate</td>
<td>11,335</td>
<td>8,990</td>
<td>11,085</td>
<td>31,410</td>
</tr>
<tr>
<td>Associate of Arts</td>
<td>11,040</td>
<td>10,120</td>
<td>9,669</td>
<td>30,829</td>
</tr>
<tr>
<td>Total</td>
<td>137,875</td>
<td>104,985</td>
<td>102,825</td>
<td>345,685</td>
</tr>
</tbody>
</table>

The number of faculty chosen corresponded to the national distribution of faculty across the 9 Carnegie classification types.

Faculty were coded for the type of institution at which they were employed with "1" for research I, "2" for research II, "3" for doctoral I, "4" for doctoral II, "5" for master’s I, "6" for master’s II, "7" for baccalaureate I, "8" for baccalaureate II, and "9" for associate of arts.

Faculty were coded for the type of institution at which they received their doctorates. The identical first 4 codes of the above system were used as these institutions confer doctoral degrees. Some faculty did receive a "5" because a small number of master’s I institutions offer a minimal doctoral program that does not meet the criteria for doctoral II classification. Faculty who received the doctorate from a university outside of the United States were not included in the study.
Faculty were coded with a "1" for professor, a "2" for associate professor, and "3" for assistant professor.

The percentage of female full-time faculty currently (1993) estimated to be employed for each classification type is as follows:

- Research universities: 24 percent
- Doctoral universities: 24 percent
- Masters universities: 34 percent
- Baccalaureate colleges: 37 percent
- Associate of arts: 42 percent

The classification of faculty by gender was determined by examining names of faculty as they appear in catalogs. If the gender of the faculty could not be determined through catalogs, the college or university was contacted by telephone or e-mail. Since gender was the only dichotomous variable used in the study faculty were coded as "0" for male and "1" for female.

Academic disciplines were clustered according to the designations of the National Science Foundation, National Endowment for the Humanities, and the U.S. Department of Education Digest of Education Statistics (1989). The clusters include agriculture, business, education, sciences (mathematics, life science, physical sciences, and psychology), humanities (fine arts, social sciences, foreign languages, English language, literature, philosophy, interdisciplinary studies), other fields (military science, allied health, architecture, protective services, library science, and other technical certificate programs such as automotive technology, semiconductor manufacturing and culinary arts), and
engineering. All faculty were coded into the appropriate cluster with “1” for agriculture, “2” for business, “3” education, “4” for sciences, “5” for humanities, “6” for other fields, and “7” for engineering.

Procedures for Analysis of Data

Data were collected for analysis from college and university catalogs of the randomly selected institutions. Faculty members’ educational backgrounds were coded according to doctoral granting institutional Carnegie classification type. Current employing institutions were also coded according to Carnegie classification type for each faculty member. Professional ranks were coded. Lastly, academic discipline and gender of each faculty member was coded. All statistical treatments were facilitated by the Stastica System computer program.

A content analysis was conducted on the published mission statement of each of the 260 institutions in the sample. The technique of qualitative content analysis was directed toward finding and understanding the meanings of the mission statement. Words were the unit of data with teaching, research, students, learning, undergraduate programs, graduate programs, economic development, and funding sources being coded.

The first null hypothesis was that faculty are not employed by the types of institutions from which they earned their doctorate. The second null hypothesis was faculty do not have higher professional rank at employing institutions that are the same type of institutions as those from which they earned their doctorate. The third null hypothesis was female faculty are not employed by the types of institutions from which they earned their doctorate. Null hypothesis four was female faculty do not have higher
professional rank at employing institutions that are the same type of institutions as those from which they received their doctorate. The fifth null hypothesis was the relationship between doctorate-granting institutions and employing institutions does not vary across academic disciplines.

The traditional way to ascertain a relationship, or association, between the categorical variables is to calculate percentages across the categories of the independent variable and to compare these percentages across the categories of the independent variable. By using the chi-square test for independence, an association would be evident if the percentages differed by a significant amount (Knoke & Burke, 1980). In this study, a multivariate analysis was needed to explore not only associations but also interactions between independent variables. Standard multivariate analysis such as analysis of variance, regression analysis, and analysis of covariance generally requires an interval or ratio dependent variable. One way for analyzing ordinal and nominal data is via crosstabulation. The major results can be summarized in a multi-way frequency table. For this study a Log-linear Analysis was utilized. The term “log-linear” derives from the process of logarithmic transformations. Specifically, the multi-way frequency table reflects various main effects and interaction effects that add together in a linear fashion to bring about the observed table of frequencies; essentially analyzing multi-way frequency tables in terms that are very similar to analysis of variance (Goodman, 1972; Statsoft, 1995).

The log-linear model of contingency table analysis is an outgrowth of the Yule’s Q which is a simple function of the odds ratio (Knoke & Burke, 1980). Rather than
proportion, log-linear models use odds as the basic form of variation to be explained. Bishop, Fienberg, and Holland (1974) provided details on how to derive a log-linear equation to express the relationship between factors in a multi-way frequency table, formalized the goodness-of-fit test, and delineated how to choose a model that best describes the data. A model is "a statement of the expected cell frequencies of a crosstabulation as functions of parameters representing characteristics of the categorical variables and their relationships with each other" (Knoke & Burke, 1980, p.11). How well a model explains the data is determined by the extent to which the frequencies expected in the model approximate the frequencies observed (Knoke & Burke, 1980). The primary objective of log-linear analysis is to utilize hierarchical models to test significance of main effects and interaction effects. The best fitting model will be the one that includes the least number of interactions necessary to fit the observed table (Statsoft, 1995).

In this study, the results of fitting models to categorical data are reported. By testing and estimating parameters of models to explain the joint distribution of the polytomous dependent variable with four coded independent variables, an attempt was made to explain relationships among variables in a quantitative explicit model of the system (Youn, 1981).
The model for analysis is as follows:

\[
\hat{f}_{ijklm} = \eta E_1 \tau D_1 \tau G_1 \tau R_1 \tau A_1 \tau ED_1 \tau EG_1 \tau ER_1 \tau EA_1 \tau DG_1 \tau DR_1 \tau DA_1 \tau GR_1 \tau GA_1 \\
= i_1 j_1 k_1 l_1 m_1 ij_1 ik_1 il_1 im_1 jk_1 ji_1 jm_1 kl_1 km_1 \\
\tau RA \tau EDG \tau DGR \tau GRA \tau EDGR \tau DRGA \tau EDGRA \\
lm_1 ijk_1 jkl_1 klm_1 jklm_1 jiklm_1
\]

E \((i=1,...,I)\) is the Ph.D. employing institutions

D \((j=1,...,J)\) is the doctoral-granting institutions

G \((k=1,...,K)\) is gender of faculty

R \((l=1,...,L)\) is rank of faculty

A \((m=1,...,M)\) is academic discipline of faculty

\(\eta\) is the geometric mean of the number of cases in each cell in the table.

\(\tau\) is the tau parameters which represent the effects which the variables have on the cell frequencies. The parameters \(\tau E_1; \tau D_1; \tau G_1; \tau R_1; \tau A_1\) pertain to the probabilities of an observation which appears in the \(i^{th}, j^{th}, k^{th}, l^{th},\) or \(m^{th}\) cell of the marginal distributions of faculty in the employing institutions, doctoral-granting institutions, by gender, by rank, or by academic discipline with respect to the grand mean. The parameters \(\tau ED_1; \tau EG_1; \tau ER_1; \tau EA_1; \tau DG_1; \tau DR_1; \tau DA_1; \tau GR_1;\) or \(\tau GA_1\) relate to the chances that an observation appears in the \(ij^{th}, ik^{th}, il^{th}, im^{th}, jk^{th}, jl^{th}, jm^{th}, kl^{th}, km^{th},\) or \(lm^{th}\) cell of the marginal classifications of the employing institutions by doctoral-granting institutions; the employing institutions by gender, the employing institutions by rank; the employing institutions by academic discipline; the doctoral-granting institutions by gender; the
doctoral-granting institutions by rank; the doctoral-granting institutions by academic discipline; gender by rank; gender by academic discipline; or rank by academic discipline.

The parameters \( \tau_{EDG}; \tau_{DGR}; \) or \( \tau_{GRA} \) pertain to the probability that \( ijk, jkl, \) or \( klm \) appears in the \( ijk^{th}, jkl^{th}, \) or \( klm^{th} \) cell of the marginal classification of the employing institutions by doctoral-granting institutions and gender; the doctoral-granting institutions by gender and rank; or gender by rank and academic discipline. The parameters \( \tau_{EDGR} \) and \( \tau_{DGRA} \) relate to the probability that \( ijkl \) and \( jklm \) observations, appear in the \( ijkl^{th} \) or \( jklm^{th} \) cell of the marginal classification of the employing institutions by doctoral-granting institutions, gender, and rank or doctoral-granting institutions by gender, rank and academic discipline. The final parameter, \( \tau_{EDGRA} \), pertains to the probability that \( ijklm \) appears in the \( ijklm^{th} \) cell of the complete five-way classification.

This model is the saturated model because all possible effect parameters are present in the model. The assumption behind this model is that there is a relationship between \( E \) (the employing institutions) and \( D \) (the doctoral-granting institutions, and also that this relationship depends upon gender, academic rank, and academic discipline. The saturated model can be represented by the fitted-marginal notation \{EDGRA\}. Throughout the remainder of this study, the marginal notation will be used to represent the models.

In order to test each of the five null hypotheses, different models were introduced. The saturated model (equation 1) was the beginning point with more parsimonious models
constructed by setting various effect parameters to 1.00 (analogous in regression to setting a priori regression coefficient to 0).

The statistical criterion for accepting a model was whether the decrease in $L^2$ squared (likelihood ratio statistic) relative to the loss of degrees of freedom in estimating the additional parameters was significant (Knoke & Burke, 1980). The following models are possible for testing the five null hypotheses:

<table>
<thead>
<tr>
<th>Model</th>
<th>Fitted Marginals</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>{DGRA} {E}</td>
<td>Employment location interacts with all the independent variables</td>
</tr>
<tr>
<td>3</td>
<td>{DGRA} {DE}</td>
<td>Effect of doctoral-granting institution on employment location</td>
</tr>
<tr>
<td>4</td>
<td>{DGRA} {GE}</td>
<td>Effect of gender on employment location</td>
</tr>
<tr>
<td>5</td>
<td>{DGRA} {RE}</td>
<td>Effect of academic rank on employment location</td>
</tr>
<tr>
<td>6</td>
<td>{DGRA} {AE}</td>
<td>Effect of academic discipline on employment location</td>
</tr>
<tr>
<td>7</td>
<td>{DGRA} {DE}{GE}</td>
<td>Effect of doctoral-granting institution and employment location and gender and employment location</td>
</tr>
<tr>
<td>8</td>
<td>{DGRA} {DE}{RE}</td>
<td>Effect of academic rank and employment location and doctoral-granting institution and employment location</td>
</tr>
</tbody>
</table>
Effect of academic discipline and employment location and doctoral-granting institution and employment location

Effect of academic rank and employment location and gender and employment location

Effect of academic discipline and employment location and gender and employment location

Effect of academic discipline and employment location and rank and employment location

Effect of interaction between doctoral-granting institution, gender, and employment location with rank and employing location
16  \( \{DGRA\} \{DGE\} \{AE\} \)
Effect of interaction between doctoral-granting institution, gender, and employment location with academic discipline and employment location

17  \( \{DGRA\} \{DRE\} \{GE\} \)
Effect of interaction between doctoral-granting institution, rank, and employment location with gender and employment location

18  \( \{DGRA\} \{DRE\} \{AE\} \)
Effect of interaction between doctoral-granting institution, rank, and employment location with academic discipline and employment location

19  \( \{DGRA\} \{DAE\} \{GE\} \)
Effect of interaction between doctoral-granting institutions academic disciplines, and employment location with gender and employment location

20  \( \{DGRA\} \{DAE\} \{RE\} \)
Effect of interaction between doctoral-granting institutions academic disciplines, and employment location with rank and employment location

21  \( \{DGRA\} \{GRE\} \{DE\} \)
Effect of interaction between gender, rank, and employment location with doctoral-
granting institution and employment location

22  \{DGRA\} \{GRE\} \{AE\} Effect of interaction between gender, rank, and employment location with academic discipline and employment location

23  \{DGRA\} \{GAE\} \{RE\} Effect of interaction between gender, academic discipline, and employment location with rank and employment location

24  \{DGRA\} \{GAE\} \{DE\} Effect of interaction between gender, academic discipline, and employment location with doctoral-granting institutions and employment location

25  \{DGRA\} \{RAE\} \{DE\} Effect of interaction between rank, academic discipline, and employment location with doctoral-granting institution and employment location

26  \{DGRA\} \{RAE\} \{GE\} Effect of interaction between rank, academic discipline, and employment location with gender and employing location

27  \{DGRA\} \{DGE\} \{RE\} \{AE\} Effect or interaction between doctoral-granting institution,
gender and employment location
with rank and employment location as well
as academic discipline and employment
location

28 \{DGRA\} \{DRE\} \{GE\} \{AE\} Effect of interaction between
doctoral-granting institution, rank, and
employment location with gender and
employment location as well as academic
discipline and employment location

29 \{DGRA\} \{DAE\} \{GE\} \{RE\} Effect of interaction between
doctoral-granting institution,
academic discipline and employment location
with gender and employment location
as well as rank and employment
location

30 \{DGRA\} \{GRE\} \{DE\} \{AE\} Effect of interaction between gender, rank
and employment location with doctoral-
granting institution and employment location
as well as academic discipline and
employment location

31 \{DGRA\} \{GAE\} \{DE\} \{RE\} Effect of interaction between
gender, academic discipline
and employment location with
doctoral-granting institution
and employment location as
well as rank and employment location

32 \{DGRA\} \{RAE\} \{DE\} \{GE\} Effect of interaction between
rank, academic discipline, and
employment location with
doctoral-granting institution
and employment location as
well as gender and employment location

33 \{DGRA\} \{DGE\} \{RAE\} Effect of interaction between
doctoral-granting institution,
gender, and employment location with
interaction between rank, academic
discipline and employment location

34 \{DGRA\} \{GRE\} \{DAE\} Effect of interaction between
gender, rank, and employment
location with interaction between doctoral-
granting institution, academic discipline and
employment location

35 \{DGRA\} \{DRE\} \{GAE\} Effect interaction between
doctoral-granting institution,
rank, and employment location with interaction between gender, academic discipline, and employment location

36 \{DGRA\} \{DGRE\} \{AE\} Effect of interaction between doctoral-granting institution, gender, rank, and employment location with academic rank and employment location

37 \{DGRA\} \{DGAE\} \{RE\} Effect of interaction between doctoral-granting institution, gender, academic discipline, and employment location with rank and employment location

38 \{DGRA\} \{DRAE\} \{GE\} Effect of interaction between doctoral-granting institution, rank, academic discipline, and employment location with gender and employment location

39 \{DGRA\} \{GRAE\} \{DE\} Effect of interaction between gender, rank, academic discipline, and employment
location with doctoral-granting institution 
and employment location 

All higher-order relationships in these models have the lower-order relationships nested within them (e.g. \{DGRA\} \{DE\} \{GE\} has \{DG\} \{DR\} \{DA\} \{GR\} \{GA\} \{RA\} \{D\} \{G\} \{R\} \{A\} \{E\}). These models are based upon inclusion of all variables and log-linear statistical testing was used to determine which one or ones of these is the best fit for the data.
CHAPTER 4

RESULTS

The results of a national study on academic lineage as a predictor of career success are reported in this chapter. The first section of the chapter presents the demographics of the faculty within each of the nine Carnegie classifications. Section two of the chapter presents the results of the qualitative analysis of the mission statements of the 260 sample colleges and universities. The third section of the chapter presents the log-linear data regarding hypothesis one: faculty are employed by the types of institutions from which they earned their doctorate. The data associated with hypothesis two, rank, are presented in section four of the chapter. Section five displays the separate data for female faculty including the relationship between employing institution and doctoral granting institution as well as professional rank information. The final section of the chapter presents the variability of all previous variables across academic disciplines.

Demographics

Demographic information relevant to the investigation was obtained from college catalogs, the World Wide Web, electronic mail, and telephone conversations to colleges and universities. The U.S. Secretary of Education recognizes 3,595 colleges and universities in the United States that are degree-granting and accredited. This study drew a random sample of 260 institutions from 2,873 college and universities from research I
universities through associate of arts colleges as classified by the Carnegie Foundation for the Advancement of Teaching. Institutions were selected at random until the sample size of faculty members corresponded to the national distribution across Carnegie classification categories.

<table>
<thead>
<tr>
<th>Carnegie Category</th>
<th>Population</th>
<th>Sample</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Universities I</td>
<td>88</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Research Universities II</td>
<td>37</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>Doctoral Universities I</td>
<td>52</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Doctoral Universities II</td>
<td>59</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Master's I</td>
<td>436</td>
<td>42</td>
<td>10</td>
</tr>
<tr>
<td>Master's II</td>
<td>93</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Baccalaureate Colleges I</td>
<td>165</td>
<td>17</td>
<td>10</td>
</tr>
<tr>
<td>Baccalaureate Colleges II</td>
<td>472</td>
<td>41</td>
<td>9</td>
</tr>
<tr>
<td>Associate of Arts Colleges</td>
<td>1,471</td>
<td>126</td>
<td>9</td>
</tr>
<tr>
<td>Totals</td>
<td>2,873</td>
<td>260</td>
<td>9</td>
</tr>
</tbody>
</table>

A total of approximately 345,685 faculty holding the professional rank of professor, associate professor, or assistant professor were employed at these institutions. A random sample of 3,940 faculty holding the degree of Ph.D. or Ed.D. were selected to be included in the study. The sample size was based on an estimate of the number of faculty members in each classification category and the percentage of all faculty in the United States who fell into each classification category. Emeriti faculty, adjunct faculty, instructors, administrators and other personnel without faculty rank were not included.
Table 4
Faculty Sample by Academic Rank

<table>
<thead>
<tr>
<th>Carnegie category</th>
<th>Professor</th>
<th>Percentage</th>
<th>Associate Professor</th>
<th>Percentage</th>
<th>Assistant Professor</th>
<th>Percentage</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research I</td>
<td>390</td>
<td>45</td>
<td>278</td>
<td>32</td>
<td>191</td>
<td>22</td>
<td>859</td>
</tr>
<tr>
<td>Research II</td>
<td>222</td>
<td>43</td>
<td>156</td>
<td>30</td>
<td>138</td>
<td>27</td>
<td>516</td>
</tr>
<tr>
<td>Doctoral I</td>
<td>94</td>
<td>35</td>
<td>90</td>
<td>34</td>
<td>82</td>
<td>31</td>
<td>266</td>
</tr>
<tr>
<td>Doctoral II</td>
<td>96</td>
<td>38</td>
<td>81</td>
<td>32</td>
<td>73</td>
<td>29</td>
<td>250</td>
</tr>
<tr>
<td>Master's I</td>
<td>483</td>
<td>43</td>
<td>327</td>
<td>29</td>
<td>323</td>
<td>29</td>
<td>1133</td>
</tr>
<tr>
<td>Master's II</td>
<td>80</td>
<td>44</td>
<td>52</td>
<td>29</td>
<td>48</td>
<td>27</td>
<td>180</td>
</tr>
<tr>
<td>Baccal. I</td>
<td>96</td>
<td>46</td>
<td>63</td>
<td>30</td>
<td>51</td>
<td>24</td>
<td>210</td>
</tr>
<tr>
<td>Baccal. II</td>
<td>116</td>
<td>52</td>
<td>57</td>
<td>26</td>
<td>49</td>
<td>22</td>
<td>222</td>
</tr>
<tr>
<td>Associate of Arts</td>
<td>232</td>
<td>76</td>
<td>45</td>
<td>15</td>
<td>27</td>
<td>9</td>
<td>304</td>
</tr>
<tr>
<td>Total</td>
<td>1,809</td>
<td>46</td>
<td>1,149</td>
<td>29</td>
<td>982</td>
<td>25</td>
<td>3,940</td>
</tr>
</tbody>
</table>

The distributions of male and female faculty within each classification category are displayed in Table 5. Research II institutions have the least representation of women faculty who hold the doctoral degree and academic rank while baccalaureate I colleges and associate of arts colleges have the most representation. The majority of faculty with doctoral degrees holding academic rank were male totaling 2812 (71%), while the number of female faculty members was 1128 (29%).
Table 5
Gender of Faculty Sample

<table>
<thead>
<tr>
<th>Carnegie Category</th>
<th>Male</th>
<th>Percentage</th>
<th>Female</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research I</td>
<td>639</td>
<td>74</td>
<td>220</td>
<td>26</td>
</tr>
<tr>
<td>Research II</td>
<td>401</td>
<td>78</td>
<td>115</td>
<td>22</td>
</tr>
<tr>
<td>Doctoral I</td>
<td>178</td>
<td>67</td>
<td>88</td>
<td>33</td>
</tr>
<tr>
<td>Doctoral II</td>
<td>192</td>
<td>77</td>
<td>58</td>
<td>23</td>
</tr>
<tr>
<td>Master’s I</td>
<td>792</td>
<td>70</td>
<td>341</td>
<td>30</td>
</tr>
<tr>
<td>Master’s II</td>
<td>134</td>
<td>74</td>
<td>46</td>
<td>26</td>
</tr>
<tr>
<td>Baccalaureate I</td>
<td>128</td>
<td>61</td>
<td>82</td>
<td>39</td>
</tr>
<tr>
<td>Baccalaureate II</td>
<td>159</td>
<td>72</td>
<td>63</td>
<td>28</td>
</tr>
<tr>
<td>Associate of Arts</td>
<td>189</td>
<td>62</td>
<td>115</td>
<td>38</td>
</tr>
<tr>
<td>Total</td>
<td>2812</td>
<td>71</td>
<td>1128</td>
<td>29</td>
</tr>
</tbody>
</table>

In Table 6 are displayed the academic disciplines of the faculty in the sample. All disciplines were represented in 7 of the classification categories. The academic discipline of agriculture was not represented in master’s II institutions or baccalaureate I institutions. Engineering faculty were not found in the sample of baccalaureate I institutions. These omissions were not surprising for the baccalaureate I institutions as they are undergraduate liberal arts institutions that do offer only limited professional areas of study. Baccalaureate I institutions also had the highest concentration of humanities faculty across all classification categories. Research II institutions had the highest percentage of agriculture faculty while Doctoral I institutions had the highest percentage of faculty in the education disciplines. More than 50 percent of faculty who have a doctoral degree and academic rank teach in the sciences and humanities across eight of the nine classification
categories. Only Research II institutions have less than half (46%) of faculty teaching in these disciplines.

Table 6

<table>
<thead>
<tr>
<th>Car</th>
<th>Agr %</th>
<th>Bus %</th>
<th>Edu %</th>
<th>Sci %</th>
<th>Hm %</th>
<th>Oth %</th>
<th>Eng %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Res I</td>
<td>79</td>
<td>9</td>
<td>90</td>
<td>10</td>
<td>82</td>
<td>10</td>
<td>222</td>
</tr>
<tr>
<td>Res II</td>
<td>72</td>
<td>14</td>
<td>63</td>
<td>12</td>
<td>57</td>
<td>11</td>
<td>102</td>
</tr>
<tr>
<td>Doc I</td>
<td>1</td>
<td>0</td>
<td>31</td>
<td>12</td>
<td>48</td>
<td>18</td>
<td>56</td>
</tr>
<tr>
<td>Doc II</td>
<td>6</td>
<td>2</td>
<td>46</td>
<td>18</td>
<td>30</td>
<td>12</td>
<td>60</td>
</tr>
<tr>
<td>Mas I</td>
<td>16</td>
<td>1</td>
<td>169</td>
<td>15</td>
<td>184</td>
<td>16</td>
<td>273</td>
</tr>
<tr>
<td>Mas II</td>
<td>0</td>
<td>0</td>
<td>42</td>
<td>23</td>
<td>24</td>
<td>13</td>
<td>41</td>
</tr>
<tr>
<td>Bac I</td>
<td>0</td>
<td>0</td>
<td>30</td>
<td>14</td>
<td>13</td>
<td>6</td>
<td>52</td>
</tr>
<tr>
<td>Bac II</td>
<td>1</td>
<td>1</td>
<td>31</td>
<td>14</td>
<td>36</td>
<td>16</td>
<td>72</td>
</tr>
<tr>
<td>As Art</td>
<td>2</td>
<td>1</td>
<td>25</td>
<td>8</td>
<td>27</td>
<td>9</td>
<td>96</td>
</tr>
<tr>
<td>Tot</td>
<td>177</td>
<td>5</td>
<td>527</td>
<td>13</td>
<td>491</td>
<td>12</td>
<td>974</td>
</tr>
</tbody>
</table>

Employment of Faculty

The distribution of employment of faculty based on type of doctoral-granting institution is seen in Table 7.

Table 7

<table>
<thead>
<tr>
<th>Employer</th>
<th>Res I %</th>
<th>Res II %</th>
<th>Doc I %</th>
<th>Doc II %</th>
<th>Mas I %</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Res I</td>
<td>787</td>
<td>92</td>
<td>43</td>
<td>5</td>
<td>21</td>
<td>2</td>
</tr>
<tr>
<td>Res II</td>
<td>409</td>
<td>79</td>
<td>86</td>
<td>17</td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td>Doc I</td>
<td>198</td>
<td>74</td>
<td>41</td>
<td>15</td>
<td>20</td>
<td>8</td>
</tr>
<tr>
<td>Doc II</td>
<td>189</td>
<td>76</td>
<td>34</td>
<td>14</td>
<td>21</td>
<td>8</td>
</tr>
<tr>
<td>Mas I</td>
<td>754</td>
<td>67</td>
<td>243</td>
<td>22</td>
<td>96</td>
<td>8</td>
</tr>
<tr>
<td>Mas II</td>
<td>131</td>
<td>73</td>
<td>29</td>
<td>16</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>Bac I</td>
<td>177</td>
<td>84</td>
<td>18</td>
<td>9</td>
<td>15</td>
<td>7</td>
</tr>
<tr>
<td>Bac II</td>
<td>141</td>
<td>64</td>
<td>58</td>
<td>26</td>
<td>13</td>
<td>6</td>
</tr>
<tr>
<td>AA</td>
<td>175</td>
<td>58</td>
<td>52</td>
<td>17</td>
<td>53</td>
<td>17</td>
</tr>
<tr>
<td>Total</td>
<td>2,961</td>
<td>74</td>
<td>604</td>
<td>15</td>
<td>266</td>
<td>7</td>
</tr>
</tbody>
</table>


It becomes apparent that the majority of faculty members employed in institutions of higher education, with academic rank, have a doctoral degree from a research I institution. Research I institutions have the highest percentage (92%, n=787) and associate of arts institutions have the lowest percentage (58%, n=175). A visual representation of the number of faculty employed in postsecondary institutions holding doctoral degrees from research I institutions is displayed in graph 1.

Graph 1

A content analysis was conducted on the published mission statement of each of the 260 institutions in the sample. The mission statements ranged in length from two
sentences to one and one-half pages. Words were the unit of data with teaching, research, students, learning, undergraduate, graduate, economic development and funding sources being coded. After reviewing the 260 mission statements, frequency patterns revealed several interesting characteristics. The percentage of mission statements containing the coded words is displayed in Table 8.

<table>
<thead>
<tr>
<th>Carnegie class</th>
<th>funding sources</th>
<th>graduate program</th>
<th>teaching</th>
<th>learning</th>
<th>students</th>
<th>research</th>
<th>econ. development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Res I</td>
<td>100%</td>
<td>67%</td>
<td>100%</td>
<td>78%</td>
<td>44%</td>
<td>78%</td>
<td>100%</td>
</tr>
<tr>
<td>Res II</td>
<td>100%</td>
<td>20%</td>
<td>60%</td>
<td>80%</td>
<td>80%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Doc I</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>60%</td>
<td>80%</td>
<td>100%</td>
</tr>
<tr>
<td>Doc II</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>50%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Mas I</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>68%</td>
<td>100%</td>
<td>98%</td>
</tr>
<tr>
<td>Mas II</td>
<td>100%</td>
<td>78%</td>
<td>78%</td>
<td>100%</td>
<td>22%</td>
<td>100%</td>
<td>33%</td>
</tr>
<tr>
<td>Bac I</td>
<td>100%</td>
<td>76%</td>
<td>29%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>53%</td>
</tr>
<tr>
<td>Bac II</td>
<td>100%</td>
<td>73%</td>
<td>11%</td>
<td>100%</td>
<td>84%</td>
<td>100%</td>
<td>28%</td>
</tr>
<tr>
<td>AA</td>
<td>100%</td>
<td>78%</td>
<td>0%</td>
<td>98%</td>
<td>98%</td>
<td>100%</td>
<td>6%</td>
</tr>
</tbody>
</table>

Of the 260 mission statements studied, all 260 contained specific statements regarding the institution's primary funding source. The statements referred to the institutions being public, independent, or affiliated with a specific religious or other organization. Additionally, one research I institution (11%), one research II institution (20%) and one master's I institution (2%) stated that research grants were a supplemental funding source.

Of particular interest to this study was the frequency of statements regarding teaching and research components in the mission statements. Two research I institutions (22%) did not mention undergraduate education, teaching, learning, or students in their
respective mission statements. One research II institution (20%) also did not mention undergraduate education, teaching or learning, but all research II institutions did mention students (the word “student” was used 14 times in the 5 mission statements). Two associate of arts institutions (2%) did not mention undergraduate education, teaching, or learning but all associate of arts institutions did mention students (the word “student” was used 142 times in 126 mission statements). Two research II institutions (40%) and master’s II institutions (22%) did not mentioned graduate education. Five baccalaureate I (29%) institutions and 4 baccalaureate II (11%) institutions that offer limited graduate programs did refer to these programs in their missions statements.

Research is a significant element to research I (100%), research II (100%), doctoral I (100%) and doctoral II (100%) institutions, according to their mission statements. All but one master’s I institution (98%) referred to research in the mission statement. Interestingly, the word “research” was mentioned 42 times in the nine research I, 15 times in the five research II, 22 times in the 5 doctoral I, 16 times in the 6 doctoral II, and 65 times in the 41 master’s I institutional mission statements.

The final component for most postsecondary institutions is service to the city, region, state, and/or global community. In this study, “economic development” was the inclusive term used for data coding. Master’s II and baccalaureate I and II institutions do not include economic development as a major aspect in their purpose according to their mission statements. Mention of service was found in only thirty-three percent of master’s II, eighteen percent of baccalaureate I and twenty-two percent of baccalaureate II institutional mission statements. The few institutions in these classification categories that
did refer to economic development did so with respect to the local geographical region. The institutions within the six classification categories (research I, research II, doctoral I, doctoral II, master's I and associate of arts) that emphasized economic development in their mission statements included all levels of influence and responsibility of service (i.e. regional to international).

Log-linear Analysis

In Chapter 3 the variety of models available to test the five hypotheses were presented. The tests of significance are presented in Table 9. The variable of academic discipline has been omitted from these models. A thorough description of this omission is discussed under hypothesis 5 later in this chapter.

Typically, in order to generalize sample results to a population alpha is set at \( p=0.05 \). Finding the best fitting log-linear model requires identifying the one model which contains all true relationships. If the Type II error has a high probability, effects are likely to be omitted from the model that exist in the population (Knoke & Burke, 1980). The recommendation for reducing Type II errors include increasing the probability of Type I error to a range of .10 to .35 (Knoke & Burke, 1980).

Table 9
Models for Academic Lineage of Faculty

<table>
<thead>
<tr>
<th>Model</th>
<th>Fitted Marginals</th>
<th>( L^2 )</th>
<th>d.f.</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>{DGRE}</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>2</td>
<td>{D}{G}{R}{E}</td>
<td>958.98</td>
<td>254</td>
<td>0.0</td>
</tr>
<tr>
<td>Model</td>
<td>Fitted Marginals</td>
<td>$L^2$</td>
<td>d.f.</td>
<td>p</td>
</tr>
<tr>
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<td>-----------------</td>
<td>-------</td>
<td>------</td>
<td>----</td>
</tr>
<tr>
<td>3</td>
<td>{DGR} {E}</td>
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<td>232</td>
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<td>224</td>
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<tr>
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<td>112</td>
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<tr>
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<td>{DGR} {GRE} {DE}</td>
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<tr>
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<td>64</td>
<td>0.59</td>
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</table>

The saturated model is Model 1 which contains all variables (i.e. \{E\}, \{D\}, \{R\}, \{G\}, \{ED\}, \{ER\}, \{ER\}, \{EG\}, \{DG\}, \{RG\}, \{EDR\}, \{EDG\}, \{DRG\}, and \{EDRG\}) necessary to estimate the expected frequencies within the four-way table. The
assumption behind this model was that a relationship exists between E and D, as well as this relationship depending upon G and R and all interrelationships. The $L^2$ is 0 and the df is 0 because this is a perfectly fit model. The saturated model is not parsimonious. By examining the remaining models, an assessment of relationships between models can be more parsimoniously attained.

Model 2 examined the main effects E, D, G, R with no interaction between these variables. This model assessed the main effects of the equation. The null hypothesis for this model is that the relationships between E, D, G, and R are all independent. With the $L^2$ of 958.98 and df=254, the null hypothesis was rejected as the model requires only 112 df to fit the data. The elements of employing institutions, doctoral-granting institution, gender, and rank were related.

Model 3 tested the null hypothesis that none of the variables D, G, and R had a significant relationship with E. If this is true, no additional tests would then be necessary. The difference between the saturated model and model 3 was $\Delta L^2=746.37$, $\Delta df=232$ and therefore the null hypothesis was rejected. Employment of faculty was indeed related to doctoral-granting institution, gender, and/or academic rank.

Models 4, 5, and 6 each add a single bivariate relationship, two-factor interaction, involving employment. Although all three substantially reduced $L^2$ relative to the cost in degrees of freedom, model 6 appears to have had the most impact. Employment was effected by gender and rank but was most strongly related to doctoral-granting institution. The first null hypothesis of this study was that faculty are not employed by the types of
institutions from which they earned their doctorate. Due to the significance of model 6, the relationship between where faculty members received their doctorates and where they were employed was confirmed. An assessment of the residuals will give additional information on whether this relationship is within each doctoral-granting institutional category or whether one institutional category is predominant in establishing the relationship.

Models 7, 8, and 9 each contain an additional bivariate relationship. Model 9 was immediately rejected due to the increase in $L^2$ value and degrees of freedom. Gender and academic rank did not significantly effect employment when the doctoral-granting institution was taken out of the equation. In other words, the correct rejection of the first null hypothesis of this study was again confirmed. The predominant element to faculty employment was academic lineage. Models 7 and 8 were both significant and suggest that doctoral-granting institution and rank as well as doctoral-granting institution and gender were interacting with employment of faculty. The significance of these models required further examination to find a model that encompassed all of these elements.

Model 10 was the best fit of the data with respect to $L^2$ value and degrees of freedom with all the bivariate relationships included. The difference between model 10 and model 7 was $\Delta L^2=82.45, \Delta df=8, p<0.001$. This significance means that gender, rank, and doctoral-granting institutions were all independently interacting with employment. At this point, the complex higher-order models were examined to ascertain whether interactions between these variables contributed to the relationship of faculty employment. If not,
model 10 would be the best fit of the data, verifying that the elements of faculty members' gender, rank, and where they received their doctoral degrees all contributed to their employment in academia.

Models 11, 12, and 13 examined the higher-order interactions between the variables. Model 12 was rejected as the degrees of freedom and the $L^2$ value were larger than models 7 and 8. Model 13 was rejected because $L^2=335.80$, $df=160$ was larger than model 7. Model 11 had the smallest $L^2=198.38$, $df=120$ thus far, indicating that there was an interaction between doctoral-granting institution, rank and employment. The significance of this model was an important component to null hypothesis two of the study; faculty do not have higher professional rank at employing institutions that are the same type of institutions as those from which they earned their doctorate. The relationship between rank, doctoral-granting institution, and employment institution was established by the significance of this model. However, this hypothesis was directional and therefore could not be rejected until the parameters of the “best fit” model were examined.

Models 14, 16, and 17 were rejected because the $L^2$ values did not significantly change in relation to degrees of freedom. Models 18, and 19 were all rejected because $p>.35$ in both cases. This indicates that a more parsimonious model can represent the data while including the three-variable interaction that seems essential in representing the relationships.
The model that best fit the data was model 15, $\chi^2 = 117.91$, df=112, $p=.33$. The difference between model 15 and model 11 was $\Delta \chi^2 = 80.47$, $\Delta$df=8, $p<.001$. Graph 2 illustrates the goodness-of-fit between the observed versus fitted frequencies using this model. The model contains the interaction term {DRE}, which was found to be prerequisite for any higher order model, and the two-variable marginal not nested within the interaction {GE}. There was an interaction between doctoral-granting institution, rank and employment. In addition gender was interacting with employment but was independent of the other interactions.

Graph 2
Observed versus Fitted Frequencies
Residuals

The model that best represents the data in this study was model 15. To examine the strength of effect due to one variable or to its interaction with other variables the $L^2$ values for a model which included the relevant variable were compared with that for a model in which the variable was absent (Farkas, 1975). In order to explore the fit of each cell within the best fit model, the respective residual scores were needed. Residuals are beneficial in indicating where there are statistically significant influential observations. Positive residuals point out an increase of staying within the respective category while negative residuals denote movement out of the respective category. A standardized residual score for a category of greater than 2.00 attests to an influential observation that is contributing to the statistical significance. Residual values also provide a process for examining normality of the distribution of scores. The residuals reflect the amount of discrepancy between observed and predicted values which was still present after having fit the best log-linear model. An “best fit” log-linear model will have approximately equal numbers of positive and negative residual values across the table of all cells of the model. The amplitude of the residuals from variables {E}, {D}, {R}, and {G} are presented in the following tables.
Table 10  
Model 15  
Residual frequencies for Males Employing by Doctoral-Granting Institution by Rank

<table>
<thead>
<tr>
<th>Employer</th>
<th>Rank</th>
<th>Res I</th>
<th>Res II</th>
<th>Doc I</th>
<th>Doc II</th>
<th>Mas I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Res I</td>
<td>Prof</td>
<td>0.1258</td>
<td>-0.1176</td>
<td>0.0864</td>
<td>0.0254</td>
<td>0.0068</td>
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<td>-0.1023</td>
<td>0.0482</td>
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Table 11  
Model 15  
Residual Frequencies for Females Employing by Doctoral-Granting Institution by Rank

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<th>Employer</th>
<th>Rank</th>
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<th>Res II</th>
<th>Doc I</th>
<th>Doc II</th>
<th>Mas I</th>
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</tr>
</tbody>
</table>

As can be seen in Table 10, male faculty residuals were an adequate fit of the data. In other words, the observed and expected frequencies were well within the acceptable
level of under 2. When standardized residuals for a category are greater than 2.00, the conclusion can be made that it is a major contributor to the significant $\chi^2$ value (Hinkle, 1994). The selected model 15 appeared to be appropriate for the table as the residual frequencies had approximately equal magnitudes of positive and negative values or "random noise". Positive residuals point to a staying in the category while the negative residuals signal a moving out of a particular category. Seventy-six (56%) of the residuals were positive and 59 (44%) were negative for males. Forty-eight (35%) of the residuals were positive and 87 (65%) were negative for females. The residuals on women faculty, therefore, show a very different picture. Four of the categories had residuals over 2 with one over 3. For example, the cell with residual 3.2420 represents women who graduated from a research II institution moving into associate professor positions at research I institutions. Likewise, women from research I institutions were not staying at research I institutions as was seen from the negative residuals. Women who graduated from research I institutions were becoming professors at associate of arts colleges while women who graduated from research II institutions were in assistant professor positions at baccalaureate II institutions in larger than expected numbers. The number of negative residuals for women graduating from research I institutions and being employed in research I, research II, or professor of doctoral I was worthy of note. Women with degrees from research II institutions and doctoral I institutions appeared to be employed at research I institutions more than expected. Similarly, women with degrees from research II and doctoral II institutions tended not to be as frequently employed at the
associate of arts institutions as expected. Graph 3 shows the fitted frequencies vs. standardized residuals for both men and women.

**Graph 3**

Fitted Frequencies vs. Standard Residuals

Components of Max-likelihood Ratio

The best fit model, Model 15, in the log-linear analysis confirmed a relationship between academic rank, doctoral-granting institution, and employing institution. The components of the maximum likelihood ratio provide the contributions of each cell to the overall goodness-of-fit statistic.
Table 12
Model 15
Max-likelihood ratio component for Employer by Rank
Research I Doctoral-Granting Institutions

<table>
<thead>
<tr>
<th>Employer</th>
<th>Gender</th>
<th>Professor</th>
<th>Assoc. Prof</th>
<th>Asst.. Prof</th>
</tr>
</thead>
<tbody>
<tr>
<td>Res I</td>
<td>Male</td>
<td>4.3873</td>
<td>2.6866</td>
<td>-0.5372</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>-2.3715</td>
<td>-1.6988</td>
<td>0.5642</td>
</tr>
<tr>
<td>Res II</td>
<td>Male</td>
<td>4.7162</td>
<td>1.0882</td>
<td>-0.5123</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>0</td>
<td>-0.8667</td>
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</tr>
<tr>
<td>Doc I</td>
<td>Male</td>
<td>0.9528</td>
<td>-3.487</td>
<td>0.0063</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>-0.8518</td>
<td>4.7049</td>
<td>-0.0063</td>
</tr>
<tr>
<td>Doc II</td>
<td>Male</td>
<td>0.6875</td>
<td>-1.0461</td>
<td>4.0531</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>-0.5895</td>
<td>1.2199</td>
<td>0</td>
</tr>
<tr>
<td>Mas I</td>
<td>Male</td>
<td>-0.2972</td>
<td>1.9543</td>
<td>-0.9776</td>
</tr>
<tr>
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<td>Female</td>
<td>0.2996</td>
<td>-1.8048</td>
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</tr>
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<td>Female</td>
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<tr>
<td>A A</td>
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<td></td>
<td>Female</td>
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<td>-1.3754</td>
</tr>
<tr>
<td>Employer</td>
<td>Gender</td>
<td>Professor</td>
<td>Assoc. Prof</td>
<td>Asst. Prof</td>
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<td>----------</td>
<td>--------</td>
<td>-----------</td>
<td>-------------</td>
<td>------------</td>
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<td>Res I</td>
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<td>2.1012</td>
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<td>Res II</td>
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</tr>
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<td>1.6175</td>
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</tr>
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<td>Female</td>
<td>0.3463</td>
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</tr>
<tr>
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<td>0.0879</td>
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</tr>
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<td></td>
<td>Female</td>
<td>-0.086</td>
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<td>Mas I</td>
<td>Male</td>
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<td>Female</td>
<td>7.5632</td>
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<td>Mas II</td>
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<td>Female</td>
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<tr>
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<tr>
<td>Bac II</td>
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Table 14  
Model 15  
Max-likelihood ratio components for Employer by Rank  
Doctoral I Doctoral-Granting Institutions  

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<th>Gender</th>
<th>Professor</th>
<th>Assoc. Prof</th>
<th>Asst.. Prof</th>
</tr>
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<td>Female</td>
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<td>Female</td>
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<tr>
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<td>Male</td>
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<tr>
<td>Bac II</td>
<td>Male</td>
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<td>Female</td>
<td>4.6203</td>
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Table 15
Model 15
Max-likelihood ratio components for Employer by Rank
Doctoral II Doctoral-Granting Institutions

<table>
<thead>
<tr>
<th>Employer</th>
<th>Gender</th>
<th>Professor</th>
<th>Assoc. Prof</th>
<th>Asst. Prof</th>
</tr>
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<tr>
<td>Res I</td>
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<td>0.2166</td>
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<td>0</td>
</tr>
<tr>
<td>Res II</td>
<td>Male</td>
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<td>0.7272</td>
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<td>Female</td>
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<td>Doc I</td>
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<tr>
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<td>-2.4022</td>
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<tr>
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<td>0.3177</td>
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<td>Female</td>
<td>4.1343</td>
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<tr>
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<td>Male</td>
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<td>0.058</td>
</tr>
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</tr>
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<td>Bac II</td>
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<tr>
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</tr>
</tbody>
</table>

Academic Lineage

Null hypothesis one states that faculty are not employed at the same type of institutions as those from which they received their doctorates. Although the log-linear model showed a clear relationship between doctoral-granting institutions and employing institutions in every examination of the model selection process, this relationship was not due to faculty being employed at the same type of institutions as those from which they received their doctorates. For example, men who graduated from research I institutions
were likely to be employed by research I institutions but were more likely to employed by research II or baccalaureate II institutions. Women who graduated from research I institutions were less likely to be employed by research I institutions while women who graduated from research II institutions moved to research I institutions. Associate of arts institutions were getting the majority of their male faculty with doctorates from research II institutions (12.6688) and their female faculty from research I institutions (19.4451).

Research I institutions were supplying the majority (74%) of faculty who had a doctorate and held academic rank to all types of postsecondary institutions. The max-likelihood ratio confirmed that research I institutions were supplying significant numbers of faculty of all ranks to other institutions (7 out of 18 cells had a value of over 4.0). The other type of institution that had similar placement across types of institutions (in smaller numbers, 7% of faculty employed) was doctoral I institutions. While 92% of research I faculty were graduates of research I institutions, 17% of research II faculty were graduates of research II institutions, 8% of doctoral I employees were graduates of doctoral I institutions, 2% of doctoral II faculty were graduates of doctoral II institutions, 1% of master's I faculty were their graduates. Research II institutions provided faculty at higher percentages to master's I (22%), and baccalaureate II (26%) institutions than to other research II institutions. Doctoral I institutions provided 17% of the associate of arts faculty and only 8% of their own. Doctoral II institution graduates were more likely to find positions at doctoral I (3%), master's I (3%), master's II(3%), baccalaureate II (4%), and associate of arts (7%) institutions than at doctoral II universities. Clearly, null hypothesis one was retained, indicating that faculty were not significantly more likely to be
employed at institutions that were the same type as those from which they received their doctorates.

When examining the partial associations of variables, academic lineage was significant in all the partial association chi-squares that included the variable of doctoral-granting institution. The partial association of variables are as follows: (1) employing institution and doctoral-granting institution, df=21, partial association chi-square=297.835, p<.0001; (2) rank and doctoral-granting institution, df=8, partial association chi-square=142.105, p<.0001; gender and doctoral-granting institution, df=4, partial association chi-square=23.593, p<.0001; (3) employing institution, rank, and doctoral-granting institution, df=64, partial association chi-square=85.119, p<.04, (4) employing institution, gender, and doctoral-granting institution, df=32, partial association chi-square=48.148, p<.03, and (5) rank, gender, and doctoral-granting institution, df=8, partial association chi-square=52.373, p<.0001. When doctoral-granting institution was partialled out, the interaction was no longer significant; employing institution, gender, and rank, df=16, partial association chi-square=12.54, p<.71.

Academic Rank

The second null hypothesis states that faculty do not have higher professional rank at employing institutions that are the same type of institutions as those from which they earned their doctorates. The distribution of faculty by academic rank across employing institutions is displayed in Table 4. Across all institutional categories, forty-six percent of faculty with academic rank held the rank of professor, twenty-nine percent held the rank of associate professor and twenty-five percent held the rank of assistant professor.
According to model 15, there was an interaction between academic rank, employing institution, and doctoral-granting institution. When examining the max-likelihood ratios the interaction became apparent in that the effect of academic rank was not the same across the levels of doctoral-granting institutions. (Max-likelihood ratio components for master's I institutions were not included because of the small number of faculty who had received their doctoral-degrees from these institutions.) Research I male graduates had a high likelihood of having the rank of professor at research I institutions (4.3873). They also, however, had a similar likelihood for the rank of professor at research II institutions (4.7162) and slightly less at masters' II institutions (2.9788). Female faculty who graduated from research I institutions were more likely to attain the rank of associate professor at doctoral I institutions (4.7049) as well as professor at associate of arts institutions (19.4451) and less likely to have had any rank at research I institutions. Male faculty who graduated from a research II institution were likely to hold the rank of professor at an associate of arts institution (12.6688) while female faculty with the same academic lineage were most likely to hold an associate professor position at a research I institution (11.8826). Doctoral I graduates were more likely to obtain the rank of associate professor (males, 3.2021) and assistant professor (females 7.9207) at doctoral I institutions. Male faculty who graduated from doctoral I institutions were more likely to hold the rank of professor at master's I institutions (5.2569). Female faculty who graduated from doctoral I institutions were more likely to have the rank of associate professor at research II institutions (4.4079) and professor at doctoral II (4.2002) and associate of arts institutions (4.6023). Although academic rank did contribute to
understanding the current employment patterns of faculty in higher education, the data show that doctoral-granting institutional lineage did not insure higher academic rank. Graduates from research I institutions achieved higher ranks at six different institutional types (research II, doctoral I, master’s II, baccalaureate I, baccalaureate II, and associate of arts). Faculty who earned their doctorates at research II institutions moved up in rank by moving into research I, doctoral I, master’s I, master’s II, and associate of arts institutions. Graduates from doctoral I institutions improved their academic ranking if they were employed at research II, doctoral II, master’s I, baccalaureate II and associate of arts institutions. Faculty who had a degree from a doctoral II institution obtained higher ranking if they moved to a master’s II, baccalaureate II, or associate of arts institution. Therefore, null hypothesis two was retained, indicating that faculty do not have higher rank at employing institutions that are the same type as those from which they received their doctorates.

Gender

Hypotheses three and four investigated the aspects of gender in relationship to academic lineage and employment. The distribution of faculty by gender across employment institutions is displayed in Table 5 earlier in this chapter. Seventy-one percent of the faculty who held the doctoral degree and had academic rank were men (n=2812) and twenty-nine percent (n=1128) were women. According to model 15, gender was related to employment location of faculty but was not part of the interaction with doctoral-granting, institution, academic rank, and employing institution. The
distinctiveness of this variable indicated that gender contributed something unique to academic lineage and employment.

The third null hypothesis stated that female faculty are not employed by the types of institutions as those from which they earned their doctorates. The percentage of women who received their doctorate degrees from research I institutions and were currently employed in academia is seventy-one percent (n=801). With only 199 (18%) women employed at research I institutions it was apparent that women were not employed at the same type of institutions from which they received their degrees in this category. Likewise, seventeen percent (n=191) of female faculty earned their doctorates at research II institutions with only 31 (3%) being employed at research II institutions. Female faculty who earned their doctorates at a research I institution were less likely to be employed at a research I institution and more likely to be employed at a doctoral I, baccalaureate I and most predominantly at an associate of arts institution (19.4551). The surprising finding was female faculty who graduated from a research II institution were most likely to be employed by a research I institution (2.1012 and 11.8526 at the professor and associate professor rank respectively), followed by master’s I (7.5632) and master’s II institutions (5.5065). Research II institutions maintained some of their graduates in the professor and associate professor ranks. Women who graduated from research II institutions were unlikely to be found in the professorial ranks at an associate of arts institution (-8.8035). Doctoral I institutions were likely to employ their female graduates at the entry level position of assistant professor (7.9207). These graduates were also likely to be found at the assistant professor level of research I institutions, associate professor level of research
II institution, doctoral II and associate of arts institutions. Graduates from doctoral II institutions were likely to be employed at the assistant professor level of master's I institutions (3.1714) and professor at master's II institutions (4.1343) and baccalaureate II institutions (4.4245). Although research II institutions and doctoral I institutions did employ graduates from similar institutions, the number of faculty employed at disparate institutions was significant. For these reasons, null hypothesis three was retained, signifying that female faculty were employed at different institutions than those from which they earned their doctorates. An additional finding was that the movement of female faculty was not exclusively "down" the classification types but also showed significant movement up (value over 2.00) in four cells of the three doctoral levels (research II, doctoral I and doctoral II) where such movement was possible. By contrast, male faculty members had no cells where comparable upward movement was present.

Academic ranking of women faculty was studied with null hypothesis four. Thirty-one percent (n=352) of women held the rank of professor, thirty-four percent (n=386) held the rank of associate professor, and thirty-five percent (n=390) held the rank of assistant professor. When compared with the aggregate of faculty rank (see Table 4 in this chapter), women were less represented in the rank of professor but held the ranks of associate and assistant professor more than their male counterparts (male professors n=1423, 51%; associate professor n=759, 27%; assistant professor n=592, 21%).

Women who received their doctorates at research I institutions were likely to have the rank of assistant professor. At any other ranking they were not likely to be employed at a research I institution. Graduates from research I institutions were likely to hold the
rank of professor at baccalaureate I (6.0731) and associate of arts (19.4451) institutions. For research II graduates, the women were likely to have the rank of associate professor (1.8003) or professor (1.6175) at a research II institution but were more likely to have those ranks at a research I institution (11.8526 and 2.1012 respectively). These graduates were also likely to hold the rank of professor at master's I (7.6532) and master's II (5.5065) institutions. Women who earned their doctorates at doctoral I institutions were likely to have the rank of assistant professor (7.9207) at the same types of institutions. They were likely to hold the rank of professor and associate professor at research II (1.2757 and 4.4079) and associate of arts (4.6203 and 2.9172) institutions. Lastly, women who had a doctoral degree from a doctoral II institution were likely to hold an academic rank of assistant professor at master's I (3.1713), and professor at master's II (4.1343) and baccalaureate II (4.3679) institutions. Again, the evidence verified that women did not hold higher professional rank at employing institutions that were the same type as those from which they received their doctorates.

Academic Disciplines

The distribution of faculty across academic disciplines is displayed in Table 6 in this chapter. The totals in the respective teaching fields were 177 (5%) in agriculture, 527 (13%) in business, 491 (12%) in education, 974 (25%) in the sciences, 1,299 (33%) in the humanities, 168 (4%) in other fields, and 294 (7%) in engineering. The fifth null hypothesis stated that the relationship between doctoral-granting institutions and employing institutions of faculty does not vary across academic disciplines.
The variable of academic discipline was not included in the log-linear analysis. The reason for this omission was that in setting up the log-linear analysis, academic disciplines had several cells with 0 value. Log-linear analysis is distorted with 0 value cells. The collapsing of academic disciplines or rank to correct this problem would have invalidated the initial purpose for studying the variables. Therefore, Spearman Rank Order Correlation was utilized to examine relationships between academic disciplines and the other variables independently.

<table>
<thead>
<tr>
<th>Table 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spearman rank order correlation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pair of Variables</th>
<th>Valid N</th>
<th>Spearman R</th>
<th>p-level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment and academic discipline</td>
<td>3940</td>
<td>.010674</td>
<td>.502961</td>
</tr>
<tr>
<td>Doctoral-granting and academic discipline</td>
<td>3940</td>
<td>-.025480</td>
<td>.109800</td>
</tr>
<tr>
<td>Gender and academic discipline</td>
<td>3940</td>
<td>.025800</td>
<td>.105401</td>
</tr>
<tr>
<td>Rank and academic discipline</td>
<td>3940</td>
<td>-.027007</td>
<td>.098007</td>
</tr>
</tbody>
</table>

Academic discipline was not related to any one of the other variables in the study. The null hypothesis for academic rank was retained. Since there was no relationship between academic discipline and either employing institution nor doctoral-granting institution, there was no significant difference between disciplines on either of these variables. Likewise, any relationship between doctoral-granting institutions and employing institutions would be stable across academic disciplines since this variable is independent of the other variables.
The logit regression process used to examine causal models did include academic disciplines. This analysis verified that academic discipline was not significantly impacting the employment of faculty by the parameter estimates:

<table>
<thead>
<tr>
<th>Carnegie category</th>
<th>Parameter Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research I &amp; II institutions</td>
<td>-0.07</td>
</tr>
<tr>
<td>Doctoral I &amp; II institutions</td>
<td>-0.05</td>
</tr>
<tr>
<td>Master’s I &amp; II institutions</td>
<td>-0.09</td>
</tr>
<tr>
<td>Baccalaureate I &amp; II institutions</td>
<td>-0.10</td>
</tr>
<tr>
<td>Associate of Arts institutions</td>
<td>-0.10</td>
</tr>
</tbody>
</table>

Causal model for log-linear model

Parameter estimates provide insight into the strength of the association between variables in a log-linear analysis. By collapsing research I and II institutions, doctoral I and II institutions, masters I and II, baccalaureate I and II and associate of arts colleges, a logit causal model utilized the parameter estimates that best represented the data. The key to a causal model of relationship among variables is a diagram of recursive effects. Single-headed arrows point from cause to effect. Two-headed arrows are for variables among which no causal ordering can be posited (Knoke & Burke, 1980). The following causal models were proposed:
Causal model 1—Research institutions

The institutions from which faculty members received their doctorates increased the chances of becoming employed at a research institution while gender decreased those possibilities and rank had a marginal positive affect. The type of institution from which faculty received their doctorates had little effect on rank while gender increased the effect on attainment of rank.
Causal model 2--Doctoral institutions

From this model, the importance of doctoral-granting institutions on employment was less significant, rank was still marginal in impact and gender more adversely affected employment.

Causal model 3--Baccalaureate institutions
Master's institutions looked very similar to doctoral institutions. Baccalaureate institutions had a different causal model. Once again, where faculty members received their doctoral degrees affected employment at these institutions and gender adversely affected employment. Rank had a slight negative affect on employment.

Causal model 4--Associate of arts college

The causal model for associate of arts institutions displays the importance of where faculty members received their doctorates. The parameter estimate for this variable was less than the estimates seen for research and baccalaureate institutions but more than the estimates for doctoral institutions. The most noticeable differences in this causal model were the effect of gender and rank on employment. Gender positively affected employment while rank adversely affected employment at these institutions.
Summary

The results of a national study on academic lineage as a predictor of career success were reported in this chapter. A description was given of the faculty, holding doctoral degrees and academic rank, that are employed within each of the nine Carnegie classifications. The five hypotheses were then examined using the log-linear methodology with all null hypotheses being retained. The proposed causal models of the logit regression closed the chapter.
CHAPTER 5

SUMMARY, DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This national study examined the extent to which academic lineage affects employment of faculty in American postsecondary institutions. Academic lineage was defined as the academic heredity of an individual. Only faculty having doctoral degrees were included in this study. Thus, doctoral-granting institutions of faculty provided the heredity information. The specific purposes of the study were to determine (1) the types of institutions from which contemporary faculty received their doctoral degrees, (2) the types of institutions at which contemporary faculty are teaching, (3) the association between types of institutions awarding doctorates to faculty and the types of employing institutions, (4) the current academic rank of faculty, (5) the disciplines taught by faculty, and (6) the association between gender of faculty, types of institutions awarding their doctorates, types of employing institutions, academic rank, and academic discipline. This chapter discusses the findings, advances conclusions, and offers recommendations regarding academic lineage as a predictor of faculty employment at colleges and universities in the United States.
Data for the study were collected on a random sample of faculty employed at colleges and universities from nine Carnegie classification categories. College catalogs were the source of data for faculty from the stratified sample of 260 institutions. The data were then coded according to type of employing institution, type of institution awarding the doctorate, gender, academic rank, and academic discipline. A log-linear analysis was utilized to ascertain relationships between variables.

The results of this national study included a sample of 260 postsecondary institutions and 3,940 faculty with a doctoral degree and holding academic rank. There were 2,812 (71%) men and 1,128 (29%) women in the employed faculty sample representing all academic discipline categories.

Discussion

During the last fifty years, a few empirical studies have examined who, where, and how faculty are appointed to academic positions. Although universalism, described by Merton, is promoted as the foundation for the process of higher education faculty employment, most previous studies have confirmed that the selective criterion of doctoral-granting institutional prestige is important in the location of employment in academia (Breneman, 1988; Burke, 1988; Caplow & McGee, 1958; Debackere & Rappa, 1995; Deitsch, 1989; Fogarty & Saftner, 1993; Hulbert & Rosenfeld, 1992; Wilson, 1942). This national study provides a comprehensive examination of faculty members’ locus of employment, academic rank, academic discipline, and gender as they relate to the type of institution from which they received their doctorates. Former academic lineage research overlooks faculty employment patterns at all types of institutions (e.g. private
two-year associate of arts colleges) in all disciplines. Women faculty have been included in few previous studies (Blackburn & Lawrence, 1995; Hulbert & Rosenfeld, 1992; Massengale & Sage, 1982). This is the first study to explore gender across all academic disciplines, employing institutions, doctoral-granting institutions and rank. This study is the first to triangulate the Carnegie classification system with institutional mission statements and to examine the applicability of mission statements to hiring practices.

The academic marketplace described in this study is similar to the description by Blackburn & Lawrence (1995) and Sax (1996). The percentage of women faculty in this study was slightly lower (29%) than in the other two studies (35%). The reason for the lower percentage is because this study only included women with doctoral degrees who hold academic rank while the other studies included women without academic rank. Women were employed in all academic disciplines and academic ranks in sufficient numbers to be included in this study. This is a marked difference from previous research as late as 1989 (Deitsch). The academic rank and discipline distribution of faculty in this study reflects the descriptions in the national data bases on demographics of faculty in the academy.

In 1988, Burke concluded that institutional prestige still plays a primary organizational role in hiring practices, sometimes subtle, sometimes redefined, but always prominent in the thinking of academicians. In some ways the results of this study replicate Burke’s conclusion. Research I institutions are supplying the faculty (74%) to postsecondary institutions in the United States. The range of employment of research I graduates goes from 92% at research I institutions to 58% at associate of arts colleges. In
agreement with the Blackburn & Lawrence book (1995), colleges and universities at all Carnegie classification levels seek graduates from research I universities. Research I institutions do hire faculty from other categories of doctoral-granting institutions (8%). This finding does attest to the fact that other variables are contributing minimally to hiring even at institutions where 100% of faculty could be from the same typology. Associate of arts colleges are increasing their numbers of faculty who received their doctorates from research I institutions. Although associate of arts colleges still employ graduates from all types of doctoral-granting institutions, the majority of their faculty with academic rank holding a doctoral degree are from research I institutions (58%). The employment of such a large percentage of research I graduates is surprising since associate of arts colleges are teaching institutions and research I institutions train researchers. As Blackburn & Lawrence state, institutions hire research I graduates because they believe these graduates are better trained to conduct research and will produce more scholarship than faculty graduating from any other category (1995). The questions emerge: are associate of arts colleges trying to gain prestige by hiring prestigious graduates? or are these institutions attempting to become more involved in research activities? or do research I graduates have more opportunity to be teaching assistants and therefore gain teaching experience while in graduate school? When analyzing who postsecondary institutions are hiring and promoting, clearly research I graduates are monopolizing the marketplace.

Upon closer scrutiny of the data, an interesting phenomenon becomes apparent: men are following the traditional career progression of academic lineage through doctoral-granting to employing institution. Women, however, are showing different
trends with regard to academic lineage. Hulbert & Sage (1992) and Massengale & Sage (1982) found little difference in career mobility of male and female psychology and physical education faculty with respect to doctoral-granting institution and employing institution. In this study, however, women are not following the same trend as men with regard to the relationship between doctoral-granting and employing institutions. While men from research I institutions are likely to be employed at research I institutions, women are not. Shichor (1970) found a curvilinear relationship in that the highest ranking and lowest ranking departments had the most inbreeding because the lowest departments could not recruit Ph.D.s from higher ranking institutions and the highest ranking kept their best graduates. The present study found that while traditional academic stratification may still reflect hiring practices for men, it does not describe women’s career path. Women who graduate from research I institutions are more likely to be employed at baccalaureate I and associate of arts colleges. The immediate response to this result is that women desire the teaching role rather than the research role and therefore migrate to teaching institutions. Women who graduated from research II institutions, however, are likely to be employed by research I institutions. Likewise, women who graduated from doctoral I institutions are also likely to be employed by research I institutions at the rank of assistant professor. The complexity of academic lineage and its impact on employment begins to emerge. The salient finding concerning academic lineage is that research I institutions are providing the majority of faculty to postsecondary institutions in the United States. As more women are entering into the academic ranks of higher education, changes in
academic lineage are beginning to appear. The inflexibility and segmentation discussed in previous research is undergoing subtle but statistically noticeable modifications.

Previous researchers on academic rank have concluded that faculty change jobs to lower prestige institutions to obtain higher rank but rarely trade to higher prestige institutions for lower rank (Hulbert & Rosenfeld, 1992). When investigating the aggregate data, the above hypothesis appears to remain valid. By separating gender data, however, a different pattern emerges. Male faculty are following the Hulbert & Rosenfeld statement but women are not. Women are moving into different categories and to higher ranks. This movement may be “up” (from research II to associate professor at research I institutions) as well as “down” (research I to professor at baccalaureate I institutions).

The few studies that have included multiple academic disciplines have concluded that there are differences in the impact of academic lineage on employment across disciplines (Deitsch, 1989; Youn, 1981). This study found no difference between the academic disciplines with respect to rank, doctoral-granting institutions or employing institutions. What discrepancies have been evident in the past are no longer valid in the academic marketplace. This parity between disciplines does not mean that the impact of academic lineage has lessened across disciplines but rather that it is equivalent across disciplines with faculty who hold academic rank.

What becomes apparent from examining the variables in this study is that academic success is a complex phenomenon that is not singularly explainable by academic lineage. The interaction between doctoral-granting institution, academic rank, and employing
institution is magnified by the additional independent variable of gender. Previous
directional "trickle down" approaches to academic appointments are no longer explaining
the entire picture of the academic marketplace. It is true that research I institutions are
still prominently supplying faculty for academia and this lineage does increase the chances
of a faculty member obtaining academic rank. These results indicate, however, that the
stratification explanation is more complex than simply doctoral-granting institutional
typology.

The final area of discussion is the well documented bifurcation between the
teaching and research roles within the academy. This study explored the effects of the
reported shift to valuing teaching as part of the criteria for tenure and hiring practices
(El-Khawas, 1995; Sax, 1996). Virtually every study in the literature reviewed in this
study discussed the segmentation of postsecondary institutions in the United States based
upon whether research or teaching was the primary emphasis of the institution. The
Carnegie classification system delineates some of these differences in its criteria for
inclusion in a category. The mission statements of the colleges and universities in the
sample were examined to verify the Carnegie typology and to ascertain differences in
reported missions. As was expected, research institutions emphasized research while
baccalaureate and associate of arts institutions stressed undergraduate education as their
primary institutional missions. Doctoral institutions and masters institutions combined
both components almost equally in their mission statements (with the exception of
master's II institutions). The divergence in content of mission statements is noticeable
across Carnegie classification categories.
What is evident from this section of the study is that hiring practices of faculty do not coincide with mission statements of institutions. For example, research is mentioned in 33% of master’s II, 28% of baccalaureate II, and 6% of associate of arts institutional mission statements but 73%, 64% and 58% of faculty at these institutions, respectively, have their doctorates from research I institutions where 33% of the mission statements do not mention undergraduate education and 22% do not mention teaching. Doctoral I and II as well as master’s institutions are also hiring more research I graduates (74%, 76%, 67%, 73%) perhaps in an effort to compete in the research arena. Why are baccalaureate II and associate of arts colleges not hiring more doctoral I and II institution graduates (6%, 4%, 17% and 7%)? The mission statements of these doctoral institutions discuss graduate education, undergraduate education, teaching, learning, and students. The historical roots of the doctoral category institutions in teaching rather than research is obvious.

The close link between baccalaureate I institutions and research I institutions is clear when the data are perused. As has been pointed out in previous research, baccalaureate I institutions are the feeder schools to the research I institutions (Blackburn & Lawrence, 1995; Deitsch, 1989; Youn, 1991). Therefore, even though the mission statements discuss teaching rather than research, baccalaureate I institutions hire research I graduates in order to prepare undergraduates for their graduate careers.

A simple explanation for the discrepancy between mission statements and hiring practices may be that institutions and faculty are no longer viewing teaching and research as polarities in the professorial role. An alternative rationale may be that graduates from research I institutions are generally employed in a different Carnegie category (either by
choice or by supply and demand characteristics at the research I institutions) where they are socialized into the new environment. If the faculty members do not alter their values or beliefs they do not succeed at the employing institution. Therefore, the institutional mission statement reflects the essence of the institution and the faculty members embrace these values in order to obtain employment and academic rank.

Conclusions

The following conclusions are based on the data obtained and analyzed in this study:

1. Where faculty members receive their doctorates influences where they are employed. The primary finding of this study, however, is that the place of employment is not the same type of institution as the type from which faculty receive their doctorates. The research I category is the only type of institution where the typology of doctoral-granting and employment is the same for faculty. Receiving a doctoral degree from a research I institution is the single best predictor of obtaining a faculty position and academic rank at any type of postsecondary institution in the United States. Seventy-four percent of faculty employed in postsecondary institutions in the United States received their doctorates from a research I institution.

2. Gender is not the best predictor of academic rank. Overall, females have lower academic rank than males (31% women hold rank of professor while 51% of men hold rank of professor). Professional academic rank, however, is an interaction of doctoral-granting institution and employing institution combined with the variable of gender. Women with academic rank are more likely to be employed by baccalaureate I
(39%) and associate of arts (38%) institutions than by research II (22%) and doctoral II (23%) institutions. When examining academic lineage, women who graduated from research I institutions and are employed at baccalaureate I institutions are most likely to have the rank of associate or assistant professor while women who graduated from research I institutions and are employed at associate of arts institutions are most likely to have the rank of professor. Women who graduated from research II institutions are less likely to hold any rank at baccalaureate I and associate of arts institutions. The research II female graduates are likely to hold a professor or associate professor position at a research I institution. Women who are doctoral I graduates are not likely to hold rank at a baccalaureate I institutions but are likely to have the rank of professor at an associate of arts or doctoral II institution, an associate professor ranking at research II institutions, and assistant professor ranking at research I, doctoral I and master’s I institutions.

With men the picture of academic rank is much simpler. A male graduate of research I institution is employed at the rank of professor at a research I, research II, or baccalaureate II institution. Male graduates of research II institutions are most likely to hold the rank of professor at an associate of arts institution. A male graduate of a doctoral I institution is likely to hold the rank of professor at a master’s I institution, associate professor at a baccalaureate II institution, and assistant professor at a master’s I institution. Clearly the interaction between employing and doctoral-granting institution upon academic rank is evident. The difference between genders of this interaction is also apparent.
3. Moving to a different Carnegie category does not ensure advancement in academic rank in a prescribed directional trend. The divergence of academic rank attainment can be seen in graduates from research II institutions who moved up in rank by being employed at research I, doctoral I, master’s I, master’s II, and associate of arts institutions. Graduates from doctoral I institutions improved their academic rank if they were employed at research II, doctoral II, master’s I, baccalaureate II and associate of arts institutions. Men who graduated from research I institutions attain higher rank if they stay at research I institutions whereas women who graduated from research I institutions attain lower academic rank if they are employed at research I institutions.

4. Academic lineage is different for women than it is for men. Women who graduate from research I institutions are less likely to be employed at research I institutions. However, women who graduate from research II institutions are more likely to be employed by research I institutions. Also women who graduate from doctoral I institutions have a greater opportunity to have an early appointment at a research I institution (assistant professor). Men tend to follow the traditional, inflexible pattern of doctoral origins impacting employment with only career movement “down” the classification categories of employing institutions.

5. Diversity of institutional mission statements does not reflect a significant difference in hiring practices.

6. There is no significant difference in the impact of academic lineage on employment between the academic disciplines.
Recommendations

Based on the findings of this study the following recommendations for further research are offered:

1. Qualitative analysis utilizing in-depth interviews to uncover the reasons why faculty choose to teach in diverse educational institutions.

2. Additional research of associate of arts college administrators to determine the reasons for the increase in Ph.D. hiring.

3. Additional research of associate of arts college administrators to determine the reasons why research I institutions are providing over fifty percent of two-year colleges’ faculty with doctoral degrees.

4. Additional studies of research I administrators to determine why these institutions are not hiring their female doctoral graduates.

5. Additional research to ascertain if publication productivity of associate of arts college faculty is increasing along with the hiring of faculty with Ph.D.s from research institutions.

6. Additional research to investigate if associate of arts colleges are starting to use publication rates to determine academic rank.

7. Additional research to evaluate the effect of holding a teaching assistant position, while in graduate school, upon place of employment and academic rank.

8. Additional research to evaluate academic lineage of doctoral faculty employed at two-year colleges that do not utilize academic rank.
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