

DEPARTMENTAL FACTORS AFFECTING TIME TO DEGREE AND
COMPLETION RATES OF DOCTORAL STUDENTS AT ONE LAND-GRANT,
RESEARCH INSTITUTION

by

Yaritza Ferrer de Valero

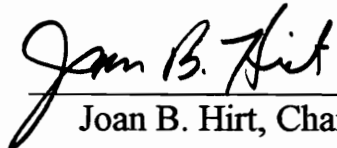
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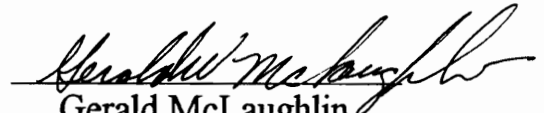
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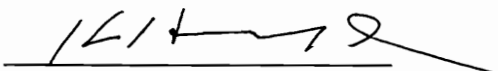
Educational Administration

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Abstract

Time to doctoral degree has increased consistently in American universities since 1967, in some fields by as much as two years. At the same time, rates of completion have decreased. It is predicted that this pattern will persist, resulting in a diminished supply of highly trained workers in the future.

The present research was designed to analyze time to doctoral degree and completion rates by academic department, and to identify departmental factors that positively or negatively affect these outcomes at one land-grant, research institution. This topic is significant to all aspects of higher education: students, departments, and universities. For students, increased time and lower completion rates diminish their competitiveness in the job market, morale tends to decline, and the tendency to not finish increases over time. For the department and the university, attractiveness to other students is decreased, and the number of new students who can be accepted may be reduced. A reduction in the pool of applicants due to the increased time to

degree and lower completion rates may create both a supply and demand problem, and an inability for higher education to meet the demand.

Given the high costs associated with graduate education, the current national climate of diminishing resources for higher education, and increased competition for these resources between undergraduate and graduate programs, it is critical to further examine the outcomes of graduate study.

This research employed quantitative and qualitative methods. It was conducted in two phases. The first phase focused on calculations of time to degree and completion rates by academic department for students who began a program leading to the doctor of philosophy degree between the fall, 1986 and spring, 1990 semesters. Data were analyzed through the end of the fall, 1995 semester.

The second phase of the study involved interviews with graduate students and faculty from selected departments to identify departmental factors affecting time to degree and completion rates, and to explore whether faculty opinions differ from those of students, and whether faculty and students opinions differ among departments.

Results of this study allowed the researcher to identify variables that explain achievements and failures within the graduate education process, and provide evidence for designing and re-designing graduate programs and policies. Results may contribute to a better understanding of the factors affecting graduate education outcomes at this particular institution, and may guide university administrators in implementing strategies to improve graduate student success.

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Table of Contents

Abstract	ii
Acknowledgments	iv
CHAPTER I - INTRODUCTION	1
Trends in Graduate Education	8
Purpose of the Study	11
Significance of the Study	12
Organization of the Study	14
CHAPTER II - REVIEW OF LITERATURE	15
Departmental Factors Affecting Completion Rates	17
Structural Factors	17
Environmental Factors	22
Departmental Factors Affecting Time to Degree	30
Structural Factors	30
Environmental Factors	36
Summary	41
CHAPTER III - METHODOLOGY	43
Phase I	45
Sampling	45
Data Collection Procedure	46
Phase II	48
Pilot Study	49
Sampling	49
Data Collection Procedure	51
Trustworthiness of the Study	55
Data Analysis	55
CHAPTER IV - RESULTS OF THE STUDY	58
Time to Doctoral Degree and Completion Rates	58
Descriptions of the Departments Under Study	62
Chemical Engineering (CHE)	64
Family and Child Development (FCD)	67
Aerospace Engineering (ASE)	70
Finance (FIN)	71
Biochemistry (BION)	73
Chemistry (CHEM)	74
Physics (PHYS)	76

Psychology (PSYC)	77
Interview Groups, Themes, and Categories.....	79
General Observations.....	79
Observations About the Protocol.....	81
Description of the Interview Groups	81
Emerging Themes and Categories	84
Departmental Factors	84
Structural Factors	85
Financial Support.....	85
Degree Requirements..	88
Environmental Factors.....	89
Departmental policies and practices.....	95
Advising.....	100
Departmental climate.....	106
Personal Factors.....	112
Most Influential Factors.....	116
CHAPTER V - DISCUSSION, LIMITATIONS, AND IMPLICATIONS ..	119
Discussion of Results	119
Results of Time to Degree and Completion Rates	119
Results of the Interviews.....	123
Comparison Between Faculty and Student Opinions.....	124
Comparisons Among Clusters	134
High-Short Departments..	134
Low-Short Departments.....	137
High-Long Departments..	140
Low-Long Departments.....	142
Short versus Long Time to Degree Departments.	144
High versus Low Completion Rates Departments.	146
Limitations of the Study.....	151
Implications of the Study.....	154
Recommendations for Future Research.....	154
Recommendations for the Institution	155
Recommendations for Departments.....	156
Recommendations for Faculty Advisors	158
Recommendations for Students	159

References	162
Appendix A - Sample Letter to Department Head.....	170
Appendix B - Sample Letter to Student Participants	172
Appendix C - Sample Letter to Faculty Participants.....	175
Appendix D - Interview Protocol for Graduate Students	178
Appendix E - Interview Protocol for Graduate Faculty Members	184
Vita	190

List of Tables

1. Doctoral Completion Rates and Time to Degree, 1986-90 Cohort60

2. Academic Departments Clustered by Time to Degree and Completion
Rates63

3. Number of Faculty and Students for the Fall Semester 199565

4. Characteristics of the Faculty Respondents.....82

5. Characteristics of the Graduate Student Respondents83

6. Faculty and Student Perceptions of Structural Factors by Cluster.....86

7. Faculty and Student Perceptions of Environmental Factors by Cluster90

8. Faculty and Student Perceptions of Personal Factors by Cluster.....113

9. Most Influential Factors Identified by Faculty and Students117

10. Summary of the Impact of Departmental Factors Affecting Graduate
Study Outcomes.....133

CHAPTER I

INTRODUCTION

Formal graduate education emerged in America in 1876 with the founding of Johns Hopkins University (Berelson, 1960). Initially created for the sole purpose of providing graduate instruction, Johns Hopkins became the “prototype and propagator of research as a major university function” (Gumport, 1993. p. 227).

Following Johns Hopkins’s example, several American universities, including Harvard and Columbia, formally implemented graduate education. New universities like Stanford (1891) and Chicago (1892) offered undergraduate and graduate education in their founding curricula. By 1900, the number of doctoral-granting institutions had grown to fourteen, and those schools had awarded around 250 Doctor of Philosophy (Ph.D.) degrees (Berelson, 1960).

During the twentieth century, graduate education in America has continuously expanded. In 1993, 39,754 doctorates were conferred by 368 institutions (Thurgood & Clarke, 1995). Four major trends have accompanied this expansion. First, Ph.D. programs became an attractive means of advancing an institution’s competitive position in the higher education system. An assumption has emerged that linking graduate education and organized research results in excellence in both arenas and promotes prestige. Seeking to increase their prestige, many institutions sought to hire persons with research interests. As a result, those institutions began to compete for the most renown faculties and talented graduate students. By providing

opportunities for research and advanced training across the disciplines, leading universities attracted people interested in pursuing research. By offering merit-based fellowships, universities were able to attract the best students from all over the country (Gumport, 1993).

Second, the Ph.D. certified a degree of competence in, and solid command of the chosen field of specialization. The Ph.D. was a degree that certified ability in research. In fact, in America, research related to graduate education has existed almost since the inception of graduate study (Clark, 1995). Research has become the center of academic activities at many American universities. The extent of research an institution engages in dictates the degree of prestige it is awarded and is a symbol of the academic enterprise pursued in such an institution.

Third, Ph.D. programs became a means for garnering additional financial support for institutions. As graduate education in America expanded, a national system of sponsored research developed. Financial support initially came from external resources, such as philanthropic foundations and some industries. Over time, “universities and faculties built their own rationales and adapted organizational structures to expand the scope of their research activities, while training the next generation of researchers” (Gumport, 1993. p. 231). Numerous research centers have emerged at university campuses around the country in which scholars from multiple disciplines have been trained and have conducted applied research sponsored by campus resources as well as by external resources (Clark, 1995).

Within this context of funded research, university research centers have expanded and incorporated the ideal of service into their missions, especially

at public universities. This ideal has further encouraged industry to sponsor research and development projects in university settings during this century (Gumport, 1993).

In addition to private support for university research, after World War II the federal government began to play an increasingly important role in advancing scientific endeavors in higher education. The federal government has funded graduate education in America directly through fellowship funds and indirectly through research grants, facility programs, and other types of loans (Berelson, 1960).

The fourth trend that has emerged as graduate education has expanded in America relates to specialization, departmental organization, and the emergence of disciplinary associations at the end of the nineteenth century. All these factors further facilitated the development of Ph.D. programs during the twentieth century. The organization of the curriculum into subjects, or disciplines, led to increasingly specialized teaching and research activities. Professors engaged in activities that contributed to the development of their particular fields. Consequently, graduate education became increasingly specialized. Moreover, doctoral programs emerged not only in the more specialized fields in arts and sciences, such as sociology, chemistry, or anthropology, but also in a number of professional fields: education, business, agriculture, engineering, journalism, and social work (Berelson, 1960).

Departmental organization provided faculty more structural flexibility to design undergraduate and graduate curricula according to the specialized training of the relevant disciplines. By organizing the different fields into departments, and by giving departments autonomy to design graduate

curricula, determine admission and degree requirements, and establish research priorities, universities delegated to departments the authority to develop teaching and research activities according to the current standards of the discipline. As a result, departments in American universities have developed graduate education and research training more closely aligned with the disciplinary community than the campus community (Alpert, 1985).

Disciplinary associations (e.g., American Chemical Society, 1876; American Psychological Association, 1892; American Physical Society, 1899; American Sociological Society, 1905) were founded on the basis of specialized research. By gathering leading scientists in each field, and through the publication of scientific journals, those associations determined what each discipline deemed appropriate research topics, methods and orientations. In sum, they established the general standards of graduate training and research to be followed in their respective fields of study (Berelson, 1960).

Within this context of competition, centered on developing and expanding research, and controlling academic activities through departments and their respective professional associations, graduate education in America expanded into a wide range of doctoral and master's programs. Enrollment in master's and doctoral programs totaled over 1.6 million by the fall of the 1992 (U.S. Department of Education, 1994), accounting for about 11.5% of all higher education enrollment in the United States.

While graduate education and research activities have grown dramatically since the beginning of this century, research on graduate education is relatively recent. A limited number of studies were conducted during the first half of this century, most of them dealing with the value of

graduate education and enrollment issues (Malaney, 1988). In the mid-1950s, scholars first published a journal entitled The Graduate Journal. For unknown reasons, this periodical ceased publication in 1975. Most of the articles that appeared in it were scholarly essays covering a broad spectrum of educational affairs rather than research on issues dealing with phenomena related to formal graduate education (Malaney, 1988).

The majority of research on graduate education has been conducted since 1960, nearly 100 years after the creation of graduate study in America. Most of the systematic investigations were produced after 1970, and coincided with the exponential growth of graduate student enrollment during that decade (Malaney, 1988). Those studies have been published in journals dedicated to higher education in general, and there is not currently a single journal exclusively focused on graduate education.

The bulk of research conducted since 1970 has focused on graduate student performance and matriculation issues. Only 1% of the articles reviewed by Malaney (1988) examined other issues related to graduate education. There are many aspects of graduate education that need to be more fully investigated, including: minority student needs; international student needs; student-faculty relationships; peer relations; departmental climate; student performance differences among fields; student performance differences within the same field but among different institutions; and, departmental factors affecting time to degree and completion rates among disciplines.

The extent and importance of graduate education in America suggest several reasons why additional research on graduate education is warranted.

First, graduate education is considered the best producer of highly specialized researchers who can promote economic development, national security, health care, and national welfare (Clark, 1995). The future availability of an adequately trained scientific work force depends on the quantity and quality of graduate education outcomes.

Second, the costs associated with graduate education are very high when compared to those of undergraduate instruction. The number of advising hours, the necessary equipment and facilities, and the ratio of teaching hours to number of students are dramatically higher for graduate students. Given the current national climate of diminishing resources for higher education, and increased competition for these resources between undergraduate and graduate programs, it is critical to further examine the outcomes of graduate study.

Third, there has been a shift in enrollment patterns among graduate students. The number of American students awarded doctoral degrees has declined since the mid-1970s, while the number of international students earning graduate degrees from American universities has increased (Hauptman, 1986). In 1973, more than 82% of all Ph.D.s awarded in the United States were conferred on American citizens. By 1993, that proportion dropped to 68%, and the trend continues today. In some fields, such as, engineering and physical sciences, 50.8% and 37.5% of doctoral degrees, respectively, were conferred to non-U.S. students in 1993 (Thurgood & Clarke, 1995).

Furthermore, the majority of foreign students with temporary visas return to their home countries after graduation. This situation, coupled with

the decreasing proportion of American citizens earning doctoral degrees, could negatively impact the supply of Ph.D.s in America. It is predicted that the United States, in the near future, will face a shortage of Ph.D.s, especially in the technical fields. This shortage will be exacerbated by increased competition for Ph.D.s from abroad, as other countries intensify their investments in science and technology (Ziolkowski, 1990).

Another justification for more empirical research on graduate study relates to the higher levels of graduate student attrition, and the increased time to degree that has occurred over the past decade. Recent studies have shown that the amount of time to earn a Ph.D. degree is increasing all over the country. Although completion rates and time to degree vary systematically by field of study, in general, the median time spent enrolled as graduate student has increased from 6.6 years in 1983 to 7.1 in 1993. In the same period, the median time elapsed between the bachelor's degree and doctorate rose from 9.8 to 10.5 years (Thurgood & Clarke, 1995).

Furthermore, an increasing number of students who pass the general examinations required for the Ph.D. fail to subsequently complete the degree (Ziolkowski, 1990). That is, students enroll in graduate programs, complete required course work and exams, but fail to successfully complete the research component required for the degree. It is important to point out that accurate information about doctoral student attrition rates is limited. For example, Jacks, Chubin, Porter, and Connolly (1983) indicated that few universities keep systematic data on students who fail to complete doctoral degrees. The same concern is expressed by the majority of the scholars who

have investigated attrition at doctoral level (Bowen & Rudenstine, 1992; Golde, 1995; Kowalik, 1989; Monsour & Corman, 1991; Valentine, 1987).

Given the high costs of graduate education, demographic shifts in enrollment, and decreased resources for higher education, further research on factors affecting completion rates and time to degree of graduate students is warranted. Universities need a stronger empirical basis for developing graduate study programs, especially in times when budget constraints prevail, and technological and social demands for effective graduate education are increasing.

Trends in Graduate Education

Since 1960, when Berelson examined the reasons for the increase in time to degree in graduate education, several studies have been conducted to explore the diversity of factors influencing completion rates and time to degree.

In an effort to predict which students were more likely to complete their degrees, and who did so in a relatively short time, some scholars correlated student characteristics (e.g., gender, marital status, number of dependents, citizenship, enrollment status, and employment situation) with completion rates and time to degree (Abedi & Benkin, 1987; Benkin, 1984; Berelson, 1960; Berg & Ferber, 1983; Ethington & Smart, 1986; Gilligham, Seneca, and Taussig, 1991; Girves & Wemmerus, 1988; Gunn & Sanford, 1988; Pogrow, 1978; Vacc & Picot, 1984; Wilson, 1965; Zwick, 1991). Others investigated field of study, delayed entrance to graduate school, pursuit of the graduate degree at an institution different from the bachelor or

master's institution, change in discipline, and the amount and type of financial support (Bowen & Rudenstine, 1992; Nerad & Cerny, 1993).

Less common are studies that analyze the influence of environmental factors in the graduate education process. Environmental factors include those departmental characteristics that could affect completion rates and time to doctoral degree, such as faculty-student relationships, research mode, and faculty expectations of the dissertation (Nerad & Cerny, 1993). As a result, there is a little theory about the extent to which departmental characteristics affect graduate student progress, or how those characteristics differ among disciplines.

Unlike undergraduate curricula, which are determined by faculties as a whole, graduate curricula requirements are established almost exclusively by individual departments. Moreover, admission and degree requirements vary from one department to another because of the decentralized nature of graduate education. For these reasons, factors affecting completion rates and time to degree may be better analyzed by department rather than general institutional contexts.

Some studies on graduate education have been conducted by field of study. Results show that time to degree varies widely by discipline. The biological, mathematical and physical sciences, and engineering have relatively short medians, and narrow ranges, across departments, while humanities and social sciences have longer medians and wider ranges (Berelson, 1960; Bowen & Rudenstine, 1992; Snyder, 1985; Solmon, 1976; Tuckman et al., 1989, 1990; Wilson, 1965; Zwick, 1991).

Other researchers have examined program characteristics that are associated with doctoral study (Baird, 1990a; Girves & Wemmerus, 1988; Nerad & Cerny, 1993). Results have shown that the norms and expectations of faculty vary by department. The nature of the department, including attitudes of the faculty, and the activities they value and engage in, determine, in part, the experiences of graduate students. What faculty do to stimulate student interest, and to strengthen student commitment to the profession, may ultimately determine the level of degree progress achieved by students in that department (Girves & Wemmerus, 1988).

The pattern of results associated with studies about doctoral programs suggests that there is an “internal culture” in disciplines. This internal culture involves norms, orientations, emphases on scholarly careers, resources to implement those emphases, modes of research, expectations and definitions of the dissertation, and even degree requirements (Baird, 1990a). In other words, the nature of the department appears to be an important factor influencing time to degree and completion rates.

However, most of the studies conducted to date examine graduate student progress in all fields, and research on how the characteristics that distinguish disciplines affect graduate student progress has been limited. Some studies (Bowen & Rudenstine, 1992), after differentiating time to degree by field of study, concentrated only on those fields where graduate students took longer times to complete degrees. The effect of environmental variables on degree progress between disciplines with the longest and shortest times to degree has not been thoroughly examined.

Additionally, little research has been conducted in particular institutional settings. The bulk of research related to departmental characteristics affecting graduate study progress has been analyzed on the national level; therefore, not much is known about the impact of environmental characteristics among different departments in the same institution or among different programs in the same department. Because graduate education is such a discipline-specific endeavor, investigating differences among disciplines, even among programs within the same discipline at a particular institution, is important.

Moreover, the vast majority of research has been conducted through quantitative research. In the literature reviewed, only three investigations applied a qualitative methodology. Surveys have been the dominant means of obtaining data, while qualitative methods, such as interviews, focus groups, and observational techniques have been rarely employed. Such an analysis may identify individual program characteristics that impact on time to degree and completion rates among graduate students.

Purpose of the Study

The present research has been designed to analyze completion rates and time to doctoral degree among departments, and to identify what departmental factors positively or negatively affect degree progress and completion rates at one land-grant, research university. This research employed a qualitative approach, based on personal interviews, to obtain extensive data from the people (faculty and graduate students) actually engaged in the graduate education process.

The study is designed to address four research questions:

1. What are the median times to degree and completion rates of Ph.D. students among academic departments?
2. What factors of departments do graduate students perceive affect time to doctoral degree and completion rates?
3. What factors of departments do faculty perceive affect time to doctoral degree and completion rates?
4. What are the differences among departmental factors, and how do these differences affect students trying to complete doctoral degrees in a relatively short time?

Significance of the Study

There are several important implications of the present research. First, the weight of evidence indicates that time to degree for Ph.D. students has increased since 1967, in some fields by as much as two years. Moreover, it is predicted that this pattern will persist, resulting in a diminished supply of highly trained future workers (Tuckman et al., 1990). This study will contribute to understanding what may have driven this trend.

Second, there is little research to provide a basis for developing models about what influences the time students take to complete doctoral degrees. The majority of research about attrition and degree completion in higher education has concentrated on undergraduates. Although some aspects of undergraduate retention may apply to graduate study, these models would need to be interpreted in different ways for the two different populations. In many respects, graduate students are different from undergraduate students. For example, graduate students are older, often they are married and have children, have work experience, bear more economic responsibilities, and are

more familiar with the field of study (Baird, 1990b). These characteristics reveal the uniqueness of graduate students, and limit the applicability of undergraduate models of retention. The present study will enhance knowledge about persistence and time to degree among graduate students.

Third, few studies have comparatively examined the relevance of certain departmental factors on graduate student degree progress. Even fewer have examined these factors as perceived by faculty members and graduate students from different departments. Rather, the emphasis in the literature has been on quantitative analysis of graduate education outcomes correlated with several student and/or institutional characteristics. As a result, little is known about the specific program factors that affect graduate student progress. This research is designed to expand the available knowledge on graduate study at the departmental level, and the influence of environmental and structural factors on degree progress. It may help identify variables that explain achievements and failures within the graduate education process, and provide evidence for designing and re-designing graduate programs and policies.

Fourth, the findings may contribute to a better understanding of the particular factors affecting graduate education outcomes at one institution, and may guide university administrators in implementing strategies to improve graduate student success.

Finally, the methodology of this study could serve as a model for other land-grant, research institutions that wish to explore their graduate education programs.

Organization of the Study

This study is divided into five chapters. In the present chapter, the phenomena to be explored and the rationale for the study have been discussed. Chapter II elaborates on the research conducted to date about graduate education. Chapter III describes the methodology employed in gathering data, while Chapter IV reports the findings of the study. Finally, Chapter V analyzes the results, provides interpretations and conclusions related to the research questions, and discusses the implications of those results for future research and practice.

CHAPTER II

REVIEW OF LITERATURE

The prestige and importance of graduate education in America is widely acknowledged. This is evident in the increasing number of international students who have pursued graduate study at American universities over the last three decades. In 1963, 1,605 Ph.D. degrees were awarded to foreign students, accounting for 13% of the total doctoral degrees conferred that year in the United States. In 1993, that number rose to 12,173 accounting for 32% of the total (Thurgood & Clarke, 1995).

Despite its enormous prestige, graduate education in America is still problematic for some students. The constant increase in attrition rates and time to degree over the last 25 years are indicators that something is happening in the graduate education system that deserves more attention from both university administrators and graduate faculty members.

The present literature review is focused on those studies concerned with analyzing completion rates and time to degree of Ph.D. students. Some scholars have found that these two outcomes are related (Bowen & Rudenstine, 1992; Nerad & Cerny, 1993; Tuckman, 1991). Programs with high completion rates are often those in which students take relatively short times to earn a doctoral degree. However, the literature is unclear about whether the time students spend enrolled in graduate school may be a predictor of their successful completion of the degree. Additional research in this direction needs to be conducted to confidently establish that causal relation (Tuckman, 1991).

The weight of evidence indicates that the potential for students to successfully complete their doctoral degrees in a relatively short time depends not only on a complex set of individual characteristics related to demographics, financial support and type, motivation, and ability but also on several aspects of the department. The effect of personal characteristics, as well as amount and type of financial support, on graduate student progress has been extensively analyzed (Abedi & Benkin, 1987; Benkin, 1984; Berelson, 1960; Berg & Ferber, 1983; Bowen & Rudenstine, 1992; Cook & Swanson, 1978; Dolph, 1983; Girves & Wemmerus, 1988; Gunn & Sanford, 1988; Ott & Markewich, 1985; Solmon, 1976; Tucker et al., 1964; Tuckman et al., 1990; Vacc & Picot, 1984; Valentine, 1987; Wilson, 1965; Zwick, 1991). Most of the scholars agree that personal factors alone are not sufficient to explain or predict graduate student completion times. Instead, this outcome seems to be better explained by the interaction of individual characteristics and field of study (Berg & Ferber, 1983; Bowen & Rudenstine, 1992; Gunn & Sanford, 1988; Ott & Markewich, 1985). This conclusion is supported by the decentralized nature of graduate education.

Despite the relevance of personal factors on completion rates and time to degree, this literature review focused exclusively on studies related to departmental factors that impact graduate student education. To this end, the review was organized around two major categories: studies related to the analysis of departmental factors influencing completion rates, and those dealing with departmental factors affecting time to doctoral degree. The presentation in two discrete categories was employed to make sense of the

evidence available, and was guided by the research questions asked in this study.

Within each major category, two subcategories have been presented: structural factors and environmental factors that affect doctoral degree progress. Structural factors refer to size and quality of the program, type of financial aid offered by the department, and degree requirements. Environmental factors refer to the conditions and climate for graduate study in different departments, including amount and type of advising, research mode, faculty expectations of the dissertation, and student-faculty relationships.

Departmental Factors Affecting Completion Rates

Empirical evidence suggests complex reasons that extend beyond student attributes promote or inhibit graduate student persistence. The majority of research indicates that several factors related to the conditions in different departments may explain persistence (Bowen & Rudenstine, 1992; Girves & Wemmerus, 1988; Golde, 1994; Hartnett, 1991; Jacks et al., 1983; Kluever, 1995; Lenz, 1995; Lussier, 1995; Nerad & Cerny, 1993; Tucker et al., 1964; Valentine, 1987).

Structural Factors

The relationship between size of program and completion rates has not been thoroughly analyzed. Only one study, conducted by Bowen and Rudenstine (1992), examined that relationship. This study focused on completion rates and time to doctoral degree in English, History, Political Science, Economics, Mathematics, and Physics departments at ten prestigious American universities during the period 1962-1986. The researchers reported that graduate programs with relatively small entering cohorts had consistently

higher completion rates than those with larger entering cohorts. These differences persisted even after controlling for selectivity of students and provision of financial aid. This finding was explained by the researchers in several ways. In small programs (as measured by the faculty/student ratio), there are more opportunities to continuously monitor student performance, and faculty have more time to dedicate to the advising task. Furthermore, small programs usually offer fewer courses, limiting the possibility that students will be lost in a wide array of options. Faculty consensus about orientation and requirements of the program is easier to reach in small programs than in large ones. Finally, small programs offer more opportunities for students and faculty to interact in academic and social settings.

The relationship between stability of program, as measured by number of years of existence, and the ability of standard admission criteria to predict successful completion of the doctorate was studied by Pogrow (1978). He examined the relationship between student and program characteristics and the ability of standard admission criteria to predict successful completion of the doctorate. Pogrow found a positive relationship between these two variables. The longer a program had existed, the more accurate the predictions of success. Pogrow explained this result in terms of faculty experience. In other words, the longer a program had existed, the more experience faculty had in making admission decisions.

The availability and type of financial support that a student receives while enrolled in graduate school is another factor explored by researchers in relation to student success, and results have been inconsistent. Benkin (1984) reported that financial assistance was one of the major factors differentiating

people who had finished all academic requirements except the dissertation (ABDs) from Ph.D.s. Dolph (1983) compared doctoral students in Educational Administration who completed their degrees with those who did not. He indicated that students who were successful in obtaining the doctorate were more likely to have received a scholarship, assistantship, or fellowship. Jacks et al. (1983) interviewed several ABD people. They clustered the interviewees by field of graduate training: psychology, sociology, zoology, physics, electrical engineering, and biochemistry. About 50% of the total respondents cited financial problems as a major reason for failing to complete the dissertation. Valentine (1987) analyzed factors related to attrition from Doctor of Education (Ed.D.) programs at one institution, and reported that Ed.D. recipients were more likely than non-graduates to have financial subsidy, among other things. These findings supported those of Tucker et al. (1964), who examined the percentage of Ph.D. students in arts and sciences who dropped out before completing requirements for the degree, and the psychological, sociological, and economic characteristics that differentiated drop-outs from completors. They reported that dropping out of graduate school was primarily related to ability and motivation of students. Problems with the dissertation and financial support were also important factors in doctoral attrition.

Contrary to these results, other scholars have not found that doctoral completion rates are significantly influenced by financial support. For example, Pogrow (1978) did not find any significant variance in the probability of completing a doctoral degree explained by financial support.

It is important to point out that the influence of financial support on completion rates has been better analyzed by correlating kinds of financial aid with field of study. The distribution of different kinds of financial aid varies across the fields. Hauptman (1986) reported that doctoral students in the social sciences were the most likely to borrow money to pursue study, students in the physical and life sciences, and in engineering, were the most likely to receive research assistantships, while students in the arts and humanities, and in the physical sciences, were the most likely to have teaching assistantships, and those in arts and humanities were the most likely to receive institutionally-funded fellowships. This pattern of funding persists today. Research assistantships were most common in the physical and life sciences and engineering. Twenty-four percent of the total research assistantships were awarded to students in physical sciences, 21% to students in engineering, and 23% to students in life sciences. Physical science, social science, and humanities students were the most likely to receive teaching assistantships (23%, 19%, and 17% respectively). University-funded fellowships were more common for students from social sciences and humanities (21% and 22% respectively). Doctoral students in social sciences were the most likely to have incurred educational debt (Thurgood & Clarke, 1995).

Empirical evidence suggests that this pattern of funding affects the probability of graduation for doctoral students. Bowen and Rudenstine (1992) found that completion rates tended to be higher for students with teaching assistantships than for students with fellowships in the humanities and social sciences fields. They pointed out that teaching assistantships allow students to

regularly interact with faculty members. Such interaction seems to positively affect commitment of students to remain in the program. In the sciences, research assistantships and laboratory work serve similar functions. Lower completion rates for fellowship students may be explained by the isolation of those students. Recipients of fellowships do not have any work obligation in the department, so they have less opportunity to interact each other and with the faculty members.

Other findings support those of Bowen and Rudenstine. Valentine (1987) reported that Ed.D. recipients were more likely to have different sources of financial subsidy, primarily assistantships, and more positive relationships with faculty members. In addition, Girves and Wemmerus (1988), in developing a model to predict progress toward master's and doctoral degrees, examined departmental and student characteristics, financial support, satisfaction with the department, and alienation. They pointed out that success at the doctoral level is directly related to student involvement, which is a function of financial support and student perceptions of their relationships with faculty.

Less is known about the conditions under which teaching and research assistantships may contribute to higher graduation rates. Roaden and Worthen (1976) examined the influence of research assistantships on the subsequent research involvement, and productivity, of graduate students. They reported that, in general, research assistantship experience is positively related to subsequent research involvement and productivity. Specifically, the quantity of publications, grants, and contracts is approximately 2.5 times greater for holders of research assistantships than for persons who have not been

research assistants. Nonetheless, research apprenticeship experience is not inherently valuable. Rather, what individuals do as apprentices is more directly related to what they accomplish later in their careers. The study reported that productive and non-productive groups differed primarily in the extent to which they participated in all aspects of research, from conceptualizing the problem to writing the final report and publishing the findings. Productive research assistants used the computer as a research tool and conducted statistical analyses; they were provided with orientation and supervision; and, a climate of confidence and cooperation existed at working settings. These results suggest that graduate students who have opportunities to conduct research under adequate guidance, and to use appropriate research tools, will have less trouble selecting a dissertation topic and conducting that research in a timely, cost efficient manner.

In summary, it appears that structural factors alone do not explain completion times and rates, but they do interact with environmental factors. For example, the effect of size of the program on those outcomes was explained in terms of the extent of faculty-student relationship, which is an environmental factor. In the same sense, the effectiveness of the types of financial aid seems to depend on the amount of student participation in departmental activities, and on student interactions with faculty.

Environmental Factors

Most scholars agree with the notion that environmental factors affect graduate student persistence (Baird, 1978; Baird, 1990a; Bowen & Rudenstine; Dolph, 1983; Girves & Wemmerus, 1988; Golde, 1994; Hartnett, 1981; Heiss, 1970; Jacks et al., 1983; Monsour & Corman, 1991; Tucker et

al., 1964; Valentine, 1987; Ziolkowski, 1990). The most common environmental factors that affected completion included: relationships among students and between students and faculty; choice and scope of the dissertation topic; kind of advising; lack of clarity about faculty expectations of student performance; and, departmental policies and practices.

Ethington and Smart (1986) elaborated on Tinto's (1975) model of persistence which suggested that the level of social integration of students determines, in part, their decisions to persist or drop out of school, and pointed out that the level of academic and social integration during undergraduate study affects graduate school attendance. They examined the process through which students arrived at graduate school, and studied personal characteristics of students and undergraduate institutional characteristics and experiences. They found significant differences between males and females. Although both academic and social integration were significant for men and women, academic integration had a greater impact on men, while social integration had a stronger effect for women. Results of this study illuminate those of Bowen and Rudenstine (1992), who found that women had higher completion rates than men in smaller graduate programs. Women appear to highly value social interactions and external support. A lack of those factors may influence their decisions to leave graduate school.

In the same vein, Lussier (1995) analyzed completion rates by gender and by field of study during the 1984-85 academic year at one institution. Results indicated that the progress of students was affected by the financial and emotional support they received, advisory relationships, and departmental climate. Women experienced aspects of the doctoral program differently, and

with different intensity, leading to the conclusion that studies must take gender into account.

Heiss (1970) explored the components of excellence in graduate education, and found that many students dropped out of graduate school because of academic problems. In her study, 25% of students attributed their attrition to lost interest in the field, 26% complained of the lack of faculty interest in students, nearly 14% complained of a poor relationship with their advisors, and almost 6% felt the same true of their sponsors. Over 40% were tired of studying, and nearly 45% were disillusioned with graduate work.

Hartnett (1991) investigated whether there were sex differences in graduate students' perceptions of their academic environments, and whether perceptions of the environments varied by discipline. He reported that the quality of graduate experience did not seem to differ by sex, instead it differed by field of study. In other words, student perceptions of the environment and the graduate experience for both sexes differed by discipline, rather than by gender. Psychology graduate students were consistently more satisfied with the concern shown for their welfare by faculty members, and reported more satisfying assistantship experiences and supportive peer relations than their counterparts in history.

In relation to the selection of the dissertation topic, Bowen and Rudenstine (1992) indicated that it has become a formidable task in humanities and social sciences. Most of the Mellon fellows in the humanities cited difficulty in finding a dissertation topic as a major reason for blocking, or slowing down, their progress toward the Ph.D. degree. The authors offered several reasons to explain such a phenomenon. First, it appears that, during

the first two years of study, there is not much emphasis on student research. Most graduate work during this period focuses on completing courses and preparing term papers which do not necessarily entail research. Second, the complexity and variety of theoretical approaches in social sciences and humanities negatively impacts the scope of the dissertation. There is not a single paradigm explaining certain phenomena, and it is more difficult to reach consensus among scholars about the most suitable theoretical approaches. This can induce uncertainty in students when they select a research topic, and increase the probability of leaving graduate school.

Bowen and Rudenstine's (1992) findings supported those of Jacks et al. (1983), who found that graduate students in sociology reported problems with selecting a dissertation topic as a probable cause of dropping out. Several participants reported they had chosen topics that were too broad, and found themselves unable to narrow them.

This situation may be a consequence of poor, or limited advising. When developing the dissertation, the role of the advisor is crucial to student success. Golde (1994) studied the influences of the departmental context on student experiences. She interviewed students who had dropped out of graduate school, and concluded that having a caring advisor and a nurturing community highly influenced student persistence. When students experienced care, they were appreciative. When it was not available, they felt deprived. Many other studies have indicated that the availability, and kind of advising, influenced student decisions to remain in graduate school (Baird, 1990a; Benkin, 1984; Bowen & Rudenstine, 1992; Girves & Wemmerus, 1988;

Hartnett, 1991; Jacks et al., 1983; Kluever, 1995; Lenz, 1995; Valentine, 1987).

Jacks et al. (1983) cited problems with doctoral committees, or advisors, as a major reason for students failing to complete their dissertations. The students reported that they received no guidance, or encouragement, from advisors. These results supported those of Girves and Wemmerus (1988), who found that student-faculty relationships were directly related to doctoral degree progress, and the role of the advisor was critical at the doctoral level. Dolph (1983) and Valentine (1987) reported similar findings. They indicated that those who graduated had better relations with their advisors and less difficulty with their dissertations.

Lenz (1995) explored the factors influencing the completion of doctoral degrees by non-traditional aged, academically able women. She found that positive support from family, friends, and advisor was the most important factor for doctoral degree completion. In a related study, Kluever (1995) compared the scholarly and academic credentials of doctoral graduates in education with those of non-graduates (ABDs). He reported that emotional support provided by the student's family and advisor was a significant factor associated with degree completion.

In terms of advising, Bowen and Rudenstine (1992) pointed out that there was a wide range of faculty attitudes and practices. At one extreme are advisors who are very busy and give advising low priority. At the other extreme are faculty who assume advising is essential, and unilaterally establish meetings; discuss topics, methodology, and orientation of the dissertation; and, set deadlines for production of the project. However, the

most common advisors were those who simply expressed that they were available for advisees, and who allowed students to work at their own pace. According to Bowen and Rudenstine (1992), the latter attitude is dangerous, because some kind of schedule and guidelines must be imposed to periodically monitor the research work. Given the isolated nature of research in the social sciences and humanities, students can spend months lost in bibliographic research without appropriate guidance from the advisor. Such situations create negative psychological states, inducing students to drop out the program.

In a related vein, Monsour and Corman (1991) analyzed the problem of attrition at the ABD stage. They affirmed that high stress levels and pressures to complete the dissertation are major factors in graduate student attrition, particularly when students do not have close relationships with the chairs of their committees, when they work alone, and when less feedback is provided.

Tinto (1993), concerned with understanding the factors that affect persistence at the graduate level, divided doctoral study into three stages: transition to membership in the graduate community, attaining candidacy through the development of competence, and active research. In the first stage, students integrate into the departmental community, and learn the research language and methodology of the field. In the second stage, students acquire knowledge and develop skills, and in the last stage, students dedicate themselves exclusively to conducting research. Attrition in the first two stages is connected to lack of interaction in the department, lack of orientation, and low commitment to degree and career goals. During the last stage, attrition is connected with the relationship between student and the major advisor.

The underlying assumption of this model is that as students progress through their program, they become integrated into their institution, department, and discipline (Baird, 1972; Tinto, 1993). In other words, a process of socialization occurs while enrolled at graduate school. In this process, the major agents of socialization are faculty and student peers (Baird, 1992, 1993; Bess, 1978; Bragg, 1976; Stein & Weidman, 1990). This socialization involves learning the forms of reasoning favored by the discipline, and the method, language, and research orientations of the field. Faculty are the agents of socialization who define the roles to be mastered and the performance standards to be met by graduate students. Therefore, in those disciplines where close relationships between faculty and students exist, and where faculty expectations are clear, students will move more easily through the program and become more thoroughly socialized.

Another environmental factor affecting graduate student attrition is the lack of clarity by faculty in terms of their expectations of student performance. Valentine (1987) reported that the success of graduate students was positively related to orientation to the department and academic expectations. Bowen and Rudenstine (1992) pointed out that, in humanities, many students complained about unrealistic standards of professors. Moreover, the enormous amount of material that is expected to be mastered in comprehensive or general examinations may result in pushing the date of the exam back, or dropping out of school in some departments, especially in the humanities.

Baird (1978) explored prospective student expectations of graduate and professional school, and compared those expectations to the reality they

encountered in graduate school. Results indicated that there was a significant difference between students' expectations of graduate school and the reality of the experience. Major differences in the quality of teaching, curriculum structure, and environment were identified. Such differences produced dissatisfaction with the program, and 40% of the respondents said they strongly considered transferring to another program.

In a subsequent study, Baird (1990b) identified five constructs related to graduate students. Peer relationships favored student integration which, in turn, produced a greater commitment to the field. Lack of clarity on faculty expectations was a source of stress and anxiety. Competitive environments caused a high level of tension in graduate students. Lack of consensus among faculty about performance standards made students dissatisfied. Finally, warmth of student-faculty relationships increased student involvement and participation.

Departmental graduate policies and procedures is another factor mentioned by several scholars as determinants in completing graduate education. Golde (1995) analyzed the influence of departmental policies and procedures on graduate student attrition. She found departments that implemented policies and procedures oriented to helping students through the graduate education process had lower levels of attrition than those which did not. Some of the policies and procedures considered by Golde were: departmental orientation program, core course work, opportunity to get to know various faculty, matches with advisor in terms of interests and style, research proposal requirements, annual reviews of progress, and advisor expectations clear and consistent in terms of proposal. These results

supported those of Nerad and Cerny (1993), who studied completion rates by field of study and surveyed graduate students to investigate the factors affecting completion rates. These researchers reported higher completion rates in biological and physical sciences than in humanities and social sciences. Results of the survey indicated that the existence of departmental policies and procedures oriented to support and guide graduate students directly influenced completion rates.

In sum, drawing general conclusions about factors that positively or negatively affect completion rates is difficult. Empirical evidence showed that the possibility of a student successfully completing graduate study depends on a complex set of factors. Personal and departmental factors interact to model a dynamic process through degree completion. In this process, the kind of experiences graduate students have appears to be largely determined by academic and emotional support provided by the advisor, peers, and faculty in general.

Departmental Factors Affecting Time to Degree

As in the case of completion rates, the time that a student spends to earn a doctoral degree depends on many factors. The empirical evidence suggests that time to degree is a complex phenomenon that cannot be explained by personal factors alone. Instead, the interaction of personal and departmental factors must be considered.

Structural Factors

The requirements for graduation are frequently cited in the literature as a major cause for delaying completion of the doctoral degree in some disciplines. Ziolkowski (1990), and Bowen and Rudenstine (1992), have

suggested that foreign language proficiency exams, field research, and master's degree requirements in some disciplines might explain the longer times to degree reported by students. In fields like history and philosophy, it is expected that graduate students master foreign languages in order to support their research with primary sources. In other fields, such as anthropology, graduate students have to conduct field research, which, in turn, imposes time and financial constraints. All these factors affect time to degree. In the same vein, Nerad and Cerny (1993) reported shorter times to degree in departments which did not require a master's degree before conferring the Ph.D. degree.

Quality of the school, or program, is another structural aspect that has been studied by several researchers. It has been assumed that the selectivity of the graduate school increases the commitment of graduate students, which in turn increases the possibility of completion (Baird, 1990b). Nonetheless, it could be interpreted in a different way. That is, students might perform better in high quality graduate schools because they are brighter and more able than students in low quality, less selective schools. Tuckman (1991) pointed out that the academic leaders in their fields usually work in high quality schools. Their research skills are important to students in terms of selecting a research topic, methodology, and literature relevant to the field. Less able faculty are often associated with lower quality schools, and this might limit, or delay, the development of the necessary research skills to complete doctoral study.

Empirical evidence about the influence of quality of the school on doctoral degree completion is inconsistent. Berelson (1960) found that graduate students at 12 top universities took less time to complete their

degrees than other students. Solmon (1976) reported differences in time to degree between men and women according to institutional quality. A longer time to degree was reported for women than for men at the lowest rated institutions. In other words, the higher the quality of the institution, the lower the difference between male and female time to degree. Snyder (1985) also indicated that students in the top 10% of departments completed degrees in six months less than students in the lower 50% of departments. Baird (1990a) associated several departmental characteristics with the average duration of doctoral study. He found a significant correlation between reputational ratings of faculty and time to degree. This correlation, along with level of federal and university research support, and number of publications was particularly high in physiology and mathematics.

These results supported those of Jones, Lindzey, and Coggeshall (1982), and Bowen and Rudenstine (1992). These scholars reported a relationship between quality ratings of the program, or its parent university, and time to degree. In other words, the better the quality of the school, the shorter the time to degree. On the contrary, Tuckman et al. (1990) could not find any significant effect of quality of graduate school on completion times. In the same vein, Stricker (1994) reported that selectivity, requirements, faculty quality, and learning resources of the departments (chemistry, psychology, and English) were unrelated to time to degree.

Size of the department is another structural variable examined by several researchers in relation to time to doctoral degree. Bowen and Rudenstine (1992) indicated that time to degree was shorter in smaller programs than in larger ones. The interaction between field of study and size

of the program has also been examined and suggests that the influence of size varies by discipline. Jones et al. (1982) found no overall association between size and time to degree, but observed a positive association between size and time to degree for psychology students, and a negative relation between size of program and time to degree in chemistry. These findings support those of Stricker (1994), who reported a positive association between time to degree and size of program for psychology students.

The influence of financial support on time to doctoral degree has been studied extensively, and the results suggest that a lack of financial support increases the time that students spend in completing their doctoral degrees. Berelson (1960) identified lack of financial subsidy as a major reason for lengthening time to degree. Therefore, the more support a department has in the form of fellowships or assistantships, the faster its students complete their degrees. This conclusion was supported by Wilson (1965), who examined time to doctoral degree by field of study. Results indicated that time to degree varies by field of study, and that limited financial aid is an important factor in increasing time to degree. The same conclusion was reached by Abedi and Benkin (1987), Benkin (1984), Gillingham et al. (1991), Goldberg (1984), Ploskonka (1993), Snyder (1985), Solmon (1976), and Ziolkowski (1990).

Solmon (1976) found that financial variables appear to affect women more than men. After controlling for quality of the institution, women completed the doctorate in less time than men in wealthier institutions. Although both male and female students completed their degrees faster in wealthier institutions than those at less wealthy schools, the effect seems to be stronger for women than for men. The researcher explained this result by

noting that it is more difficult for women to find external financial aid, or jobs, than men. Thus, women are more dependent on institutional financial resources to complete graduate study.

Snyder (1985) pointed out that both type of financial aid and the pattern of funding among disciplines affect time to degree. He reported that students who received some kind of financial support (fellowships, teaching or research assistantships) while enrolled in graduate school completed their degrees faster than those who did not. By analyzing the reduction in federal aid across disciplines, Snyder reported that the social and psychological sciences had been most severely impacted. These fields lost more federal support (40%) than other fields in the 1975-1982 period. For instance, only 8% of students in the social and psychological sciences were federally supported in 1982, compared with 25% of engineering and natural science students. At the same time, 43% of social and psychological sciences students were primarily self-supporting, compared with only 25% in other fields. Furthermore, the majority of institutionally funded research and teaching assistantships were awarded to students in engineering and physical science fields. The greater availability of money in those fields might explain not only higher enrollment rates, but also shorter times spent by students to earn a doctoral degree. Tuckman et al. (1990) reported that financial aid reduces student reliance on outside employment which, in turn, affects time to degree. However, none of these scholars differentiated what types of financial aid were more efficient in reducing time to degree.

In terms of efficiency, Ziolkowski (1990) acknowledged that since fellowships are awarded based on merit, it is not clear whether fellows

perform better than non-fellows because they are provided financial support or because they are brighter. Goldberg (1984), in turn, conducted a study to determine differences between fellows and non-fellows in time to degree. Results indicated no significant difference between the two groups. In fact, in some departments (history and history of arts), non-fellows achieved superior performance than fellows. Goldberg argued that fellowships may limit student-faculty interactions, which has been found crucial for social and academic integration of graduate students. Bowen and Rudenstine (1992) reported similar results, but they differentiated the effect of various forms of financial aid. Time to degree tended to be shorter for students with teaching assistantships than for students with fellowships. It appeared that working as teaching assistants allowed students to interact more with faculty members, and this interaction encouraged students to complete their graduate study more quickly. Nevertheless, Bowen and Rudenstine (1992) also reported that students who worked as teaching assistants for a long time took longer to complete their degrees. The same result was reported by Wilson (1965), who indicated that work as a teaching assistant, discontinuity of attendance, nature of the dissertation topic, and writing the dissertation off-campus while working full-time were the most common reasons cited by graduate students for lengthening completion times.

In addition to the influence of structural factors, the literature suggests that time to doctoral degree is also affected by environmental factors. The most common environmental factors cited were: lack of training for conducting independent research, lack of orientation in preparing for comprehensive examination, departmental climate, research mode, kind of

advising, selection of the dissertation topic, faculty expectations of the dissertation, and length of the dissertation.

Environmental Factors

Hansen (1990) studied how well Ph.D. programs trained students to cope with the nature and direction of current research in economics. Data indicated over 50% of the field courses failed to prepare students to use theory in empirical applications, to apply theory to real-world problems, or to do independent research. One of the major problems identified by graduate students for delaying their completion of the doctoral degree was the lack of training to conduct independent research.

Another factor directly related to time to doctoral degree was the lack of orientation for general examinations. Nerad and Cerny (1993) interviewed graduate students and faculty in departments with long times to degree and in departments with short times. They identified particular departmental practices and policies that are associated with the observed effect. For example, they reported that students from social sciences and humanities complained about the stress they felt, and the time they spent in preparing for comprehensive exams. Since limited, or poor guidance was provided, they were overprepared and, consequently wasted precious time that might otherwise have been devoted to their research. This is a consequence of the lack of interaction between professors and students.

Another strand of research has explored the influence of student-faculty relationships on time to degree. Freeman and Loadman (1985) described alumni perceptions of the role of doctoral committees in planning programs of study, preparing and administering comprehensive examinations, and guiding

dissertation research. Although an overall satisfaction with doctoral committees was reported, alumni suggested that more courses were necessary to prepare students to conduct independent research. They particularly stressed that doctoral committees underestimated student needs not only in terms of the number of research courses, but also the time necessary to prepare for comprehensive examinations. Alumni also complained about the lack of clarity about the material necessary to be mastered for those examinations, the lack of constructive feedback from committee members when evaluating the performance of each candidate, the lack of participation of committee members in assisting graduate students in selecting an adequate dissertation topic, and the lack of emphasis on the importance of publishing research findings.

Moreover, Baird (1990b) affirmed that most graduate programs do not clearly specify faculty expectations and demands. This can prompt students to spend a lot of time attempting to satisfy ambiguous demands and performance criteria.

In relation to departmental climate, empirical research has indicated that the kind of environment (cooperative or contentious) in departments determines, in part, the time students spend in completing a doctoral program. Nerad and Cerny (1993) found that departments with shorter times to degree were those in which students were treated as junior colleagues and participated in social and academic activities of the department. These departments reflected a cooperative environment where periodic evaluations of student performance occurred, and apprenticeship or teamwork, rather than

isolation dominated research. The same conclusions were reached by Bowen and Rudenstine (1992).

The way in which research is conducted was another relevant factor reported by the researchers that affected time to degree. Wilson (1965) differentiated departmental practices and policies related to time to degree. He argued that the shorter time to degree in natural sciences was due to factors related to research work. For example, dissertation topics in those fields were easier to define, and more clearly focused. Research methodology was more specific, dissertation research began earlier, and closer relationships between students and advisors developed. The same conclusions were drawn by Nerad and Cerny (1993).

The role of the advisor was also found to be a crucial factor in determining time to degree. Weil (1989) indicated that not only the kind of advising, but also the frequency of contact between student and advisor were significant aspects in explaining the differences in time to degree between biology and literature graduate students. In her study, Weil reported that biology students spent less time completing their doctoral programs than literature students. She found that the kind, and frequency of communication between students and advisors was much greater in biology departments, and the advisors seemed to feel closer and to be closer to their advisees than their counterparts in literature departments.

These results supported those of Manis, Frazier, Kouassi, Hollenshead, and Burkam (1993), who surveyed graduate students to assess the quality of graduate experience at one prestigious university. They reported that one of

the most frequently cited sources of delay was the lack of adequate mentoring or advising.

In relation to the selection of the dissertation topic, research suggests that this factor contributes to lengthening time to degree. Hansen (1990) reported that less than 10% of graduate students identified their dissertation topic by the end of the second year, 50% identified their topic during the third year, and more than 40% had not selected the topic by the beginning of the fourth year. Students also reported no guidance from their advisors or committee members in the selection of an appropriate research topic, in terms of scope and relevance. In fact, only 20% of the students gave credit to their advisors for orienting them at this stage. This problem has been reported by other scholars as a major reason for slowing graduate student progress (Bowen & Rudenstine, 1992; Nerad & Cerny, 1993; Snyder, 1985; Weil, 1989; Wilson, 1965; Ziolkowski, 1990).

Finally, faculty expectations of the dissertation and length of the dissertation were reported as factors affecting time to degree. The expectations of faculty in relation to the originality, scholarly depth, and significance of the dissertation vary by field of study. Berelson (1960), Bowen and Rudenstine (1992), Nerad and Cerny (1993), Wilson (1965), and Ziolkowski (1990), reported that, in physical science and engineering departments, the dissertation is expected to be a demonstration of student ability to conduct research in a particular field by following widely accepted orientations and methodology. In social science and humanities departments, dissertations are expected to be an original contribution to the field, and there is not consensus among scholars about the most adequate theoretical

approaches and methodologies in those particular fields. Bowen and Rudenstine (1992) also pointed out that as the number of competing theoretical approaches increases, faculty expectations of student mastery are greater. This situation contributed to the increased time to doctoral degree.

Berelson (1960) indicated that expected length of the dissertation varies widely by field of study. Dissertations in social sciences tended to be longer than those in natural sciences. Political science and history dissertations were the longest (about 350 pages), whereas dissertations in mathematics were the shortest (about 70 pages). Benkin (1984) reported differences in dissertation length by field of study that parallels the time to degree in the different disciplines. Dissertations were shorter in disciplines that showed shorter times to degree (physical sciences) than disciplines where students take longer times to complete the degree (humanities). This pattern appears to persist (Ziolkowski, 1990), and it is an indicator of both the growing amount of knowledge to be mastered by graduate students and faculty expectations of dissertations.

After analyzing the influence of departmental factors on doctoral completion rates and time to degree, developing general graduate progress models is difficult for several reasons. First, graduate education is decentralized. Admission and degree requirements, financial aid, research conditions, and curriculum vary significantly among programs. This decentralization makes it difficult to draw general conclusions about factors affecting graduate student progress. Consequently, it is difficult to predict with any certainty the proportion of students who will earn degrees (Bowen & Rudenstine, 1992).

Second, graduate education is less structured, and more individualized, than undergraduate education. Graduate students may leave their programs for a time and subsequently re-enroll. This complicates the analysis of completion rates, and renders data about the duration of doctoral study uncertain (Isaac, 1993).

Summary

In sum, the literature reveals that academic departments differ in many important aspects that directly impact the experiences graduate students have, and greatly influence the possibility of completing graduate study in a relatively short time.

As can be observed, the majority of research related to factors affecting completion rates and time to degree of doctoral students has concentrated on analyzing student and institutional characteristics in an effort to explain the influence of both kinds of factors on graduate student progress. Most of this research has been conducted through quantitative methods. Few studies have applied a qualitative methodology to investigate this topic. As a result, completion rates and time to degree appear to be isolated outcomes of graduate education with little relation to the student experiences and departmental practices involved in the process. The role of departmental barriers to success have been minimized, in favor of research on individual or institutional characteristics (Golde, 1994).

With few exceptions, opinions of the actual people participating in the graduate education process (students and faculty) have been neither analyzed nor contrasted. Therefore, not much is known about the effect of departmental practices on doctoral student success, or the significance of

such practices at different points of the graduate education process. Without knowing the experiences of people, and what those experiences mean to them in their own terms, the real nature of this dynamic process, would remain hidden.

In an effort to fill this gap in the knowledge related to graduate education, the present research was designed to analyze completion rates and time to degree of doctoral students among different departments, and to identify the departmental factors that affect degree progress at one land-grant, research university. The methodology used to collect and analyze data is explained in detail in the next chapter.

CHAPTER III

METHODOLOGY

The purposes of the present research were to analyze completion rates and time to doctoral degree by academic department, and to identify departmental factors that positively or negatively affected degree progress and completion at one land-grant, research university. The study was designed to address the following research questions:

1. What are the median times to degree and completion rates of doctoral students among academic departments?
2. What departmental factors do graduate students perceive affect time to doctoral degree and completion rates?
3. What departmental factors do faculty perceive affect time to doctoral degree and completion rates?
4. What are the differences among departmental factors, and how do these differences affect students trying to complete doctoral degrees in a relatively short time?

The present study was conducted at a public, research, land-grant university located in the mid-Atlantic region of the United States. The institution under study is ranked in the top 25 doctorate-granting institutions in the U.S., based on the number of doctorates awarded annually (Thurgood & Clarke, 1995). The campus offers doctoral degrees in 57 different programs, or disciplines. At the time of the study, 1,438 graduate students were enrolled in the university's on-campus doctoral programs. Male

graduate students (957), comprised 66% of the graduate student population, while women (481) made up the remaining 34% at this institution.

This research employed quantitative analysis and qualitative methods to address the research questions. It was conducted in two phases. The first phase addressed the first research question, and was concerned with statistical analyses of data about graduate student progress by academic department. The purposes of this part of the study were to calculate median times to degree and completion rates of students in each graduate department on campus. The results of this phase enabled the researcher to assign departments to one of the four groups, and then select departments from each of those groups for further analysis in the second phase of the research.

This research assumed that the key arena for doctoral education is the department. Department was defined as an organizational unit within one college that represents a single discipline (Clark, 1984). Organizationally, the department, rather than the institution as a whole, is the locus of control for doctoral education. The department determines the policies that affect student progress, including admission and degree requirements (Berelson, 1960; Bowen & Rudenstine, 1992; Golde, 1995), rendering graduate education a highly decentralized function. Differences in faculty behaviors and departmental practices can be examined, in part, through the nature of their disciplines. In other words, departmental boundaries typically demarcate differences in the nature of research and intellectual activity (Biglan, 1973; Lodahl & Gordon, 1972; Thompson & Brewster, 1978). Therefore, it was expected to find differences among different departments included in the same group, but since departments within the same cluster were alike in terms

of their times to degree and completion rates, some similarities in the way graduate education is conducted might explain similar outcomes in terms of time to degree and completion rates.

The second phase of the study addressed the last three research questions, and involved interviews with graduate students and faculty members from two departments within each cluster. The interviews were designed to identify departmental factors affecting time to degree and completion rates, to explore whether faculty opinions differed from those of students, and to examine whether faculty and student opinions differed among the clusters.

Phase I

Sampling

Data for this phase were obtained from institutional records. Time to degree and completion rates were calculated for students who began a program leading to a doctoral degree between the fall, 1986, and spring, 1990 semesters. Completion status of these students was assessed through the end of the fall, 1995 semester. Thus, students in the sample had been enrolled for minimum of six academic years and a maximum of nine academic years.

This was considered an adequate period of time to calculate completion rates and times to doctoral degree. The median time to degree is four and a half years in most of the departments at this institution. Therefore, at the end of the sixth academic year, the majority of students have graduated or have left graduate study. Overall, only 6% of the students from 1986-1990 cohort were still enrolled at the institution at the time of the study.

Only data about those students who identified themselves as working toward the doctoral degree were included. Doctoral students who changed major fields of study after initial matriculation, or who started in master's programs but subsequently transferred to doctoral programs, were not considered in the calculations related to time to degree and completion rate.

Data Collection Procedure

Time to degree has been measured by researchers in various ways. Some scholars have measured total time to degree, from the undergraduate completion date to doctorate completion year (Abedi & Benkin, 1987; Berelson, 1960; Bowen & Rudenstine, 1992; Tuckman et al., 1990). Others have measured time to degree from the first enrollment in graduate school to graduation date (Abedi & Benkin, 1987; Berelson, 1960; Bowen & Rudenstine, 1992; Nerad & Cerny, 1993; Wilson, 1965; Zwick, 1991), and still others have computed time to degree considering only the registered time in graduate school (Dolph, 1983).

The present research used the second measure of time to degree. Although this measure might have included time students spent away from graduate school after initial registration, thus overstating the actual time spent in graduate school, it was more useful for purposes of this study because it allowed the researcher to explore the influence of departmental factors on completion times and rates.

Median time to degree was used in this research because this measure of central tendency is less affected by the influence of extreme observations (the fastest and slowest students) and it is also the most common measure used by researchers (Abedi & Benkin, 1987; Baird, 1990a; Berelson, 1960;

Bowen & Rudenstine, 1992; Jones et al., 1982; Lussier, 1995; Snyder, 1985; Stricker, 1994; Thurgood & Clarke, 1995).

Median time to degree and completion rate were calculated for departments with more than four graduate students enrolled in the extended cohort. Completion rates were computed by measuring the percentage of the 1986-1990 extended entering cohort who earned doctoral degrees by the end of the fall semester, 1995. Students were classified into two categories for purposes of comparison. "Completers" included those who had graduated by the end of the fall semester, 1995. "Non-completers" included those who had not graduated, those who ended their graduate studies at levels other than the doctorate, and those who were still registered during the fall semester, 1995.

The median completion rate and median time to degree were calculated initially for departments with more than four students enrolled in the extended cohort. Because the main objective of this phase of the research was to establish an empirical basis for selecting departments to be further analyzed in the second phase of the study, several departments were eliminated from the pool after this initial phase of analysis.

Departments with six or fewer doctoral students enrolled in dissertation hours during the spring, 1996 semester when data were collected were not considered in the second phase of the study because it was necessary to examine departments with a sufficient number of students who would agree to participate in the study. Education departments were not included in the sample for several reasons. First, the researcher is a student in the College of Education, thus her own experience might bias the analysis of the results. Second, the College of Education was undergoing an extensive restructuring

process at the time of the study, and changes resulting from that reorganization might have influenced student and faculty opinions.

The remaining departments were grouped into two categories according to their median of completion rates: high and low. High completion rate departments included those whose median completion rate was equal to or greater than the median of the population. Low completion rate departments included those whose median completion rate was less than the median of the population.

Two categories were also developed to group departments according to their median time to degree: short and long. Short time departments included those with time to degree equal to or less than the median of the population. Long time departments included those below the median. By combining these four categories, four clusters of departments were developed: Those with high completion rates and short times to degree (HS); those with low completion rates and short times to degree (LS); those with high completion rates and long times to degree (HL); and, those with low completion rates and long times to degree (LL).

Phase II

Because this part of the study was designed to discover and understand the departmental factors affecting time to degree and completion rates, as experienced by graduate students and faculty, a qualitative methodology was employed in the second phase of the research. Qualitative procedures provide means of accessing unquantifiable facts about the people with whom researchers interact. Qualitative methods are the best for exploring what people think about a particular phenomenon, and allow the researcher to

explore the social setting of those who experience it. As a result, the researcher gains a better understanding of the significant issues surrounding the issue under study (Berg, 1989; Jones, 1985; Lincoln & Guba, 1985; Patton, 1980).

In order to obtain some preliminary data about the influence of departmental factors on time to degree and completion rates, and to test the interview protocol for the present research, a pilot study was conducted in the summer of 1995.

Pilot Study

The pilot study consisted of interviews with 8 graduate students from five different departments who were working on their dissertations. Two students were enrolled in engineering programs, two in economics, one in family and child development, one in statistics, and two in psychology. Respondents were asked what they considered the most important departmental factors that affected their success as graduate students.

Three themes emerged from those interviews: research mode; advising; and, environment. The interview protocol for the current study was adapted to reflect these themes. Although the pilot study did not include faculty interviews, the interview protocol for faculty was patterned after that used for student interviews, so consistent data from both groups was elicited.

Sampling

Graduate students and faculty members participating in the second phase of the study were selected from two departments in each of the four clusters (HS, LS, HL, LL). Departments were selected at random. The rationale for selecting two departments, instead of one from each cluster, was to enhance

the knowledge about the cluster. It was assumed that departmental factors affecting graduate study progress differed more between the clusters than within the clusters. For example, departmental factors affecting time to degree and completion rates of students from the psychology department were assumed to be more similar to those affecting physics students than those affecting chemistry students because psychology and physics departments showed low completion rates and long times to degree.

Lists of faculty members working at graduate level and graduate students working on dissertations in the selected departments were provided by the Institutional Research and Planning Office of the institution, and reviewed by the department chairs, or directors of graduate programs from each particular department. From those lists, graduate faculty members and students who met the selection criteria for this study were randomly selected.

Selection of graduate faculty members was based on the number of years of experience. Only those with five or more years of teaching and research experience in the program were considered as potential respondents. It was assumed that experienced faculty would better understand the environmental aspects of the program affecting graduate student progress. Therefore, they would provide richer information.

Only those graduate students who were working on their dissertations at the time of the study were considered for selection purposes. Students writing dissertations have experienced various stages of the graduate education process (e.g., course work, qualifying and preliminary examinations, selection of the advisor and the dissertation topic) and, therefore, could provide rich information about their experiences.

To identify potential respondents, the researcher sent letters to the chairs of the selected departments explaining the purpose of the study, and requesting lists of graduate faculty members and students who met the selection criteria (see Appendix A).

In order to get range of perspectives and compare faculty and students' opinions, two graduate faculty members and three graduate students from each of the eight departments were then randomly selected from the pool of candidates who met the selection criteria. A total of forty people (16 faculty, 24 students) were selected to participate in the study.

Data Collection Procedure

The research technique employed to collect data was the long interview. The long interview is an appropriate technique when the researcher seeks to capture meanings and perspectives of program participants, and other subjective information not normally available through other research techniques. Furthermore, interviews maximize the opportunity for more complete and accurate communication of ideas between the researcher and the subjects under study (McCracken, 1988).

Semi-structured, open-ended interview questions were asked of all participants. This kind of interview was appropriate for this particular investigation because the purpose was to compare student and faculty opinions about the environmental factors that influence time to degree and completion rates. Thus, it was desirable to elicit the same type of information from each person interviewed (Patton, 1980). Each subject was interviewed once, and all interviews lasted between 45 and 60 minutes.

Approval from the Institutional Review Board (IRB) was obtained prior to contacting participants. Potential respondents were contacted through letters that solicited participation. A sample letter addressed to graduate students is included in Appendix B, and one addressed to faculty members is included in Appendix C. The letters explained the purpose and significance of the study, how respondents were selected, the importance of their participation, the anticipated length of the interview, how the results would be reported, and where they could contact the researcher. The letter assured participants that their confidentiality would be maintained.

One week after letters were mailed, the researcher called the potential subjects to confirm their willingness to participate. If a subject declined to participate, a letter was sent to another randomly selected faculty or student from that department. This process was repeated until 16 faculty and 24 students agreed to be interviewed.

Appointments were established with the participants for the interviews. Participants selected the date, time, and place for the interview. Interviews were conducted from March through the second week of April, 1996. This time period was selected to avoid pressures characteristic of the end of the semester.

At the start of each interview, the researcher provided participants with an overview of the study, and asked if they had any concerns they would like to discuss before starting to tape record the interview. The purpose of the preliminary conversation was to establish a relaxed and trusting environment. Respondents were informed that they could control the interview and stop the tape recorder at any time they wished.

Questions were asked in a systematic order, but participants were allowed to talk as much as they wanted. The interview protocol was designed to guide the direction of the conversation in a general way. In order to provide more flexibility for the interviewer to determine when it was appropriate to explore certain topics in greater depth, some prompt questions were included in the protocol.

To elicit information about departmental factors that graduate students perceived affected their time to degree and completion rates, respondents were asked about their financial support, the way they conducted research, what behaviors faculty engaged in that assisted their endeavors, what behaviors faculty exhibited that constrained their endeavors, and how much the department promoted student participation in social and academic activities.

To elicit information about faculty opinions on departmental factors affecting time to degree and completion rates of doctoral students, respondents were asked the same kinds of questions but the questions focused on the faculty perspective.

The interview protocols were designed to elicit data related to the themes that emerged from the pilot study and those suggested by the literature review: structural factors and environmental factors. Structural factors referred to the flexibility of the plan of study, availability and kind of financial support offered by the department, and degree requirements. Degree requirements involved the number and difficulty of the required courses, difficulty of the preliminary examination, and other requirements, such as a Master's thesis.

Environmental factors referred to departmental policies and practices, advising, and environment. Departmental policies and practices referred to orientation and advising offered by the department to help students through the graduate education process including: initial orientation; information about the material to be mastered for the preliminary exams; expectations of student performance; and, information about research projects in which faculty are involved. Departmental policies and practices also referred to the relationship between course work and research (how much the respondents thought that the required courses helped students to learn how to conduct independent research); research mode (the way students developed the dissertation); and, definition of the dissertation (i.e., novel piece of research or contribution to knowledge certifying the ability to carry out research according to the current standards of the discipline).

Advising was concerned with changes in advisor, student-committee relationship (how often the advisory committee formally evaluated graduate student progress and gave them feedback), and student-advisor relationship (availability of the advisor, match between student and advisor's personalities and interests, and advisor's involvement or participation in the whole process of graduate education).

Departmental environment referred to the sense of community within the department. This category included attitude toward students (how students were treated), student participation in departmental activities (how often students participated in social and academic activities organized by the department), and peer support (provided by other graduate students in the department, or by the research group to which the student belonged).

The interview protocol for students is included in Appendix D, and the interview protocol for faculty members is included in Appendix E. The protocols were divided into two parts. Part I elicited general demographic information about each interviewee, and Part II elicited data related to the research questions.

The descriptive nature of this study led the researcher to provide participants an opportunity to identify additional factors related to the graduate school experience. These themes were identified, labeled, and analyzed as they emerged.

Trustworthiness of the Study

To avoid researcher bias and improve the credibility of data analysis, at the conclusion of each interview, the researcher summarized what she understood to be the most salient points articulated by the respondent, and asked them for additional information that they wished to include.

Moreover, because the native language of the researcher is not English, a native English speaker listened to the audio tapes of interviews and compared them to the written transcriptions of the first few sessions. This ensured the fidelity of the transcriptions and confirmed that the major themes identified by the researcher were consistent with those identified by the English speaker.

Data Analysis

Data analysis was conducted throughout the research project, consistent with the constant comparative method (Glasser & Strauss, 1967). This method involves joint collection, coding, and analysis of data. After each

interview, the audio tapes were transcribed by the researcher or by a paid transcriber. Any information that could identify the participant was eliminated from the audio tapes transcribed by the paid transcriber to ensure the anonymity of the respondent. Transcriptions were read several times to note initial impressions, compare them with field notes, develop detailed knowledge, and list preliminary themes. To assure the proper codification of data into the different themes, an experienced researcher read the transcriptions and listened to the tapes of the first few interviews, and discussed with the researcher the emerging themes. These themes were refined by examining the results repeatedly, and then coded by paragraph in the transcriptions. After that, data were grouped under the themes and categories identified earlier in the pilot study, and under new themes that emerged from the interviews. Verbatim narrative was used to link raw data to the themes.

The next step was creating subthemes and categories within the themes. The categories were developed by assigning appropriate data to each category.

The final step consisted of integrating findings, and comparing results for similarities, differences, and unique occurrences between all four clusters, between the departments with high completion rates and those with low completion rates, and between departments with short times to degree and those with long times to degree.

Results of this phase of the study were presented in a descriptive manner and summarized in tables which showed the frequency of the categories within the themes for each cluster of departments.

Faculty and student opinions within each cluster were analyzed for differences and similarities between them. The opinions collected from all participants of each cluster were compared and contrasted to opinions of participants from the other clusters. As a result, the differences among clusters emerged, which allowed the researcher to identify the factors that contributed to the program's effectiveness or ineffectiveness.

The present study sought to inform faculty, administrators, and students about the effectiveness of graduate study. The methodology was designed to elicit data related to the research questions. Given this description of the procedures to be used, it was reasonable to assume that the data elicited from this approach would yield interesting insights and results.

CHAPTER IV

RESULTS OF THE STUDY

Although data were collected in two phases (calculation of medians and interviews) the results were so rich, the researcher elected to report those results in four sections. The first section describes calculations of median time to degree and completion rates of doctoral students at this institution. Results in the second section include descriptions of the eight departments under study. The third section reports the themes and categories that emerged from the interviews with faculty and student participants. The fourth section describes the most influential factors affecting time to degree and completion rates, as they were ranked by the respondents. Throughout this chapter, the terms “participants,” “respondents,” and “interviewees” are used interchangeably.

TIME TO DOCTORAL DEGREE AND COMPLETION RATES

Having eliminated those departments that enrolled fewer than five new students between 1986 and 1990, there were 1,187 students enrolled in doctoral programs in the remaining departments under study.

By the fall 1995, 540 (45%) out of the 1,187 students had graduated, 171 (14%) students had stopped at levels other than the doctorate (Master’s and Advanced Certificate), 68 (6%) students were still enrolled, and 408 (35%) students had permanently or temporarily left graduate school. Fifty-six percent of the students who failed to earn their doctorates left during their first two years of graduate study.

The median of completion rates for the departments under study was 52.4% ranging from 3% to 80.9%. The median of time to degree was 4.6 years ranging from 3.3 years to 8 years (see Table 1). This period included the time spent earning a master's degree, if it was required for the doctoral degree. The time during which students were not registered and, perhaps, away from campus was also included in the total time to degree.

The institution under study changed from an academic calendar based on quarters to one based on semesters after the 1987-88 academic year. Therefore, for the 1986-87 and 1987-88 academic years, four quarters were counted as a year. From the 1988-89 academic year on, three semesters were counted as an academic year. The summer sessions (Summer I and Summer II) were counted as one semester, and were included because most graduate students at this institution take summer courses.

When data were analyzed by gender, it was evident that male students comprise the majority of graduate students at this institution. Of the 1187 students under study, 775 (62%) were men and 412 (38%) women. Overall, women had a completion rate of 35%, while the rate for men was 51%. However, no difference in time to degree was observed between the two groups.

After eliminating from the sample the departments with fewer than five graduate students enrolled in dissertation hours in the spring, 1996 semester, and the departments in the College of Education, the remaining departments were grouped into two categories according to their median completion rates: high and low. High completion rate departments included those whose median completion rates were equal to or greater than 52.4%. Low

Table 1

Doctoral Completion Rates and Time to Degree, 1986-90 Cohort

Department	Total	* Comp.	** Non-comp.	*** % Comp.	**** TTD (years)
Accounting	15	12	3	80.0	4.6
Aerospace Engineering	21	6	15	28.6	4.0
Agricultural Engineering	8	5	3	62.5	4.0
Agricultural Economics	15	9	6	60.0	4.6
Animal Science	17	13	4	76.5	4.3
Animal Sciences, Dairy	7	3	4	42.9	5.0
Biochemistry and Nutrition	9	6	3	66.7	5.3
Biology	7	4	3	57.1	5.0
Chemistry	66	41	25	62.1	5.0
Chemical Engineering	15	10	5	66.7	4.0
Civil Engineering	28	12	16	42.9	4.0
Clothing and Textiles	6	1	5	16.7	4.0
Computer Science	23	5	18	21.7	6.0
Economics	14	3	11	21.4	5.0
Adult and Continuing Education	33	1	32	3.0	8.0
Educational Administration	82	19	63	23.2	5.0
Community College Education	32	6	26	18.8	5.3
Curriculum and Instruction	57	15	42	26.3	4.3
Educational Research & Eval.	19	8	11	42.1	3.6
Adm. & Supervision Special Ed.	14	1	13	7.1	4.3
Student Personnel	41	21	20	51.2	4.3
Vocational Technical Education	33	10	23	30.3	3.3
Electrical Engineering	42	29	13	69.0	4.3
Engineering Mechanics	68	41	27	60.3	4.6
Entomology	14	9	5	64.3	4.6
Environmental Design & Planning	12	6	6	50.0	4.3
Environmental Science & Eng.	5	1	4	20.0	4.6
Family and Child Development	44	27	17	61.4	3.3
Finance	10	5	5	50.0	4.0

Table 1

Doctoral Completion Rates and Time to Degree, 1986-90 Cohort (cont.)

Department	Total	* Comp.	** Non-comp.	*** % Comp.	**** TTD (years)
Fisheries and Wildlife Sciences	15	11	4	73.3	5.6
Forest Products	9	3	6	33.3	4.6
Forestry	22	14	8	63.6	4.0
Geology	17	9	8	52.9	5.0
Horticulture	5	4	1	80.0	4.0
Housing, Int. Des. & Resource Mgt.	10	4	6	40.0	3.6
Human Nutrition & Foods	29	18	11	62.1	4.3
Industrial Eng. & Oper. Research	12	6	6	50.0	3.6
Management	21	14	7	66.7	4.3
Marketing	10	8	2	80.0	5.3
Mathematics	29	16	13	55.2	4.0
Materials Engineering	20	12	8	60.0	5.0
Mechanical Engineering Science	13	8	5	61.5	3.6
Mining Engineering	5	3	2	60.0	5.0
Physics	26	8	18	30.8	5.3
Plant Path, Physiology & Weed Sc.	21	17	4	80.9	4.3
Psychology	31	14	17	45.2	5.0
Public Adm. & Public Affairs	66	10	56	15.2	6.0
Science & Technology Studies	10	5	5	50.0	5.0
Sociology	24	7	17	29.2	3.3
Statistics	21	11	10	52.4	4.6
Veterinary Medical Sciences	14	9	5	64.3	5.3
Total	1187	540	647	0	0
Median	0	0	0	52.4	4.6

* = No. of Completers

*** = Percentage of Completion

** = No. of Non-completers

**** = Median Time to Degree

completion rate departments included those whose median completion rates were less than 52.4%.

Two categories were also developed to group departments based on their median times to degree: short and long. Short time departments included those with median times to degree equal to, or less than 4.6 years, and long time departments included those above 4.6 years. By combining these four categories, four clusters of departments were developed: high-short, low-short, high-long, and low-long. The departments assigned to each of the four clusters are provided in Table 2.

DESCRIPTIONS OF THE DEPARTMENTS UNDER STUDY

Two departments were selected at random from each cluster, rendering a total of eight departments to be analyzed in the second phase of the study. The selected departments included: chemical engineering and family and child development from the high-short cluster; finance and aerospace engineering from the low-short cluster; biochemistry and chemistry from the high-long cluster; and, physics and psychology from the low-long cluster.

The purpose of this section of the study was to elicit information about departmental policies and procedures that would enable the researcher to better understand the relation between departmental support and the times to degree and completion rates among the selected departments.

Descriptions of the departments were based on information published in the graduate catalog of this institution, the graduate student handbook of each department, institutional records, and information provided by the department heads, directors of graduate programs, and interviewees. One of the difficulties with compiling a detailed description of departmental policies

Table 2

Academic Departments Clustered by Time to Degree and Completion Rates

Completion Rates			Time to Degree			
	Dept.	Short	TTD	Dept.	Long	TTD
		% Comp.			% Comp.	
High	AGE	62.5	4.0	BION	66.7	5.3
	CHE	66.7	4.0	CHEM	62.1	5.0
	EE	69.0	4.3	BIOL	57.1	5.0
	ME	60.3	4.6	GEOL	52.9	5.0
	ENT	64.3	4.6	FIW	73.3	5.6
	FCD	61.4	3.3	MSE	60.0	5.0
	FOR	63.6	4.0			
	MGT	66.7	4.3			
	MATH	55.2	4.0			
	ESM	61.5	3.6			
	STAT	52.4	4.6			
Low	ASE	28.6	4.0	CSA	21.7	6.0
	CE	42.9	4.0	ECON	21.4	5.0
	EDP	50.0	4.3	PHYS	30.8	5.3
	FIN	50.0	4.0	PSYC	45.2	5.0
	HIDM	40.0	3.6	STS	50.0	5.0
	ISE	50.0	3.6			

AGE= Agricultural Engineering
 CHE= Chemical Engineerin
 EE= Electrical Engineering
 ME= Mechanical Engineering
 ENT= Entomology
 FCD= Fam. & Child Development
 FOR= Forestry
 MGT= Management
 MATH= Mathematics
 ESM= Eng. Science & Mech.

STAT= Statistics
 BION= Biochemistry
 CHEM= Chemistry
 BIOL= Biology
 GEOL= Geology
 FIW= Fish. & Wildlife Sc.
 MSE= Materials Sc. Eng.
 ASE= Aerospace Engineering
 CE= Civil Engineering
 EDP= Env. Des. & Planning

FIN= Finance
 HIDM=Hou. Int. Des.Mgt
 ISE= Industrial Eng.
 CSA= Computer Sc.
 ECON= Economics
 PHYS= Physics
 PSYC= Psychology
 STS= Sc. & Tech. Studies

and procedures is that they change over time. Therefore, some of the current practices might be different from those in place for the 1986-90 cohort.

The selected departments differed in size, as measured by the number of doctoral students enrolled for the spring, 1996 semester and the number of faculty members with a rank of assistant professor or higher. Those professors are usually the ones who work in graduate education. Table 3 lists the number of graduate faculty members and doctoral students in the selected departments as at the fall semester, 1995.

Departments also differed on the amount, and kind of financial support allocated to students. Some departmental policies and practices, such as initial orientation, flexibility of the plan of study, degree requirements, and research mode differed among departments.

Chemical Engineering (CHE)

The CHE department is the first of the two high-short departments in this study. Doctoral students in this department attend an orientation meeting at the beginning of the academic year, where they meet with the Department Head and the Secretary of the Graduate Program. At that meeting, they are told about payroll, purchasing, and safety procedures. They are also informed about general rules and degree requirements.

Toward the end of the first semester, there is a meeting where those faculty who have research projects in progress give a presentation and describe the various projects that are available. Students are encouraged to talk to the individual faculty member if they are interested in a particular project.

Table 3

Number of Faculty and Students for the Fall Semester 1995

Cluster	Department	No. Grad. Faculty	No. Doctoral Students
High-Short	CHE	12	16
High-Short	FCD	16	29
Low-Short	ASE	17	34
Low-Short	FIN	19	12
High-Long	BION	19	14
High-Long	CHEM	31	57
Low-Long	PHYS	29	22
Low-Long	PSYC	24	34

By the end of the second semester, students must have selected their advisors. To accomplish that, they list three faculty they would like as an advisor in order of preference. The Graduate Committee then assigns students their advisors. The assignment is based on the students' preferences, availability of space in labs, research funds, and demands of the faculty.

The plan of study in CHE is fairly flexible. There are only four required courses (12 credit hours) and remaining courses are selected in consultation with the advisor, based on the student's area of interest in terms of research. Research interest areas include: biochemical studies, catalysis, chemical process control, environment, polymer materials, polymer processing, and surface science. The student's advisory committee is also chosen in consultation with the advisor.

In terms of degree requirements, there is a qualifying examination at the end of the first year of study which covers four general areas of chemical engineering. It is a written, in-class exam. The exam is prepared by the CHE Graduate Committee and a list of books is provided to help students prepare for the exam. The students must pass at least three of the four exam areas to pass the qualifying exam. If students only pass one or two sections, they take the sections that they did not pass in a second exam.

The preliminary examination is related to the student's research area, and consists of a written report plus an oral presentation of what the student is planning to do in their research. It is conducted by the student's advisory committee. In other words, the dissertation proposal and the preliminary examination are one and the same in this department.

In terms of research mode, students usually work in teams, or as an apprentice to their advisors. The advisor often selects the dissertation topic and determines the scope of the dissertation. Students frequently start working on their research in their second year of study.

There are several forms of financial support. Teaching assistantships (TAs), research assistantships (RAs), senior research assistantships (SRAs), and fellowships (FSs). TAs are funded by departmental moneys which are allocated to teaching. Typical TA duties include grading homework assignments, quizzes and tests; holding regular office hours to assist students with problems; and, conducting problem sessions in class. RAs are supported by money that comes from sponsored research programs managed by professors in the department. Duties and responsibilities are at the discretion of the professor directing the research project. SRAs differ from RAs in the amount of the stipend. SRAs are paid at a higher rate. Fellowships are awarded by several sources: the university, the department, industry, and other outside resources, like the National Science Foundation (NSF).

Family and Child Development (FCD)

FCD is the second high-short department in the present research. Before the start of the academic year, the Graduate Student Association (GSA) of this department contacts the newly admitted graduate students and invites them to visit the campus. New students can stay at the homes of continuing graduate students who show them around, and help new students meet the faculty. When students matriculate in the fall, they take a two-semester orientation course in which they are informed about the different degree programs; courses that are available; degree requirements;

professional development issues; how to write papers; publishing; applying for grants; and, related matters. In this orientation course, students have the opportunity meet the faculty and learn about their research interests.

Continuing graduate students, through the GSA, also participate in this course and talk about their experiences with the preliminary examination and research project. The purpose of the GSA is to provide support and information for new graduate students through several social and academic activities, as well as through its newsletter.

Students are initially assigned to a temporary advisor, and in the second semester of study, they are encouraged to select their major advisor and work with that person on the preparation of the program of study. The program is flexible in the sense that there are not too many required courses for students. Instead, the program of study is organized by areas of interest. All Ph.D. students are required to take two research methods courses, two statistics courses (beyond the Master's level statistic course), and two elective courses outside their major area of study. The rest of the course work is taken within the area of the student's interest. There are four interest areas offered for Ph.D. students: adult development and aging; child development; family studies; and, marriage and family therapy.

The advisory committee is selected through consultation between the student and the major advisor. This committee participates in several steps of graduate work: the plan of study, preliminary examination, dissertation proposal, and final defense of the dissertation.

The preliminary examination is usually taken by the end of the second year of study. This exam has a written and an oral component. The written

part is a take-home exam that covers theory, research methods, statistics, and research in the selected field of study. The statistics portion of the exam can be substituted by successfully completing a research proficiency examination, which is administered by the faculty of the College of Education. The oral portion complements the written part, and students have the opportunity to improve on what they wrote. The students are informed about their weaknesses in the written portion of the exam, so they can improve their answers in certain areas during the oral exam. The exam is conducted by the advisory committee, and the students are normally prepared for the exam by their advisors and committee members, and by continuing graduate students who have had the same faculty on their committees.

The dissertation proposal consists of a written component plus an oral presentation of what the student is planning to investigate. For the most part, students work alone on their research and select their own research topics.

This department offers several kinds of financial support: TAs, RAs, and GAs. TAs are funded by the department and the students are responsible for teaching a course. RAs are supported through internally or externally funded research sources. The tasks of the RAs are assigned at the discretion of the research project leaders. GAs are funded by the department and differ from TAs in that the student may be assigned to any departmental responsibility except that of principal instructor of a class. Not all assistantships are full assistantships. They vary from 20-hour assistantships, which carry full tuition benefits, to 5-hour assistantships, which carry a tuition payment proportional to the number of hours worked.

Aerospace Engineering (ASE)

The ASE department is the first low-short department in this study. Students in this department attend an orientation meeting at the beginning of the first semester of study in which the chairman of the graduate committee outlines the policies and procedures of the department. Students are assigned to their research advisors based on what they identified in their admission application as their areas of interest.

The plan of the study is prepared by the student in consultation with the advisor, and focuses on the student's preferred area of specialization. Most of the plan of study is predetermined. Options to take courses outside the area of concentration are limited. The specialization areas in this department are: aero-hydrodynamics, dynamics and control, ocean engineering, structures and structural dynamics, applied physics, and applied mathematics.

The preliminary examination is required after the student has completed one-third of the course work. This is a written, open book exam that covers four general areas of the program. The exam is conducted jointly by the ASE faculty and the Graduate Committee. The faculty meet, as a whole, to decide the minimum grade needed to pass the examination. Students are provided a reading list from selected references in advance of the exam. The oral part of the preliminary examination is not related to the written part. The oral exam consists of questions related to a technical paper selected from the literature, and questions related to the student's major area of study. The oral exam is conducted by an examining committee composed of three faculty members from the student's major area, and two members of the student's advisory committee, including the major advisor.

No formal dissertation proposal is required by this department. The dissertation topic and methodology are decided by the student and his or her advisor, which are then approved by the committee. The dissertation topic is selected by the major advisor. Because most students are supported by research grants, the scope of the dissertation is defined by the objectives of the research grant. Students start research right from the beginning of their graduate studies.

Graduate assistantships and fellowships are available. In this department, there are no differences between TAs and RAs. Students are told that they are assistants, and their duties consist of working 5 hours per week, normally grading papers and helping in lab classes. The remaining time (15 hours) is dedicated to research. Most GAs are funded by research grants. There are also a number of fellowships supported by external sources. All students are fully funded in this department.

Finance (FIN)

FIN is the second low-short department in the present research. No formal orientation is scheduled for students in this department. During the first two years of study, students are advised by the Graduate Director. After passing the preliminary exam, students select their research advisors and members of their advisory committees.

The plan of study is the same for all students, regardless of the area of research concentration. There are 14 required courses that all students must complete, unless they have already done previous graduate work in areas related to the course work. If that is the case, students can develop an individually tailored program of study. Students spend the first two, or two

and a half years of study fulfilling the course work requirements, with little or no involvement in research activities.

The preliminary examination must be taken when the student finishes the course work, and it is a written, closed book, eight-hour exam. The preliminary is a general exam about finance, and all finance faculty can submit questions for the exam. The exam is prepared by the Graduate Committee, and the faculty members who submitted questions evaluate them. An oral component is required when a student does not do very well on the written exam. This oral exam is at the discretion of the Graduate Committee. Students are also required to write a research paper by the beginning of the third year of study. This research paper must be a publishable paper, and its quality is evaluated by the advisory committee.

By the end of the second year of study, students select a research advisor and advisory committee. The research proposal is presented once the student has completed a sufficient amount of empirical work that he or she can defend the proposal. Once the proposal is defended, the student knows exactly what further steps are required, and the dissertation consists of gathering more data, and writing.

In terms of research mode, students normally work alone. They have to develop their own ideas about the research topic, but the advisor participates in helping the student to determine the scope of the dissertation.

This program is very small. The department admits only 4 new students every other year. All students are supported by the department in the form of graduate assistantships. Students on assistantships carry a half-time load in teaching or research.

Biochemistry (BION)

The BION department is the first of the high-long departments studied in this research. Students in this department attend an orientation meeting on safety rules, course work, and research. Faculty members who serve as advisors give brief presentations about the work they are doing. Given this information, plus the written information contained in the department handbook, students are encouraged to select two different labs in which they want to work. During the first semester of study, students participate in two research rotations to familiarize themselves with individual faculty members and their research interests. At the end of that semester, students choose the particular faculty member with whom they wish to work (who will serve as the student's major advisor), and begin a research project that forms the basis of the dissertation.

The plan of study is prepared in consultation with the major advisor, as well as the student's advisory committee. Course work consists of a core of advanced courses taken during the first year of graduate study. This core is supplemented with additional elective courses focusing on specialized topics related to the individual student's needs and interests.

The preliminary examination is an oral exam conducted by the student's advisory committee and one additional faculty selected from a pool of faculty in the department. The major advisor does not participate in this exam. This examination is administered at the beginning of the second year of study and covers a wide range of topics in biochemistry. It lasts approximately three hours. Most of the information needed to prepare for this

exam is provided by more advanced graduate students. Consultation with the advisory committee about this exam is up to the student.

The dissertation topic is decided in consultation with the major advisor, and students work in apprenticeship with the advisor. The dissertation proposal is written in the form of a grant proposal, emphasizing the importance of the study and how the student plans to conduct the research. It is submitted to the advisory committee for evaluation, and that committee conducts an oral defense of the proposal.

This department offers TAs and RAs supported by departmental funds. There are also several stipends provided by the grants awarded to different faculty members.

Chemistry (CHEM)

CHEM is the second high-long department considered in this study. All entering students in this department are expected to attend orientation meetings during a one week period of time just prior to the start of the academic year. Departmental orientation consists of information about policies and practices, safety procedures, and degree requirements. During this week, all incoming students have to take a series of proficiency examinations in four areas: organic, inorganic, analytical, and physical chemistry. The purpose of these exams is to determine whether the student is prepared to take advanced courses in each area, and to advise them with respect to any deficiencies, so that appropriate courses can be taken. These exams are standardized tests prepared by the American Chemical Society. Most of the remainder of the orientation week is dedicated to orienting students who have accepted teaching assistantships.

During the first semester of study, students are required to formally interview six faculty members to gain a better idea of what those particular faculty are working on, and, later, to select the major advisor. Those interviews provide an opportunity for both the student and the advisor to determine if there is a good match between their research interests. During the second semester, the student must submit to the Director of Graduate Education the name of the professor with whom he or she desires to work. Final assignment of the advisor is made by the Department Head.

The plan of study is prepared in consultation with the advisor, as is the selection of the advisory committee. The plan of study consists of four core courses that are required for all students regardless the specialization area. The remaining course work is related to the student's area of specialization. Within each specialty area, courses for the plan of study are predetermined. In addition to courses, Ph.D. students are required to pass two seminars. In the second seminar, they are required to make a presentation on their dissertation topic which is evaluated by other faculty and students in the department.

The preliminary examination is administered by the student's advisory committee and its format varies among the four divisions of the department. That is, it may be oral, written, or both. In addition to this exam, students in all divisions have to present and defend an original research proposal that may or may not be their dissertation topic. This presentation is part of the preliminary examination. The research proposal should include the relevant information that a normal proposal to a funding agency would contain.

There is not a dissertation proposal defense, and the dissertation topic is usually arrived at in consultation with the advisor. The student usually works as an apprentice with the advisor, or post-doctoral research associates. The advisory committee evaluates each student every semester. This department offers TAs and RAs to most of its graduate students.

Physics (PHYS)

The PHYS department is the first low-long department examined in this research. A three-day training program is organized for incoming students in this department who have accepted GA/ TA positions. This program is designed to prepare the graduate students for their teaching duties. Beyond this program, there is no orientation before classes start. The plan of study consists of seven required courses plus three elective courses. The students select their dissertation advisors after passing the preliminary examination, which must be taken after finishing the course work. Before that time, no specific advisor is assigned to the student.

The preliminary examination is a written, closed book exam that covers basic physics at the graduate level. The exam has four parts. The first three parts are written and the fourth part is oral, and is administered if the results of the written examination are not satisfactory. The exam is conducted by the Graduate Committee of the department, and all faculty members can submit questions for the exam. The Graduate Committee selects the questions to be included in the exam, and evaluates the results. Students can study from old exams, which are at their disposal in the department's library, in order to get a better idea about the format of the exams and the kind of questions asked.

The advisor does not participate in either the preparation of the plan of study or the preliminary exam.

The dissertation proposal is part of the preliminary examination, and consists of an oral presentation before the student's advisory committee about what research the student is planning to conduct. The members of the advisory committee are selected by the student in consultation with the major advisor. The committee must submit a yearly report to the Graduate Committee concerning the student's progress. This evaluation is required only for students who are receiving financial aid from the department.

The dissertation topic, and the scope of the research are determined by the major advisor, and students start research when they finish all course-work and pass the preliminary exam. Students work on teams, or as apprentices to their advisors.

The physics department offers GAs/TAs to most students (which should not exceed 20 hours per week). The duties for assistants include grading tests and papers, holding office hours to help students, and conducting lab classes. It is recommended that students seek RA support from faculty research groups as early as possible, and not remain in a GA/TA position beyond the third year of graduate study.

Psychology (PSYC)

PSYC is the second low-long department considered in this study. There is no formal orientation session in this department. It offers Ph.D. programs in three different areas: clinical psychology, psychological sciences, and industrial-organizational psychology. When students matriculate, the Program Director assigns them to faculty advisors based on the Director's

perceptions of student interests. At the end of the first year of study, students are expected to select an advisor and a Master's thesis topic.

The plan of study is fairly well predetermined for each of the four areas. All students, regardless their specialty areas, are required to complete a core program of 18 semester hours. The remaining credit hours are in the area of specialization. All students must complete their Master's thesis research prior to being admitted to the doctoral program in their third year. In addition to course work, clinical psychology students must complete a one-year predoctoral internship in a setting approved by the American Psychological Association (APA) and the Director of Clinical Training. In industrial psychology, the internship is not formally required, but students are strongly encouraged to complete one during the summer months.

The preliminary examination varies by specialization area. In clinical psychology, it involves the preparation of a 50-page research paper, and there are detailed guidelines about what this paper must contain and how it is evaluated. In the other two areas, the preliminary exam has a written and an oral component. The preliminary exams in all areas are administered by the student's advisory committee.

Students choose the members of the advisory committee in consultation with their major advisors. Student progress is evaluated yearly, and students are notified about the results of those evaluations. The evaluation is based on grades, fulfillment of graduate assistant responsibilities, and testimony of the faculty about the research activities performed by the student.

The dissertation proposal is written, and defended before the student's advisory committee. Students usually develop their own research ideas, and

they work on teams with other students in terms of data collection and statistical analyses.

There are TAs and RAs offered by the department. Because of financial constraints, not all teaching assistantships are full assistantships (20 hours). The teaching assistantships vary from 5 to 20 hours per week. The portion of tuition waived is proportional to the time the student works in the department.

The information resulting from the documents and interviews provided the researcher with an understanding of the different departmental policies and practices in terms of graduate education, which was useful in identifying similarities and differences among departments in terms of their times to degree and completion rates.

INTERVIEW GROUPS, THEMES, AND CATEGORIES

This section of the study involved general observations about the data collection process, observations about the protocol, descriptions of the demographic characteristics of the interview groups (faculty and graduate students) and the themes and categories that emerged from the interviews.

General Observations

Three graduate students (one from physics, one from biochemistry, and one from finance) and four faculty members (one from physics, one from biochemistry, and two from finance) declined to participate in the research project when invited to do so. Four other faculty members (from the finance department) did not respond to the request for participation, either by mail or through phone messages. Letters were subsequently sent to other people meeting the necessary criteria until the targeted number of participants (40)

was achieved. The most common reason for declining to participate in the study was availability of time. One student, from the finance department, expressed concern about participating because his department is very small and he did not want to be identified.

Faculty members who participated in the study were comfortable in the interview, willingly offered information, and discussed issues that were relevant to the study. All interviews with faculty members were conducted at their respective offices.

In general, graduate students were responsive to the task, as well. There were two graduate students who did not feel comfortable talking about their relationships with their advisors and advisory committee members. In particular, they reported trouble with their advisors. These two students asked the interviewer to stop the tape recorder in order to provide more “honest” and “frank” opinions about their advisors. In spite of the confidentiality guaranteed to respondents in this study, these students reported that they were finishing their dissertations and that they did not want to create any problems at this point in their academic programs if, for any reason, their opinions were revealed to their advisors.

Student interviews were conducted at different places. Most of them were conducted at students’ labs, or offices. Libraries and conference rooms of the departments were also interview sites, as was the home of the researcher.

Overall, the interviews went very well, and were conducted at the place and date selected by the participants. Respondents were participatory and appeared to provide genuine responses to the questions. The data

collected was rich and descriptive. It provided substantial information for this research project.

Observations About the Protocol

There was one change to the interview protocol made by the researcher. The first faculty member interviewed introduced a category, not initially considered by the researcher, namely: requirement to report significant results. This respondent differentiated her department from other departments in that, in her department, the proposal is considered a contract, where students point out what they plan to study and how they plan to collect data. If students complete what was agreed to in the proposal, and approved by the advisory committee, that is sufficient, regardless of whether the research results are significant. Other departments, however, require students to conduct research until significant results are found.

After considering literature on time to degree and completion rates (Bowen and Rudenstine, 1992; Nerad and Cerny, 1993), this issue was deemed important by the researcher, so a related question was added to the interview protocol. There were no other changes to the protocol.

Description of the Interview Groups

Forty people participated in this study, two faculty and three graduate students from each of the eight selected departments, resulting in a total of 16 faculty members and 24 graduate students. Table 4 lists the characteristics of the faculty members and Table 5 lists the characteristics of the graduate students.

Table 4

Characteristics of the Faculty Respondents

Faculty No.	* Cluster	Years Exp.	No. Doct. Advisees
Faculty 1	H-S	5	3
Faculty 2	H-S	10	6
Faculty 3	H-S	15	8
Faculty 4	H-S	12	12
Faculty 5	L-S	10	4
Faculty 6	L-S	14	6
Faculty 7	L-S	30	6
Faculty 8	L-S	30	20
Faculty 9	H-L	32	20
Faculty 10	H-L	19	12
Faculty 11	H-L	26	5
Faculty 12	H-L	16	11
Faculty 13	L-L	18	6
Faculty 14	L-L	21	30
Faculty 15	L-L	35	12
Faculty 16	L-L	6	5

* H-S: High completion rates and short time to degree

L-S: Low completion rates and short time to degree

H-L: High completion rates and long time to degree

L-L: Low completion rates and long time to degree

Table 5

Characteristics of the Graduate Student Respondents

Student No.	Cluster	Time Enrolled	Antic. Grad. Date	* Fin. Support
Student 1	H-S	4	Fall 96	TA
Student 2	H-S	5	Spring 96	TA
Student 3	H-S	4	Fall 96	RA
Student 4	H-S	5	Fall 96	TA
Student 5	H-S	4	Spring 96	Own
Student 6	H-S	4	Spring 96	GA
Student 7	L-S	3	Summer 96	Fell.
Student 8	L-S	3	Summer 97	GA
Student 9	L-S	4	Spring 96	TA
Student 10	L-S	4	Spring 96	GA
Student 11	L-S	3	Spring 97	TA
Student 12	L-S	6	Spring 96	TA
Student 13	H-L	4	Summer 96	Scho.
Student 14	H-L	7	Spring 97	RA
Student 15	H-L	5	Spring 96	TA
Student 16	H-L	4	Fall 96	Grant
Student 17	H-L	5	Spring 96	RA
Student 18	H-L	4	Spring 97	TA
Student 19	L-L	6	Spring 96	TA
Student 20	L-L	8	Spring 96	TA
Student 21	L-L	4	Spring 97	TA
Student 22	L-L	4	Spring 97	TA
Student 23	L-L	8	Spring 96	RA
Student 24	L-L	4	Fall 97	TA

* TA: Teaching Assistantship

RA: Research Assistantship

Fell: Fellowship

Scho: Scholarship

Emerging Themes and Categories

Even though the purpose of the interviews was to identify departmental factors affecting time to degree and completion rates, the exploratory nature of this study directed the researcher to give participants the opportunity to mention factors from their personal experiences that had also affected these outcomes. The influence of personal factors on time to degree and completion rates was frequently mentioned by the respondents. Therefore, it became a second theme in this study. Two main themes were revealed in this research: departmental factors and personal factors.

Departmental Factors

Departmental factors that affected time to degree and completion rates were divided into two main subthemes: structural and environmental factors. Comments on both structural and environmental factors were assigned to one of three groups: comments that promoted time to degree and completion rates; those that had no effect on time to degree and completion rates; and, those that impeded time to degree and completion rates.

Decision rules to classify comments in each of three groups (promoting, no affecting, and impeding) were based on the kinds of words used by the respondents to describe the departmental situation on each of the factors they were asked. Comments considered as promoting time to degree and completion rates were those that included words like: “excellent,” “well informed,” “all the courses really lean towards research,” “help me a lot,” “periodical evaluations of students,” “I consider my students to be professional colleagues,” and “concern for student development.”

Comments that suggested no effect of departmental factors on student success included words like: “it isn’t really a big issue,” “it wouldn’t affect at all,” “it didn’t impact,” “it’s only as good as the student makes it,” and “it’s nothing too good, nothing too bad.”

Comments that suggested that departmental factors impeded student success included words, such as “it is not nearly enough,” “more an obstacle for students,” “it doesn’t work,” “never see the whole committee,” “doesn’t help me,” “it is not so great,” and “it’s a negative one.”

Structural Factors

These factors were further sorted into two categories: financial support, and degree requirements. Financial support included the availability and kind of financial support offered by the department. Degree requirements involved the number and difficulty of required courses, difficulty of the preliminary examination, and other requirements, such as master’s thesis, or research papers, perceived by the participants to affect time to degree and completion rates.

Table 6 provides details on the number of comments, and number of participants who offered those comments related to structural factors in each cluster.

Financial Support. Examples of comments made by the respondents that suggested financial support promoted completion time and rates included:

As a general rule, all the graduate students in our department are on financial support. They are either on teaching assistantships or research assistantships (HS, faculty).

Table 6

Faculty and Student Perceptions of Structural Factors by Cluster

Factors	HS		LS		HL		LL		TOTAL	
	*C	**P	C	P	C	P	C	P	C	***%C
Financial Support										
Faculty										
Promoted	8	3	9	3	10	4	4	2	31	50
No Effect	0	0	0	0	0	0	0	0	0	0
Impeded	3	2	7	2	7	2	13	4	30	50
Total	11		16		17		17		61	100
Students										
Promoted	12	6	14	6	12	6	9	4	47	53
No Effect	0	0	0	0	0	0	0	0	0	0
Impeded	11	3	8	2	10	3	13	5	42	47
Total	23		22		22		22		89	100
Degree Req.										
Faculty										
Promoted	0	0	0	0	0	0	0	0	0	0
No Effect	13	4	7	4	4	2	11	4	35	41
Impeded	9	2	16	4	11	4	14	4	50	59
Total	22		23		15		25		85	100
Students										
Promoted	0	0	0	0	0	0	0	0	0	0
No Effect	18	6	9	3	22	6	11	5	60	41
Impeded	21	5	19	5	21	4	26	6	87	59
Total	39		28		43		37		147	100

* = Number of Comments ** = Number of People who offered those comments

*** = Percentage of Comments per category

Just about all our graduate students are on research grants, so they like to keep it that way and don't have you go back to departmental funding because that means that money that comes to me, then they cannot give it to a new graduate student (HL, student).

Overall, faculty made 31 comments and students made 47 comments that were assigned to the category of financial support promoting student success.

No comments about financial support were made that suggested it had no effect on time to degree and completion rates.

Examples of comments made by the respondents that suggested the financial support impeded completion time and rates included:

Financial support is not, of course, nearly enough, and as money is getting tighter the availability to give like... it would seem that almost everybody will get an assistantship but that's not the case anymore, so there are not full-time assistantships. They are 20-hours and some people have 5-hours, 10-hours, up to 20 (LL, student).

I think without a doubt, at least in this department, the biggest factor for getting out of here would have to be financial support. Generally everybody gets financial support, but if you don't, you're never going to graduate. If your advisor has a research assistantship as opposed to actually spending time in teaching, you know twenty hours a week of classes, that's by far the biggest factor. I mean, I was on a teaching assistantship for a long time, and you just have a real difficult time trying to work on your research. So when I got into a research assistantship, it speeded up immensely (LL, student).

When funding was more generous, in terms of travel support, we were able to get, or encourage students to get to more than one meeting in their career. I think it would be ideal for students to get to more than one meeting in their career, but ah... I think, right now, that's a very severe limitation we have as a department in helping educate our students (HL, faculty).

Overall, faculty made 30 comments and students made 42 comments that were assigned to the category of financial support impeding student success.

Degree Requirements. No comments about degree requirements were identified as promoting time to degree and completion rates.

Examples of comments made by the respondents that suggested degree requirements had no effect on completion time and rates included:

I've never known any delays to result from the course work requirements, and if there is a course they put in their program that they find is not available when they need it, we'll make a substitution (LS, faculty).

I don't know of a student who ever was out for the prelim exams. We just don't let them, I mean, we just... if they flunk, we just set up some sort of study program, we'll tell them what they need to learn and we make them to do it again. So, maybe... it would be two or three months before they take it again (HL, faculty).

I cannot say anything about the class work, so it isn't really a big issue because you just take three courses per semester, so that's not a big issue (LS, student).

Overall, faculty made 35 comments and students made 60 comments that were assigned to the category of degree requirements that had no effect on student success.

Examples of comments made by the respondents that suggested the degree requirements impeded completion time and rates included:

It has been always my opinion that we require too many hours of course work for a Ph.D. I think at the Masters level we've got the right amount of course work, but I think we've got too much for the Ph.D.,

where they really need to be concentrating on the research that they are doing (HS, faculty).

... it turns to be that these prelim exams are more an obstacle for students because they spend a lot of time studying and, and they could probably use that time to do research (LS, faculty).

I think the Master's thesis definitively delays the time that people spend here. Most people graduate in at least five years, but there are people that have been here six or seven years (LL, student).

Overall, faculty made 50 comments and students made 87 comments that were assigned to the category of degree requirements impeding student success.

Overall, in terms of structural factors, 51% percent of faculty's comments and 53% of students' comments suggested that financial support promoted time to degree and completion rates. Fifty percent of faculty's comments and 47% of students' comments suggested that financial support impeded success. Degree requirements were considered more as impeding time to degree and completion rates than having no effect (59% versus 41% for both groups).

Environmental Factors

Comments about environmental factors were assigned to three categories: departmental policies and practices, advising, and departmental climate. Table 7 provides details on the number of comments and number of respondents who made comments related to environmental factors offered by type of participants (faculty and graduate students).

Table 7

Faculty and Student Perceptions of Environmental Factors by Cluster

Factors	HS		LS		HL		LL		TOTAL	
	*C	**P	C	P	C	P	C	P	C	***%C
Dept. Orient. Advis.										
Faculty										
Promoted	33	4	8	3	22	4	20	4	83	66
No Effect	0	0	0	0	0	0	0	0	0	0
Impeded	9	2	12	4	5	2	16	4	42	34
Total	42		20		27		36		125	100
Students										
Promoted	26	6	8	3	16	6	15	5	65	42
No Effect	0	0	0	0	0	0	0	0	0	0
Impeded	19	4	24	6	12	4	35	6	90	58
Total	45		32		28		50		155	100
Course/Res. Relat.										
Faculty										
Promoted	5	3	7	3	2	1	7	2	21	54
No Effect	0	0	0	0	0	0	0	0	0	0
Impeded	2	1	7	3	4	3	5	3	18	46
Total	7		14		6		12		39	100
Students										
Promoted	11	4	6	4	5	3	3	1	25	41
No Effect	0	0	0	0	0	0	0	0	0	0
Impeded	11	5	8	4	8	4	9	5	36	59
Total	22		14		13		12		61	100

Table 7

Faculty and Student Perceptions of Environmental Factors by Cluster (cont.)

Factors	HS		LS		HL		LL		TOTAL	
	C	P	C	P	C	P	C	P	C	%C
Req. Sig. Results										
Faculty										
Promoted	9	4	8	4	6	2	13	4	36	62
No Effect	0	0	0	0	0	0	0	0	0	0
Impeded	1	1	0	0	21	3	0	0	22	38
Total	10		8		27		13		58	100
Students										
Promoted	10	6	10	6	5	3	12	6	37	56
No Effect	0	0	0	0	0	0	0	0	0	0
Impeded	0	0	0	0	28	6	1	1	29	44
Total	10		10		33		13		66	100
Change Advisor										
Faculty										
Promoted	2	1	6	3	1	1	1	1	10	18
No Effect	8	4	2	1	3	2	3	3	16	29
Impeded	4	2	7	3	8	4	10	4	29	53
Total	14		15		12		14		55	100
Students										
Promoted	3	2	4	2	1	1	0	0	8	11
No Effect	2	1	1	1	7	2	5	2	15	22
Impeded	14	5	5	3	7	4	16	5	46	67
Total	19		10		15		21		69	100

Table 7

Faculty and Student Perceptions of Environmental Factors by Cluster (cont.)

Factors	HS		LS		HL		LL		TOTAL	
	C	P	C	P	C	P	C	P	C	%C
Stud./Comm. Rel.										
Faculty										
Promoted	12	4	10	3	25	4	7	3	54	69
No Effect	2	2	9	4	2	2	0	0	13	17
Impeded	2	1	4	3	3	2	2	1	11	14
Total	16		23		30		9		78	100
Students										
Promoted	10	5	9	4	11	3	7	4	37	28
No Effect	10	4	20	6	5	4	2	2	37	28
Impeded	19	6	8	3	23	5	6	5	56	44
Total	39		37		39		15		130	100
Stud./Adv. Rel.										
Faculty										
Promoted	67	4	47	4	70	4	44	4	228	82
No Effect	0	0	0	0	0	0	0	0	0	0
Impeded	10	2	15	4	10	2	14	4	49	18
Total	77		62		80		58		277	100
Students										
Promoted	100	6	57	6	69	6	52	6	278	74
No Effect	0	0	0	0	0	0	0	0	0	0
Impeded	20	3	20	6	33	5	27	6	100	26
Total	120		77		102		79		378	100

Table 7

Faculty and Student Perceptions of Environmental Factors by Cluster (cont.)

Factors	HS		LS		HL		LL		TOTAL	
	C	P	C	P	C	P	C	P	C	%C
Att. Toward Stud.										
Faculty										
Promoted	6	3	10	3	6	3	6	4	28	72
No Effect	0	0	2	1	0	0	1	1	3	8
Impeded	5	1	0	0	3	1	0	0	8	20
Total	11		12		9		7		39	100
Students										
Promoted	16	5	6	3	9	4	8	3	39	38
No Effect	8	3	5	3	3	2	4	3	20	19
Impeded	12	2	13	4	3	1	17	5	45	43
Total	36		24		15		29		104	100
Stud. Participation										
Faculty										
Promoted	25	4	27	4	36	4	13	3	101	67
No Effect	2	1	5	3	5	1	10	3	22	14
Impeded	6	2	8	2	2	2	13	4	29	19
Total	33		40		43		36		152	100
Students										
Promoted	20	4	36	6	31	6	14	5	101	59
No Effect	14	5	3	2	4	3	8	5	29	17
Impeded	10	4	1	1	6	4	24	6	41	24
Total	44		40		41		46		171	100

Departmental policies and practices. This category included several subcategories, including orientation and advising offered by the department to help students through the graduate education process, the relationship between course work and research skills, and, the requirement to find significant results in the dissertation.

Examples of comments made by the respondents that suggested the departmental orientation and advising promoted completion time and rates included:

I knew how long the prelim exam was going to be, I knew what the usual expectations were, and I knew a little bit about what the oral defense would be like, so there were not surprises for me (HS, student)

.... in the orientation class, that I spoke with you about, ah... each faculty member came in ah... and they usually came three or four at a time in a given day, and each of them talked about their current research projects and what they were projecting to do ah... so that, we did have a good idea of what faculty work was about (HS, student).

Well, the first thing that we do is we provide a, ah... research presentation by all the faculty in the department. So, when students arrive, they get information about, you know, general expectations of the program, you know, what the minimum requirements are. There is an orientation on safety, and then there is a research orientation where each faculty member that participates as an advisor for graduate students presents some data that helps the students gain some perspective of the kind of work that's been done. So, we have orientation about course work and orientation about laboratory work in the first semester here, so all students are well informed right from the beginning (HL, faculty).

Overall, faculty made 83 comments and students made 65 comments that were assigned to the subcategory of departmental orientation and advising promoting student success.

No comments were identified that suggested that departmental orientation and advising had no effect on time to degree and completion rates.

Examples of comments made by the respondents that suggested departmental orientation and advising impeded completion time and rates included:

No, the department hasn't offered me any kind of advising, none that I know. If they have it, they have to make it public (HS, student).

I think that beyond the paper work that needs to be done, like programs of study, how to sign up for the qualifying exams and the prelims, the department, as a whole, does very little advising for graduate students (HL, faculty).

We don't advise graduate students in a formal way, I think that's primarily done informally between the student and the research advisor (LL, faculty).

Overall, faculty made 42 comments and students made 90 comments that were assigned to the subcategory of departmental orientation and advising impeding student success.

Examples of comments made by the respondents that suggested the relationship between course work and research skills promoted completion time and rates included:

All the courses really lean towards research because in the content courses they are reading about the research in their field, and they're examining the methods, and discussing them in classes. Then, they take a sequence of two courses, in our department, on quantitative and

qualitative research methods, and they also take statistics, and more statistics courses are required for doctoral students than for master's students, so ah... and then, they take... they are required to take theory courses too, so all of those together contribute to their learning about doing research (HS, faculty).

I think conducting independent research has two components. One component is the obvious one, maybe they're both obvious, the student has to get substantive information about a particular area that he or she wants to investigate. The other thing is the student has to become.... and I think we provide this, is the research skills. He has to learn how to think well, and think carefully and analytically about devising an appropriate research design. Devising a research design could be independent of the content area, so they do both of these things. And to do independent research well, one has to know the content area, which students can get from some course work and from his or her readings, and has to devise a methodological set of span, which most students these days get from the courses that we have at the graduate level and titled research methods. So, the course work is geared to train students to do independent research (LL, faculty).

Oh, the course work has helped me a lot because most of these courses are all in line with my current research. So, with all the ah..., and also in terms of how they conduct them. They encourage us to write papers, so I'm very much um, um, oriented toward writing papers in those classes, doing presentations as well, um... some experimental techniques that I needed for my own research. So, it's quite helpful, yeah (HL, student).

Overall, faculty made 21 comments and students made 25 comments that were assigned to the subcategory of the relationship between course work and research skills promoting student success.

No comments were identified that suggested that this relationship had no effect on time to degree and completion rates.

Examples of comments made by the respondents that suggested the course work-research skills relationship impeded completion time and rates included:

I would love to be attached to some kind of research project that's going on as opposed to just depending on class because, at the point I am now, I see it makes a lot of difference actually doing research rather than going to sit in the classroom and having instructions on those kinds of things (HS, student).

Until the dissertation stage, the students have done statistics, and they've done all these tools but they haven't applied the tools until that period of time. So, we don't get people started. And I think that for that reason some of our students are slow to get started with their dissertations because they haven't practiced independent research (LS, faculty).

Overall, faculty made 18 comments and students made 36 comments that suggested that the relationship between course work and research skills impeded student success.

Examples of comments made by the respondents that suggested the requirement of significant results promoted completion time and rates included:

You can graduate from this department with a dissertation that has negative results, um... because negative results add information to the field equally well (LL, student).

I think that once a student passes their dissertation prospectus, they have a document for their dissertation prospectus. There is a meeting with the student and the committee, it's gone over, some changes are made, there are agreements on this is what the study is going to be. Once that agreement is made, that is essentially a contract with the students. Contract is: you do the study and write it up in an acceptable way and you have passed. Results maybe negative, you know, we can't always guarantee positive results, but it is not the idea that you are

doing this, and doing this. I mean, the contract is you come up with an acceptable dissertation prospectus that this entire committee agrees to, and if you follow through, and do the study, and write it up to the acceptable standards, you pass, and that's how it's set up (LL, faculty).

Overall, faculty made 36 comments and students made 37 comments that were assigned to the subcategory that requiring significant results promoted student success.

No comments were identified that suggested the requirement of significant results had no effect on time to degree and completion rates.

Examples of comments made by the respondents that suggested the requirement of significant results impeded completion time and rates included:

It would be very, very difficult for a student to successfully obtain a Ph.D. degree with only negative results. If every experiment this student ever did failed, then he or she would not get a Ph.D. degree. But a failure in one experiment, or two experiments, or even ten experiments should lead you to devise... either change the problem or change the methodology to get something to work okay, and so, usually that kind of failure results in no degree, and they would stay as long as needed to either change the project to something that is successful or to change the methodology to be successful (HL, faculty).

Actually, I think the whole... in Biochemistry, if everything went right the first time, then you would have a Ph.D. in a year. Because... if all the research that you did, if it went exactly according to what you have read, and you didn't have to redo it and change things, or if the conclusions you had drawn were valid, then you could be done in a year. Because we spend so much time having things... You read something, this should work this way. You try it, and in your instance it doesn't work so you have to redo it. Or, just... I don't know, it can be really frustrating. But, it depends on how smoothly your research goes. Or, even you kind of like to finish having something that is

publishable, and people don't publish, well, we studied this, and this, and this, and there was nothing publishable about it. Or, we looked at all these things and there was no effect. You wouldn't publish a paper on we've studied all these things and there was no effect. You'd wait until you got the effect and say we've studied all these things and there was no effect, but then we studied this thing and there was an effect (HL, student)

Overall, faculty made 22 comments and students made 29 comments that suggested that requiring significant results impeded student success.

Advising. This category included the following subcategories: changes in advisor, student-committee relationship, and student-advisor relationship.

Examples of comments made by the respondents that suggested that changes in advisors promoted completion time and rates included:

I cannot imagine a situation in this department where a change in advisor would not mostly be done to expedite the degree, and I would not think that changing would necessarily ever make the degree be later in coming, but rather the change would probably motivate it. So that we can get the student finished if the student and the faculty member came to an impasse, or they just failed to be able to work together (LS, faculty).

... if there was any one thing that I did well, since I've been here, was to make the decision to change my advisor. Looking at the progress that I have made, looking at where I am now. I can see the light at the end of the tunnel now. I don't think I wouldn't have been able to see it. There is no way I could have done it without the change, given the kind of relationship that I have with my current advisor, given the kind of interest on what we are doing together (HS, student).

Overall, faculty made 10 comments and students made 8 comments that indicated changing advisors promoted student success.

Examples of comments made by the respondents that suggested changes in advisors had no effect on completion time and rates included:

I don't think it would affect at all because, um... it's not very common and ah... I guess because the faculty in the department are cooperative, you know, the students can usually find someone else to work with if they want to make a change, and so there would be no time left at all in between. They just get the paper signed (HS, faculty).

No, because you still work on the same timeline, you know, you're doing your thesis, you're doing your dissertation, so that if you switch your advisor along the way, I don't think that would impact you on how long it would take (LL, student).

Overall, faculty made 16 comments and students made 15 comments that suggested changing advisors did not affect student success.

Examples of comments made by the respondents that suggested that changes in advisors impeded completion time and rates included:

Yes, absolutely it has and I'll tell you why. I was this close to defending my proposal when he left, and it wasn't just he who left, his wife, who was also on my committee, left with him, and so, I had to get a new advisor which I took out of the existing three members and add two new members to my committee who had a very different perspective on what I should be doing. Had I been able to defend my proposal before he and his wife left, I would be finished now (HS, student).

If the new advisor says: Oh, you want to work in materials engineering, why don't you take some of our basic courses in materials science and... In other words, ask the student to take extra-courses which physics doesn't require, that make them to take an extra-time. I would say, for the constructive cases, it probably adds a half a year, or a year. On the other hand, we don't have that many groups of people where you could change from one faculty member within that group to another faculty member within that group in the same research area.

We don't have that many of these people. So in general, if you switch the advisor, you will be switching the research topic at least up to some degree, and then, it means time (LL, faculty).

Overall, faculty made 29 comments and students made 46 comments that indicated changing advisors impeded student success.

The student-committee relationship was considered as promoting time to degree and completion rates when the advisory committee performed formal, periodic evaluations of student progress and helped students through the process of graduate work. Examples of comments made by the respondents that suggested the student-committee relationship promoted completion time and rates included:

The faculty advisors periodically evaluate whether the student is making progress, for example, if they have their program of study, how did they do in the preliminary exam, if they are making progress in research, and so on, and so on. It's done each semester for assistantships and each year for the general progress of the student through the academic program (HS, faculty).

Each semester, the committee evaluates my progress and they inform me about what they think is strong and on what they think I am weak in (LL, student).

Overall, faculty made 54 comments and students made 37 comments that suggested the student-committee relationship promoted student success.

Student-committee relationship was considered as no having effect when that relationship was more informal than formal, that is, when it was up to the student to seek help from the advisors. This relationship was also determined to have no effect when the level of involvement of those committee members was restricted to signing the required forms from the

graduate school, and the bulk of advising was left to the main advisor.

Examples of comments made by the respondents that suggested the student-committee relationship had no effect on completion time and rates included:

I think the advising of the committee members is only as good as the student makes it in the sense that... they don't, they don't invite you to come. But if you are willing to take the initiative when you have an issue or a problem and go to any of your advisors who has expertise in that area, or can help you at, they are more than willing to sit down with you and talk to you. But my point is that the student has to initiate some of that, it's not like they hang out a shingle say: come any time or whatever (HS, student).

In this department, it's kind of slack about that. I think they say your advisor should have an excellent idea of what you need to do to get your degree and you should be listening to that person. I know a lot of people in other departments, when they start their research they have to present to their committee members what they are going to do and get it approved, but our department is not like that (LS, student).

In practice, it is the student's responsibility to convene the committee and to get that feedback. And some students do it very conscientiously, and other students do not. The responsibility lays on the student to do that. The student will usually, but not uniformly, be reminded of this, this need (HL, faculty).

Overall, faculty made 13 comments and students made 37 comments that reported the student-committee relationship had no effect on student success.

Student-committee relationship was considered as impeding success when no advising was provided by the committee members at all, but they had the last word on deciding if the student passed or failed. In other words, the role and authority of the main advisor over student's research was

subjugated to the authority of the committee members. Examples of comments made by the respondents that suggested the student-committee relationship impeded completion time and rates included:

No, in this department, they don't give you any feedback whatsoever. You go in, you propose it, they give you their opinions, you have to make the changes they told you. It's a matter of pleasing everybody, you know, you have to please everybody on your committee, and then, you don't talk to them again until your final defense (LL, student).

Some students probably never see their whole committee together except during the oral exam and the final exam (LS, faculty).

Overall, faculty made 11 comments and students made 56 comments that suggested the student-committee relationship impeded student success.

The student-advisor relationship was considered as promoting success when the advisor was readily available, there was a high degree of involvement by the advisor in the process of graduate work, and when this relationship was supportive not only in professional terms, but also in personal matters. Examples of comments made by the respondents that suggested the student-advisor relationship promoted completion time and rates included:

I consider my students to be professional colleagues. I think I am very available to them. I give them a lot of time one on one. I really try to encourage them to participate in professional organizations and I've written a lot of letters of recommendations to get them on committees of the national organizations, so they can become active participants. I've helped them with publishing things, like co-authored articles with me, or a presentation in a conference. So, I've really tried to support their professional development not just with the dissertation, but other parts of their professional life too (HS, faculty).

Actually, it's excellent, ah... in fact, ah... when I'm here for my stat class, I come from several miles away, I stay at her home overnight by her invitation, and am invited for dinner, and... But it's not excellent because of that, I just think that's a barometer of how good it has been. She and I correspond frequently through e-mail, she has been a super help in getting everything lined up. She's been a great support in my job search and in helping me with a... presentations, develop presentations and that sort of things. So, I would say it's an excellent relationship (HS, student).

Overall, faculty made 228 comments and students made 278 comments that indicated the student-advisor relationship promoted student success.

No comments were identified that suggested the student-advisor relationship had no effect on time to degree and completion rates.

Student-advisor relationship was viewed as impeding success when the advisor was not very available to the student, and had little involvement in what the student was doing through the several steps of graduate work. Examples of comments made by the respondents that suggested the student-advisor relationship impeded completion time and rates included:

I would say that the administrative commitments that I have, and the teaching commitments that I have, besides things that I have to do, like write proposals, review papers and theses, and stuff like that, all those things leave me very little time to dedicate to my students (HS, faculty).

He doesn't help me at all really, with anything. I pretty much have figured everything out on my own. So, he doesn't even... I wanted to work with DNA and he had no experience with that, and so I had to pretty much learn all that on my own because he... I don't even think he really knows much of what I'm doing (HL, student).

I think that personality clashes between the student and the advisor is one of the most common reasons that make students leave the program.

You know, it's not easy to change the advisor because you have that departmental politics that you are going to face with. You, as a student, are so vulnerable. Professors, whatever they are, can say that they work collaboratively as much as they want to, but the reality, the honest reality is that there is a hierarchy, and in that hierarchy they are above you and you are below. So, in many cases when a student has problems with the advisor it's better to leave the program rather than face authorities and people emotions (HS, student).

Overall, faculty made 49 comments and students made 100 comments that indicated the student-advisor relationship impeded student success.

Departmental climate. This category referred to the sense of community within the department and included attitudes towards students, student participation in departmental activities, and peer support.

Examples of comments made by the respondents that suggested that attitudes toward students promoted completion time and rates included:

... the faculty, overall, have a concern for their development and for their welfare, ah... our department head is always willing to listen to any of the graduate students, if they have questions, or concerns, or personal problems. I think overall this department is ah... very sensitive to its graduate students' needs (HS, faculty).

I think that they've always treated me as if I were someone with something to offer ah... who was... you know, going to be able to make a contribution some day to the field. So, I've always felt very nurtured and very well regarded by the faculty in this department (HS, student).

Overall, faculty made 28 comments and students made 39 comments that reported that attitudes toward students promoted student success.

Examples of comments made by the respondents that suggested that attitudes toward students had no effect on completion time and rates included:

It's nothing too good, nothing too bad. It's just okay, I suppose (LL, student).

I'm not sure exactly what to tell you. Everybody is different, some people are jerks, some people are very nice people and easy to get along with (LL, student).

I don't think students have much to complain about. The environment is very informal. Some people are very nice and some not (LS, faculty).

Overall, faculty made 3 comments and students made 20 comments that indicated that attitudes toward students had no effect on success.

Examples of comments made by the respondents that suggested that attitudes toward students impeded completion time and rates included:

I think the environment is not so great. There is a clear hierarchy in this department. Graduate students do awful a lot of slave work (LL, student).

I don't know if I have one word to describe the environment in this department. Competitive, I guess. There is a lot of different factions. My overall impression is a negative one (LL, student).

The environment for graduate students is not particularly good. We have various types of ethnic groups of students in the department, for example, we have an enormous number of students from China, who for example, stick with themselves and don't mix very well. So, I don't think in particular that the environment is an outstanding one in this department (HL, faculty).

Overall, faculty made 8 comments and students made 45 comments that suggested attitudes toward students that impeded student success.

Examples of comments made by the respondents that suggested student participation in departmental activities promoted completion time and rates included:

Everything that is done within the department, as a social activity, is usually a social activity to which graduate students and research associates are invited. Everything that takes place within the department is open to graduate students. I can't think of anything that is closed to graduate students, you know, visitors, recruiting kind of things, seminars, picnics, or what ever are always faculty and graduate students. There are never any faculty picnics. Everything is open to them and all these activities are well attended (HL, faculty).

I usually participate in departmental activities whenever they're offered, you know. Sometimes we're very good about having many people almost always offered, or there'll be things going all the time, and other times it's... you know, a little bit more limited, but I usually participate whether it be in the department or college, here in the college, and... both social as well as professional, academic, I mean, usually I'm involved in putting it together, so... (HS, student).

Overall, faculty made 101 comments and students made 101 comments that suggested that student participation in departmental activities promoted student success.

Examples of comments made by the respondents that suggested student participation in departmental activities had no effect on completion time and rates included:

There are definitely collaborative efforts among faculty. I got a collaborative effort going with my colleague next door. A number of other people in our faculty collaborate with people in the department and outside the department, so that definitely happens. As far as collaboration between graduate students and other faculty in the department or the research advisor, I would say that to a certain extent

it depends on the advisor and the student. There are a few instances where people have taken in small projects with other advisors. I've got a Master's student right now that is working on a project with another professor because it's something that he started as an undergraduate (HS, faculty).

Yes, there are collaborative efforts in this department, and sometimes, there are conflicts among people too. But, you know, conflicts exist in any work environment, whether it is industry environment, or academic environment. Wherever there are more than two people there have to be conflicts and ah... it's unavoidable, but the proper management of conflict is ah... what differentiates one work place from another (LS, student).

Overall, faculty made 22 comments and students made 29 comments suggesting that student participation in departmental activities had no effect on student success.

Examples of comments made by the respondents that suggested student participation in departmental activities impeded completion time and rates included:

There are very structured interactions that the students can have, you know, seminars where students are supposed to present some sort of the seminar in front of other graduate students, those tend to not work very well. Students don't like getting up, don't like talking. They don't like to prepare anything. The whole idea of seeing a coherent group of people, a graduate group, asking questions with one another and being enthusiastic about their work, I don't see that anywhere. I've never seen it. Perhaps, they get enthusiastic talking about football, basketball, but not about anything else (HL, faculty).

The department really doesn't have seminars, so to speak. No, we don't have seminars where individual students present data. That's just for our research group. There has never been, to my knowledge, a meeting where a graduate student presents data to the department and gets feedback from them. So, I mean, you are asking questions about

the department, but I really don't see myself as much a part of the chemical engineering department as I do part of the research group, so to speak. This is really where I see myself. Even though, yes, I am a chemical engineer, and I'm getting a chemical engineering degree, and as chemical engineering you are taught, it's almost like a school rivalry, you are taught to hate chemists (HS, student).

Overall, faculty made 29 comments and students made 41 comments indicating that student participation in departmental activities impeded student success.

Examples of comments made by the respondents that suggested peer support promoted completion time and rates included:

Yes, they do a lot of that themselves. Right now, they have a dissertation support group. They meet every two weeks and my students started that, you know, with each other and somebody else's students are working on that (HS, faculty).

It depends upon the groups, you know, it all depends on the specific advisor and things like that. Generally, at the level of the research group, you know, they have things called brown bag seminars and everybody is invited, but just the research group and the few related people who may be interested in those things attend. You know, they are working on the same project, so there is a lot of support and collaboration in there, there has to be (LL, student).

Overall, faculty made 76 comments and students made 63 comments that were assigned to the subcategory of peer support promoting student success.

No comments were identified that suggested peer support had no effect on time to degree and completion rates.

Examples of comments made by the respondents that suggested peer support impeded completion time and rates included:

There is a little bit of sometimes conflict between graduate students. You have to make sure that you don't step on somebody else's feet, that your project doesn't overlap theirs, or if it does, boundaries are set. There is one person that works in my lab that is doing something similar to a person that is working upstairs. And this person that is working upstairs is a little possessive and doesn't like this other person working in the same area. And so, there is a conflict because the person upstairs is supposed to be sharing the same equipment, since the grant is common between two professors, and he doesn't share the equipment or makes a big deal out of it (HL, student).

I think that part of the problems that our department has had in the last couple of years is that there is not the same kind of support that the students have, the same camaraderie that we had in the past, and I think that, that has affected a number of students (HS, student).

Overall, students made 6 comments that suggested peer support impeded student success. No comments were made by faculty members that could be assigned to this category.

In terms of the environmental factors that affect time to degree and completion rates, findings indicated similarities and differences among faculty and graduate students.

In general, results indicated similarities in faculty and student perceptions about the following categories: requirement of significant results, changes in advisors, student-advisor relationship, student participation, and peer support.

Faculty and student perceptions differed in terms of departmental orientation and advising, relationship between course work and research, student-committee relationship, and attitudes toward students.

Personal Factors

Personal factors referred to student characteristics, such as ability, motivation, maturity, and family responsibilities.

Comments on personal factors were not classified into the groups mentioned above (promoting, no effect, and impeding) because they all were reported as factors that impeded graduate student progress. Table 8 provides details about the number of comments of each of the personal factor categories, as reported by faculty members and graduate students from each cluster.

Overall, faculty made 53 comments and students made 13 comments that were assigned to the category of ability including:

I'm sure this is true everywhere where the quality of the student that enters in the program is a very big factor in the, the ability with which the program moves the student through from entering student to graduate. Ah... if you have students who come to you well prepared, and confident, your job is easy. If you don't, and I think, as a department, we aren't in a competitive position that we attract, you know, the top level students, they are not going to come to [name of school]. We don't have the funding that competes with a lot of schools. So, the level of student who comes to [name of school] needs more work in this confidence building, because you are starting out with a student who's not as well prepared as some students are in the nation. So, I think the quality of the students is a very big factor. And the question you are asking, what determines how the program moves students through the program, if you start out with a gem, you end up with a gem, maybe better polished. But if you start out with some, some crude stones, it's going to take a lot more effort, and more time to move that person through the program (HL, faculty).

Table 8

Faculty and Student Perceptions of Personal Factors by Cluster

Group	HS		LS		HL		LL		TOTAL	
	C	P	C	P	C	P	C	P	C	%C
Faculty										
Ability	12	3	18	4	20	4	3	3	53	40
Motivation	29	4	11	4	9	3	7	3	56	43
Maturity	1	1	0	0	3	2	6	3	10	8
Fam. Resp.	5	2	4	1	0	0	3	2	12	9
Total	47		33		32		19		131	100
Students										
Ability	3	2	2	2	6	3	2	1	13	14
Motivation	12	5	6	2	18	5	13	5	49	51
Maturity	19	4	4	2	4	3	3	1	30	32
Fam. Resp.	2	1	0	0	0	0	1	1	3	3
Total	36		12		28		19		95	100

Some people don't take their classes all the way. They are not able to maintain a good QCA, or don't do very well in the prelims, then, they have to leave with a Master's degree or go to another school (HS, student).

Overall, faculty made 56 comments and students made 49 comments that were assigned to the category of motivation including:

I think that some students are not cut out for this sort of business, they don't take the time, or make the effort, or they don't realize the seriousness of what they're doing, and that causes many of the problems. In other words, they are not motivated to invest the necessary amount of time and effort that is required in this kind of business (HL, faculty).

There is one factor which delayed it, and that's the fact that most of the time I don't feel inspired to work and it's not really laziness because, yeah, we can say laziness as well but ah... it's just the lack of focus on research. So, you have to force yourself somehow to, to work a lot, and maybe you can get some advantage of that at the end. So, I would say that the lack of motivation is what has made me stay longer here (LL, student).

Faculty made 10 comments and graduate students made 30 comments that were assigned to the category of maturity including:

Many of the students don't take it seriously enough. They don't realize, perhaps at this stage, many of them don't realize at this stage of their career, um... anything that they want to do beyond the next two days. I don't believe that they have that concept, for many of the students I've met. So, they look upon it as an extension of high school, or an extension of undergraduate. It takes years, years for these people to get the message that this is a serious part of their career development. So, that's the biggest problem (HL, faculty).

I think that sometimes people are not mature enough. They may be brilliant, or whatever, but I think it goes with the maturity of the sense of what you want to do. You know, it is a very tough road and it will

be very easy to get disappointed, to get depressed if you are not mature enough to understand the kind of effort that to get a Ph.D. entails, and I don't know how you are going to complete that if you are not mature to overcome all the roadblocks that you could find along the way (HS, student).

Faculty made 12 comments and graduate students made 3 comments assigned to the category of family responsibilities including:

If a person has family problems, or a death in the family, or something like that, I guess it comes under environment, so I... I had a student, a young lady who had a baby. Certainly that delayed her finishing, you know, students just don't do research when they have other things on their minds (LS, faculty).

Well, moving back home always lengthens the time spent in getting a degree, and I say that because when I lived up here I worked harder. In retrospective, I probably should have given myself more social life... When I got home, it was very easy to fall back into the routine of family life and I always did some work on dissertation in some way shape, or form, but ah... it's much, it has lengthened the time for me to graduate, by at least a half a year, and I think that's just because I allowed myself more time to just be a family person (HS, student).

In general, faculty and students differed on their perceptions about personal factors or student characteristics that affect graduate student progress. Ability was one of the most frequently mentioned personal factors by faculty members (40% of the comments), while only 14% of the students' comments referred to ability as an influential factor. Only a few comments (8%) of faculty members suggested that maturity of the student affected time to degree and completion rates, whereas several student comments (32%)

suggested this factor as an important one. Both groups of respondents considered student motivation important in terms of student success.

MOST INFLUENTIAL FACTORS

In this section of the study, the factors that most influenced time to degree and completion rates, as mentioned by the respondents, were elicited. Results of this section helped to answer the second and the third research questions of this study, which sought to compare faculty and student perceptions about the most important factors related to graduate student success. Table 9 details the frequency of those factors as mentioned by faculty and graduate students.

Overall, student-advisor relationship was the most salient factor mentioned faculty members and graduate students (83% of the total) as influencing time to degree and completion rates.

Motivation was the second factor most frequently mentioned by the respondents (55% of the total). In this factor, a much higher percent of faculty (75%) mentioned it as a major determinant of student success as compared to the percentage of students (42%) who made reference to it.

Financial support was the third factor in order of importance (48% of the total). Thirteen students (54% of the total) mentioned financial support as one of the most influential factors, while only six faculty (38%) considered financial support among the most influential factors on time to degree and completion rates.

Ability was another factor where more differences among faculty and student opinions were reported. Thirty-eight percent of faculty considered

Table 9

Most Influential Factors Identified by Faculty and Students

Factors	No.Fac	% Fac	No.Stu	% Stu	Total	% Tot
Student/Advisor Relation	12	75	21	88	33	83%
Motivation	12	75	10	42	22	55%
Financial Support	6	38	13	54	19	48%
Requirement of Sig. Res.	3	19	7	29	10	25%
Ability	6	38	3	13	9	23%
Degree Requirements	4	25	4	17	8	20%
Maturity	2	13	5	21	7	18%
Attitudes Toward Students	1	7	4	17	5	13%
Departmental Orientation	0	0	3	13	3	8%
Student Participation	0	0	2	8	2	5%
Family Responsibilities	1	6	0	0	1	3%

No. of faculty respondents= 16

No. of students respondents= 24

Total= 40 respondents

that to succeed at graduate school mostly depend on student ability, whereas only 13% of students mentioned ability among the most influential factors.

In the same vein, departmental orientation and student participation in departmental academic and social activities were factors mentioned only by students as affecting time to degree and completion rates. In other words, no faculty considered these two factors among the most important ones in terms of student success.

Overall, the data collected in this study was rich and descriptive. It provided substantial information for this research project. Findings of this study revealed that time to doctoral degree and completion rates are related to numerous departmental and personal factors. Findings also revealed that the importance of many those factors is perceived differently by faculty and graduate students among the different clusters of departments. Details on such differences are analyzed in Chapter V.

CHAPTER V

DISCUSSION, LIMITATIONS, AND IMPLICATIONS

The purposes of the present research were to analyze completion rates and time to doctoral degree by academic department, and to identify departmental factors that positively or negatively affected degree progress and completion at one land-grant, research university. In this chapter, results of the investigation are analyzed and discussed in terms of the research questions and previous literature. Additionally, the limitations of the study, and implications for future research and practice are discussed.

Discussion of Results

In this section of the study, results about time to degree and completion rates are analyzed as well as findings related to factors that affected these graduate education outcomes, as perceived by faculty and students who participated in the investigation. Faculty and student opinions are compared separately to determine what factors were considered that influenced time to degree and completion rates by both groups of interviewees. Finally, data was aggregated by cluster to examine differences among the clusters.

Results of Time to Degree and Completion Rates

Time to degree and completion rates were calculated for all students who began a program leading to a doctoral degree between the fall, 1986, and spring, 1990 semesters. Completion status of these students was assessed through the end of the fall, 1995 semester.

The median time to degree (4.6 years) at this institution was lower than the median time reported by the National Research Council for 1993, which

was 7.1 years (Thurgood and Clarke, 1995). It was also lower than those reported by other recent studies. Bowen and Rudenstine (1992) reported a median time to degree of 6.7 years, though that study was limited to six fields within arts and sciences.

Lussier (1995) reported a median of 5.1 years for the 1984-85 cohort of doctoral students at one Canadian university, while Snyder (1985) reported that the median time to degree had risen from 5.7 years in 1973, to 6.2 years in 1983. Tuckman, Coyle, and Bae (1989) reported a median time to degree of 7.0 years in 1987.

It was difficult to compare studies because the structure and policies of graduate education vary from one institution to another, even from one department to another within the same institution. For example, if a doctorate in a given program at one university is normally pursued on a full-time basis, while another university permits part-time study, completion times will differ accordingly.

The shorter time to degree exhibited by this institution might be explained by the high percentage (78%) of full-time graduate students enrolled at this particular institution. The enrollment status obviously determines the time that students spend to earn a degree, that is, full-time students should finish sooner than part-time students. Wilson (1965) and Ott and Markewich (1985) reported that enrollment status was the primary factor associated with retention and degree completion of graduate students. Ott and Markewich also speculated that being enrolled full-time reflected the student's commitment to earning a degree.

The shorter time to degree in the present study might also be related to the fields of doctoral study offered by this institution. Empirical evidence has shown that time to degree varies by field of study. The biological, mathematical and physical sciences, and engineering have relatively short medians, across departments, while humanities and social sciences have longer medians (Berelson, 1960; Bowen & Rudenstine, 1992; Jones et al., 1982; Snyder, 1985; Solmon, 1976; Stricker, 1994; Tuckman et al., 1990; Wilson, 1965; Zwick, 1991). In the institution under study, no doctoral degrees are offered in humanities and just a few are offered in social sciences. This particular situation might explain the short median time to degree in this institution.

Results of this study indicated the importance of analyzing the particular conditions of graduate education at each institution and the difficulty of comparing time to doctoral degree across institutions.

Another important finding was that there was no difference between male and female students in relation to time to degree at this institution. These results supported those of Nerad and Cerny (1993) who found no substantial differences in time to degree between men and women. However, the present results contradicted those reported by other researchers who have found differences in time to degree related to gender. Abedi and Benkin (1987) reported that time to degree (as measured by the registered time in graduate school) for men was a half a year less than for women, while Lussier (1995) found that time to degree was shorter for female students (4.8 years) than for male students (5.1 years).

As no previous institution-wide studies have been done, no comparative data on time to degree and completion rates exist. Therefore, it was not possible to analyze trends on those outcomes at this institution.

The present results related to completion rates were also notable. By the fall 1995, semester, 45% of students from 1986-90 entering cohort had completed their doctoral programs, and 6% were still enrolled, for a maximum possible of graduation rate of 51%. This rate of completion was lower than those reported by several scholars who investigated attrition at a single university setting. Cook and Swanson (1978) and Dolph (1983) reported completion rates of 57% and 55%, respectively, for cohorts of doctoral students in the 1970s. More recently, Golde (1995) reported a 62% completion rate for a 1984-89 extended cohort. Other scholars have reported rates between 53% and 59% (Gunn & Sandford, 1988; Nerad & Cerny, 1993; Pogrow, 1978).

The lower completion rate at the institution under study may be considered problematic. Given the high cost of graduate education, and the current budget constraints, university administrators and faculty may wish to pay more attention to this situation and implement policies designed to increase graduate student success. ✓

Overall, women in the institution under study had a completion rate of 35% while the rate for men was 51%. These findings supported those of Berg and Ferber (1983), Nerad and Cerny (1993), Ott and Markewich (1985), and Zwick (1991), all of whom reported higher completion rates for men than for women.

At the institution under study, the majority of doctoral students were men (62%). One possible explanation for differences in completion rates between men and women at this particular institution could lay in an argument proffered by Ott and Markewich (1985). These scholars argued that the sex of the student may affect the level of social integration that is achieved. If the student is a female in a field whose students and faculty are predominantly males, less social integration occurs, resulting in lower completion rates.

The present results suggested that more research needs to be conducted to better understand the particular conditions of graduate education at this institution that are affecting women's completion rates.

On the other hand, results of this study indicated that 56% of the students who failed to earn their doctorates left during their first two years of graduate study. These results supported those of Benkin (1984), Bowen and Rudenstine (1992), Golde (1995), and Nerad and Cerny (1993), who reported that most of the graduate student attrition occurred during the first stages of graduate education.

Results of the Interviews

Results of the interviews were analyzed first for differences between faculty and graduate student opinions, in general, and to identify factors each group perceived promoted, had no effect, or impeded time to degree and completion rates. Furthermore, the most influential factors on time to degree and completion rates, as ranked by faculty and students, were analyzed. Then, results from each cluster of departments were analyzed and compared to other clusters. Finally, results were aggregated and compared in terms of time to degree and completion rates, that is, short time to degree departments

versus long time to degree departments, and high completion rate departments versus low completion rate departments. The purpose of this comparison was to determine factors that might be affecting those outcomes, as perceived by the respondents.

Comparison Between Faculty and Student Opinions

By comparing the percentage of comments made by each group of interviewees, findings suggested similarities in terms of the structural factors (financial support and degree requirements).

Fifty-one percent of faculty comments, and 53% of student comments suggested that financial support promoted time to degree and completion rates. Fifty percent of faculty comments and 47% of student comments suggested that financial support impeded such success.

Despite these similarities, it is important to note that most of the faculty complaints were about the amount of financial support available for distribution among students, while most of the student complaints focused on the kind of financial support offered by the department. In general, students perceived that teaching assistantships delayed time to degree, as opposed to research assistantships which promoted success.

In addition, three faculty members reported that financial support, in some cases, can have a contrary effect. For example, in departments where students receive full support, and the job market is highly competitive, students usually take their time in graduate school to avoid the pressures of finding a job. Furthermore, those faculty said that the amount of support is not grand, but it is enough for a student to live on and, depending on other resources and the student's resourcefulness, may permit a comfortable life.

Those faculty expressed that this situation was more evident with some international students who did not want to return to their home countries. This finding suggested that more research needs to be conducted by comparing student success rates between American and international students.

In terms of degree requirements, this category was considered more an impediment to time to degree and completion rates than one which has no effect (59% versus 41%, respectively, of comments from both groups). Most of the faculty who deemed that degree requirements impeded student success were concerned about the number of required courses. In general, they said that even though those courses provided students necessary basic knowledge, students spent a great deal of time fulfilling the required credit hours, limiting their ability to conduct research, which is the first priority in graduate education. Students, in turn, generally focused on other degree requirements, such as comprehensive examinations, and research papers, as factors that delayed their time to degree, rather than the number of required courses.

Both faculty and students considered degree requirements as a major factor in students' decisions to drop out of graduate school. They reported that the majority of students who dropped out left the programs either because they did not make good grades in the courses, or they did not pass the candidacy exams. These opinions were consistent with the results reported about completion rates that indicated that 56% of students who did not complete doctoral studies left graduate school during the first two years of study.

In terms of the environmental factors that affect time to degree and completion rates, findings indicated similarities and differences among faculty

and graduate students. In general, results indicated similarities between faculty and student perceptions about the following categories: requirement of significant results, changes in advisors, student-advisor relationship, student participation, and peer support.

Requiring significant results for the dissertation was deemed, in general, as promoting rather than impeding time to degree and completion rates by both groups of interviewees (62% of faculty comments and 56% of student comments).

Changing advisors was considered by the majority of both groups (53% of faculty comments and 67% of student comments) as an act that impeded student success. This finding suggested the crucial role advisors play in doctoral programs, and the importance of matching student and advisor research interests and personalities. Changing the major advisor normally means changing the dissertation topic. The consequences of these changes are worse, in terms of time to degree, if the student switches advisors at later stages of the program. Even in cases where the student could continue working on the same research topic, the previous work usually has to be refocused, and major changes need to be made to comply with the perspective of the new research advisor. Obviously, all those changes imply an extension of time to graduation and, in some cases, may be a factor that precipitates student decisions to leave graduate school.

In the same vein, the majority of comments from both groups of interviewees suggested that the kind of student-advisor relationship, student participation in departmental academic and social activities, and peer support promoted time to degree and completion rates.

It is important to keep in mind that all the students participating in this study were currently finishing their dissertations. Thus, they might be expected to have a good relationship with their advisors and to be well integrated into the departmental environment. Those crucial conditions might have allowed them to persist in graduate school. It would have been interesting to elicit information from students who left doctoral programs, and to compare their opinions to those of the persistors to paint a more accurate picture of the situation, but that was beyond the scope of this study.

Overall, faculty and student perceptions differed in terms of departmental orientation and advising, the relationship between course work and research, student-committee relationship, and attitudes toward students. The majority of faculty comments about these factors suggested that they promoted student progress and completion, whereas the majority of student comments suggested that those factors impeded student success.

Faculty perceived departmental policies and practices related to graduate education more positively than students. In terms of departmental orientation and advising, the majority (66%) of faculty comments indicated that this factor promoted student progress and completion, while the majority (58%) of student comments indicated that impeded such success.

In the same vein, the relationship between course work and research was deemed by faculty (68% of comments) as helping students to learn how to conduct independent research. According to several faculty, those courses provided students the necessary research tools and theoretical background. On the contrary, the majority (59%) of student comments suggested that the required courses helped them very little, or not at all, in terms of how to

conduct independent research, and that the actual learning about research was gained through hands-on research, that is, through actually working on a research project.

In terms of student-committee relationship, faculty tended to deem it as favorable to student success (69% of comments) while students tended to consider it more as an impediment (44%). In general, those who believed that this relationship promoted student success expressed that it was advantageous to the students to have experts on their committee because those people could provide accurate and useful insights into the research. Those who thought that the student-committee relationship had no effect, or impeded their success reported that they had scarcely met their committee members, and no periodic evaluations or feedback had been provided from those people. As a result, they did not have any idea about the committee's expectations of the dissertation. If the advisory committee expectations are not clear, it might be expected that students have to spend extra time meeting all committee members' requirements. These results supported those of Weil (1989), who reported a very limited influence of committee members on students' time to degree.

In terms of attitudes toward students, it is important to point out that a high percentage (72%) of faculty comments suggested that this factor promoted student success. In other words, the departmental environment was considered by most of the faculty members as "supportive" and "friendly". In the case of students, it is important to note that most of the students' comments in the "impeding" category came from students in the "low completion" rate departments. This is even more interesting because no

comments in the “impeding” category were made by faculty from those departments. More research needs to be done to better explain such differences between faculty and student perceptions about the climate in their departments.

On the other hand, faculty and students differed in their perceptions about personal factors or characteristics that affect graduate student progress. Ability was one of the most frequently mentioned factors by faculty members (40% of the comments), while only 14% of the student comments referred to ability as an influential factor.

In the same vein, only a few comments (8%) of faculty members suggested that maturity of the student affected time to degree and completion rates, whereas a considerable proportion of student comments (32%) suggested this factor as an important one. Both groups of respondents considered student motivation to be important in terms of student success.

When faculty were asked to rank the most important factors affecting time to degree and completion rates, motivation and student-advisor relationship were the most salient factors. In fact, 12 out of 16 faculty members (75% of the total) mentioned these two factors among the most important ones. Eleven out of these 12 faculty members (92%) included motivation as an important factor affecting student success.

Student-advisor relationship was considered important by both groups of respondents. Twenty-one students (88% of the total) and 12 faculty members (75% of the total) mentioned this relationship as a crucial factor on graduate student success.

Financial support was another important factor perceived by graduate students. Thirteen out of 24 students (54%) mentioned financial support as one of the most influential factors.

Motivation was also important for students. Ten out of 24 students (42%) mentioned it as one of the most influential factors impacting time to degree and completion rates.

In general, motivation and student-advisor relationship seemed to be the most important factors for both groups. However, for the majority of the faculty, motivation was more important. In this sense, faculty believe that success in graduate school depends on student motivation. The following faculty comment typifies this attitude:

It is an old saying that you can take a horse to water, but you can't make it drink. So, I'll provide every single thing that I have to do in my capacity to give advise, help, and after that time, if there is no self-motivation, that's the student's problem (HL, faculty).

Comments like this revealed that some faculty place responsibility for success exclusively in the hands of students. Although student motivation has been reported in previous research to be a very important factor with respect to student success in graduate school, it is not the only one. The weight of evidence has indicated that succeeding in doctoral studies is more a combination of personal factors and departmental factors (Berg & Ferber, 1983; Bowen & Rudenstine, 1992; Gunn & Sandford, 1988; Ott & Markewich, 1985). When faculty explain longer time to degree and lower completion rate only in terms of student characteristics, they may be ignoring

important departmental factors, and missing opportunities to improve student success.

Student-advisor relationship is a factor reported by many previous researchers as a determinant of graduate student success (Baird, 1990a; Bowen & Rudenstine, 1992; Girves & Wemmerus, 1988; Golde, 1994; Harnett, 1991; Jacks et al., 1983; Kluever, 1995; Lenz, 1995; Manis et al., 1993; Nerad & Cerny, 1993; Valentine, 1987; Weil, 1989; Wilson, 1965). Results of this study supported the previous research in relation to the role of the advisor in student success and the importance of choosing an advisor whose personality and research interests match those of the student. When students were asked what they would suggest to new graduate students, all of them recommended that future students select an appropriate advisor.

In general, faculty perceived departmental policies and practices to be more supportive, and were less critical of such factors than students. Faculty members also placed more importance on student characteristics in terms of student success than students did.

When the participants were asked what advice they could offer to incoming graduate students, several similarities and differences emerged between faculty and students.

Both groups of participants recommended that future students work hard, that is work more than 40 hours per week, even during the weekends. Both groups also agreed that starting research early in the program is important in expediting time to degree. This enables to students to learn standard research skills early on, and finish their dissertations more readily. In addition, when students start research activities early in their programs, they

become more involved with faculty and research groups which, in turn, increases their commitment to completing the degree and decreases the likelihood of dropping out of graduate school.

In addition to these two recommendations, the most common advice that faculty members made were: make good grades in classes; enroll full-time in the program; self-educate by reading the most recent research literature in the field; and, get information about degree requirements, formal procedures, faculty personalities, and active researchers. As a matter of fact, several faculty said that continuing graduate students are the best source of information. Those students are always aware of all the necessary information, and can help incoming students with several things they would need to know to get out quickly and do good work.

The most common recommendations given by students were: be sure that there is a good match between student and advisor personalities and research interests; pick an advisor who has enough money to guarantee financial support through graduation; take just the required courses; get done with the courses and other requirements as soon as possible; and, make sure that doing graduate work is what the student really wants.

Because of the complexity and extent of the results, Table 10 was designed to provide the reader with a summary of the impact (positive, negative, or none) that various characteristics of graduate study had on the success rates of the different clusters.

Overall, more promoting comments about attitudes toward students and departmental orientation and advising were identified in departments with

Table 10

Summary of the Impact of Departmental Factors Affecting Graduate Study Outcomes

Factors	Clusters			
	H - S	L - S	H - L	L - L
Financial Supp.	+	+	+	-
Degree Req.	0	-	-	-
Dept. Orien/Ad.	+	-	+	-
Cour/Res. Rel.	+	-	-	-
Req. Sig. Result	+	+	-	+
Change Advisor	-	-	-	-
Stu/Comm. Rel.	+	0	+	+
Stu/Adv. Rel.	+	+	+	+
Att.Toward Stu	+	-	+	-
Stu.Participatio	+	+	+	-
Peer Support	+	+	+	+

+ = Positively affects outcomes

- = Negatively affects outcomes

0 = No effect on outcomes

high completion rates than in their counterparts low completion rate departments, which induced to speculate that those factors might be affecting the rate of completion in those departments.

Results on degree requirements and the relationship between course work and research skills differentiated the cluster of high-short departments from the rest of the clusters. In those departments, degree requirements were deemed that had no effect on student success and the course work was considered oriented to developing research skills. In the same vein, results on financial support suggested that this factor negatively affected graduate study outcomes of departments in the low-long cluster as compared to the other clusters.

Comparisons Among Clusters

In this section, the factors that affected time to degree and completion rates were identified. This identification was based on descriptions of the departments and similarities found between faculty and student perceptions about graduate education within the clusters.

High-Short Departments. In departments with high completion rates and short times to degree, financial support, departmental orientation and advising, relationship between course work and research skills, requiring significant results in the dissertation, student-committee relationship, student-advisor relationship, attitudes toward students, student participation, and peer support promoted student success.

Nine out of the 10 people from these departments who participated in this study deemed that the financial support provided to students promoted time to degree and completion rates.

In terms of departmental orientation and advising, all the participants made comments that suggested that this factor promoted student success. Both faculty and students expressed satisfaction with the care and concern of departmental authorities for graduate student success. Students from one of the departments indicated that the one-year orientation program offered by this department had been very helpful to them because they had opportunities to meet faculty and students. They expressed that continuing graduate students provided them information about the program from their own experiences which was very useful. From these results, it is evident that providing an orientation program enhances student success.

All participants from this cluster reported that obtaining significant results was not required for dissertations. The dissertation proposal is considered a contract. Once the advisory committee agrees on what the study is about and how it will be conducted, and the student completes what was described on the proposal, that is sufficient for a dissertation. Faculty members from this cluster expressed that non-significant results, although not desirable, still contribute to the body of knowledge in the field. As long as students are able to explain what they did, how they conducted the investigation, why they thought the results were not significant and suggested new ways to conduct future research, that is considered sufficient for dissertation work.

In terms of student-advisor relationship, this factor was considered in all the clusters more as promoting than impeding time to degree and completion rates. However, more comments (167) that suggested that this factor promoted those outcomes were made by people from this cluster than

in other clusters, and fewer people (5) deemed that this relationship impeded student success. Not only was the number of promoted comments higher in this cluster but the kinds of word respondents used differed, as well. The most common words used to describe student-advisor relationship were: “excellent,” “nurturing,” “mentoring,” “caring,” “loving,” and “exceptional”. Four out of six students said that they considered their advisors a friend, a person who could help them not only in academic issues, but in personal matters. These findings were unique to this cluster, and suggested closer relationships between students and advisors in this cluster than in the other clusters.

Furthermore, the involvement of the advisor in the graduate education process was higher in this cluster than in the other clusters. The major advisors were involved, almost from the beginning, in all the activities developed by the students, that is, from the preparation of the plan of study to the final defense of the dissertation. This might explain, in part, the higher completion rates and lower times to degree exhibited by departments in this cluster. The literature supports the notion that a good relationship between student and advisor is a major determinant of student success (Baird, 1990a; Bowen & Rudenstine, 1992; Girves & Wemmerus, 1988; Golde, 1994; Harnett, 1991; Jacks et al., 1983; Kluever, 1995; Lenz, 1995; Manis et al., 1993; Valentine, 1987; Weil, 1989).

Departmental climate was positive in this cluster, and all the categories used to define it were found to promote time to degree and completion rates to a greater degree than they impeded, or had no effect on student success.

Attitude towards student was another factor in which not only more people (8) agreed promoted time to degree and completion rates but, about which the number of comments was higher (22) than in the other clusters. The most common words used to describe departmental environment were: “open,” “friendly,” and “respectful.” Five out of six students said that they were treated as junior colleagues.

In terms of student participation and peer support, the majority of people from this cluster made comments that suggested that these two factors promoted student success.

These findings supported those of Nerad and Cerny (1993) who reported that departments with shorter times to degree and higher completion rates were those in which more advising was offered, a student-advisor mentoring relationship existed, and students were treated as junior colleagues and participated in social and academic activities of the department.

In terms of personal factors, this was the cluster where more comments were made by respondents that suggested that student motivation, maturity, and family responsibilities impeded time to degree and completion rates, as compared to the other three clusters.

Low-Short Departments. Results from this cluster indicated that financial support, requirement of significant results, student-advisor relationship, student participation, and peer support promoted time to degree and completion rates.

Degree requirements, departmental orientation and advising, relationship between course work and research skills, and attitude toward students were deemed factors that impeded student success by the majority of

the participants. Student-committee relationship was considered by all participants as having no effect.

Nine out of 10 people from this cluster made 23 comments that suggested that financial support promoted time to degree and completion rates. In the same vein, all participants reported that it was not required to report significant results in the dissertation.

Also, they offered more comments (104) that suggested the student-advisor relationship promoted student progress than comments (35) that suggested this relationship impeded student progress. It is important to note, that although fewer in number, all participants from this cluster made comments that suggested that student-advisor relationship impeded student success. For example, in one department, four out of five people said that a good match between student and advisor is sometimes difficult to achieve, especially in cases where students came from a different institution. In this department, students are assigned by the Graduate Committee to their major advisors, based on what they identified in their admission applications as their areas of interest. Although it was always possible to change the advisor after entering the program, such a change was difficult according to the students. Changing the advisor not only extends completion time, but also increases the possibility the student will leave the program, in an early stage of the study. According to Tinto (1993), the first year of study is often the time for students to decide whether attending graduate school was a good choice, and to integrate into the academic and social departmental community. A bad match between student and advisor personalities and research interests might impede such integration and, thus, decrease student commitment to doctoral

completion. That situation might partially explain the low completion rates revealed in this cluster.

In terms of degree requirements, nine out of 10 people from this cluster made comments that suggested that this factor impeded student success. Difficulties in passing the preliminary examinations were reported as the most common reason for leaving the program in one department, while difficulties with the course work was the most common reason for attrition reported in the other department. In fact, 100% of attrition for the cohort under study occurred during the first two years of study in one department.

On the other hand, all people from this cluster reported that departmental orientation and advising impeded student progress. No formal orientation was offered in either of the two departments within this cluster, and the weight of advising was left in the hands of the major advisor. The lack of departmental orientation and advising has been reported as negatively affecting student completion rates (Bowen & Rudenstine, 1992; Golde, 1995; Heiss, 1970; Nerad & Cerny, 1993). Therefore, the lack of departmental orientation and advising exhibited by these departments might explain, in part, their low completion rates.

In terms of student-committee relationship, all respondents in this cluster made more comments that suggested that this relationship had no effect, rather than promoted or impeded time to degree and completion rates. This result might be a consequence of the lack of participation of committee members in the graduate education process in these departments. For example, in one department no dissertation proposal is required. The research project is simply a decision made by the student and his or her advisor, which

is then approved by the committee. In the case of the other department, the research proposal is presented once the student has completed a sufficient amount of empirical work that he or she can defend the proposal.

Participation by committee members was perceived as limited because the research advising is primarily a responsibility of the major advisor.

Furthermore, no formal periodic evaluations were conducted in these departments, which reduces the possibility of participation by the committee members. Any advising provided by the members of the committee is left to the initiative of the students.

High-Long Departments. Results in this cluster indicated that financial support, departmental orientation and advising, student-committee relationship, student-advisor relationship, attitudes toward students, student participation, and peer support promoted time to degree and completion rates.

As in the case of high-short departments, departmental climate was positive in this cluster because all the categories used to define it were reported more as promoting time to degree and completion rates. In particular, more comments were made by participants in this cluster that suggested that peer support promoted those graduate education outcomes than by respondents in the other three clusters. Most of the peer support was provided by the research group to which the student belonged, rather than by the departmental community.

In terms of financial support, results from this cluster were similar to the two previous clusters, that is, financial support was deemed more as a promoter (66% of the comments) than an impediment (44% of the comments) of student success. However, the percentage of “impeded” comments in this

cluster was a little higher than in the other two clusters (41% in high-short departments and 39% in low-short departments). Three out of six students expressed that working as a teaching assistant had been a major factor that affected the time they spent to complete degree requirements.

All factors identified in the high-short departments that promoted time to degree and completion rates were the same in the high-long departments, with the exception of requiring significant results in the dissertation. In fact, it was the only cluster where requiring significant results was deemed by most of the people as impeding student progress. Nine out of 10 people made comments that suggested that this factor impeded student progress, however the situation was different for the two departments analyzed within this cluster.

All respondents in one department expressed that it was not possible to report only non-significant results in dissertations. When non-significant results were found, the alternatives were to change either the research topic or the methodology. Furthermore, there was not a dissertation proposal defense in this department; thus, there was no proposal to be considered as a contract leading to successful completion of the degree.

In the other department, although reporting significant results was not required for the dissertation, it was expected that dissertations be publishable. Four out of five people in this department expressed that to have dissertations published greatly supported the future academic career of the student. On the other hand, most publishable research reports significant results. Therefore, it was crucial in this discipline to report significant research results.

These conditions might explain the long time to degree revealed in these departments. It would be interesting to analyze whether the situation is the same in the rest of the departments within this cluster, or if it is an exclusive characteristic of these two departments because their fields of study are similar. That kind of analysis was beyond the scope of this study.

In terms of the relationship between course work and research, seven out of 10 people made 62% of the comments that suggested that this factor impeded student progress. Three faculty reported that the purpose of the courses was not to prepare students to do research, but to give them necessary theoretical background in the field. They also said that the actual learning of how to do independent research was gained through hands-on research, that is, working directly in the laboratory with a real research project. This opinion was shared by four of the six students interviewed. One of the students said that most of what she learned in the courses was not directly related to what she is investigating, thus, she had to learn additional material to conduct her research. Even worse, she expressed she had forgotten most of what she was taught in the course work and, in the event she would need it in the future, she would need to re-learn all those materials.

These results might explain, in part, the long time to degree exhibited by departments within this cluster.

Low-Long Departments. Results in this cluster indicated that requirement of significant results, student-committee relationship, student-advisor relationship, and peer support promoted time to degree and completion rates.

Financial support, degree requirements, departmental orientation and advising, course work-research relationship, attitudes toward students, and student participation were deemed factors that impeded student success by the majority of the participants.

Student-committee relationship was reported by seven people in this cluster as something that promoted time to degree and completion rates. Respondents from both departments articulated that evaluations of student performance were periodically made by the committee members. Four out of six students said that they knew what their respective committees expected from them and enough feedback was provided to them.

In terms of student-advisor relationship, although more comments (96) were made in the “promoted” group than in the “impeded” group (41), the percentage (70%) of “promoted” comments was lower than in the other three clusters (85% in the high-short departments, 75% in the low-short departments, and 76% in the high-long departments).

In terms of financial support, nine out of 10 people suggested that financial support impeded time to degree and completion rates. In fact, it was the only cluster where financial support was perceived as an impediment. The most common complaint about financial support made by students was about the kind of financial support offered by the department. Five out of six students expressed that being a teaching assistant was one of the major factors that delayed their time to degree.

In terms of degree requirements, results in this cluster indicated that this factor negatively affected time to degree and completion rates. As in the case of the low-short departments, difficulties in passing preliminary

examinations and making good grades in the courses were the most common reasons cited by participants as influencing completion rates. Contrary to what has been previously reported in the literature (Bowen & Rudenstine, 1992; Nerad & Cerny, 1993), the Master's thesis requirement was considered a factor that had delayed time to degree by only one student.

Similar to the low-short departments, all participants in this cluster made comments that suggested that departmental orientation and advising impeded student success. In fact, there is no formal departmental orientation and advising in either of the departments analyzed within this cluster.

The relationship between course work and research was deemed by eight out of 10 people as impeding student success, similar to the results reported by the high-long departments.

This was the only cluster where student participation was perceived more as an impediment than a promoter (or having no effect) on student success. All participants from this cluster made comments (45% of the comments) that suggested that student participation impeded those outcomes. The most common reasons mentioned by the participants for limited participation of students in departmental academic and social activities were: conflicts among people; limited social and academic activities organized by the department; and, lack of collaboration between faculty and graduate students.

In the same vein, five out of six students made comments that suggested that attitudes toward students impeded student success. This situation, along with limited student participation, indicated that the

departmental climate was not good, which could explain the low completion rates and long time to degree exhibited by departments in this cluster.

Short versus Long Time to Degree Departments. When data were aggregated by examining short time to degree departments versus long time to degree departments, some factors were identified that affected this outcome.

Financial support and the relationship between course work and research were the factors where differences were found between these two groups of departments. These factors seemed to influence time to degree, because a higher percent of comments that suggested they promoted success were reported by the short time departments than the long time departments. Conversely, a lower percent of comments that suggested that they impeded success were reported by the short time departments than the long time departments.

In terms of financial support, results indicated that whether support was provided was not an issue for most of the people, but the kind of financial support offered was important. This result was expected as 23 out of 24 of the students who participated in this study received financial support, and several commented that they only applied to universities with full support packages.

Considering that teaching assistantships were the most important source of support for people in the “long time” departments, it is reasonable to suggest that this type of support might extend time to degree in those departments. These results support previous findings on time to degree. Bowen and Rudenstine (1992) reported that students who worked as teaching assistants for a long time took longer to complete their degrees. Wilson

(1965) indicated that work as a teaching assistant was one of the most common reasons cited by students for lengthening completion times.

It is important to mention that teaching assistantships were also the most common form of support for students from two departments in the “short time” departments. Four out of six students from these departments reported they have managed their time well and have been able to maintain their focus on their graduate work. Evidently, individual capacity to organize and plan activities, which is an indicator of maturity, matters when it comes to time to degree. Therefore, it should be interesting to further investigate the impact of teaching assistantships on time to degree.

The majority (51%) of the comments reported by respondents from the “short” departments suggested that the relationship between course work and research promoted time to degree, while the majority (60%) of the comments from the “long” departments suggested that it impeded time to degree. The literature reports that one of the major problems for delaying completion of the doctoral degree was the lack of training to conduct independent research (Hansen, 1990).

Contrary to what was expected, perceptions about changes in advisors were similar between the groups. This factor was deemed as an impediment to time to degree by the majority of people, suggesting that more research is needed.

High versus Low Completion Rates Departments. When data were aggregated from high completion rates departments versus low completion rates departments, some factors were identified that affected this outcome.

Departmental orientation and advising, and attitudes toward students, were the factors where important differences were found between these two groups of departments. A higher percent of comments that suggested that these factors promoted completion rates were found in the “high completion” departments than in the “low completion” departments. Conversely, a lower percent of comments that suggested that these factors impeded completion rates were found in the “high completion” departments than in the “low completion” departments.

In terms of departmental orientation and advising, “high completion” departments offered more orientation and advising to graduate students than low completion rate departments. Seventy-seven percent of the comments made by respondents from the “high completion” departments suggested that this factor promoted success, and 63% of the comments made by respondents from the “low completion” departments suggested that it impeded completion rates.

Considering that most of the attrition at this institution occurred during the two first years of study, the low completion rates exhibited by departments could be explained in terms of the Tinto’s theory. According to Tinto (1993), during the first two years of study students are integrated into the intellectual and social community of the campus, and decide if the degree is really what they want to do. Typically, this period culminates with the preliminary examination. During these two years, students spend their time fulfilling course requirements and taking examinations required for the candidacy. Thus, departments that have policies and practices designed to help students through the process of integration into the social and academic

culture of the department should have shown higher completion rates than those departments do not offer such guidance. Results of this research supported Tinto's theory, because departments that had more formal orientation and advising procedures were the ones that showed higher completion rates. Results also supported previous findings in this respect (Golde, 1995; Heiss, 1970; Nerad and Cerny, 1993).

At this point, it is important to mention that not only was more orientation and advising provided by "high completion" departments, but also more flexibility of the plan of study was observed in those departments, compared to their counterparts with low completion rates. In the "high completion" departments students have more options in terms of courses to choose according to their areas of interest, and the advisor plays a more influential role in the elaboration of the plan of study.

In terms of attitudes toward students, 52% of the comments made by interviewees from the "high completion" departments suggested that this factor promoted success, and 43% of the comments made by respondents from the "low completion" departments suggested that it impeded completion rates. Not only was the number of comments important to differentiate the influence of this factor on completion rates, but the kind of comments merited attention as well. The most common words used to describe departmental environment by people from the "high completion" departments were: "supportive," "friendly," "excellent," and "collegial." The most common words used by people from the "low completion" departments were: "productive," "positive," "competitive," and "accommodating." These comments suggested that the departmental environment in the "high

completion” departments was warm and supportive, while the environment in the “low completion” departments was efficient and professional. It is reasonable to suggest that nurturance and support are more effective in promoting student success than professionalism and formality.

Additionally, one interesting finding in the “low completion” departments was that faculty made no comments that suggested that attitudes towards students impeded student success. All faculty deemed departmental environment as good and positive, while only 50% of students reported such a culture. Such a difference between faculty and student opinions should be investigated in more depth, but that was beyond the scope of this study.

In relation to the other two categories used to define departmental climate (student participation and peer support), even though the majority of comments in both groups suggested that these factors promoted success, it is important to remark that more “promoted” comments were made by people from the “high completion” than from the “low completion” departments. From these results, it was reasonable to conclude that a more supportive departmental climate seemed to exist in “high completion” departments, which might partially explain their high completion rates.

These results were consistent with previous findings that when a favorable departmental climate exists, the possibility of student completion is higher. Golde (1994) concluded that having a nurturing community highly influenced student persistence. Baird (1990b), in turn, found that peer relationships favored student integration which, in turn, produced a greater commitment to the field and reduced the possibility of dropping out of graduate school.

Finally, degree requirements impeded completion rates. The percentage of comments (66%) that suggested that this factor impeded degree completion was higher in “low completion” departments than in the “high completion” departments (52%). Furthermore, the number of people who deemed degree requirements as an impediment was higher (19) in “low completion” departments than “high completion” departments (15).

No differences among all the departments under study were found in relation to the definition of the dissertation. The dissertation was generally expected to be original, in the sense that it must provide new information that contributes to the body of knowledge of the field, but it can be an extension of data that somebody else has already done that results in a new model or explanation, or may look at old models from a new perspective. In other words, nobody is expecting a dissertation to be a pathbreaking, seminal work, but it has to be original in the sense that it is a work that no one has done before. At the same time, it is expected to be a demonstration of the research skills of the students according to the current standards of the discipline. This result is contrary to what has been previously reported (Berelson, 1960; Bowen & Rudenstine, 1992; Nerad & Cerny, 1993; Wilson, 1965; Ziolkowski, 1990). These scholars have reported differences among departments in terms of the definition of the dissertation. They found that in departments with lower completion rates and longer times to degree (arts and humanities) the dissertation was expected to be a major contribution to knowledge and usually presented in the form of a book, as opposed to departments with higher completion rates and shorter time to degree (physical

science and engineering) where the dissertation was conceived as a test of future ability to do research.

No differences in advisors' expectations about the length of the dissertation seemed to exist among departments either. It was reported that the length of the dissertation is not a problem at all, and what is more important is the quality of the dissertation rather than the number of pages. In most cases, the length of the dissertation is up to students. That is, it depends on how much information they want to include in terms of appendices, and other kinds of information. This result is contrary to what has been previously reported. Berelson (1960) and Benkin (1984) reported that there were differences in dissertation length by major fields which closely parallel the time to degree in the different disciplines. For example, the time to degree and the length of dissertation are the least in the physical sciences and the greatest in the humanities.

Divergence of results of the present study from previous research findings in relation to the definition of the dissertation and advisor's expectations about the length of dissertations were expected, because no doctoral programs in arts and humanities are offered by the institution under study.

Limitations of the Study

The purpose of the present research was exploratory rather than confirmatory. In consequence, the body of knowledge was not sufficient to test beliefs, only to explore them.

This study had several limitations on the sample. The present research was limited to the analysis of departmental factors affecting graduate student

success at one institution. Therefore, the findings of this research will not be generalizable to other university settings. Instead, they should be ideographically interpreted in terms of particulars to the case, and tentatively applied (Lincoln & Guba, 1985). Furthermore, the sample size was small.

On the other hand, Baird (1992), Bess (1978), and Bragg (1976) affirmed that socialization occurs during graduate study. Some departmental factors are more important at different stages of the graduate education. For instance, the behavior of a specific faculty member (usually the advisor) is more crucial at the dissertation stage than at other times. This study elicited information only from current graduate students who are working on their dissertations. The analysis and differentiation of the influence of departmental factors on degree progress at different stages of graduate education process was beyond the scope of this investigation.

This study was also limited in that no information was elicited from students who did not complete their doctoral studies. New factors affecting completion rates, or more striking differences in the influence of the factors already studied might have been found if those students had been included in the sample. For example, several investigations that elicited information from non-completers have reported that the student-advisor relationship was a major factor that impeded student completion (Dolph, 1983; Golde, 1994; Heiss, 1970; Jacks et al., 1983; Kluever, 1995; Lenz, 1995; Monsour & Corman, 1991; Valentine, 1987). This study indicated that the majority of the comments about student-advisor relationship suggested that it promoted student success. However, a more accurate idea about this relationship among different departments might have been found by comparing information

elicited from completors and non-completors, rather than limiting the study to students who were almost finishing their doctoral studies. It could have being also interesting to include people who had finished graduate study because those people have a complete picture of the whole process rather than limitating the study to students who have not completed their studies yet.

This research did not differentiate opinions of early and late finishing students. Thus, it is likely that results could be different when opinions from people meeting those criteria were contrasted.

Furthermore, this study was conducted by interviewing people who volunteered to participate. Some people declined to participate. Thus, it is possible that the volunteers differed in some significant way from the non-volunteers, hence affected the results of the research.

This research was also limited in that it did not differentiate the effects of departmental factors on doctoral degree progress for different kinds of graduate students. For example, several investigations have demonstrated that foreign students take shorter times to earn a Ph.D. than American students (Bowen & Rudenstine, 1992; Gillingham et al., 1991; Zwick, 1991), that working full-time in a job not related to the field of study negatively affects progress to doctoral degree (Gillingham et al., 1991; Wilson, 1965), and that a lack of financial support increases the possibility for either temporary or permanent attrition from graduate school (Abedi & Benkin, 1987; Berelson, 1960; Girves & Wemmerus, 1988; Tucker, Gottlieb, & Peace, 1964; Wilson, 1965). While it would be interesting to investigate which, and to what extent, departmental factors affect time to degree and completion rates of different types of graduate students, such analysis was beyond the scope of this study.

There were also limitations in the methodology. Respondents were interviewed at one point of time and they were asked to recall events. Furthermore, the coding was made only by one rater. Consequently, non-independent response categories could be drawn.

In this study, two departments were randomly selected from each of the four clusters in order to enhance generalization of the results to the respective clusters. Given that the median and the mean time to degree and completion rates were approximately equal, it is possible that more striking differences among departments could have been found by selecting the two most extreme departments in each cluster instead of selecting departments randomly.

Despite these limitations, the present study made major contributions to the knowledge about differences among departments and the impact such differences have on graduate student progress and success. This research also posed several pertinent issues to guide future research and practice.

Implications of the Study

Recommendations for Future Research

Findings of the present research allowed to identify several factors affecting time to doctoral degree and completion rates at one institution, the next step might be to operationalize these factors in order to quantify their influence on student success, and make statistical analyses and comparisons among departments.

Results of this study indicated that more research needs to be conducted desegregating data by gender and ethnicity, and looking at factors that could explain differences in student performance.

Given the high percentage of students who did not complete their doctoral studies at this institution, more research needs to be conducted that describes patterns of attrition by department, desegregating attrition by stages of study, and identifying connections between departmental factors and the levels of attrition at various stages.

On the other hand, the influence of departmental factors on completion rates may be further analyzed by comparing completors and non-completors. In the same vein, the influence of departmental factors on time to degree may also be further studied through comparisons of earlier finishers versus late finishers.

Finally, efficiency of teaching assistantships versus research assistantships in relation to time to degree and completion rates is another strand of research that could be investigated more thoroughly.

By identifying factors influencing time to degree and completion rates, the expectation was that the findings would serve several constituencies of academia. Even though the study was focused on students and faculty in a particular institution, it was believed that the same groups of people at similar doctorate-granting institutions may benefit. However, in applying these comments to other institutions, care must be taken to allow for the differences in enrollment, funding patterns, and structure of the programs.

Recommendations for the Institution

Given the results of the present study, the institution should implement several strategies oriented to improve graduate student success, including examining the implications of teaching assistantships during later stages of graduate education. The institution should look for additional sources of support, as well as hire active research professors who can get more research grants, so more RA positions could be offered to students.

Other strategies at the institutional level might include: instituting annual evaluations of all graduate students; instituting more adequate counseling of graduate students; developing consistent patterns of expectations related to skills and competencies required to complete the degree; establishing norms about the functions and obligations of the advisory committees; monitoring and evaluating the performance of each department in order to identify major roadblocks to student success. These strategies might provide students clear information about graduate education policies and practices in the institution. These strategies also might provide the institution an empirical basis for improving graduate programs.

Finally, the institution could sponsor periodic seminars with the participation of the Dean of Graduate School, senior administrators, department chairs, and some faculty and graduate students. The purpose of those seminars should be to provide information about particular issues related to graduate education, and to generate ideas on what changes should be made.

Recommendations for Departments

In reviewing the graduate handbooks of departments, it was noted that there is a lack of information about departmental practices that new applicants would benefit from knowing before selecting the program. For example, departments could provide detailed information to applicants about historic departmental completion rates, clear cut expectations of student performance, and realistic time for degree completion.

Results of this study indicated that motivation is an important factor affecting graduate student success. Thus, departments should implement admission procedures that pay attention not only to grades and previous research work, but also to student motivation and sense of purpose. In addition, departments should implement periodic comprehensive evaluations of students to identify early students who do not have the potential to conduct graduate work.

Results of the present study support previous research findings that departmental orientation and climate affect doctoral completion. So, departments, especially those with low completion rates, should put into practice strategies to improve student persistence, such as implementing formal orientation and advising activities for incoming graduate students, where those students have the opportunity to meet faculty and continuing students and have a clearer idea about how research is conducted in the department, funding opportunities, and how to overcome hurdles in graduate work.

Other strategies for improving retention might include formal counseling and guidance procedures to improve communication between

students and departmental staff; implementation of seminars or colloquia where faculty and graduate students discuss issues related to their field; sponsoring departmental social activities to improve communication among faculty and graduate students in an informal environment; annually surveying student satisfaction with the program to evaluate efficiency of departmental policies and procedures; if appropriate, improving departmental conditions for graduate work; and, implementing dissertation workshops in which graduate students can share their preliminary results, or concerns with the research they are conducting, and receive feedback from faculty and other graduate students. These kinds of activities would facilitate a greater sense of collegiality as research and writing proceed.

Lack of linkages between course work and research, and working as a teaching assistant were factors that affected student progress at this institution. Therefore, departments, especially those with longer times to degree, should regularly evaluate the pertinence of program content (course work) to research demands; formulate procedures to engage students in research activities early in the program and encourage them to make clear progress in defining dissertation topics within stipulated time-frames; formulate guidelines for candidacy examinations and research work; and, try to offer research support to students who are in the later stages of graduate study, so they can dedicate all their time to research activities, as opposed to working as teaching assistants, which is time consuming.

Other strategies to improve student success could include requiring periodic meetings of students and advisory committee members to evaluate student progress and map out a plan for the following year; ensuring that

faculty understand their roles as advisors; encouraging faculty to work closely with their students; and, evaluating faculty members with respect to their performance as research advisors.

Finally, it is advisable that departments continuously monitor and evaluate departmental performance to identify roadblocks, and plan actions to improve the success rates for their graduate students.

Recommendations for Faculty Advisors

The student-advisor relationship is one of the major factors affecting student progress and completion. In this sense, faculty advisors should pay closer attention to the differences among students to get a better idea about how well their personalities and research interests match; realize individual needs of their students, some need more help and direction than others; implement strategies to motivate students, such as encouraging students to publish together, present papers at conferences, and expressing interest in their research; help students realize the importance of succeeding at graduate school in terms of their future career development; help students to remain focused on research; and, provide students clear information about what is expected from them in terms of research activities, work schedule, and timetable.

Other recommendations for faculty advisors include informal meetings with students, informal occasions allow people to interact outside of formal meetings or interviews; and, finally, continuous feedback to students about their strengths and weaknesses.

Recommendations for Students

Deciding to get a doctoral degree is a big decision that affects a student's life. An enormous amount of time and effort are required to successfully complete doctoral study. So, incoming students should make certain to have up dated information about the program; be sure to understand what graduate work means, that is, be sure that they are able to dedicate the time and effort necessary to get out early and do good work; and, be sure that the financial support is sufficient for the period of graduate study.

Doctoral study also requires strong motivation and a sense of purpose to overcome stressful situations. So, students should be sure they have a network of family or friends who can support them through the process of graduate work.

Results of the present study indicate that in order to successfully complete doctoral study in a relatively short time, students should ascertain their research interests early; select the dissertation topic and become engaged in research activities as soon as possible; make certain that the research project is doable within the established time-frame; and, make sure that there is a good match between student personality and research interests and those of the potential advisor.

Other recommendations to students include: make good grades in courses, there is no excuse for not being a good student; actively participate in departmental academic and social activities, this could help students to get know people in the department and improve communication; talk to other graduate students and find out their opinions about professors' personalities, continuing graduate students can help new students with several things they

would need to know to succeed at graduate school; develop a good relationship with faculty in the department; and, establish timelines to plan and organize activities related to doctoral work.

In summary, the present research has identified some significant differences between the perceptions faculty hold about the graduate experience and those that students hold. Additionally, the results revealed specific characteristics of departments that boast high completion rates and short times to degree, as well as departmental traits related to low completion rates and long times to degree. The results may help academic administration, graduate faculty, and doctoral students re-examine the doctoral experience the doctoral experience and, as appropriate, re-design policies and procedures to promote graduate student success.

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Appendix A:

Sample Letter to Department Head

1104 Ascot Lane
Blacksburg, VA. 24060
Date

Dear:

I am a faculty member at a university in Venezuela and a Ph.D. student in the Education Administration program of the College of Education at Virginia Tech. I am conducting research for my doctoral dissertation. One of the purposes of the research is to identify factors that affect degree progress and completion rates for graduate students at Virginia Tech.

This phase of my study consists of interviewing faculty members and graduate students with the purpose of exploring factors that, in their opinion, have positively or negatively affected the possibility of graduating in a relatively short time.

This study has been approved by the Institutional Review Board for projects involving human subjects at Virginia Polytechnic Institute and State University, and by the Department of Educational Leadership and Policy Studies in the College of Education.

Results of this study might be helpful in determining the conditions that relate to the progress of doctoral students at Virginia Tech.

Your department has been selected for inclusion in the study. The success of the study depends on the availability of potential participants. Therefore, I should like to ask if you could please provide me with a list of graduate faculty members in your department who have more than five years of experience in graduate education, and a list of graduate students who are currently working on dissertations. I will then randomly select faculty and students to ask if they would be willing to participate in the study. Participants will be asked to schedule one interview of 60-90 minutes. Participants will be assured that confidentiality will be respected.

If you have any question or concern about this request, please feel free to contact me at 951- 0915 or, ovalero@vt.edu. You may also wish to contact my dissertation chair, Dr. Joan Hirt, at 231- 9700 or, jbhirt@vt.edu.

Thank you for your assistance in this matter. I look forward to hearing from you in the near future.

Sincerely,

Yaritza Ferrer de Valero

Appendix B

Sample Letter to Student Participants

1104 Ascot Lane
Blacksburg, VA. 24060
Date

Dear:

I am a Ph.D. student in the Education Administration program, of the College of Education at Virginia Tech. I am conducting research for my doctoral dissertation. The purposes of the research are to analyze completion rates and time to doctoral degree, and to identify what factors affect degree progress and completion at Virginia Tech. This study has been approved by the Institutional Review Board for projects involving human subjects at Virginia Polytechnic Institute and State University, and by the Department of Educational Leadership and Policy Studies in the College of Education.

Median time to degree and completion rates were calculated for the 1986-90 entering cohort during the first phase of this study. The second phase of the study consists of interviewing graduate students who are currently working on their dissertations, and faculty members with more than five years of experience in graduate education for the purpose of exploring factors that, in their opinion, have positively or negatively affected their possibility of graduating in a relatively short time.

You have been selected at random from the pool of students who are currently working on their research projects in your department. My purpose in contacting you is to solicit your participation in this study.

The information gathered from these interviews might help to identify factors affecting graduate degree progress at Virginia Tech. Your frank and honest opinions during the interview will be very helpful in gaining a better understanding of your experiences as graduate student.

The interview will last approximately 60-90 minutes, and will be audio-taped. Interviews will be conducted during March and April, 1996. You will have freedom to set the date, time, and place for the interview, and the tape recorder will be stopped at any time that you consider necessary. Transcripts of your interview will be available to you in case you would like to check the information you provided.

Confidentiality is guaranteed in this study. The researcher will not release identifiable information regarding the participants at any time. Any information released will be identified through an alias. The audio tapes and

Appendix C

Sample Letter to Faculty Participants

1104 Ascot Lane
Blacksburg, VA. 24060
Date

Dear:

I am a Ph.D. student in the Education Administration program of the College of Education at Virginia Tech, and a professor at the University of Zulia in Venezuela. I am conducting research for my doctoral dissertation. The purposes of the research are to analyze completion rates and time to doctoral degree, and to identify what factors affect degree progress and completion at Virginia Tech. This study has been approved by the Institutional Review Board for projects involving human subjects at Virginia Polytechnic Institute and State University, and by the Department of Educational Leadership and Policy Studies in the College of Education.

Median time to degree and completion rates were calculated for the 1986-90 entering cohort during the first phase of this study. The second phase of the study consists of interviewing graduate students who are currently working on their dissertations, and faculty members with more than five years of experience in graduate education for the purpose of exploring factors that, in their opinion, have positively or negatively affected the possibility of graduating in a relatively short time. Results of this study might be helpful in determining the conditions that relate to the progress of graduate students at Virginia Tech.

You have been selected at random from the pool of faculty members in your department who have more than five years of experience in graduate education, and my purpose in contacting you is to seek your participation in the study.

The information will be collected through interviews. Your frank and honest opinions during the interview will be very helpful in gaining a better understanding of your experiences as faculty advisor.

The interview will last approximately 60-90 minutes, and will be audio-taped. Interviews will be conducted during March and April, 1996. You will have freedom to set the date, time, and place for the interview, and the tape recorder will be stopped at any time that you consider necessary. Transcripts of your interview will be available to you in case you would like to check the information you provided.

Confidentiality is guaranteed in this study. The researcher will not release identifiable information regarding the participants at any time. Any information reported will use aliases. The audio tapes and transcripts of the interviews will be destroyed one year after the completion of this study.

I will contact you in the next several days to determine if you are willing to participate. If so, I will ask you to sign the statement at the end of this letter and return it to me.

Questions and concerns about this research or its conduct should be addressed to:

Yaritza Ferrer de Valero, Investigator	or	Dr. Joan Hirt, Faculty Advisor
951-0915		231-9700
e-mail: ovalero@vt.edu		e-mail: jbhirt@vt.edu

Thank you for your kind attention to this request. I hope you will give serious consideration to participating.

Sincerely,

Yaritza Ferrer de Valero

 Name _____
 Subject's Permission _____

I have read and understand the letter requesting my participation in the study about factors affecting time to degree and completion rates of doctoral students at Virginia Tech. My questions and concerns have been answered and addressed. I voluntarily agree to participate in this project.

 Signature

 Date

Appendix D

Interview Protocol for Graduate Students

Part I

Name _____

Department _____

Year of First Enrollment in the Graduate School at this Institution

1986 1987 1988 1989 1990 1991 1992 1993

Term of First Enrollment in the Graduate School at this Institution

Fall Spring First Summer Second Summer

Anticipated Date of Graduation Term _____ Year _____

When you enrolled at this institution, how many semesters did you anticipate it would take you to graduate? _____

Part II

Research Question:

What departmental factors do graduate students perceive affect time to doctoral degree and completion rates?

Interview Questions:

1. What kind of orientation did you receive when you started in this program?
2. How were you assigned to your first advisor?
3. How did you prepare your plan of study?
 - . How much do you think the required courses have helped you learn how to conduct independent research?
4. Do you think that the formal degree requirements in this department have affected student degree completion?
 - . What requirements specifically?
5. At what point of the program is the preliminary examination required?

- . What does this exam cover?
 - . In your opinion, were the requirements for this exam sufficiently clear to allow you to be aware of the material to be mastered, how to handle it, and the committee's expectations of your performance?
 - . What options do you think could have enhanced this experience?
6. At what point of the program is the dissertation proposal required?
7. We have been talking about your personal experiences with this program. Now, I would like to ask you some questions concerning your opinion about some aspects of this department, such as, advising, research mode, and environment. Let's begin with the advising. How do you choose the members of your advisory committee?
8. At what points of your enrollment in this program has the advisory committee evaluated your progress?
- . What occurs at these evaluations?
 - . Do they give you feedback about your strengths and weaknesses?
9. How did you choose your major advisor?
10. In general, how would you describe your relationship with your advisor?
- . Could you offer some examples that illustrate that relationship?
 - . How much orientation did your advisor give to you in preparing the plan of study?
 - . How much orientation did your advisor provide to you in preparing for candidacy examinations?
11. In your opinion, are changes in dissertation advisors very common in this department?
- . Have you changed advisors?

. Could you explain some common reasons for changing advisors?

12. Considering your response, how do you think that changes in advisors have affected the time students have to spend completing their degree requirements, and their possibilities of graduation?

. Could you elaborate more on that?

13. Okay, let's move on the subject of research mode. How did you decide on your dissertation topic?

. What role did your advisor play?

. How did you approach this task?

. Are you working alone on your project?

14. Let's talk about your advisor's participation in helping you develop your research. What role did the your advisor play in the process of determining the scope of your dissertation?

. How much time, approximately, did your chair spend advising you on your dissertation?

. Did you meet on a regular basis?

. How available is your chair?

. Has your advisor assisted you in writing grants or obtaining funds to support your research?

. What are the expectations of your advisor in relation to the scope and length of the dissertation?

15. How do you think the dissertation is defined in this department?

. Is the dissertation defined as an original piece of research, or as a work certifying your ability to carry out research according to the standards of the discipline?

- . Give some examples that illustrate your opinion.
- . Is it required that the dissertation report significant results? If so, how do you think that the requirement of reporting significant results has affected your time to degree?
- . Could you elaborate more on that?

16. Until now, we have been talking about the way your research has been conducted, and the kind of support offered by your advisor. Let's talk about departmental advising. What kind of advising has this department offered to you in order to help you through the process of graduate work?

- . Does this department organize formal or informal meetings at which you can share your concerns and preliminary research results with faculty and other students?
- . How often do these meetings occur?
- . Who attends such meetings?
- . Did this department provide you information and guidance about research projects in which the department is particularly

interested?

17. Now, let's talk about the environment in your department. How would you characterize the general environment?

- . When you think about how you are treated in the department, what kinds of things come to mind?
- . Are there collaborative efforts in the department?
- . Could you provide some examples that illustrate such efforts?
- . Are there conflicts in the department?
- . How often do you participate in departmental academic activities?

. How often do you participate in departmental social activities?

18. What factors, other than those already discussed, do you think have accelerated or delayed your time to degree?

19. Which factors do you think are the most important ones?

20. What, if anything, do you think could be done to control those factors?

21. Suppose I am a new student in this program, and I do not know anything about what goes on around here. What would you tell me about things I have to do in order to successfully complete my doctoral degree in a relatively short time?

Appendix E
Interview Protocol for Graduate Faculty Members

Part I

Name _____

Department _____

How many years of experience do you have in graduate education?

How many graduate students, approximately, have you advised?

Part II

Research Question:

What departmental factors do faculty perceive affect time to doctoral degree and completion rates among graduate students?

Interview Questions:

1. What kind of orientation do doctoral students receive when they start in this program?
2. How are students assigned to their first advisors?
3. How do students prepare the plan of study?
 - . How much do the required courses help students learn how to conduct independent research?
4. Do you think that the formal degree requirements in this department have affected student degree completion?
 - . What requirements specifically?
5. At what point of the program is the preliminary examination required?
 - . What does this exam cover?

- . In your opinion, are the requirements for this exam sufficiently clear to allow students to be aware of the material to be mastered, how to handle it, and the committee's expectations of their performance?
 - . What options do you think could enhance this experience?
6. At what point of the program is the dissertation proposal required?
7. I would like to ask you some questions concerning your opinion about some aspects of this department, such as, advising, research mode, and environment. Let's begin with the advising. How do students choose the members of their advisory committees?
8. At what points of student enrollment in this program do the advisory committee evaluate student progress?
- . What occurs at these evaluations?
 - . Do they give students feedback about their strengths and weaknesses?
9. How do students choose the major advisor?
10. In general, how would you describe your relationship with your advisees?
- . Could you offer some examples that illustrate that relationship?
 - . How much orientation do you give to your students in preparing the plan of study?
 - . How much orientation do you provide to your students in preparing for candidacy examinations?
11. In your opinion, are changes in dissertation advisors very common in this department?
- . Could you explain some common reasons for changing advisors?

12. Considering your response, how do you think that changes in advisors have affected the time students have to spend completing their degree requirements, and their possibilities of graduation?

. Could you elaborate more on that?

13. Okay, let's move on to the subject of research mode. How do students decide on their dissertation topic?

. What role do you play as an advisor to Ph.D. students?

. How have students approached the task?

. Do graduate students usually work alone on their projects?

14. Let's talk about your role as an advisor in helping students develop a research project. Based on your own experience, could you describe your participation, as an advisor, in the process of helping students to determine the scope of the dissertation?

. How much time, approximately, do you spend in advising dissertation activities?

. Do you meet with your advisees on a regular basis?

. How available are you to your advisees?

. Do you assist your students in writing grants or obtaining funds to support their research? How often?

. Could you describe your expectations, as an advisor, in relation to the scope and length of the dissertation?

15. How do you think the dissertation is defined in this department?

. Is the dissertation defined as an original piece of research, or as a work certifying an ability to carry out research according to the standards of the discipline?

- . Could you give some examples that illustrate your opinion.
- . Is it required that the dissertation report significant results? If so, how do you think that the requirement of reporting significant results affects student time to degree?
- . Could you elaborate more on that?

16. Until now, we have been talking about the way research is conducted in this department, and the kind of support you offer to your students. Let's talk about departmental advising. What kind of advising does this department offer to students in order to help them through the process of graduate work?

- . Does this department organize formal or informal meetings at which students can share their concerns and preliminary research results with faculty and other students?
- . How often do these meetings occur?
- . Who attends such meetings?
- . Does this department provide students information and guidance about research projects in which the department is particularly interested?

17. Now, let's talk about the environment in your department. How would you characterize the general environment?

- . When you think about how students are treated in the department, what kinds of things come to mind?
- . Are there collaborative efforts in the department?
- . Could you provide some examples that illustrate such efforts?
- . Are there conflicts in the department?

. How often do students participate in departmental academic activities?

. How often do students participate in departmental social activities?

18. What factors, other than those already discussed, do you think motivate or impede students' time to degree?

19. Which factors do you think are the most important ones?

20. What, if anything, do you think could be done to control those factors?

21. Suppose I am a new student in this program, and I do not know anything about what goes on around here. What would you tell me about things I have to do in order to successfully complete my doctoral degree in a relatively short time?

Vita

Yaritza Ferrer de Valero
1104 Ascot Lane, Blacksburg, VA 24060

Education

Doctorate of Philosophy: Educational Administration, August 1996,
Virginia Polytechnic Institute & State University, Blacksburg, VA

Dissertation: Departmental Factors Affecting Time to Degree and
Completion Rates of Doctoral Students at One Land-Grant, Research
Institution

Master of Arts: History of Science, August 1983, University of
Oklahoma, Norman, Ok

Licentiate in Education: Biology, February 1973, University of Zulia,
Maracaibo, Venezuela

Research Interests

Persistence and time to degree at doctoral level.

Environmental factors that affect doctoral student success.

Teaching Interests

Doctoral or masters level students in education programs.

Experience

Administrative

Coordinator, Planning and Management of Science and Technology,
Master Program, University of Zulia, Maracaibo, Venezuela, 1990-92

Director, Humanistic Commission of the University Research Council,
University of Zulia, Maracaibo, Venezuela, 1986-89

Teaching

Full Professor, University of Zulia, Maracaibo, Venezuela, July 1973
to present.

Taught science and technology studies at undergraduate level, and
history of science at Master's level.

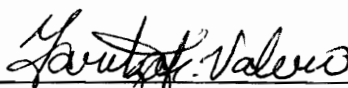
Publications

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Venezuela: EDILUZ.

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Histórica. In H. Vessuri (Ed.), Ciencia y Tecnología en Venezuela.
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Nicolás Monardes y el estudio de las plantas medicinales en Sur
América. Paper presented at the XXIII Seminario de la Sociedad
Latinoamericana de Historia de la Ciencia y la Tecnología. Mexico
City, Mexico, January 1992.



Yaritza Ferrer de Valero