

FACTORS THAT PREDICT GRADUATION AMONG
COLLEGE STUDENTS WITH DISABILITIES

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COLLEGE STUDENTS WITH DISABILITIES

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DEDICATION

This dissertation is dedicated to my grandfathers Dr. Robert Eldon Pingry and Dr. John William Matthews, both of whom were professors at the University of Illinois at Urbana-Champaign. Their accomplishments in life served as my inspiration for pursuing a PhD.

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FACTORS THAT PREDICT GRADUATION AMONG
COLLEGE STUDENTS WITH DISABILITIES

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ABSTRACT

This exploratory study determined which set of student characteristics and disability-related services explains graduation among college students with disabilities. The records of 1,289 unidentified students with disabilities in three, public midwestern universities were examined *ex post facto* to obtain information about students, disability-related services they received, and student graduation status. A hierarchical logistic regression framework was used to construct a model of factors that best predicts graduation among students with disabilities in college. That model includes: being female, being 23 years of age and older, having a physical disability, using alternative format tests, taking distraction reduced testing, having flexibility in assignment/ test dates, learning strategies assistance, and physical therapy/ functional training. Models were also constructed to explain graduation among students with cognitive disabilities, mental disorders, and physical disabilities. Factors that predicted graduation for students with cognitive disabilities were being female, being 23 years of age and older, taking distraction reduced testing, having flexibility in assignment/ test dates, and learning strategies assistance. Factors that predicted graduation for students with mental disorders were being white, being between 23 and 30 years of age, taking distraction reduced testing, and receiving extended test time. Graduation for persons with physical disabilities was explained primarily by students who were female and age 23 to age 30.

Chapter 1: Introduction

Many persons with disabilities have difficulty obtaining competitive employment due to lack of education and inadequate supports. There are 51.2 million individuals with disabilities living in the United States (Stenmeitz, 2006), and United States Census (2002) data shows that 57.5% of people with severe disabilities were unemployed compared to 18.1% of persons with a non-severe disability and 11.8% of persons with no disabilities (Stenmeitz, 2006). Difficulty achieving competitive employment often leads to persons with disabilities being unable to financially support themselves and living below the poverty line. Researchers at the United States Census reported the poverty rate is 25.9% among individuals with severe disabilities between 25 and 64 years of age, 11.2% among individuals with non-severe disabilities, and 7.7% among persons without a disability (Steinmetz, 2006).

In order to be competitive in the current labor market, it has become increasingly important for individuals with disabilities to receive a college degree (Dukes & Shaw, 2003, as cited in Shaw & Scott, 2003), primarily because having a four-year degree is positively correlated with employment rates of persons with disabilities (Stodden, Dowrick, Anderson, Heyer .& Acosta, 2005). While census data (1996) showed that 50.3% of individuals with disabilities who graduated from college were employed, only 15.6% of persons with disabilities who did not receive a high school diploma were employed. Furthermore, employment rates and salaries of individuals with disabilities who graduate from college are very similar to those of college graduates without disabilities (Shaw & Scott, 2003; Horn & Berktold, 1999).

Unfortunately, college enrollment for persons with disabilities is 50% lower than individuals without disabilities (Stodden, Whelley, Chang & Harding, 2001). Approximately 12% of individuals with disabilities graduate college as compared to 23% of individuals without disabilities (Stodden, 2001). The number of students with disabilities attending and completing higher education must increase if individuals with disabilities are going to be competitive in the labor market, financially independent, and successful within society (Stodden et al, 2005). Universities can best support students with disabilities by ensuring that students receive the appropriate accommodations they need in order to move towards successful completion of courses and graduation (Shaw & Scott, 2003).

Conceptual Framework

Astin (1998) identified the input-environment-output college impact model (IEO) for use in examining how student related characteristics and environmental factors influence the success of students in higher education. In this context, characteristics and abilities students bring with them to the college experience, as well as environmental factors within the postsecondary setting, can significantly impact a student's ability to succeed. Characteristics and abilities students bring with them to the college experience are identified in this model as student inputs including demographics, skills, experiences, academic achievements, and aptitude test scores (Astin, 1998). Environmental influences that may potentially impact postsecondary student success are identified as environmental factors and may include administrative policies, curriculum, student services, teaching practices, and peers. Aspects of student development that are affected by the collegiate setting are identified as student outputs. These include student academic achievements,

values, needs, attitudes, and daily activities (Astin, 1998). This model allows for examining which set of individual and environmental factors best predicts outcomes of students with disabilities in postsecondary settings.

Need for Study

Although statistics show that there is a significant discrepancy between the rate of individuals with and without disabilities who attend postsecondary education, recent research has shown that an increasing number of individuals with disabilities choose to attend institutions of higher education. In the academic year of 2003-2004, 11% of undergraduate students attending degree granting institutions reported having a disability (Horn & Nevill, 2006). Universities have responded to this increase of college students with disabilities by creating more accessible facilities and working to ensure that appropriate academic accommodations and guidance are provided. However, students with disabilities continue to face barriers with respect to attending and graduating from institutions of higher education. The National Council of Education Statistics (NCES, 2003) reported that in the 1999-2000 school year, 9% of undergraduate students attending degree granting institutions reported having a disability. Twenty-two percent of the students who identified themselves as having a disability also reported not receiving the appropriate accommodations needed to be successful at their institution.

The Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 mandate that universities across the United States provide services to students with disabilities. The mandates in these acts, however, do not require universities provide a standard service delivery system which allows for flexibility when universities develop and provide services to students with disabilities. Unfortunately, this lack of clear criteria

causes service providers and students difficulties in advocating for the appropriate accommodations needed for student success.

Many universities have developed accessibility centers where individuals with disabilities can access services. These centers generally employ a disability counselor or coordinator who assists with determination of eligibility, development of services, and oversight of accommodations provided (AHEAD, 2002a, 2002b; Fuller, 2001). Disability counselors are commonly designated service providers, although standards for the provision of services are yet to be developed and provider duties often differ at various institutions of higher education. Several studies have described the types of disability accommodations provided by universities including those by Beirne-Smith & Deck (1989); Bursuck, Rose, Cowen, & Yahaya (1989); Sergent, Carter, Sedlacek, & Scales, (1988); and Tagayuna, Stodden, Chang, Zeleznik & Whelley (2005). Still, few researchers have focused on the type of accommodations necessary for providing equal access to students with disabilities; specifically, on which set of accommodations best explain student success (Dukes, 2001).

Statement of the Problem

The majority of research associated with the provision of disability services at postsecondary institutions has been focused on identifying types of accommodations currently provided in institutions of higher learning (Beirne-Smith & Deck, 1989; Bursuck et al, 1989; Sergent et al, 1988; Tagayuna et al, 2005). More research is needed that focuses on which set of accommodations explains the outcomes of students with disabilities, such as graduation rate and grade point average. More important, there is

very little evidence in the literature that shows that this research has been conducted, and this is particularly true in the field of social work (Pardeck, 2002).

Purpose of the Study

This study examined the set of individual characteristics and disability-related services that best predict graduation for college students with disabilities. The objectives of this study were to: describe the individual characteristics of students receiving disability supports at public, four-year universities, describe the nature of the disability related supports provided at the universities; determine which set of student characteristics predict student success (graduation) for postsecondary students with disabilities; and determine which set of accommodations predict student success (graduation) for postsecondary students with disabilities. With these purposes in mind, the following research questions were formulated:

1. What are the individual characteristics of students registered through the disability offices at public, four-year universities? What are the individual characteristics of students registered through the disability offices at public, four-year universities based on students' primary disability?
2. What types of services do students receive through the disability offices at public, four-year universities? What types of services do students receive through the disability offices at public, four-year universities based on students' primary disability?
3. What is the graduation rate of students registered with the disability offices at public, four-year universities? What is the graduation rate of students registered at the disability offices at public, four-year universities based on students' primary disability?

4. Which set of student characteristics and disability-related services provided by the disability offices at public, four-year universities predict student graduation? Which set of student characteristics and disability-related services provided by the disability offices at public, four-year universities predict student graduation based on students' primary disability?

Hypotheses

Hypothesis 1: There is a statistically significant relationship between the characteristics of students' with disabilities and postsecondary student graduation.

Hypothesis 2: There is a statistically significant relationship between the types of disability-related services students receive through university disability offices and postsecondary student graduation.

Significance of the Study

The results of this study provide policymakers, practitioners, and researchers with insight into the association between the types of disability accommodations students with disabilities receive in postsecondary education and outcomes. Policymakers can use this insight to the development of postsecondary and governmental policies that promote institutional services and accommodations most useful in assisting students with disabilities. Practitioners can use the insight to make programmatic decisions that improve the rate of students with disabilities graduating from four-year public universities. Last, researchers in a variety of disciplines can use the insight to conduct similar research studies in an attempt to enhance knowledge of environmental factors that predict success for students with disabilities attending four-year public universities.

Chapter 2: Literature Review

Seventeen million students enroll in postsecondary degree granting institutions each year (NCES, 2006). These students enter into postsecondary institutions with the expectation that they will leave with the knowledge and experiences needed to be successful as citizens and workers. Recently, state and federal funding for postsecondary education has declined (Astin, 1998). As a result, postsecondary institutions are increasingly accountable for providing evidence that the postsecondary experience positively impacts the development of students who attend. Lack of governmental funding also forces universities to become more competitive in actively recruiting students who have the resources to financially support their education. Increased postsecondary accountability resulted in institutions exploring ways they can create a collegiate environment that best supports student success and produces outcomes that show postsecondary education significantly impacts the development of students. The population of successful students with disabilities is one that many universities may target, and many institutional personnel are looking at environmental factors that will best support the development of students with disabilities.

The percentage of individuals with disabilities accepted to private and public universities and colleges drastically increased from the 1970s to present day. Researchers in a national survey of college freshman at public and private institutions of higher education found that 9% of all college freshman reported having a disability in 1999-2000 compared to 2.7% of freshman who reported a disability in 1978 (NCES, 2003). Through the mid-1970s, many individuals with disabilities were denied access to higher

education in the United States. In a 1962 survey of midwestern universities and colleges, one researcher found that 65 of the 92 institutions studied did not accept students who used wheelchairs (Angel, 1969). In the late 1960s another researcher found that only 200 postsecondary institutions in the United States provided some type of accessibility to students with physical disabilities (Blosser, 1984). In a 1974 survey of representatives in 994 four-year institutions, 18% rejected blind applicants, 27% rejected wheelchair users, and 22% rejected individuals who were deaf (Mahan, 1974).

The enrollment of students with disabilities in higher education has increased in the United States since the 1960s (Dukes, 2001). More and more individuals with disabilities choose to attend institutions of higher education and students with disabilities who graduate from secondary institutions are three times as likely to enroll in higher education programs as compared to non-disabled students (Brown, 1992; Garlin, Rumrill, & Serebreni, 1996). Accessibility laws, political support, disability advocacy groups, technology, high school transition plans required by IDEA, and media coverage have contributed to this increase (Hirschorn, 1992; Skinner, 2004). As the numbers of students with disabilities who choose to attend institutions of higher education increases, universities have begun to examine how to best provide adequate supports to ensure student success.

Universities are creating more accessible facilities and working towards ensuring that appropriate accommodations are provided. However, students with disabilities continue to face barriers in regard to attending and graduating from these institutions of higher education. The Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 mandate that universities in the United States provide services to individuals with

disabilities. Those laws were written to allow universities flexibility in developing and providing appropriate accommodations for students. University personnel have only taken the first step to ensure that students with disabilities have the appropriate environment and adequate supports to be successful. With appropriate services, the next step will be to mediate the environmental factors that influence student success either negatively or positively.

Conceptual Framework for the Study

Astin (1998) developed the input-environment-output (I-E-O) college impact model (IEO). College impact models explore the characteristics of student change through environmental or sociological origins (Pascarella & Terenzini, 1991). Astin (1985) proposed that the collegiate environment allows for change and opportunities to which students must respond. In this regard, student related characteristics, structural organizational characteristics, and environmental characteristics interact to determine how they influence the success of students in postsecondary institutions (Pascarella & Terenzini, 1991).

The IEO model emphasizes the extent to which student success may differ depending on the type of environmental setting provided by the university (Astin, 1977). In this context, the first consideration is student inputs or the characteristics and abilities students bring to the college experience such as demographics, talents, skills, academic achievements, and aptitude test scores (Astin, 1998). Student inputs can be used as pretests to determine students' expected scores on posttests. For example, a student's SAT score can be used to predict the student's score on the Graduate Record Exam.

In the model, environmental influences have potential to affect postsecondary student success (Astin, 1998). Those influences may include curriculum, facilities, peers, teaching practices, and administrative policies. Finally, student outputs, or aspects of student development that can be or are affected by the collegiate setting are important (Astin, 1998). Outputs and or outcomes include student achievements, values, needs, attitudes, and daily activities. Student inputs contribute to an expected score or answer on the post test, and if the expected score or answer is different than the predicted one, it may be that an environmental influence is correlated with the change. Student change is evaluated by comparing input characteristics with output characteristics (Astin, 1998).

In a longitudinal study of college dropouts, Astin (1974) found that students' involvement within the university impacted significantly their ability to remain in college and in turn developed the theory of involvement (Astin, 1985). The theory posits that increased participation in the environment is correlated with improved student learning. In theory the student plays an important role and must actively utilize opportunities provided in the environment to have a successful experience. However, it is the responsibility of the postsecondary institution to ensure that students are afforded the opportunity to actively participate in the higher learning environment.

Astin (1998) examined a group of 24,847 traditional age freshmen at 309 four-year universities as they progressed through their four critical years, 1985 to 1990. He (1998) investigated how 131 inputs, 192 environmental influences, and 82 outcome measures correlated. In the study, 25,000 faculty members at 217 institutions provided information about teaching styles and institutional climate at some of the universities students attended. In dividing the 192 environmental measures into environmental and

involvement effects, Astin (1998) found that the environmental effects most highly associated with student success were faculty environment and the student peer group. Of the involvement effects, the students' involvement with faculty and academic involvement were most highly associated with student success.

Many universities are considering the use of college impact models to assess student development (Pascarella & Terenzini, 2005). With this consideration in mind, university personnel recognize that addressing students' disabilities solely is insufficient to ensure student success. Barriers to student success exist at universities that are associated with conditions in the social and physical environment rather than with the student's disability. Experts in higher education are acknowledging that the institution's environment impacts the success of students as much as the student's disability does. Staff who are employed in disability offices must be trained and have experience in working with types of postsecondary disability related services (environmental influences) that impact the success of college students with disabilities.

Characteristics of Students with Disabilities (Input)

As the number of students enrolled in postsecondary institutions increases, university personnel have begun to gather data in regard to the background of students and the type of institutions they attend. In the academic year 2003-2004, 11% of undergraduate students reported a disability (Horn & Nevill, 2006). Statistics from The National Center for Education Statistics (1998) show that 54% of students with disabilities who identified themselves to a postsecondary institution as having a disability attended a public 2-year institution, 1% attended a private 2-year institution, 32% attended a public 4-year institution, and the remaining 13% attended a private 2-year

institution. Students with disabilities were more likely to transition from a two-year college to a four-year college in 2001 than in 1987 (Wagner, Cameto & Newman, 2003). According to researchers at the National Council on Educational Statistics, in the academic year 1999-2000, 33.5% of students with disabilities attended postsecondary education full time as compared to 41% of students without disabilities (NCES, 2002).

Students with disabilities attending postsecondary education were more likely to be female, 59% as compared to 41% male, and the average age of students with disabilities tended to be higher than those without a disability (NCES, 2002). Thirty one years of age is the average for students with disabilities attending higher education as compared to 26 as the average age of students without disabilities (NCES, 2002). In addition, researchers at the Cooperative Institutional Research Program (1998) found that 10% of students with disabilities, as compared to 4% of non-disabled students enter college full time as a freshman at the age of 20 or above.

Freshman students with a disability listed their family income as slightly lower than their non-disabled peers. In a 1998 study, researchers found that the median family income of students with disabilities is \$50,294 as compared to \$53,033 of the non-disabled peer (CIRP, 1998). In the academic year 1999-2000, students with disabilities were more likely to be in the lowest income quartile as compared to their non-disabled peers; 30% of students with disabilities were low income versus 23% of students without disabilities (NCES, 2002). Students with disabilities were also less likely to live on campus (11.3%) as compared to their non-disabled peers (15.5%) (NCES, 2002). The ethnicity of students with disabilities attending postsecondary education in the school year 1999-2000 was: 71.8% White/non-Hispanic, 11% Black/non-Hispanic, 10%

Hispanic, 3.3% Asian/Pacific Islander, 2.1% Native American/Alaska Native, and 1.6% of students classified their ethnicity as 'other' (NCES, 2002). Approximately 28.2% of students with disabilities noted an ethnicity other than white as opposed to 33% of students without disabilities.

Individuals with learning disabilities have been cited as the fastest growing subgroup of students with disabilities attending postsecondary education (American Council on Education, 1996; Henderson, 2001). However, recent studies show that students with psychiatric disabilities and attention deficit disorder may now be considered the fastest growing subgroup (Brinckerhoff, McGuire & Shaw, 2002; Steinberg, 1998; Wolf, 2001). In the academic year 2003-2004, Horn and Nevel (2006) found that postsecondary students identified themselves as having the following disabilities: orthopedic (25.4%), mental illness or depression (21.9%), health impairment problems (17.3%), attention deficit disorder (11%), learning disability (7.5%), hearing disability (5%), visual impairment (3.8%), speech disability (.4%), and 'other' (7.8%). Men with disabilities were more likely than women to be diagnosed with attention deficit disorder, and women with disabilities were more likely to be diagnosed with a mental disorder or health impairment. Students with orthopedic disabilities were the largest group of students with disabilities attending postsecondary education (Horn & Nevel, 2006).

Statistics documenting the percentage of students attending postsecondary education based on disability type deviate from statistics documenting the percentage of students who receive postsecondary disability related services based on disability type. Researchers at the National Center for the Study of Postsecondary Education Supports

(NCSPEs, 2000a) conducted a survey of 650 disability support coordinators at postsecondary institutions. They asked disability coordinators to estimate the percentage of students currently receiving disability related services at their institutions based on disability type. The NCSPEs report shows that students were diagnosed in the following ways: learning disability or attention deficit disorder (48.9%); multiple disabilities (13.9%); mobility impairment or orthopedic impairment (8.39%); health impairment (8.2%); psychiatric disability (7.6%); blind or visual impairment (4.1%); deaf or hearing impairment (3.95%); acquired head injury (2.4%); 1.3% cognitive disability (1.3%); and speech impairment (1.1%).

The chosen fields of study for undergraduate students with disabilities were as follows: 15.7% business/management, 7.9% education, 15.2% engineering/computer science, 8.3% health, 16.3% humanities, 4.8% life/ physical sciences, 10% social/ behavioral sciences, 5% vocational/ technical, 6.9% undeclared, and 9.8% other (NCES, 2002). With the increase in students with disabilities attending higher education, disability programs are faced with providing individualized services to students from diverse backgrounds and a wide variety of disabilities (Madaus, 1996). Empirical studies must be conducted to ensure that the diverse groups of students with disabilities attending postsecondary education are provided the most effective disability related services (Anderson, 1995).

Environmental Influences on Students with Disabilities

Students attending postsecondary education face many obstacles while working towards degrees. As students transition into postsecondary institutions, they must develop knowledge and skills that assist with assuming independent roles. Students learn to live in

the school's physical and psychosocial environment which includes attending classes, using the library, using dormitories and other living accommodations, using transportation, participating in extracurricular activities, shopping at the university and community, socializing , and using public offices such as the post office and banks (Paul, 1998). While all students have to learn and adjust to these more independent activities, students with disabilities face additional attitudinal and physical barriers compared to non-disabled peers (Paul, 1998).

Researchers reported that in a survey of 40 college and university students with disabilities lack of understanding and cooperation from administrators, faculty, and staff were identified as barriers to student education (West, Kregel, Getzel, Zhu, Ipsen & Martin, 1993). Other barriers students identified were lack of adaptive aids, inaccessible buildings and grounds, and lack of other accommodations. Lehman (2000) interviewed 35 students at a rural, midwestern community college. Four major themes were discovered as they relate to barriers that exist for individuals with disabilities in postsecondary institutions. Those barriers identified were lack of understanding and acceptance, lack of adequate services to assist with academic and nonacademic responsibilities, lack of self advocacy skills, and lack of sufficient financial resources or the knowledge to acquire them. Students also expressed concern that staff and tutors in academic resource centers knew little about disabilities and were unable to assist or communicate effectively (Lehman, 2000).

Academic Barriers

Skinner (2004) documented that college students with learning disabilities are more likely to face academic barriers as compared to their non-disabled peers. Students

with learning disabilities are more likely to have difficulty with study skills, test taking, note-taking, listening comprehension, organizing, social skills, self esteem, and academic deficits in reading, written expression, and mathematics (deBettencourt, Zigmond, & Thornton, 1989; Deshler & Lenz, 1989; Kish, 1991; Mercer, 1997; Omizo & Omizo, 1988; White, 1992). Lehman (2000) found that a majority of students with disabilities expressed concern that instructors did not have the knowledge to appropriately modify classroom environments, instructional strategies, or grading methods.

Attitudinal Barriers

Students with disabilities often face attitudinal barriers from students and faculty while attending postsecondary institutions. Research has shown that there is a lack of understanding on the part of instructors relative to disability issues (Hill, 1996; West et al., 1993). Faculty attitudes can significantly impact students' with disabilities level of happiness and success. Students with disabilities identified positive faculty-student and student-administration relationships as being contributing factors to a positive school experience (Neal, 1992; Nelson, 1993). Junco (2002) found that negative instructor attitudes decreased students' with disabilities willingness to use self advocacy skills.

Farbman (1983) interviewed 15 faculty members who had contact with 68 students with disabilities at large urban universities and found that whether accommodations were provided to students with disabilities did not appear to be a function of background, opinion, university policy, knowledge of the Rehabilitation Act, or contact with other persons with disabilities. However, the more articulate and precise students were at expressing their needs to the instructor the more likely they were to receive those services. The autonomy afforded to professors in regard to academic

freedom may be detrimental to students with disabilities, and as a result, students with disabilities should be provided with advocacy skills to enhance their educational opportunities (Farbman, 1983).

University personnel serving students with disabilities must be aware of additional attitudinal barriers individuals with disabilities face. Garvey (1991) investigated campuses that developed programs specifically designed to create more accessible campuses. The findings show that the attitude of students without disabilities toward their peers with disabilities was more favorable on these campuses as compared to campuses without programs focused on creating an accessible environment. Similarly, findings in other studies indicated that the more access individuals with disabilities have to university facilities the more accommodating the staff and students are to needs and concerns of students with disabilities (Fichten, Goodrick, Tagalakis, Amsel & Libman, 1990).

Physical Barriers

Physical barriers continue to exist on university campuses. Students with disabilities often face many physical barriers to accessing opportunities to participate and become actively involved in academic activities at universities. Architectural barriers that students with disabilities face include features of buildings, building access, classroom access, and public facilities such as elevators, restrooms and parking availability within a university (Brown, 1992; Schneid, 1992). Specific barriers identified by students with disabilities were the lack of adaptive aids, inaccessible buildings and grounds, and lack of other educational accommodations (West et al, 1993). The quality of life of individuals with physical disabilities depends greatly on the degree to which the social and physical

environment is disabling. If all buildings had ramps and colleges did not exclude people who use wheelchairs from housing facilities, many individuals would not see themselves as having a significant disability (Minow, 1990).

Students who use wheelchairs for mobility continue to encounter problems during their postsecondary careers (American Council on Education, 1995). King (1980) surveyed 33 student wheelchair users at three major public universities in Michigan and identified barriers in the physical environment. Barriers included lack of adequate snow removal, inaccessible housing, inaccessible cafeterias, inaccessible drinking fountains, inaccessibility to sporting events, and inadequate help to facilitate self-care activities. King's (1980) research indicated male students reported fewer concerns than females, and students without upper extremity involvement had fewer concerns.

Paul (1998) described accessibility issues that students with physical disabilities face. A student who uses forearm crutches could have great difficulty getting from class to class in the allocated 10 minutes. Similarly, students who use wheelchairs may struggle with finding accessible restrooms close to their classrooms (Paul, 1998). The availability of appropriate medical services has also been identified as a barrier for students attending postsecondary institutions (Lehman, 2000). Students who were deaf reported going to the university health clinic but were unable to receive assistance due to communication difficulty. The clinic did not employ a medical professional or staff member who was able to understand sign language (Lehman, 2000).

Legislative Impact on Barriers Students with Disabilities Encounter

Legislation in the past 30 years has helped to eliminate some of the academic, attitudinal, and physical barriers that students with disabilities face at institutions of

higher learning. However, the flexibility the laws allow in the way disability related services are provided in postsecondary institutions does not ensure students with disabilities have the same opportunities and supports afforded to them from one institution to the next. The differences in the interpretation of the Americans with Disabilities Act make it difficult to have a minimum standard for providing specific types of accommodation, services, and supports (Tagayuna et al, 2005).

Since the late 1960s, legislation has been passed that directly impacts individuals with disabilities and the opportunities afforded them at institutions of higher learning. The Architectural Barriers Act of 1968 required the removal or avoidance of architectural barriers designed, built, altered, or leased with Federal funds (P.L. 90-480). The Rehabilitation Act of 1973 addressed the right of individuals with disabilities to have equal access to federally funded institutions (P.L. 93-112). Section 504 of the Rehabilitation Act significantly impacted students with disabilities who planned to attend institutions of higher education. Section 504 states that, "...no otherwise qualified individual with a disability in the United States, as defined in section 7(20), shall, solely by reason of her or his disability, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance"(P.L. 93-112). This section requires postsecondary institutions who receive federal funding to provide equal educational opportunity for "otherwise qualified handicapped individuals" (Kaplan, 1985, p. 242). Subpart E of Section 504 also lists modifications that postsecondary institutions may provide. These modifications include course substitutions, extensions of time limits for degree completion, modifying the manner in which courses are conducted, modifications to

course examinations, the provision of taped texts, sign language interpreters, readers in libraries, and adaptation of classroom and laboratory equipment (P.L. 93-112).

The Education for All Handicapped Children Act of 1975 (P.L. 94-142), is now known as the Individuals with Disabilities Education Act (IDEA) (P.L. 105-17). This act was amended in 1990, 1997, and 2004 (Individuals with Disabilities Education Improvement Act). IDEA requires schools to meet the special needs of students through the development of an Individual Education Program (IEP) while keeping the student in the least restrictive environment. In amendments to the original statute, the law requires schools to include a transition statement by age 16. As a result of this law, the number of children with disabilities participating in the regular education classroom increased and teachers developed plans for postsecondary education. The law provides additional educational opportunities to students with disabilities allowing for higher levels of learning that prepare students who wish to attend postsecondary institutions upon graduation (Shaw, McGuire, & Brinckerhoff, 1994).

The Fair Housing Act, as amended in 1988, prohibits discrimination against individuals with disabilities in housing (P.L. 100-430). The Fair Housing Act makes it unlawful for private housing, housing that receives Federal funds, and state and local governments to discriminate against individuals with disabilities in regard to selling or renting housing. Reasonable exceptions must be made in regard to policies and operations of housing facilities in order to provide individuals with disabilities equal access (United States Department of Justice, 2002). This law impacts students with disabilities attending postsecondary education by increasing their access to housing opportunities that previously did not exist.

As disability law evolved, the Americans with Disabilities Act was created to encompass many of the regulations in past legislation and attempted to address many of the previous loopholes that existed. The ADA prohibits discrimination on the basis of disability in employment, transportation, public facilities and communications, and public accommodations (P.L. 101-336). The ADA now applies to all United State colleges and universities regardless of federal financial assistance or private status. The ADA provides a legal avenue for individuals with disabilities to pursue if their civil rights are not granted due to discrimination on the basis of disability (Jetesen, 2001).

With the passage of the Americans with Disabilities Act there has been a significant increase in support provided to individuals with disabilities. However, barriers continue to exist in regard to the way the law was written and how postsecondary institutions choose to provide the required services. Disability services that elementary and secondary students receive through the public education system are guided and provided through a strict set of guidelines under The Individuals with Disabilities Act (IDEA) (Dukes, 2001). Under the ADA, the student carries two burdens: (a) the student must self-identify to the university they have a disability and (b) the student must prove that requested accommodations are needed to ameliorate the functional limitations caused by the disability (P.L. 101-336, 1990).

The ADA also requires universities to provide accommodations unless undue cost occurs or significant operational change is needed (Jetesen, 2001). This regulation allows universities to challenge requests for physical and educational accommodations due to financial concerns, potentially resulting in students' inability to access university services. The ADA was also created to allow for flexibility in regard to the type and way

an accommodation is provided within a postsecondary institution. Universities are not required to provide accommodations in a standard way. Postsecondary institutions are required to provide effective but not necessarily the best accommodations (Fuller, 2001).

Because a specific set of service delivery standards for postsecondary institutions was not mandated through the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, court decisions throughout the 1980s and 1990s were responsible for determining requirements of the provision of disability services in higher education (Brinkerhoff et al., 2002). A number of court decisions have influenced the requirements of postsecondary institutions to provide disability related services. These include: *Southeastern Community College v. Davis, 1979*-determining who is qualified to receive services; *Grove City College v. Bell, 1984*- the extent of Section 504 coverage; *Campbell A. Dinsmore V. Charles C. Pugh and the Regents of the University of California, 1989* and *Wynne v. Tufts University School of Medicine, 1992*-reasonable accommodations and *Howe v. Hull, 1994*- the ability of persons with disabilities to sue individuals, as well as public institutions on the basis of discrimination (Dona & Edminster, 2001; Madaus, 2000).

Postsecondary Disability Support Centers

Many universities have developed accessibility centers where individuals with disabilities can obtain services. These centers generally employ some type of disability counselor or coordinator who assists with determination of eligibility, development of services, and oversight of accommodations provided (AHEAD, 2002a, 2002b; Fichten et al, 2004). Professionals hired to provide services in the postsecondary disability centers come from a wide variety of disciplines and their duties often differ.

This inconsistency in professional training often results in the service delivery model being significantly different from university to university (Brinckerhoff, McGuire, & Shaw, (2002). Complicating the problem further, universities are not required to follow a designated set of standards when providing disability services. Due to a minimal budget or lack of personnel, an institutions' service delivery model may be negatively affected without a mandated set of standards for the provision of disability services (Tagayuna et al, 2005; Stodden, Conway & Chang, 2002; Whelley, Hart & Zaft, 2002).

Legislation pertaining to postsecondary disability services does not require institutions to follow a standard service delivery model. However, The Council for the Advancement of Standards in Education (CAS) and the Association for Higher Education in Disabilities (AHEAD) have both published a set of standards for disability support services at universities. Unfortunately, CAS standards have not been empirically validated (Dukes, 2001).

AHEAD, which is the professional organization for postsecondary disability support workers published a set of professional guidelines (Shaw, McGuire, & Madaus, 1997) and program standards (Shaw & Dukes, 2001). AHEAD's program standards were created through a survey administered to offices of students with disabilities practitioners to determine what disability office service components professionals in the field see as essential when providing appropriate accommodations to students with disabilities (Dukes, 2001). The standards were approved in June, 1999, by the membership of AHEAD (Shaw & Dukes, 2001).

Recommendations from postsecondary disability providers on what types of services should be provided to students with disabilities is an important step needed to

make certain students with disabilities receive the accommodations needed to be successful in higher education. In order to ensure that postsecondary disability offices support students with disabilities in the most effective way possible, research must also examine types of disability related services that predict student graduation.

Types of Accommodations Provided by Postsecondary Disability Offices

Several studies have been conducted to identify the types of services provided in postsecondary institutions (Bieren, Smith & Deck, 1989; Bursuck Rose, Cowen & Yaha, 1989; Sergent, Carter, Sedlacek & Scales, 1988; Tagayuna et al., 2005). Researchers at the National Center for the Study of Postsecondary Educational Supports (NCSPEs) conducted a national survey administered to 1,500 disability support coordinators working in postsecondary education institutions. Results of the report showed that the most commonly provided disability supports offered at least 75% of the time at postsecondary institutions in 2001 were testing accommodations (89%), personal counseling (75.1%), note takers/scribes/readers (72.6%), advocacy (71.6%), tutorials (63.5%), interpreters (61.9%), learning center laboratory (61%), and career/vocational assessment (65%) (Tagayuna et al., 2005). Disability supports least likely to be provided by postsecondary institutions included summer orientation, assistive technology evaluations, real time captioning, disability specific assessment/ evaluations, and assistance with transferring supports to a work setting (Tagayuna, et al, 2005). “The lack of consensus among postsecondary institutions of what should be considered a ‘standard base service,’ as well as, their inability to offer individualized accommodation plans, impacts the decision making process of this population and often forces students with

disabilities to make the time-consuming effort of mapping and negotiating their postsecondary lifestyle.”(Tagayuna et al, 2005, p.8)

Measures of Student Success (Output)

As higher education becomes more accessible, individuals with disabilities are attending these institutions at a higher rate because of the potential opportunities postsecondary education provides. Many students attend postsecondary education with the hope it might provide opportunities including employment, respect, and acceptance (Paul, 2000). Recent statistics indicated that students with disabilities who graduate from college have similar labor market outcomes as their non-disabled peers (Horn & Berkold, 1999; NCES, 1999).

Although the number of students with disabilities who choose to attend higher education has increased, it appears that many of these individuals have difficulty remaining at these institutions and graduating. Many students with disabilities fail academically or leave postsecondary institutions before they have completed their programs and graduated (Fairweather & Shaver, 1991). Researchers employed through the United States Department of Education (2000a) found that 53% of students with disabilities, as compared to 64% of their non-disabled peers, received a degree at a postsecondary institution five years after enrolling. They also reported that students with disabilities are less likely than their non disabled peers to earn a postsecondary degree. In addition, students with disabilities enrolled in two-year postsecondary programs that report they intend to transfer to a four-year institution typically do not (NCES, 2000b). Furthermore, students with disabilities who complete postsecondary education typically take twice as long as students without disabilities (NCSPES, 2000b).

Very few postsecondary institutions currently collect data on the grade point average, graduation, and retention rates of students enrolled through their disability offices. In a 2001 study, only 10 of 43 participating universities report collecting retention rates of students with disabilities for the past three years (Fuller, 2001). Personnel in disability offices at universities are just beginning to collect retention and graduation numbers of students receiving their services. The delay in this process makes it difficult to look at the impact disability related services have on the students' success (Fuller, 2001).

Factors that Predict Student Success

Little data exists on the effectiveness of disability services provided in postsecondary educational institutions. By comparison, data has been collected on students' perspectives of types of accommodations that are most effective. Other studies conducted address student characteristics predictive of student success, as well as, how specific accommodations may predict a variety of student success measures.

Student Success Based on Student Report.

Nale (1993) asked students with disabilities to rate the importance of 20 disability related services. The top five services students ranked as most important were (a) financial aid assistance; (b) academic advising from counselors knowledgeable in the special needs of students with disabilities; (c) career services designed to assist with appropriate selection of careers; (d) job placement services after graduation; and (e) counseling services (Nale, 1993). Students identified the provision of self-advocacy training as essential to student success in other studies. Students with disabilities noted in a national focus group study that disability offices needed to focus more on supporting

and developing self advocacy as opposed to providing information and advocating on behalf of the student (NCSPEs, 2000b; Stodden, Conway & Chang, 2002).

Researchers who conducted a study at Virginia Commonwealth University assessed the effectiveness of the supported education model in postsecondary disability services (Getzel., McManus & Briel, 2004). The model focuses on providing individualized supports and services that are driven by consumer goals. University and community resources are utilized in this model to ensure students are supported within campus life (Cooper, 1993; Egnew, 1993; Unger, 1998; Getzel, McManus, & Briel, 2004). The supported education model was provided to a cohort of 24 students with learning disabilities and attention deficit disorders receiving disability services at Virginia Commonwealth University. Students participating in the study reported the educational strategies found to be most effective were time management strategies, use of technology, self advocacy strategies, study/test taking strategies, and practice sessions for students who needed to pass clinical requirements (Getzel et al, 2004).

In a 2001 study of postsecondary computer and information technology, researchers documented the responses of 37 students with disabilities attending higher education in Canada regarding the technology they valued most (Fichten, Asuncion, Barile, Fossey, & Robillard, 2001). Study participants reported spelling and grammar checking, scanners, portable note taking devices, dictation software, and material in electronic format as the most valued tools in their postsecondary education programs (Fichten et al, 2001).

Student Characteristics Predict Success.

Few studies address student characteristics that predict student success. Flowers (1993) completed a study of 167 students who attended Southern Illinois University at Carbondale between fall of 1990 and summer of 1992. He investigated student factors that predicted academic success of individuals with disabilities in postsecondary institutions. Student grade point average was the best predictor for academic persistence. In addition, the student's acceptance of the disability was also found to be a significant predictor to academic success, as well the age of the individual. Older students tended to have better grade point averages (Flowers, 1993).

In 2004, Skinner conducted a qualitative study that looked at the affect student self advocacy had on the success of 20 students with learning disabilities in postsecondary education. Skinner (2004) found that students with learning disabilities who demonstrated knowledge of their disability and communicated their rights and needs to authority figures were more likely to succeed in postsecondary education than students who were unable to demonstrate these competencies.

Disability Services Predict Student Success.

A few studies explored the effect disability accommodations have on various student success measures. Keim, McWhirter and Bernstein (1996) explored the relationship between the types of academic supports college students with disabilities received (N=125) and student grade point average. Advisement contacts, computer laboratory utilization, tutor utilization and test accommodations were the independent variables used in the study and student cumulative grade point average was the dependent variable. The researchers found students who received low levels of advisement and

utilized the computer laboratory at high levels had significantly higher cumulative grade point averages than students who did not (Keim, McWhirter & Bernstein, 1996).

Course substitutions can be effective in increasing students with disabilities graduation rates (Skinner, 1999). Students with learning disabilities often have difficulty with universities' foreign language requirements. This is often related to those students difficulty with sound discrimination, working memory, grammatical sensitivity, and ability to represent unfamiliar phonological material accurately (Crain, 1989; Gass & Selinker, 1994; Humes-Bartlo, 1989; Mann, Cowin & Schoenheimer, 1989; Service, 1992; Skehan, 1986; Spolsky, 1989). Skinner (1999) conducted a descriptive study of over 700 college students with disabilities. He found that students with learning disabilities who took advantage of math or foreign language course substitutions were more likely to graduate than students who did not take advantage of this accommodation (Skinner, 1999).

Testing accommodations can positively effect student achievement. Several researchers reported that the provision of extended time on tests significantly increased students' with learning disabilities test scores (Alster, 1997; Hill, 1984; Jarvis, 1996; Ofiesh, 2000; Runyan, 1991a, 1991B; Weaver, 2000). However, Halla (1988) found differing results when assessing the effect the provision of extended time on the Nelson Denny Reading Tests and Graduate Record Exam had on students with and without learning disabilities. Halla (1988) found no difference in students' with and without learning disabilities timed scores.

Initial studies completed by AHEAD and the National Center For The Study Of Postsecondary Educational Supports determine what accommodations are needed and

most appropriate to ensure success in higher education from both the professionals' and students' with disabilities perspectives. The next step to ensure that the disability professions' "standards are grounded in theory or supported by evaluation data" is to analyze what accommodations received by students with disabilities predict positive student outcomes (McGuire, Norlander, & Shaw, 1990, p.71).

Conclusion

This review of the literature shows that university disability office personnel have only just begun to develop a specific service delivery model that ensures students with disabilities the appropriate accommodations they need to be successful in postsecondary institutions. Research indicates that there continues to be a wide variance in the provision of services at universities, and little research exists in regard to the effectiveness of university disability programs. Additional research is needed to understand the extent to which services and accommodations provided by disability offices impact retention and graduation rates positively. Such data will assist universities in developing institutional policies, training programs and service delivery models that best support students with disabilities to achieve success at institutions of higher education, as measured by student graduation.

Chapter 3: Method of Study

The research utilized a prediction survey design that relied upon information contained in the records of college students with disabilities. The record review was used as a mechanism to collect student demographic data, disability related services the student receives, and student graduation status, and in the process, no subjects were directly involved. This design was selected because it allowed the researcher to determine which set of student characteristics and disability-related services are most highly related to students' graduation rate. The data was analyzed within a hierarchical logistic regression framework to construct a model that includes the set of student characteristics and disability accommodations that best predict graduation among students who receive services in the disability offices of institutions of higher education. This chapter provides a description of the study's sample, instruments, and procedures.

Sample

This study surveyed students receiving postsecondary disability services *ex post facto* via information contained in the records of students receiving accommodations through university disability offices. A non-probability purposive sample of 1,289 inactive student files located at the disability offices of three, midwestern public universities were used for the record review. Student records from disability offices included all student files deemed inactive in the school years 2001-2002 through 2004-2005.

Participants were not recruited for this study and only records of students who were no longer enrolled at the universities were reviewed. Therefore, there was complete

anonymity ensured for students per se. Each university's institutional review board waived the informed consent of the students with disabilities for the following reasons. Data was analyzed in aggregate and no name was attached in any way ensuring anonymity when data was transferred from the record onto the questionnaire. The raw data was kept in a locked file cabinet located in the office of this researcher.

Instrument

A 20 item questionnaire was developed to be used as a mechanism to collect student demographic data (Inputs), disability related services the student received (Environment) and student graduation (Output) (see Appendix A). Demographic variables included gender, age, ethnicity, disability, and student status (undergraduate/graduate). Predictor variables included: (a) accessible classrooms; (b) alternative format tests and assignments, (c) assistive technology; (d) classroom assistants, (e) course waivers or substitutions, (f) distraction reduced testing, (g) extended test time, (h) flexibility in assignment and test dates, (i) interpreting services, (j) learning strategies/ study skills assistance, (k) note taking services, (l) physical therapy/ functional training, (m) residence halls specialized in accommodating students with physical disabilities, (n) support groups/ individual counseling, and (o) transportation. The criterion variable was student graduation status.

Data Collection

The University of Missouri's Campus Institutional Review Board (IRB), as well as those of the universities who participated the study, approved the study waiving consent due to the anonymity involved in the study. Administrators of the disability support programs at the three designated institutions were contacted by telephone and

asked to participate in the study. They were informed of the criteria for student case file selection which included all student files that were deemed inactive from the school years 2001-2002 through 2004-2005. During that time period, there were 206, 345, and 738 inactive files in the three universities, respectively. These student files deemed inactive during the designated time period were used as the sample of case files collected from each institution.

The researcher traveled to two of the participating universities to collect data directly from student files located within the disability offices. A graduate student employed through the third participating university's disability support center was recruited and trained to collect the required information using a database located within the disability office. Consent forms to conduct the study were signed by the participating universities. The graduate student worker and this researcher systematically collected the selected demographic and disability support variables from student files at each of the three, designated universities. There was no link of person to the records reviewed. Instead, each questionnaire was numbered only, and data from records were transferred to the questionnaire.

Data Analyses

The record review survey was used as a mechanism to collect student demographic data, disability related services each student received, and student graduation. Student demographics were recorded on the questionnaire as categorical, independent variables. Types of disability related services the students received were documented as binary, categorical variables (yes/no), as was student graduation.

Once data collection was completed at all three universities, this researcher transferred the data into SPSS. One large file was created which included data from all three universities.

The data was analyzed within a hierarchical logistic regression framework to determine which set of student demographics and disability related services predicts graduation for all students with disabilities. In general, logistic regression is used to find a combination of independent variables that best predict membership in a particular group measured in terms of a dependent variable. Logistic regression allows you to have categorical or continuous independent variables and requires that you use a binary categorical dependent variable (Menard, 2002). The value predicted is a probability, which ranges from 0 to 1 when conducting logistic regression (Mertler & Vennatta, 2005), and the value specifies the probability of the particular outcomes for each subject or case involved.

A regression equation is then produced that accurately predicts the probability that an individual will fall into one category (Mertler & Vennatta, 2005). The odds ratio produced from the analysis is a measure of effect size and indicates the probability of an event occurring in the first group to the probability of it occurring in the second group. The event is equally likely to occur in both groups when the odds ratio is 1. An odds ratio greater than 1 implies the event is more likely to occur in the first group. An odds ratio less than 1 implies the condition is more likely to occur in the second group (Mertler & Vennatta, 2005). A -2 Log Likelihood value is also produced from this analysis which indicates the overall model fit. Smaller -2 Log Likelihood values indicate a better fit (George & Mallery, 2000).

For the purposes of this study, two sets of predicting factors were entered into the regression in a hierarchical fashion to determine whether or not the individual either graduated or did not. Individual student characteristics were entered first, followed by disability services. Additionally, hierarchical logistic regression analysis was used with three other data subsets to determine the set of student characteristics and disability services that predict graduation for students with cognitive disabilities, mental disorders, and physical disabilities.

It is noteworthy to mention that the predictor variable, disability type, was not included in the equation for each disability subset because it was a constant. Also, before conducting the hierarchical logistic regression, any student service variables that had cells with frequencies less than 5 in the data matrix were dropped from the regression analysis. When conducting logistic regression, if any of the cells have frequencies less than 5 the analysis may have little power (Tabachnick & Fidell, 1996). Interpreting services was the only variable in the cognitive disability data set dropped from the regression analysis. Alternative format tests and assignments, course waivers and substitutions, interpreting services, physical therapy and functional training services, specialized residential halls, and transportation services were the predictor variables not included in the regression analysis conducted using the mental disorder data set. Alternative format tests and assignments, course waivers and substitutions, flexibility in assignment and test dates, learning strategies and study skills assistance, physical therapy and functional training services, specialized residential halls, and transportation services were the predictor variables in the physical disabilities data set dropped from the regression analysis.

Peduzzi, Concato, Kemper, Holford, and Feinstein (1996) suggested that there be at least 10 cases for every independent variable included in a logistic regression equation. If this rule is not used when conducting logistic regression, high standard errors may result and the reliability of predictive estimates will decrease. This requirement was met by all four data sets. The regression analysis of all students with disabilities (N= 1,272) included 23 predictor variables and the analysis of students with cognitive disabilities (N= 704) included 20 predictor variables. Furthermore, the regression analysis for students with mental disorders (N=179) included 14 predictor variables and the regression analysis for students with physical disabilities (N= 384) included 14 predictor variables.

Logistic regression has less stringent requirements as compared to other regression models. For example, linearity of relationship is not assumed between the independent and dependent variables, and neither homoscedasticity nor normality has to be satisfied when using logistic regression (Mernard, 2002).

Assumptions

In this study, one assumption is that support service personnel at the university disability offices correctly documented student demographics and accommodations received on the appropriate sheets in student files. Another assumption is that support service personnel correctly documented student graduation status. A final assumption made in conducting the study is that all students with disabilities attending the designated universities asked for the accommodations needed to be successful in terms of graduating.

Limitations of the Study

Several limitations must be considered when reviewing the results of this study. The study was geographically restricted to midwestern, four-year, public universities. Therefore, one must be careful not to generalize the results to other geographic areas, as well as, private or two-year universities. Furthermore, only the records of students who were no longer enrolled at the university were reviewed. It is unknown whether students who left the university before graduating transferred to another postsecondary institution.

Also, the study was limited to university students identified as having a disability by the university disability office. The study is lacking a control group of students with disabilities who did not register with or receive services through the university disability office. Additionally, only two of the universities participating in the study documented both the students' primary and secondary disabilities. For the purposes of this study, only the students' primary disability was included in the regression model. Other factors related to the student's secondary disabilities are beyond the scope of this study. Finally, data for this study was collected using existing records. There was no attempt to collect qualitative information from students.

Several factors besides student demographics and accommodations received influence the outcome of students with disabilities attending higher education. These factors include the quality of interaction between student and disability office personnel, quality of interaction between student and professor, student readiness, family and friend support, financial support, and health issues. These factors were not measured for the purpose of this study, and furthermore, other measures of student success were not incorporated into the study. These measures include student grade point average, field of

study, student satisfaction with services, post-graduation employment and post-graduation financial status. Future studies may explore these other student success measures to provide additional information in regards to the success of students with disabilities.

In addition, after analyzing the data it was found that the graduation rate of one of the participating universities was significantly higher than the other two participating universities' graduation rates. However, the disability directors employed through the participating university disability offices agreed to participate in the study with the understanding that results from individual university data analyses would not be reported or compared. Therefore, this researcher is unable to report any differences that may exist between analyses conducted with each participating university.

Last, there are some limitations to logistic regression that must be noted. First, large parameter estimates and standard errors may result if the ratio of cases to the number of discrete variables is too low (Mertler & Vannatta, 2005). If this occurs, the researcher must collapse the number of discrete variables (Tabachnick & Fidell, 1996). Second, logistic regression relies on a goodness of fit test to assess the fit of the model. The analysis will have little impact if any of the predictor variables have frequencies that are too small ($f < 5$) (Tabachnick & Fidell, 1996). Third, multicollinearity may result if there is a high correlation between predictor variables (Mertler & Vannatta, 2005). Finally, logistic regression models can be sensitive to outliers and they should be examined carefully (Mertler & Vannatta, 2005).

Pilot Study

An initial pilot study was conducted to consider the preliminary design of the study, data collection tools, and data analyses procedures for the larger study. The study examined which types of postsecondary disability services predicted student success in terms of graduation rate and grade point average. A sample of 201 student files deemed inactive between the school years 2001-2002 through 2004-2005 in one public, midwestern university disability office was selected for the pilot study. Initial findings indicate that student status (graduate/ undergraduate) and flexibility in assignment and test dates may increase the likelihood of students with disabilities graduating. Distraction free testing and student financial aid may increase students with disabilities grade point averages.

Data collection procedures established for the pilot study worked in the field setting and this researcher obtained the required information needed to answer the research questions. In conducting the pilot study, changes in the study design included an alteration in the identified disability categories listed on the questionnaire as well as a more in depth description of the defined disability categories. Specific non-academic disability services that were not found to be documented in the disability office records were omitted from the questionnaire used in this study. Those included career counseling and student clubs.

The sampling strategy and data generation procedures used in the pilot study effectively allowed the researcher to determine which combination of disability services predicted success for all students with disabilities. Due to the pilot study's small sample size (N=201) and large number of independent variables (16), the researcher was unable

to conduct logistic regression to examine the type of disability services that predict student success for each of the separate disability categories identified in the study. The size of the sample in the current study (N=1,289) allows for determining which set of accommodations predicted student graduation rate by disability category.

Theoretical Definitions

Students with disabilities: Persons who (a) have a physical or mental impairment which substantially limits one or more of such person's major, life activities, (b) have a record of such an impairment, or (c) are regarded as having such an impairment (Rehabilitation Act of 1973, Section 7 (8) (B))

Primary disability: The disabling condition identified by each university disability office that has the greatest impairing effect on his/ her academic progress and performance.

Public university: A university supported in part by federal and state appropriations. A university offers academic training in a specific field or area to students for at least four years. Universities also provide advanced academic training beyond four years (Westmeyer, 1985).

Operational Definitions of Student Disability Categories

The following definitions were taken directly from the university disability offices participating in this study.

Students with cognitive disabilities: Students with a specific learning disability, attention deficit hyper activity disorder, or a traumatic brain injury/ acquired brain injury who qualified to receive postsecondary disability accommodations through the university they were attending.

a. Students with specific learning disabilities: Students receiving accommodations must provide documentation from a licensed professional that includes a specific diagnosis which conforms to DSM-IV criteria for a specific learning disability. A neurological or psychological evaluation must also be provided which illustrates a substantial limitation to learning. The comprehensive assessment battery must contain the following domains: aptitude/ cognitive ability, academic achievement, and information processing. Documentation must also include a clinical summary which indicates the substantial limitations to major life activities posed by the specified learning disability, describes the extent to which these limitations impact the academic context for which accommodations are being requested, suggests how the specific effects of the learning disability may be accommodated, and states how the effects of the learning disability are mediated by the recommended accommodations.

b. Students with a traumatic brain injury/ acquired brain injury: Students receiving postsecondary accommodations must provide a thorough neuropsychological evaluation which includes assessment of the areas of attention, vision perception/ visual reasoning, language, academic skills, memory/learning, executive function, sensory, motor, and emotional status. Data should include subtest scores and percentiles. Documentation should also include evidence of current impairment and a clinical summary which indicates the substantial limitations to major life activities posed by the disability, describes the extent to which these limitations would impact the academic context for which accommodations are being requested, suggests how the specific effects of the

disability may be accommodated, and states how the effects of the disability are mediated by the recommended accommodations.

*c. **Students with attention deficit hyper activity disorder:*** Students with attention deficit hyper activity disorder who qualify to receive postsecondary disability accommodations. Students receiving postsecondary accommodations must provide current documentation by a qualified treating professional of a DSM-IV diagnosis of attention deficit hyper activity disorder including the results of assessments used to make the diagnosis, a description of how the condition affects major life activities, and recommendations for academic accommodations.

Students with mental disorders: Students with mental disorders who qualified to receive postsecondary disability accommodations through the university they were attending. Students receiving accommodations must provide current documentation from a licensed psychologist, psychiatrist, or licensed clinical social worker, which includes a specific, current psychiatric diagnosis as per the DSM-IV which indicates the nature, frequency, and severity of the symptoms upon which the diagnosis was predicated.

Students with physical disabilities: Students with deafness or hearing loss, students with a visual impairment or who are blind, and students with a mobility, systemic, or disease related disability who qualified to receive postsecondary disability accommodations through the university they were attending.

*a. **Students with deafness or hearing loss:*** Students receiving accommodations must provide documentation consisting of an audiological evaluation and/ or an audiogram, and an interpretation of the functional implications of the diagnostic data and hearing aid evaluation when appropriate.

b. Students with low vision and blindness: Students receiving postsecondary accommodations must provide documentation consisting of an ocular assessment or evaluation from an ophthalmologist, a low vision evaluation of residual visual function when appropriate and suggestions as to how the functionally limiting manifestations of the disabling condition may be accommodated.

c. Students with a mobility, systemic, or disease related disability: Students receiving accommodations must provide documentation of a current medical or physical disability that is based on appropriate diagnostic evaluations administered by a physician identifying the disabling condition, an assessment of the functionally limiting manifestations of the conditions for which accommodations are being requested, and suggestions as to how the functionally limiting manifestations of the disabling conditions may be accommodated.

Disabilities classified in this category may include spinal cord injury (including paraplegia and quadriplegia), multiple sclerosis, cerebral palsy, muscular dystrophy, post poliomyelitis, amputations, juvenile rheumatoid arthritis, allergies/asthma, arthritis, non-paralyzing spinal injuries or disease, carpal tunnel syndrome, chronic fatigue syndrome, chronic pain, diabetes, environmental illness, epilepsy, Grave's Disease, AIDS, heart/lung conditions, kidney disease, lupus, leukemia, other blood disorders, and viral meningitis.

Operational Definitions of Disability Services

The following definitions were taken directly from the university disability offices participating in this study.

Accessible classrooms: This classroom accommodation allows for student physical accessibility. Accommodations provided may include preferential seating, accessible seating, table top desks, lap boards, and requests to academic departments for a class to be relocated to an accessible location. This accommodation may also provide students with disabilities the option to have frequent breaks or the ability to stand up or lay down during class.

Alternative format tests or assignments: This accommodation provides students with the option to receive alternative format tests or assignments. Examples of alternative format testing or assignments include an essay exam as a substitute to a multiple choice exam, or a written paper as a substitute for an oral presentation. Disability documentation that clearly identifies the need for the accommodation is necessary to receive this service and faculty members must be consulted with respect to the intent of the test format. .If altering the test format fundamentally alters the nature of the course, this accommodation is not appropriate.

Assistive technology: Assistive technology is available to students to maximize their ability to effectively complete course requirements. Some of the adaptive resources and services include: adaptive computers, tape recorders, talking calculators, sound amplification systems, television enlargers, voice synthesizers, specialized gym equipment, calculators or keyboards with large buttons, switches, and technology assessments and evaluations. Text conversion is also classified in this category. Text

conversion includes the provision of textbooks and other course material in an alternative format such as electronic/audio text, enlarged text, Braille, and raised graphics.

Classroom assistants: This accommodation applies to students who require an in-class assistant or an assistant at the campus library to complete course requirements.

Classroom assistants may include a scribe, reader, lab assistant, library assistant, or mobility assistant.

Course waivers or course substitutions: This accommodation applies to students with disabilities requesting extraordinary accommodations to the general education requirements. The accommodation applies to students who wish to have a foreign language, communication, or quantitative reasoning requirement waived or substituted for another course.

Distraction reduced testing: Distraction reduced testing is provided to students who have significant difficulty with concentration, or are highly distractible, or employ test strategies that may be distracting to those around them. Some students with physical disabilities may need a separate room to lie down or stand up as a way to manage pain or muscular conditions.

Extended test time: This testing accommodation allows students with disabilities to have an extended amount of time to complete tests. Extended time is recommended for students whose performances is compromised by a physical or cognitive disability that causes significantly slower reading, writing, recalling, or organizing. Students may be eligible to receive time and a half, double time, triple time or unlimited time.

Flexibility in assignment and test dates: Students whose disabilities fluctuate (depression, chronic fatigue syndrome, diabetes) may request a test date or an assignment

date change so they are able to complete the assignment/ test when interference from their condition is minimal. Students are expected to complete the assignment and tests within a reasonable amount of time from the test date and to notify the instructor of the request in a timely manner.

Interpreter services: Interpreting services are available to students who have a documented profound hearing loss or deafness. These services are available in the classroom and for university-sponsored events that require an interpreter.

Learning strategies and study skills assistance: This service provides one-on-one weekly, biweekly or as needed appointments with the learning disabilities specialist to work on strategies for test preparation, test-taking, reading comprehension, written expression, organization, goal setting and achieving, and problem solving/crisis management.

Note taker services: Faculty members may provide students a copy of his/her personal lecture notes. When faculty members are unable to provide notes, DSS or the professor will recruit individual note takers, ideally, teacher assistants or other students in the classes. Faculty members are notified of students' eligibility for note takers in the form of accommodation agreements, which are mailed or student delivered. Requests for this service must be supported by appropriate, professional and reasonably current documentation.

Physical therapy and functional training: Physical therapy and functional training services provide the opportunity for strength development, physical conditioning and functional training for students whose disabilities significantly limit the effective utilization of the fitness and recreational resources and programs which are otherwise

available to students. Through participation in the services, students with severe physical disabilities are afforded the opportunity to maximize their functional potential, relieve stress and increase their tolerances relative to the rigorous demands of campus life through the milieu of adaptive exercises. The physical therapist and graduate assistants aid students in developing and implementing personal exercise programs, particularly for developing and maintaining range of motion, strength and conditioning. The staff can also assist students with the development of transfer skills, e.g., getting back into a wheelchair from the floor, manual wheelchair skills, and gait training with or without assistive devices. Supplemental to the active therapy program, a limited number of physical agents are available for the treatment of acute and chronic musculoskeletal injuries and dysfunction.

Residence halls specialized in accommodating students with physical disabilities:

This is a university residence hall operated by the office of disabilities which specializes in accommodating the residential needs of students with severe physical disabilities who require assistance in the performance of basic activities of daily living. Students needing assistance in the performance of activities of daily living are afforded the opportunity to participate in training to improve their knowledge and skills in independent living, and are empowered by the responsibility which they share with the residential hall administrative team for hiring, training, scheduling, managing, and evaluating personal attendant staff. A Transitional Disability Management Plan (TDMP) is developed between the Residential Hall Disability Specialist, resident, and others identified by the student for involvement in the TDMP process. The purpose of the TDMP is to improve each student's management of his/her disability-related needs.

Support groups and individual counseling: This service includes student participation in individual counseling and/ or support groups provided through the university disability office. Support groups are available to students with attention-deficit/hyperactivity disorder, learning disabilities and students with mental disorders. These support groups meet on a regular basis and provide students with support, social interaction, and problem solving strategies.

Transportation services: This service provides accessible university transportation to students with disabilities through the university disability office.

Chapter 4: Results

Chapter one of this dissertation established the need to determine the set of student characteristics and student disability services that predict graduation for students with disabilities receiving postsecondary disability services. Chapter two focused on the literature related to the characteristics of students with disabilities attending higher education and the types of services available to them through postsecondary disability offices. Chapter three described the method and procedures used to determine which set of student characteristics and disability services best predicts graduation for postsecondary students with disabilities. This chapter describes the sample of students registered with the disability offices of three large universities and presents the results of hierarchical logistic regression analyses that show which combination of student characteristics and disability services predicts postsecondary student graduation.

Student Characteristics (Input)

The researcher reviewed the inactive records of 1,289 students registered with the disability office of three universities in the school years 2001-2002 through 2004-2005. The student's file was deemed inactive based on the last year s/he was enrolled in courses. Of the 1,289 students identified in this sample, 18.1% of the student's files were deemed inactive in the 2001-2002 school year, 24.8% were deemed inactive in the 2002-2003 school year, 25.8 percent were deemed in active in the 2003- 2004 school year, and 31.3% were last enrolled during the 2004-2005 school year.

The student sample (N=1,287) included slightly more males (53.3%) than females (46.7%) who were between 17 and 67 years of age (N= 1,279, X=26.13, SD=7.515).

Student age was determined by using the student's birth date to calculate the age of the student on May 1st of the school year during which the file was deemed inactive. The self-identified ethnicity of all students were reported in the following ways (N=1,281): White/ Non-Hispanic (76.0%); Black/ Non Hispanic (11.4%); Asian/ Pacific Islander (5.7%); Hispanic (5.9%); and Native American or Alaskan Native (0.9%). For purposes of conducting logistic regression, ethnicity was also classified into three categories; White/ Non Hispanic (76%), Black/ Non Hispanic (11.4%), and "other" (12.6%). Of the students, 82.3% were undergraduates and 17.7% were graduate students (N=1,274).

The students' identified disabilities were documented during the record review. While two of the participating universities documented the students' primary and secondary disabilities, one university identified only the students' primary disability. As a result, for the purposes of this study, only the students' primary disability was used when the researcher conducted hierarchical logistic regression analyses. The students' disabilities were categorized into the following three primary types of disabilities: cognitive (55%); mental disorder (14%); and physical (31%). The results in table 1 illustrate the percent of students by characteristic and disability category.

Types of Services Students Receive (Environment)

The type of disability services each student received was documented during the data collection process. In the 1,289 files reviewed, most students received extended test time and note taking services. The results in Table 2 show the percentage of students by type of service received.

Table 1

Student Demographics by Disability (N= 1,289)

	N	Cognitive Disabilities (n=709)	Mental Disorders (n= 185)	Physical Disabilities (n= 395)
Gender	1,287			
Male		56.9%	47.6%	49.5%
Female		43.1%	52.4%	50.4%
Ethnicity	1,281			
White/ Non Hispanic		76.4%	74.6%	74.4%
Black/ Non Hispanic		10.7%	10.8%	12.7%
Other		12.6%	13.5%	11.9%
Student Status	1,274			
Undergraduate		83.5%	81.6%	80.3%
Graduate		16.5%	18.4%	19.7%
Age	1,289			
22 and Younger		27.2%	23.8%	17.7%
23-30		60.8%	53.0%	53.9%
31 and Older		11.1%	23.2%	27.3%

Table 2

Student Services by Disability

	All Students with Disabilities (N= 1,289)	Cognitive Disabilities (n= 709)	Mental Disorders (n= 185)	Physical Disabilities (n= 394)
Extended Test Time	79.9%	91.4%	82.7%	58%
Note Taking Services	43.8%	48.5%	24.3%	44.6%
Distraction Reduced Tests	29.0%	37.4%	49.7%	3.2%
Assistive Technology	24.4%	20.9%	9.2%	38.0%
Flexibility in Dates	19.7%	17.5%	34.6%	16.7%
Accessible Classrooms	14.0%	4.8%	4.9%	34.9%
Learning Strategies	17.0%	25.1%	16.8%	.8%
Classroom Assistants	10.1%	7.2%	3.8%	18.2%
Alternative Format	9.9%	7.8%	2.7%	17.2%
Physical Therapy/ Functional Training	6.9%	1.8%	0.0%	19.2%
Transportation	6.4%	2.0%	1.6%	16.7%
Support Group/ Counseling	3.7%	2.1%	14.1%	1.8%
Course Waiver/Substitution	3.3%	4.2%	1.1%	2.5%
Residential Hall	2.6%	.8%	1.1%	6.3%
Interpreting Services	2.0%	.6%	.5%	5.3%

Graduation and Predictors of Graduation among Students with Disabilities (Output)

The graduation status of all students whose files were reviewed was recorded for the purpose of data analyses, and 74.2% of the students graduated (N=1,289). The percentage of students who graduated by primary disability was as follows: cognitive (73.8%), mental disorders (69.7%), physical disabilities (77%). Hierarchical logistic regression was conducted to determine which set of individual student characteristics and disability services predict graduation for all students in the sample (N=1,289). In the hierarchical logistic regression, graduation or not was the dependent variable with a binary response (1=yes, 0=no). The two types of predictors were entered into the regression equation in a hierarchical fashion, student characteristics first and student disability services second.

When only student characteristics were included in model I, a -2 Log Likelihood of 1,318.03 ($df=8$; $p<.05$) was reported. Gender, age, and student graduate *versus* undergraduate status were found to be statistically reliable at distinguishing between students who did and did not graduate. When student services were added to model II; gender, age, and disability type were statistically reliable. Specifically, alternative format tests, assistive technology, classroom assistants, distraction reduced testing, flexibility in assignment and test dates, learning strategies, and physical therapy/ functional training distinguished statistically between students who did and did not graduate. The addition of student services to student characteristics in model II reduced the -2 Log Likelihood by 118.05 to 1,129.98 ($df= 23$; $p<.05$). Model II correctly classified 80.8% of the cases. Regression coefficients are presented in Table 3.

Table 3

Logistic Regression of Student Graduation (N= 1,272)

	Model I			Model II		
	B	Odds Ratio	95% CI	β	Odds Ratio	95% CI
Block 1: Student Characteristics						
Gender (Male)	-.55***	.58	0.44-0.76	-.41**	.66	0.49- 0.90
Age (ref= 22 and Younger)						
23-30	1.28***	3.60	2.64-4.89	1.63***	5.11	3.5- 7.28
31 and Older	.22	1.24	0.83-1.85	1.01***	2.75	1.73- 4.35
Ethnicity (ref= White)						
Black	-.35	.70	0.47-1.05	-.35	.70	0.45- 1.09
Other	.24	1.28	0.83-1.96	-.10	.90	0.56- 1.45
Disability (ref= Physical)						
Cognitive	-.22	.90	0.59-1.10	.71***	.49	0.33- 0.73
Mental	-.39	.68	0.45-1.04	-1.23***	.29	0.17- 0.49
Student Status (Graduate)	.81***	2.24	1.46-3.43	.26	1.30	0.82- 2.07
Block 2: Student Services						
Accessible Classroom				-.31	.73	0.45- 1.20
Alternative Format				.88**	2.42	1.26- 4.65
Assistive Technology				-.37*	.69	0.49- 0.98
Classroom Assistants				-.56*	.57	0.36- 0.89
Course Waiver/ Substitution				-.31	.73	0.26- 2.06
Distraction Reduced Testing				1.44***	4.21	2.69- 6.59
Extended Test Time				.35	1.41	0.95- 2.11
Flexibility Due Dates				1.18***	3.24	1.94- 5.43
Interpreting Services				.61	1.84	0.57- 5.92
Learning Strategies				.93**	2.54	1.42- 4.53
Note Taking Services				-.26	.77	0.57- 1.05
Physical Therapy/ Functional				3.29**	26.86	2.99-241.49
Residential Hall				-1.65	.19	0.02- 1.84
Support Group/ Counseling				-.35	.71	0.21- 2.39
Transportation				-.58	.56	0.09- 3.45
-2 Log likelihood		1318.04			1129.99	
Nagelkenke R Square		.13			.31	

Notes: p <.05= *, p <.01= **, p <.001= ***

Among all significant student characteristic predictors in model II, the odds ratio was the highest for students between 23 and 30 years of age. These students were 5.10 times more likely than students age 22 and under to graduate. Students who were 31 years of age and older were also 1.24 times more likely to graduate compared to students age 22 and under. Male students were less likely than females to graduate (odds ratio=.664), and students with cognitive disabilities were less likely to graduate as compared to students with physical disabilities, (odds ratio=.49), as were students with mental disabilities (odds ratio=.67).

In model II, those students who received physical/ functional therapy were 26.85 times more likely to graduate. Students who received distraction-reduced testing were 4.21 times more likely to graduate and those students who received flexibility in assignment and test dates were 3.29 times more likely to graduate than students who did not receive these services. In addition, receiving assistance with learning strategies and study skills increased the odds of students graduating by 2.53 times and receiving alternative format tests increased the odds of students graduating by 2.42 times. Students who utilized classroom assistants (odds ratio=.56) and assistive technology (odds ratio: .69) were less likely to graduate.

Predictors of Graduation among Students with Cognitive Disabilities

Hierarchical logistic regression was conducted to determine which set of individual student characteristics and disability services predict graduation for students with cognitive disabilities (N=704). In the hierarchical logistic regression, graduation was the dependent variable with a binary response (1=yes, 0=no). Student characteristics and student disability services were entered into the regression equation first and second,

respectively. It is noteworthy that any student service variables with less than 5 cases were dropped from the regression.

When only student characteristics were included in model I a -2 Log Likelihood of 739.41 ($df=6$; $p<.05$) was reported. Gender and age were found to be statistically reliable at distinguishing between those students who did and did not graduate, and even when student services were added to model II, gender and age distinguished between those students who did and did not graduate. Of the disability services, assistive technology, distraction-reduced testing, flexibility in assignment and test dates, learning strategies and study skills, and transportation reliably distinguished between those students who did and did not graduate. The addition of the student service variables to model II reduced the -2 Log Likelihood by 613.46 to 125.95 ($df= 20$; $p<.05$). Model II correctly classified 81.3% of the cases. Regression coefficients are presented in Table 4.

Table 4

Logistic Regression of Students with Cognitive Disabilities Graduation (N= 704)

	Model I			Model II		
	B	Odds Ratio	95% CI	β	Odds Ratio	95% CI
Block 1: Student Characteristics						
Gender (Male)	-.61**	.54	0.38-0.79	-.49*	.61	0.40- 0.93
Age (ref= 22 and Younger)						
23-30	1.32***	.3.735	2.53-5.49	1.81***	6.13	3.84- 9.76
31 and Older	.82*	2.27	1.18-4.36	1.68***	5.73	2.55- 11.31
Ethnicity (ref= White)						
Black	-.32	.73	0.42-1.27	-.44	.65	0.34- 1.21
Other	.57	1.78	0.96-3.28	.08	1.08	0.54- 2.16
Student Status (Graduate)	.54	1.72	0.96-3.12	-.06	.94	0.48- 1.85
Block 2: Student Services						
Accessible Classroom				-.68	.51	0.20- 1.28
Alternative Format				.56	1.76	0.74- 4.16
Assistive Technology				-.63**	.53	0.33- 0.85
Classroom Assistants				-.33	.72	0.36- 1.41
Course Waiver/ Substitution				-.35	.70	0.20- 2.49
Distraction Reduced Testing				1.51***	4.51	2.58- 7.87
Extended Test Time				.15	1.17	0.60- 2.26
Flexibility Due Dates				.87*	2.38	1.18- 4.77
Learning Strategies				1.35***	3.87	1.89- 7.93
Note Taking Services				.02	1.02	0.68- 1.55
Physical Therapy/ Functional				2.03	7.63	0.37-157.87
Residential Hall				-1.05	.35	0.03- 4.75
Support Group/ Counseling				1.36	3.90	0.30- 50.80
Transportation				-3.85*	.02	0.00- 0.49
-2 Log likelihood		739.41			613.46	
Nagelkenke R Square		.13			.35	

p <.05= *, p < .01= **, p <.001= ***

Those students with cognitive disabilities between 23 and 30 years of age were 6.12 times more likely to graduate than students 22 years of age and younger. Additionally, students who were 31 years of age and older were 5.73 times more likely than students age 22 and younger to graduate. Males were .61 times less likely than females to graduate. Students who received distraction-reduced testing were 4.51 times more likely to graduate as compared to students who did not receive this service. Additionally, students who received assistance with learning strategies and study skills were 3.73 times more likely to graduate and students who received flexibility in assignment and test dates were 2.37 times more likely to graduate. Those students who received assistive technology services probability of graduating was reduced by .53 times, and those receiving transportation services probability of graduating was reduced by .02 times.

Predictors of Graduation among Students with Mental Disorders

Hierarchical logistic regression was conducted to determine which set of individual student characteristics and disability services predict graduation for students with mental disorders (N=179). In the hierarchical logistic regression, graduation was the dependent variable with a binary response (1=yes, 0=no). Student characteristics and student disability services were entered into the regression equation first and second, respectively. It is noteworthy that any student service variables with less than 5 cases were dropped from the regression.

When only student characteristics were included in model I, a -2 Log Likelihood of 180.11 ($df=6$; $p<.05$) was reported. Age and graduate *versus* undergraduate status were statistically reliable in distinguishing between those students who did and did not

graduate. When student services were added to model II, age and ethnicity were the most reliable student characteristic predictors. Distraction-reduced testing, extended test time, and note taking services were the accommodations that were statistically reliable in distinguishing between those students who did and did not graduate. Most important, the addition of the student service variables in model II reduced the -2 Log Likelihood by 60.43 to 119.68 ($df= 15; p<.05$). Model II correctly classified 85.5% of the cases. Regression coefficients are presented in Table 5.

Students age 23 to 30 were 10.92 times more likely than those 22 years of age and younger to graduate. Students whose ethnicity was categorized as “other” were less likely than White/Non Hispanic students to graduate (odds ratio= .22). Students with mental disorders who received distraction-reduced testing were 7.48 times more likely than those who did not receive this accommodation to graduate. In addition, those students who received extended time were 5.13 times more likely to graduate. Interestingly, receiving note taking services reduced the probability that students graduated by .19 times.

Table 5

Logistic Regression of Students with Mental Disorders Graduation (N= 179)

	Model I			Model II		
	β	Odds Ratio	95% CI	β	Odds Ratio	95% CI
Block 1: Student Characteristics						
Gender (Male)	-.27	.76	0.36- 1.60	.33	1.39	0.52-03.69
Age (ref= 22 and Younger)						
23-30	1.54**	4.64	1.92-11.22	2.40**	10.93	2.78-43.01
31 and Older	-.51	.60	0.23- 1.57	1.30	3.68	0.86-15.70
Ethnicity (ref= White)						
Black	.53	1.69	0.51- 5.65	.23	1.25	0.24-06.53
Other	-.69	.50	0.19- 1.36	1.52*	.22	0.06-00.84
Student Status (Graduate)	1.34*	3.82	1.19-12.28	.39	1.48	0.37-05.90
Block 2: Student Services						
Accessible Classroom				1.94	6.97	0.93-52.19
Assistive Technology				-1.26	.28	0.05-01.53
Classroom Assistants				-2.20	.11	0.01-01.50
Distraction Reduced Testing				2.01**	7.49	2.25-24.89
Extended Test Time				1.64*	5.14	1.46-18.09
Flexibility Due Dates				1.23	3.42	0.97-12.03
Learning Strategies				2.11	8.26	0.99-68.61
Note Taking Services				-1.65**	.19	0.07-00.56
Support Group/ Counseling				-.41	.66	0.06-07.18
-2 Log likelihood		180.12			119.68	
Nagelkenke R Square		.25			.59	

p <.05= *, p < .01= **, p <.001= ***

Predictors of Graduation among Students with Physical Disabilities

Hierarchical logistic regression was conducted to determine which set of individual student characteristics and disability services predict graduation for students with physical disabilities (N=384). In the hierarchical logistic regression, graduation was the dependent variable with a binary response (1=yes, 0=no). Student characteristics and student disability services were entered into the regression equation first and second, respectively. When only student characteristics were included in model I, a -2 Log Likelihood of 361.74 ($df=6$; $p<.05$) was reported.

When only student characteristics were entered into model I, gender, age, ethnicity, and student graduate versus undergraduate status were found to be statistically reliable at distinguishing between those students who did and did not graduate, and even when student services were added to model II, gender and age distinguished between those students who did and did not graduate. Of the disability services, classroom assistant was the only accommodation that reliably distinguished between those students who did and did not graduate. The addition of the student service variables to model II reduced the -2 Log Likelihood by 14.15 to 347.31 ($df= 14$; $p<.05$). Model II correctly classified 80.2% of the cases. Regression coefficients are presented in Table 6.

Those students with physical disabilities between 23 and 30 years of age were 2.76 times more likely to graduate than students 22 years of age and younger. Additionally, males were .54 times less likely than females to graduate. Those students who received classroom assistant services probability of graduating was reduced by .37 times.

Table 6

Logistic Regression of Students with Physical Disabilities Graduation (N= 384)

	Model I			Model II		
	β	Odds Ratio	95% CI	β	Odds Ratio	95% CI
Block 1: Student Characteristics						
Gender (Male)	-.71*	.49	0.29-0.84	-.61*	.54	0.31-0.94
Age (ref= 22 and Younger)						
23-30	1.07**	2.91	1.49-5.71	1.027**	2.77	1.38-5.56
31 and Older	.01	1.01	0.50-2.05	.01	1.01	0.48-2.13
Ethnicity (ref= White)						
Black	-.72*	.49	0.25-0.97	-.66	.52	0.25-1.05
Other	.38	1.47	0.58-3.72	.22	1.25	0.48-3.25
Student Status (Graduate)	.81*	2.24	1.01-4.98	.62	1.86	0.81-4.28
Block 2: Student Services						
Accessible Classroom				.61	1.85	0.99-3.43
Assistive Technology				.29	1.34	0.76-2.37
Classroom Assistants				-.98**	.38	0.19-0.75
Distraction Reduced Testing				.60	1.82	0.34-9.82
Extended Test Time				.28	1.32	0.69-2.52
Interpreting				.12	1.13	0.33-3.79
Note Taking Services				-.17	.85	0.47-1.53
Support Group/ Counseling				-.33	.72	0.07-7.62
-2 Log likelihood		361.75			347.31	
Nagelkenke R Square		.13			.18	

p < .05= *, p < .01= **, p < .001= ***

It is noteworthy that any predictor variables that had cells with frequencies less than 5 in the data matrix were dropped from the students with physical disabilities regression analysis. Five of the disability related services removed from the regression were found to have a statistically significant relationship with student graduation. The chi square statistics for these variables are illustrated in table 7. It is important to mention that for each variable included in the chi square analysis, zero cells had expected counts less than five. However, the frequencies of students with physical disabilities who received these five accommodations and did not graduate for each variable are very low, and though statistically significant, readers must be cautioned that results of the chi square analysis may be inflated. The chi square table was included for the purpose of informing future researchers who may be interested in exploring the impact of these accommodations on student graduation.

Table 7

Chi Square Analysis of Student Disability Services by Graduation (N= 390)

Disability Services	Graduated	Did Not Graduate	Total	X ²
Alternative Format Tests	62	3	65	13.79***
Flexibility in Assignment/ Test Dates	61	3	64	13.43***
Physical Therapy/ Functional Training	74	2	76	20.71***
Specialized Residential Halls	25	0	25	7.55**
Transportation	65	1	66	19.49***

Note: p <.05= *, p < .01= **, p <.001= ***

Chapter 5: Discussion

The final chapter is designed to summarize the key findings of the study, present conclusions drawn from the findings, and provide implications for future policy, practice and research. The first section summarizes the key findings about the characteristics of students with disabilities and the type of disability services students receive through university disability offices. This section also summarizes key findings related to the set of student characteristics and disability services that predict graduation for college students with disabilities. The second section presents a discussion and conclusions about students with disabilities receiving services through university disability offices and the types of accommodation that are most helpful in assisting students with graduating. The third section provides policy, practice and research implications for ensuring college students with disabilities are provided with appropriate services needed to graduate, and the last section provides recommendations for future studies.

Summary of Key Findings

A sample of 1,289 student files deemed inactive between the school years 2001-2002 and 2004-2005 were identified in three midwestern public universities for this study. The results of the study are summarized in the following eight key findings:

Summary of Key Findings for all Students with Disabilities

1. Nearly three-fourths of the students graduated, primarily with an undergraduate degree.
2. There were slightly more males than females, both of whom were primarily White/Non-Hispanic, undergraduate, and, on average, young.

3. While more than half of the students had cognitive disabilities and one-third of the students had physical disabilities, fewer students had mental disorders.
4. Students typically received extended test time, note taking, and distraction reduced testing services via the disability offices.
5. Students who were female, 23 years of age and older, and who had physical disabilities in combination increased the likelihood of graduation for all students, who typically received services from disability offices that included alternative format tests, distraction-reduced testing, flexibility in assignment/test dates, learning strategies/study skills, and physical therapy.

Summary of Key Findings by Disability Type

6. Students who were female and 23 years of age and older in combination increased the likelihood of graduation for students with cognitive disabilities who typically received services from disability offices that include distraction reduced testing, flexibility in assignment/test dates, and learning strategies/ study skills assistance.
7. Students who were between 23 and 30 years of age and white/ non-Hispanic, particularly, in combination increased the likelihood of graduation for students with mental disorders who typically received services from disability offices that include distraction reduced testing and extended test time.
8. Students who were female and between 23 and 30 years of age in combination, increased the likelihood of graduation for students with physical disabilities.

Discussion and Conclusion

The average graduation rate of students whose files were examined in this study is much higher than the figures reported in related literature. The United States Department of Education (2000a) found that only slightly more than half of students with disabilities received a degree five years after enrolling. The high graduation rate resulting from this study may be due to strict admission requirements and overall high graduation rates of students in one participating university. The graduation rates of the other two participating universities were more consistent with the 53% graduation rate reported by the United States Department of Education (2000a) for students with disabilities attending postsecondary institutions throughout the country.

Student Characteristics

Regarding student characteristics, the greater number of males in this study is inconsistent with current literature from the National Council for Education Statistics (NCES, 2002) that shows females are more likely than males to attend postsecondary education. Despite this difference, the universities participating in this study do appear to be doing a better job educating females with disabilities, given the greater probability of females graduating.

On average, the students in the study were 26 years of age. This figure was consistent with findings in studies of students with no disabilities attending postsecondary education but was inconsistent with National Council for Education Statistics that show students with disabilities attending postsecondary education to be 31 years of age, on average (NCES, 2002). Age was a significant predictor in this study. Students 23 years of age and older were more likely to graduate than younger students,

which seems consistent with previous findings that show older students are more likely to be successful in postsecondary education (Flowers, 1999). However, since the typical graduation age for traditional students is age 21 or 22, the reader must consider that all students between 17 and 20 years of age included in the sample most likely dropped out of college. As a result, more students in this particular age group were early leavers.

Additionally, students who were in graduate school and age 23 and older were more likely to graduate in model I. However, when disability services were included in Model II, it seems that age is the significant factor impacting student graduation and student status is no longer significant. This means that indeed, older undergraduate students tend to be more likely than younger undergraduate students to graduate.

The success of students with disabilities based on disability type is also important to discuss. The findings in this study show students with cognitive disabilities and mental disorders are less likely to graduate than those with physical disabilities. Students with cognitive and mental disorders who deal with issues related to distraction, anxiety, information processing, and verbal/written expression may find completing course assignments and tests to be more difficult than students who have physical disabilities.

Student Services and Graduation Outcome

Distraction-reduced testing was shown to be a significant predictor of graduation for the overall sample and students with cognitive disabilities and mental disorders.

While findings in this study also show that extended test time increases the likelihood that students with mental disorders will graduate, they do not support previous findings that show extended test time improves the test scores of students with learning disabilities

(Alster, 1997; Hill, 1984; Jarvis, 1996; Ofiesh, 2000; Runyan, 1991a, 1991B; Weaver, 2000).

The latter inconsistency in findings related to learning disabilities may be due to sampling issues. The sample of students with cognitive disabilities included students with learning disabilities, traumatic brain injury, and attention deficit/hyperactive disorder. Previous studies have looked specifically at students with learning disabilities. One of the other subgroups may not benefit from extended time.

Learning strategies/ study skills was a significant predictor of graduation for students with cognitive disabilities. This finding is supported in student self reports that indicate time management and test taking strategies are most effective in assisting them with success in college (Getzel et al, 2004). This finding also supports the belief that students with cognitive disabilities can greatly benefit from learning strategies to compensate for their cognitive disability.

Flexibility in assignment and test dates predicted graduation for all students with disabilities, as well as for those with cognitive disabilities. This result is consistent with the findings in the pilot study this researcher conducted for the larger study. Although previous research findings have indicated that course substitutions are significant predictors of graduation (Skinner, 1999), results in this study failed to support those findings.

Students who received physical therapy/functional training were far more likely than those who did not to graduate. Students who qualify for this accommodation typically have significant physical disabilities and may not be able to utilize fitness and recreational resources at the university. With this accommodation, students receive

assistance with strength development, physical conditioning, and developing range of motion, as well as assistance with developing transfer skills that assist with independence. Although this accommodation is not usually provided by university disability offices, it seems to be a very significant factor in predicting student graduation based on findings in this study.

In contrast to services that positively influence graduation among students with disabilities, the results in this study show that all students with disabilities who receive assistive technology services and classroom assistants were less likely to graduate as compared to other students who did not receive these services. Additionally, students with cognitive disabilities who received assistive technology and transportation were less likely to graduate, students with mental disorders who received note taking services were less likely to graduate, and students with physical disabilities who received classroom assistants were less likely to graduate. In general, the accommodations that were negatively correlated to student graduation are typically services used by student with more significant disabilities; therefore, there may be more obstacles to their success at the university. It is unknown whether the students would have a lower graduation rate regardless of the accommodations they received.

Second, students receiving classroom assistants and note taking services must rely on an “assistant” to do a complete and accurate job. For instance, the quality of work the note taker produces may impact the success of students. Specifically, this may be related to whether the professor is providing the notes, a student is using a paid note taker, or the student is using a volunteer note taker. It seems plausible to speculate that a volunteer’s note-taking may be less accurate than those of a paid note taker. The quality of notes is

especially important to students for the purpose of reviewing course material. In the current study, paid and unpaid note takers provided services to students.

Within the context that students receiving assistive technology are less likely to graduate, several explanations seem plausible. Students may not be receiving the individual attention they need in order to obtain the technology that best supports their educational and supportive needs. Also, some of the universities may not have adequate funding to provide the students with the most up-to-date technology that would best assist students with coursework. Finally, students may not receive adequate training needed to utilize available technology in the most effective and efficient manner.

Implications

The findings in this study contribute empirical evidence to the field of higher education and disabilities regarding the associations between the types of accommodations students with disabilities receive in postsecondary education and graduation. Information about the extent to which student characteristics and the provision of disability accommodations impact student ability to graduate provides insight into the types of services most effective in assisting students with academic achievement. This knowledge lays the foundation for the development of postsecondary and governmental policies that promote institutional services and accommodations most successful in assisting students with disabilities. This knowledge has implications for several groups, including researchers, policymakers, educators, practitioners, and students with disabilities.

Policy

Data resulting from this study has implications for policy makers concerned with the graduation rates of persons with disabilities enrolled in postsecondary institutions relative to their employment in the competitive labor market (Steinmetz, 2006). The findings in this study can also assist legislators when developing regulations for the provision of disability services in postsecondary institutions. Policy makers at the university level may utilize the information in developing institutional strategies in the areas of curriculum, campus accessibility, student affairs, and student disability services that support and promote the retention and graduation of students with disabilities. High quality institutional practices increase student satisfaction, which results in higher retention and graduation rates and translates into increased institutional revenue (Tinto, 1987).

Practice

Social workers and other practitioners serving as clinicians in the disability office setting can utilize the data when working with students to identify specific services and accommodations that will best support academic achievement and student graduation. The findings in this study may assist secondary and postsecondary educators committed to ensuring that students with disabilities have the supports they need to learn and graduate from institutions of higher learning. Information attained from this study can aid professors and academic administrators in determining whether academic departments are supporting students with disabilities in appropriate ways and how they can provide instructional environments most helpful to students with disabilities.

The findings in this study reflect quantifiable data that can be used to make programmatic decisions to improve the rate of students with disabilities graduating from four-year public universities. The findings also provide student affairs and university disability office personnel with information related to the types of accommodations that predict successful completion of college. Student affairs personnel concerned with institutional climate may use the findings to create a more accessible university environment and design support programs aimed specifically at students with disabilities. Equally important, the findings can significantly impact students with disabilities. Students with disabilities may use data obtained in this study to advocate for accommodations and supports needed to be successful at institutions of higher learning. Empirical evidence resulting from this study can lead to increased learning, graduation rates, and ultimately, employment opportunities for students with disabilities.

Research

Very few studies explore the effectiveness of disability services provided in postsecondary educational institutions. The empirical findings of this study provide researchers in the field of postsecondary disability services a foundation upon which to build in examining the type of disability accommodations that best supports student graduation. Additionally, there is a need in the social work profession to conduct more research related to disability issues (Gilson, Bricout, & Baskind, 1998; Pardeck, 2002).

Recommendations for Future Studies

This initial study was completed to determine which set of student characteristics and disability services predict graduation for postsecondary students with disabilities. As noted, the findings of the study have implications for policymakers, practitioners, and

researchers. Based on those implications, the following recommendations for future research seem appropriate.

One recommendation is that similar studies be completed with a larger sample in order to break down the disability categories further into several subgroups: attention deficit disorder; blind/ low vision; deaf/ hearing impairment; learning disability; mental disorders; and mobility, systemic, and disease related disabilities. This would necessitate a sample of 250 students per category so that logistic regression can be conducted with each separate disability subgroup. A second recommendation is that a follow up study include universities that provide and document the provision of advocacy training. It would be my hypothesis that these services may have a significant impact on student success measures.

In a follow up study, a third recommendation is for the inclusion of four additional success measures. First, universities chosen for the study should document grade point averages (GPAs) for all students receiving services through the disability office. The second success measure would document the semester the student first enrolled at the university and the semester last completed. The third measure would document the amount of semesters the student actually attended, and the fourth measure would document the average number of hours a student was able to take per semester. The last three statistics would provide some insight into the amount of time it takes students with disabilities to graduate and whether the provision of disability services may impact these measures.

Further research related to gender should be completed to explore the set of female student characteristics that may be impacting their higher graduation rate. More

research should also be conducted to explore the impact physical therapy and functional training have on the success of students with disabilities. Additionally, research needs to be conducted related to the provision of note taking services to determine if there is a significant difference between the graduation rates of students using volunteer note takers versus paid note takers.

Results of this study contributed to the limited research and body of knowledge in regard to the set of student characteristics and types of accommodations that predict postsecondary graduation for students with disabilities. Similar research studies would increase the postsecondary disability profession's knowledge of environmental factors that predict success for students with disabilities attending four-year public universities. Further studies should be completed in order to test the initial findings. Similar studies should also be replicated at community colleges and four-year private institutions to determine whether accommodations needed to be successful in these environments differ from four-year public universities. Additionally, further studies may explore other institutional influences not provided by the university disability office that predict student success.

Appendix A

Disability Office Record Review Questionnaire

Student Assigned Number: _____

Gender:

- Male
- Female

Birth date: _____

Primary Disability:

Cognitive Disability

- Yes
- No

Mental Disorders

- Yes
- No

Physical Disability

- Yes
- No

Ethnicity:

- Hispanic
- American Indian/Alaskan Native
- White/Non-Hispanic
- Black/Non-Hispanic
- Asian-Pacific Islander
- Other

Student Status:

- Graduate
- Undergraduate

Year the file was deemed inactive

- 2001-2002 (Fall 2001, Spring 2002, Summer 2002)
- 2002-2003 (Fall 2002, Spring 2003, Summer 2003)
- 2003-2004 (Fall 2003, Spring 2004, Summer 2004)
- 2004-2005 (Fall 2004, Spring 2005, Summer 2005)

Did the student graduate?

- Yes
- No

Support Services Received

- Accessible Classrooms
- Alternative Format Tests or Assignments
- Assistive Technology
- Classroom Assistants
- Course Waivers or Course Substitutions
- Distraction Reduced Testing
- Extended Test Time
- Flexibility in Assignment and Test Dates
- Interpreter Services
- Learning Strategies and Study Skills Assistance
- Note Taker Services
- Physical Therapy and Functional Training
- Residence Halls Specialized in Accommodating Students with Physical Disabilities
- Support Groups
- Transportation Services

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