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Examining Pre-College Academic Variables: Investigating Future College

Success

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Examining Pre-College Academic Variables: Investigating

Future College Success

A dissertation submitted to the

Division of Research and Advanced Studies

of the University of Cincinnati

in partial fulfillment

of the requirements for the degree of

Doctor of Education

in the Division of Teacher Education

of the College of Education, Criminal Justice, and Human Services

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Abstract

This study looked at the success rate of first-year students in a new program for conditionally admitted students. Logistic regression was used to determine the impact of several pre-college variables, such as high school grade point average and ACT scores, and orientation generated variables, specifically placement test results, on the dependent variable of student success. Student success was achieved when a student was subsequently enrolled for the first term of his or her second year of college. As part of the findings, each independent variable is interpreted based on whether or not it was determined to be impactful.

The study concludes with a discussion of the broader implications of the research. First, the research is discussed in terms of how it fits within the existing research on student success and how it might add to that research base. Next, the research is used to inform future researchers of similar studies how to approach and design their research so that it provides them with even more meaningful results. Finally, the practical applications of the research are discussed in the form of recommendations to student affairs professionals and others concerned with student success. These recommendations are a list of specific actions practitioners can implement to

improve the retention of their first-year students, especially those students who have been conditionally admitted and are taking developmental education courses.

Acknowledgements

I would like to thank the following people who assisted me with this project. It has been an endeavor that lasted longer than it should have, but each of you kept me moving forward and for that I am extremely grateful:

To all the students who I have worked with over the years – You are a driving force behind this study and you have my sincere pledge that I will continue to support you, and those students who follow you, for as long as I able.

To the students who contributed the data used in the study – Although you served in anonymity, you played a starring role. Suffice to say, without you, this study would not exist.

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To the members of my committee – Your generosity of time and assistance is greatly appreciated and I have enjoyed working with each of you. I would like add that Dr. Ken Martin, committee chair, has been of great assistance to me, not only in that role, but also as my faculty advisor throughout my doctoral program.

Finally, I want to thank my wonderful family for their continued support. I love you all. I would like to especially thank my dear mother, Carole Donnelly, whose wonders never cease to amaze – thanks, mom!

This dissertation is dedicated to the memory of my father, Dr. Kenneth Donnelly: I hope this work reflects the enthusiasm he had for working with students, and his love for education, both of which he instilled in me.

Peace to you, dad.

Love,

Patrick

Contents

Chapter 1: Introduction

Background and Researcher's Interest in the Problem

I have been an academic advisor for more than ten years and there are many aspects of my work that I really love. By far, the greatest experience for me as an advisor is to share in the success of the students with whom I work. Unfortunately, I also have to be a part of many students' failures, which is the part of advising that I enjoy the least. When I first started in the profession, "success" and "failure" seemed to be terms that were not difficult to understand and were, in fact, easily distinguished from one another – or so I thought at the time. Students were successful when they completed classes and experiences that moved them toward graduation. In this context, graduation represented their final, culminating, successful experience. Conversely, students were not successful when they failed to complete classes and experiences that they needed to graduate and students who left college before being able to graduate experienced the greatest level of failure. Although it didn't take me long to realize that my initial, dichotomous view of success and failure was rather simplistic and unrealistic, I still struggle with these categories on a daily basis.

Ultimately, each student faces his or her own barriers to education and each has his or her own path to success. Further, each student has his or her own definition of success, which institutions and researchers may never be able to categorize accurately. It is something that happened a few years ago that really acted as an impetus for this study. Although this research project is an attempt to make some sense of student success and failure, this story of one entering student encapsulates my reasons for wanting to make some sense out of this chaos.

"Go ahead, you can laugh now," said the young man[1] sitting across the desk from me. Although I describe him as young, he is definitely seven or eight years older than most of the incoming first-year students I have met since becoming an advisor in the conditional admission program at which I was then working. The program had just opened that same year on the main campus of a large, Midwestern, research university and this young man was going to be part of its first cohort of students, who would be starting classes in about two weeks.

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[1] This young man does not exist; rather he is a composite of a number of students I have met with over the course of my career as an academic advisor.

What was it that made him think I would want to laugh?

Admittedly, his file contained one of the worst high school profiles I have

ever seen in my nearly twelve years as an advisor, but I don't think my

face betrayed me of the unique mix of shock and confusion that was

running through my thoughts. Perhaps he had been through this kind of

meeting in the past and had developed a defense mechanism whereby he

perceived himself to gain an upper hand in some upcoming negotiations

by making the first strike. Or maybe, over the years he had grown weary

of explaining his educational background and found it easier simply to

make a joke about it.

Whatever the reason, his high school record was extremely poor: He

had taken six years to graduate last in his class from a large, urban,

public high school. The state's Department of Education had consistently

categorized this particular school as an "academic emergency." His

overall grade point average had clearly been inflated by the grades he had

earned in his non-academic electives. Unfortunately, with nothing higher

than a "D" in any core course, these electives only brought his GPA up to

about a 1.1. The subsequent placement scores from the morning's

orientation meant that he was going to need every developmental course

our program offered. But before we even approached the subject of courses or registration, I needed to know why I should laugh, when none of it was laughable.

"You see what I am capable of and yet here I am sitting with a college counselor. If nothing else you should be mad that I am wasting your time," he responded. When I told him that I was not mad and was not going to laugh, he replied, "Dig deeper."

At that same moment I had turned to his college entrance exam report and began reading his self-reported data. He had marked himself off as being in the top ten percent of his class with a solid A- average and listed his areas of interest as engineering, physics, and astronomy. When I tried to tell him that the indiscretions of a twenty-year-old could be forgiven six years later, he said, "Look at the next section and ask yourself why someone like me is even taking this test, and then I'll tell you something that will make you laugh."

The next section was where he could indicate what colleges and universities he wanted to have his scores sent to. His list included Notre Dame, Duke, and Michigan.

"Don't you see, the whole thing was a joke," he said as I read the list. "Somehow, my high school counselor got a grant from the state that paid for anyone who wanted to take the test, so I did. I really didn't want to waste a Saturday morning, but some guys at school told me that I would get free T-shirts and hats from the schools I sent my scores to[2]. Those things never came and in the end, the joke was on me."

Over the next few hours, he told me the rest of the story: He was at my desk because his supervisor at the local shipping company where he worked wanted to promote him, but was restricted by company regulations that required certain positions could only be filled by persons with a college degree. According to their policy, he had the highest position available to him without a college degree. He was not confident about his academic abilities, but was highly motivated by the opportunity. In the end, he got registered for the lowest level courses available in math and English, a reading course, and also for a First-Year

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[2] Interestingly, I have had other students recount similar tales to me over the years; however, I have not yet had any of them tell me that it happened to them, nor have I actually seen another high school record indicating that someone had been taken in on this prank. It is always someone these students know who fell for the ruse. This brings up the question of truth. It seems unlikely that this would happen on a re-occurring basis without someone at either the College Board (SAT) or ACT, Inc. noticing and rectifying the situation. Quite possibly, I discovered the kernel of truth that underlies this is urban legend.

Success Seminar, which was required for all new students in this program.

Later that evening, I really wondered what would become of that student. Even though he was academically deficient from high school, our program offered him the chance to get caught up. It would require a lot of hard work from him and he would need to take advantage of the many support systems we offered. Although his confidence was lacking, he had scored high in the motivation category of the Learning and Study Skills Index (LASSI). I was reminded of Victor Villanueva's *Bootstraps*, in which Villanueva told his own story of reaching academic success, including earning a PhD, after many attempts and failures (1993). Although Villanueva experienced failures so severe that he gave up on many occasions, he showed how barriers to education, even barriers that are political, social, or economic, could be overcome (Villanueva, 1993).

A few days before classes started, my student, with whom I had worked extensively by this time, came in and withdrew from all of his classes. He quit before he started, but with reason. He withdrew when his company made an exception and promoted him without a degree. I'm not quite sure how the university categorized him, if at all, but I know he

believes he is a success. He fulfilled his objective of getting a promotion.

In his eyes, the university aided him in this by allowing him to show his

employers he would do what they asked. In the end, this was enough,

even though he never had to follow through on their request. On the other

hand, he failed completely at getting an education and used resources,

including my time, which could have been redirected to someone who

would actually attend[3]. My immediate thoughts about how others would

categorize him assured me that without knowing anything about why he

never started that most researchers would not categorize him as a success.

I was later surprised to find that this is not necessarily true.

Vincent Tinto (1987, 1993) and John Bean (1980; 1986; 1990), both

prominent researchers in the area of student success, believe that much

can be learned from the student's own perspective of his or her success

and that this perspective must be respected. In fact, Tinto (1987, 1993)

acknowledges that many who leave college do not see themselves as

failures and see their time in postsecondary instruction as a course of

action that has prompted their own social and intellectual growth and an

awareness of this growth. Similarly, Bean (1980; 1986; 1990), concedes that

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[3] Because I based my study on students who were registered on the first day of class in the fall term of 2004, I did not have to categorize him. If his withdrawal had occurred even one day into the term, he would be included in the study and categorized as a "non-returner."

students who dropout often have positive experiences that influence their cognitive and emotional development, no matter how brief their time in college. Bean also notes that some students attend college without the goal of earning a degree (1990).

My encounter with this student and hundreds more has made me realize that I do not have an adequate understanding of why students succeed and why they fail. Further, I do not even have a good understanding of what success and failure are. As an academic advisor, one fundamental requirement that I have to adhere to is to do whatever I can to help my students achieve academic success. The idea of how to promote success led me into an informal study that has been both a frustrating and rewarding exploration. Despite the frustrations, it has helped me work better with my students, and this small taste of success prompts me to move from the informal to the formal. So whereas it might seem overly personal, at least part of the rationale for this study is my desire to become better at the work I do. This means finding out as much as I can about what makes my students successful and to do this I need to start at the most basic level and use clearly defined terms. On a broader scale, I want to show how the study contributes to the research discipline

of student success and develop a set of support measures that academic advisors can use when working with students admitted with academic deficiencies. I think the remaining sections of this document will show that these goals have been met and that this study represents a viable and useful undertaking.

Research-Based Rationale

Although researcher interest in and enthusiasm for a particular research topic are probably important to each researcher's success, I believe the best studies couple these subjective motivators with an actual research-based justification. Chapter 2 of this study contains my full review of the literature relevant to this study, but at this point, I believe it is important to introduce some related research that supports the need for this study.

It seems of critical importance in a study examining student success (as defined by first-year to second-year retention) to establish that a problem truly exists. Even a cursory review of the research completed in this field reveals that not only does a problem exist, but the numbers are staggering. Tinto, whose Student Integration Model is a well-respected theoretical framework designed to explain why students leave college, is

one of the most widely cited researchers in this field. He has been cited

in more than 400 research articles and scholarly papers (Braxton, Bray, &

Berger, 2000). Tinto introduced his model in 1975 and has revised it

numerous times (Tinto 1975; 1982; 1987; 1993). Throughout these changes,

he has remained steadfast in his emphasis on the importance of the first

year of college as it relates to student's success because the greatest rate

of attrition occurs between the first and second years (Tinto 1975; 1982;

1987; 1993). The numbers tend to support him: More than half of all

students who withdraw from college do so during their first year

(Consortium for Student Retention Data Exchange, 2002 & 2003), resulting

in a first-year attrition rate of more than 25% at four-year institutions,

and approximately 50% at two-year institutions (ACT, 2009a). Because

Tinto's model addresses the causes of student attrition and his most

recent research centers on developing solutions to this problem, he does

not generate enrollment data independently and draws primarily from

ACT reports for his data in these areas (Tinto, 1997; 1998; 1999; & 2002).

Adelman also reports that more than a quarter of students who

enter four-year institutions and half of those who enter two-year schools

depart at the end of their first year (Adelman, 2004). His report, *Principal*

Indicators of Student Academic Histories in Postsecondary Education, 1972-2000 (2004), provides a descriptive account of the postsecondary academic experience, including enrollment trends and degree completion based on student cohort populations attending higher education in 1972-2000, with an emphasis on the groups in the period 1992-2000. He completed this study as a senior associate with the Institute for Higher Education Policy (IHEP). Other researchers looking at student persistence during the first year seem to have findings similar to Adelman and Tinto, probably because the data are available from a limited number of sources, with the American College Testing Program being the primary source for most of these researchers (Blanc, Debuhr, & Martin, 1983; Colton et al., 1999; DeRoma et al., 2005).

The American College Testing Program (ACT, Inc.) has been monitoring and reporting on retention at the national level since 1983. In the organization's *Policy Report* reviewing 2008 data, the national first- to second-year retention rate for all institutional types is 65.7 %. When retention rates for four-year institutions and two-year schools are disaggregated from the all institutional types' average, these figures do approximate those used by Tinto and Adelman. This study used

enrollment data from 2,582 participating institutions to generate the results (ACT, 2009a). Additionally, in a related *Policy Report* that examined the retention trends from 1983 to 2008, it is reported that the 65.7% retention rate for 2008 is the lowest since the organization began keeping these records in 1983 (ACT, 2009b).

Although the numbers are compelling and present reason enough on their own to study student retention, I am also encouraged as a professional academic advisor to engage in such research. The National Academic Advising Association (NACADA) is a professional organization that promotes quality academic advising in higher education, and I am a member of this organization. NACADA provides a number of services to its members, with the following being specifically relevant to the research-based rationale for this study: First, NACADA maintains a website (http://www.nacada.ksu.edu/index.htm) and the organization's "Research Agenda" is posted here

(http://www.nacada.ksu.edu/Clearinghouse/Research_Related/researchage nda.htm)[4]. The purpose of the "Research Agenda" is twofold. Primarily, it serves to motivate academic advisors to undertake research in the field by

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[4] Both the *NACADA* website and the "Research Agenda" webpage were most recently accessed on January 27, 2010.

offering grants to researchers whose studies meet specific guidelines. It also lists 10 areas that have been identified as having definite research needs. Because the list is explanatory and broad, rather than a specific list of topics, it provides descriptive areas for study. So even though "retention studies" is not distinctly listed, it is not difficult to find that topic in a number of the areas listed. The second item on the list calls for "studies examining the role of academic advising in meeting the learning mission of higher education" and student success is an important part of the mission of most, if not all, institutions of higher education. Item number four indicates a need for studies addressing "specific student-learning outcomes as measures of successful academic advising," which can mean studies of student progression and retention. In fact, because most advising centers exist as a function of a retention initiative, each of the research areas listed could be interpreted as being a kind of retention study, but the two items noted above seem to be the most directly in line with the concept of student success as I have defined it in this study.

Although the "Research Agenda" posted on the NACADA website could be seen as somewhat vague, the organization also publishes the *NACADA Journal*, a biannual, refereed journal with researched-based

articles on the theory and practice of academic advising. The request for research in the journal is far more specific. In 2003 and 2004, the co-editors of the journal met with members of the organization at each year's annual international convention. Over the two years, 35 groups of two, three, or four participants completed feedback forms that prompted them to select from a list of the biggest research needs in the field of academic advising (among other student affairs issues). The results of this study were published in the Spring 2005 edition of the *NACADA Journal* and the results were clear: "Retention and Advising" was the most frequently listed of all options provided (Padak, et al., 2005; and discussed in Kuhn & Padak, 2005).

I think it is important to recognize that there is a research gap that exists in academic advising in general and student retention is one area where the need has been identified. The results of this study probably will not directly fill all these needs, but they can help in some manner. Additionally, this research can serve as a basis for additional studies and assist student affairs professionals as they struggle to find better ways to work with their students. As such, if the results do assist future researchers, then maybe these outages can be positively affected. I also

feel it is important to admit that reading the study from the *NACADA*

Journal co-editors assisted me with my personal decision to move forward

with this study, so their research is effective and motivating, at least from

my perspective.

Statement of the Problem

The research problem at the center of the study was to determine

which pre-college variables, such as high school GPA and college entrance

exam scores, and including orientation-generated data such as placement

test results, can be used to indicate a tendency toward student success for

incoming first-year students in a new program for conditionally admitted

students (i.e., a program for students who do not meet the admissions

criteria for any four-year degree program at the university, but have been

given the opportunity to achieve such admission by successfully

completing the requirements, including developmental coursework, of

their conditional admission as part of this special academic program).

Additionally, specific programs and activities that academic advisors and

other student affairs professionals can implement to support student

success are identified and discussed.

Purpose of the Study

The purpose of the study is twofold: The primary objective was to analyze existing data of students who began their conditional admission program as first-time college students in the fall term of 2004 at a large, Midwestern, research university and determine if these data have any inferential value. The secondary objective was to draw on these same findings as a basis for determining intervention techniques for academic advisors and others who work with these students, especially for those professionals in new programs of this nature. Hereafter, the study refers to the institution as "Midwestern Research University" and the program itself as "Degree Seeking Track" or "DST[5]." The data were analyzed using descriptive and predictive measures to determine if there are any single variables or pairs of variables that may be used as indicators of a student's ability to complete the first year of his or her DST program successfully. Based on the significance of each variable, academic assistance practices are proposed as actions academic advisors and other student affairs professionals can initiate to aid students in these types of programs achieve success.

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[5] A complete description of the DST program and DST program students is available in the methodology (Chapter 3).

Ultimately, this study was an attempt at building a knowledge base about the pre-enrollment characteristics of DST students and determining if that knowledge can be used proactively to support students in achieving their goals of academic success. In short, this was an exploratory study of a new program that was designed using available research on similar programs, but which has not yet had any significant research conducted on it. Additional conclusions about specific methods of assisting students are included in response to the call from many scholars in this area for the need to connect research and practice; and in anticipation of future research studies on this population of students.

Theoretical Framework

Berger and Lyon (2005), writing about the history of retention studies, indicate that by the 1990s there are many models that researchers can draw upon and that the best way to strengthen the research base is for researchers to use pieces of these models on studies of their own programs at their own institutions. Their belief seems to be justified by the thoroughness of their historical study and serves as the basis for how the theoretical framework for this study is constructed and the specifics of that construction account for the remainder of this section. As noted,

the research field of student retention has a number of prominent theories from which a researcher can draw. Two prominent theories, Tinto's Student Integration Model and Bean's (initially, and later with others) Student Attrition Model are comprehensive retention theories that utilize many discrete variables to show how students in higher education decide to persist or to drop-out. These models have been shown to be complementary and successful (Nora, 2001). Additionally, as seen in many related studies, Tinto's and Bean's models can be used as the framework upon which studies using a focused set of variables, typically related to the more comprehensive sets proposed by these theorists, can be built. This study used Tinto's and Bean's models accordingly. Each is described more fully in Chapter 2 of this study, along with a review of studies more directly related to the pre-college variables investigated in this study.

Research Variables

The following types of independent variables were used in the study:

- Pre-college items include: high school GPA, high school class rank, and college admissions tests scores.

- Orientation generated items include: placement test scores for math, reading, and English.

These variables were reviewed to determine which, if any, impacts the dependent variable. The dependent variable is "student success" and it defines the status of the students being studied by virtue of their enrollment status at the beginning of the 2005 autumn quarter. Students are classified as being in one of the following groups:

- "Returning Student" (R) is the category to which successful students were assigned. For the purposes of this study, a "returning student" is one whose first enrollment at the Midwestern Research University was as a first-year student in the DST program in the 2004 autumn term and was additionally enrolled at the university in the 2005 autumn term. In short, these are students who persisted through their first year of college and were retained and enrolled in their second year. For the purpose of data analysis, these students were coded using the number one (1).

- "Non-Returning Student" (NR) is the category to which unsuccessful students were assigned. For the purposes of this

study, a "non-returning student" is one whose first enrollment

at the Midwestern Research University was as a first-year

student in the DST program in the 2004 autumn term, but was

not enrolled at the university in the 2005 autumn term. In

short, these are students who did not persist through their

first year of college and were not retained or enrolled in their

second year. For the purpose of data analysis, these students

were coded using the number zero (0).

The focus of the study is data related to returning students and factors

that might have indicated their success.

Importance of the Study

Practical Significance: Institutions have begun to realize that they can

and do impact student success and have developed programs and

implemented strategies to ensure that this impact is positive (Gordon,

Habley, & Associates, 2000). As a result, the research field has been

flooded with studies with the purpose of determining what makes

students successful from year to year (and indeed through graduation).

These studies serve many practical purposes. Joe Cuseo, a long time

researcher in this field, describes these purposes as eventually fulfilling

two broad, but useful, roles: "Improving student retention not only fulfills the institutionally self-serving function of promoting fiscal solvency, it serves the more altruistic, student-centered purpose of promoting learning and development" (2006, p.2). In other words, retention is important because of money and mission: Retention directly impacts an institutions bottom line and it also indicates how well an institution is functioning in its educational mission.

Given the inherent differences that exist from institution to institution, it makes sense that the most helpful and applicable research is going to be that which is generated locally. Pascarella and Terenzini clearly support this view and stress that the greatest impact on retention can be made when college officials understand the enrollment patterns of their own institutions (2005). This does not forego the importance of more general research, from which local research often has its genesis. The results of this study are practically applicable on a local basis and more broadly at almost any institution of higher education. Chapter 5 of this study uses the research data as a point of departure for the more practical aspects of the study; specifically, it introduces some recommendations for student affairs professionals who work with conditionally admitted

students. These include methods of assisting students enrolled in the DST program, and other programs like it, to improve their success rate.

Contribution to Theory/Research: Once published, the study has the potential to contribute to the research field of "retention" in a number of ways. It provides another, basic level set of data about the relationship of pre-college variables to student success. Even with the plethora of studies preceding this one that address similar issues, each time the knowledge base is expanded, it provides another piece to what has been so aptly described as the "Student Success Puzzle" (Kuh, et al., 2005).

There are reasons to believe that the study could be even more impactful to the research base than the above suggests. First, the study looks at a new program for students conditionally admitted taking academic foundation courses[6]. Even without the additional modifier "new," the subjects and setting by themselves are an underrepresented combination in the research discipline of student success. Identifying the program as "new" makes it even more unique. It should also be noted that

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[6] There are students in the DST program who are re-taking coursework that they had in high school, but whose placement tests indicate that they have not mastered it at a satisfactory level. Their classes would best be described as "developmental." There are also students in the DST program who are taking coursework that they should have had in high school for the first time. Their classes would best be described as "remedial." The DST program does not make any such classifications and typically describes all of the courses it offers as "academic foundations." I use all three term interchangeable in this study.

the DST program is physically located on the main campus of the

Midwestern Research University and its students are fully integrated into

the regular student population. That is, they are considered full-time

college students who are eligible for financial aid, take classes in a variety

of buildings on campus and can live in campus housing. Most programs

of this sort are not so well incorporated and the students often feel

marginalized. Students in these programs are often stigmatized by

restrictive features of the program such as having their classes all offered

in the same building or being ineligible for campus housing.

The independent variables that are measured in the study do appear

in many previous studies (and are more fully addressed in Chapter 2), but

again, not in the same context of this study. Finally, both the theoretical

and practical conclusions are presented as starting points for future

research about the DST program and others similar to it.

Scope of the Study

The study focuses on the Degree Seeking Track program at

Midwestern Research University. This program provides students who are

not admissible to a baccalaureate program at the university's Urban

Campus (i.e., the main campus serving undergraduates at the university)

an alternate admission option that will provide them with the opportunity to complete academic foundation courses and earn admission to a baccalaureate degree program. The study uses pre-existing data to determine whether a set of independent variables, consisting primarily of pre-college factors such as high school rank, grades, and scores on entrance exams, impact the dependent variable of student success, which is defined as student persistence and re-enrollment at the university for a second year.

There are multiple, although not mutually exclusive, audiences for this study. First, the study should be of interest to those researchers who are interested in student success. The study is not wholly unique to this research area, but it does provide some innovative perspectives based on the newness and location of the program studied, the distinct subjects researched, and the mix of variables measured. The next group who can benefit from the study consists of student affairs professionals interested in methods of improving student success. They will be able to implement the suggested interventions and support efforts that the study describes. These services are mainly described from the perspective of working with students in an academic advising relationship, but they are applicable in

almost any student affairs capacity. These first two groups represent the global audience of the study.

Moving from the global audience to those with a more local interest, the faculty and staff of the DST program will be interested in the study. They can use the study's specific recommendations and, more broadly, distill from the study a more focused research plan for improving student success in the program. The final group consists of the central administration of the Midwestern Research University, who can use the information provided to understand better this program that they are funding and to learn more about retention in general so as to augment more positively and proactively the university's enrollment strategies.

Limitations of the Study

Readers of the study are reminded that it designed to be an exploratory study, so most of the conclusions rely heavily on the interpretive opinion of the researcher. Additionally, although the statistical methods used are meant to be "descriptive" and "inferential," it is also important to note that they are not "conclusive." The program is simply too new to provide a rich cross-section of data that could be more definitive in the results it provides. It is also important that readers do

not interpret "correlative conclusions" as cause and effect relationships, no matter how they are presented. The purpose of the study is primarily to narrow the scope for future studies involving the DST program, and others like it, and to identify some relationships that might influence student success. At this level, it is impossible to draw exact conclusions from the data. Finally, it is important that readers remember that the "suggested actions" provided as part of the practical conclusions are not meant to be direct results of the research itself; rather, they represent a list of well-accepted student support practices that have proven to be successful in a number of contexts.

Chapter 2: Literature Review

Structure and Purpose of the Literature Review

The structure used in this literature review was designed to give the reader a solid foundation of the prior research completed in the areas of student success and failure. These studies can be identified by their use of the paired terms success/failure, persistence/non-persistence, and retention/attrition to categorize broadly students' levels of achievement through their selected programs in higher education. Many researchers use these terms interchangeably, which can be problematic. As I discuss later in this chapter, one of the difficulties inherent to completing research in this area are the many nuances of the terminology. Although I find that I have used these related terms interchangeably throughout the course of this study, I have structured this report around a specific definition of student success and taken care to note this usage (see Chapter 3).

The review begins with a brief historical overview of studies dealing with the phenomena of students leaving higher education before completing their degrees or reaching some other milestone. I have tried to focus on a few studies that are significant based upon their conclusions

and how these conclusions foster the maturity of the research area as a whole. This also entails using more recent studies that have this historical perspective as their main topic.

This background not only provides the foundation needed to understand why retention studies have become such mainstays of prominent student affairs journals and other higher education journals in the last forty years, but also demonstrates that there is still plenty of room to grow in this research area. Additionally, it shows how complicated and confusing this research area continues to be, despite the forty years growth and the many studies about students leaving college that now exist. The literature review concludes with the following: a section focusing on the current prominent theories of student departure; a section reviewing studies that are most directly related to this study in terms of structure, variables, subjects and settings; a section showing the importance of connecting theory and practice, especially as it relates to working with college students; and finally, a section that summarizes academic programs and initiatives designed to support student retention.

The purpose of this approach is twofold: First, it satisfied my need for understanding the historical and contextual background of why

students in higher education do or do not persist. While reading

background studies, I found myself categorizing them based on their

goals, which were either expressly stated or as they developed and

emerged through my reading. Based on these goals, I began to identify

broadly studies with the following primary objectives: to understand

student retention and attrition, to develop programs or solutions to

increase persistence, or to do both equally. This taxonomy is admittedly

simple and reduces the question of student departure to a fairly

straightforward problem, which it is not. However, based on what I have

read, it seems as if one should start with the less complex studies that use

less complex concepts and build on them to achieve the more complex

answers.

Second, the approach to the literature review forced me to set the

goal of producing a research report that readers would find not only

interesting and informative, but also useful. Through a more careful

reading of the research, I quickly began to understand how complicated

the problem truly is. In short, there is a nearly endless list of independent

variables that can be studied in relation to dependent variables that often

do not represent that which they claim to represent; about subject groups

that are so broad that they end up being arbitrary, or so focused they become meaningless. Clearly, the responsibility for avoiding these pitfalls lies with the researcher, which is why I have strived to define clearly all the factors addressed within this study.

Recognizing that there are many well-designed studies that address these limitations assisted me in my study and allowed me to understand fully the complexity of how and why students decide to leave college or not. While advancing directly to those studies that are most similar to my study was attractive, I think this process provided me with a firmer ground to examine the issues and better access to the contexts of those involved. Even though my primary motivation for this structure was personal, my secondary purpose was for the reader, whom I want to ensure of my thoroughness as well.

Historical Perspective

In the Introduction to *College Student Retention: Formula for Student Success,* Alan Seidman, the book's editor, writes, "Although we think of retention research going back over seventy years as old, in the scheme of the United States' educational history, retention research is very new

indeed" (2005, xiii). It is interesting to read through the history of retention research and discover the multiple truths in what Seidman is stating. On the most literal level, Seidman's statement succinctly captures the easily overlooked premise that the past 70 years represent only a fraction of the total time education has existed and has been studied in the United States. Considering that unchecked growth in student attrition is a zero-sum game in which the educational institution and the student both lose, it does make sense to ponder why educators took so long to begin studying how to keep students enrolled. Common sense tells us that this should have been an early development in this country's educational background, but it is not. Another way to consider Seidman's statement is to ask why this research discipline, even at the advanced age of seventy, remains so immature. Why has it taken so long to build a research base? But maybe he means something completely different.

Ultimately, my goal is to try to understand the historical influences on researchers and their research studies, but to do so with questions in mind. I want to avoid a closed reading of the background material so I can understand how the past has shaped the current state of affairs. I found Seidman's Introduction to *College Student Retention: Formula for*

Student Success to be an excellent starting point. He clearly identifies the overriding need for a research agenda in the area of college student retention and makes a strong case for those embarking on such research to understand the history of this research discipline. This resulted in my mind being flooded with questions that made me want to continue my investigation.

Studies focusing on the attrition and retention of students in higher education have been appearing in journals of higher education for over 70 years (Berger & Lyon, 2005). However, it has only been since the late 1950s that studies focusing on why students drop-out of college began to appear in earnest; prior to this time, most colleges and universities accepted their high drop-out rates as evidence of their academic programs being sufficiently rigorous (Barefoot, 2004). Berger and Lyon's contribution (2005) to Seidman's book (noted above) is a concise chapter that provides a thorough historical study of retention in U.S. colleges and universities. Their primary focus was to review specific eras of the country's development and explain how the social, political, economical and other factors of each era influenced student attrition and retention (2005). They, too, acknowledge that until the 1950s, many institutions

were unconcerned about their students' success or failure; except when their success rate grew too high, which could be interpreted as a loss of academic rigor (2005).

Lenning, Beal, and Sauer (1980) address the concept of accepting student drop-out more thoroughly. They conclude that different institution types accept losing their students for different reasons. Selective institutions use student attrition to evince their academic rigor and bolster their reputations; open admissions institutions see student attrition as an acceptable side effect of providing access to all; and, in most other cases, institutional leaders acknowledge the problem of student attrition, but do not prioritize it as highly as other issues (Lenning et al., 1980). Fortunately, the greater part of their report deals with why institutions must begin dealing with their loss of students and how they may do so.

In at least one respect it is easy to understand why there was not much concern about students leaving college in the early part of the twentieth century: Starting in the 1900s and reaching its crescendo in the 1950s and continuing until the 1970s, higher education in the United States experienced a period of enormous growth. Many scholars have

noted the importance of this time period as being quite significant in the history of American higher education. (Altbach, 2002; Astin, 1985; Bean & Metzner, 1985; Berger & Lyon, 2005; Garland, 1985; Murdock & Hoque, 2000; and Tinto, 1975, 1985; among others). This was a time of expansion and the public regarded higher education extremely favorably. American research was internationally unsurpassed. Most people recognized the importance of higher education not only for the success of the individual but also for the benefit of society (Altbach, 2002).

Colleges and universities were packed with new students who had benefited from the G.I Bill, which provided complete tuition payment for any serviceman returning from World War II; the National Defense Education Act of 1958, which established funds for low-interest loans to students in higher education; and the Higher Education Act of 1965, which instituted support programs for students in higher education and greatly increased the country's investment in financial aid (Berger & Lyon, 2005). Clearly, with this level of the federal government's support for higher education, enrollments were burgeoning and colleges across the country were packed. Despite this period of growth, research on student persistence was lacking.

At least partially in response to governmental requests, student affairs personnel began paying attention to why some students were successful and others were not (Garland, 1985). Although these initial studies were important and provided a foundation for later research, much of what was produced were enrollment data, rather than actual analysis. It wasn't until the 1970s when falling enrollments, high attrition rates, and student demand for improved academic support services resulted in retention research exploding on the scene and receiving the attention it deserved (Thelin, 1996).

There were some notable studies published that formed the foundation for this explosion. Fishman and Pasanella (1960) completed a study in which they identified a number of dependent variables from student application data that they analyzed statistically to determine which variables were predictors of student success. Although the direct results of their study were inconclusive, it is a significant study because of how they used these results. Based on their review of related literature, it is clear that their premise going into the study was that students can and should be identified as either those who will complete their degree or those who will not based solely on their application data (primarily

demographic data and college admissions tests). They were, in effect, looking for a cause-and-effect relationship, but were unsuccessful.

Their lack of success, despite reviewing hundreds of previous studies that were successful using similar methods, led them to conclude that predicting student success was more complex than looking at student test scores. What makes this study so important is that these researchers were able to see through their uncertain findings and draw some valuable conclusions. Of singular importance is their directive for future studies: "Our goal must not only be to obtain as great a gain as possible from the addition of nonintellective (sic) predictors, but also to understand why we get the results that we do, whether the gains be large or small" (Fishman & Pasanella, 1960, p. 306). These goals for studying student attrition and retention continue to be relevant today. Student departure is far too complex an issue to study by looking only at college admission profile data without using those findings in increasingly more intricate, but revealing studies.

The early- to mid-1970s is a noteworthy time period in the maturation of student departure studies for a number of reasons. It is during this time that researchers start to move beyond both the

39

descriptive studies of the 1950s and the predictive studies of the 1960s

and begin to create research that can be considered theory (Berger &

Lyon, 2005). It is within this same time frame that colleges and

universities begin to shift the onus of student success from the student to

themselves. As the responsibility for student success shifted, the focus of

the research began to change, also. Research began to focus on the reasons

students remained enrolled and how colleges and universities could make

changes or develop programs to increase the retention of their students

(Nutt, 2003). Although a change in the focus of the research and a greater

sophistication in how this research was carried out do not necessarily

result in the creation of theoretical foundations, in this case there were

additional influences that may have aided in the process.

One important influence on the research that takes place during this

time is that administrative changes occur that have the effect of directly

and indirectly manipulating the kind of research that is produced. By the

1970s, it became clear that colleges and universities needed a strategy to

impede their declining enrollments and rising attrition rates (Astin, 1975;

Beal & Noel, 1980). This need often led to the creation of institutional

taskforces with administrative mandates to research why their students

were leaving and what could they do to reverse the trend (Noel, 1984). By the late 1970s, these institutional taskforces had grown into new university administrative positions in the area of enrollment management (Dennis, 1998). Enrollment management is the process whereby the recruitment, admission, and retention of students are integrated. The national trend of establishing enrollment management positions is highly significant: Not only were institutions taking on a greater responsibility for retaining their students, they were also taking responsibility for the entire college experience they provided.

Although these essential changes are occurring on the administrative level, it is important to recognize how the research about student departure was similarly changing. The emerging studies were beginning to look inward, at institutional factors, to find solutions. The days of blaming student failure on the student were quickly drawing to a close. This represents an important change in the way attrition and retention studies were structured. Studies at this time that only address the reasons for student attrition were losing their prominence, but researchers who developed models that explained attrition and led to institutional interventions that foster retention were seen as the

41

foundation of the emerging theory in this area (Habley & McClanahan, 2004). It ultimately appears as if enrollment management, especially in terms of the holistic approach to working with students, helped direct the research in this direction also.

Although many scholars point to the early- to mid-1970s as the time when research on student success began to coalesce into theories of student attrition and retention, these same researchers acknowledge how this process is not yet complete (Astin, 1984; Bean & Eaton, 2000; Berger, 2001; Berger & Lyon, 2005; Braxton, 1999, 2000, & 2001; Braxton & Hirschy, 2005; Braxton, Hirschy, & McClendon, 2004; Tinto, 1975, 1983, & 1987; among others). Most disciplines can probably make the same claim – that the models and theories that guide them are constantly undergoing changes and updates. This research about how theories developed and evolved (notably Astin, 1984 and all of Braxton's contributions) serves not only to clarify the fractured, yet mending, state of student retention theories; it also provides a solid framework for understanding the concept of "theory" itself.

It is especially interesting to read about theory development vis-à-vis Tinto's cogent argument advocating for restraint by researchers who

try to stretch their models too far (Tinto, 1982). Although he acknowledges that there is much that can still be discovered about why students leave higher education, he expressly asserts that the focus should be on those things that institutions can actually impact. There must be a concern for what is being measured and how it can be used (Tinto, 1982). The initial articles of this section, which explain how theory development emerged and then exploded, juxtaposed against Tinto's call for restraint brings the issue full circle for me. In short, Tinto makes a strong case to researchers: It is time to begin studying the more meaningful research results more closely, rather continuing the current practice of uncultivated growth in the number and kinds of variables that are studied.

As it is generally understood about theories, once they become indisputable they are recognized as facts, but this is not the case in the study of student departure and persistence. This research area has always been plagued by problems of inconsistency in what was being measured and how (Herzog, 2004). Despite the advances of theory and the formalization of enrollment processes, the developments of the 1970s uncovered problems inherent to the research area of retention studies.

These can be characterized as problems of definition and problems of measurement. Hagedorn states the problem more candidly, "Measuring college student retention is complicated, confusing, and context dependent" (2005, p. 89). Tinto identifies a primary insufficiency in the research of student departure from higher education when he writes, "Inadequate attention given to the questions of definition has often led leaders to lump together, under the rubric of dropout, forms of leaving behavior that are very different in character" (Tinto, 1975, p. 89). When Hagedorn's noted measurement difficulties are combined with the inconsistent terminology described by Tinto, it is easy to see why theoretical models about student departure are slow to emerge.

This problem, which has only been partially resolved almost forty years later, is the failure to account for the different types of voluntary student withdrawal – both what to call the different types of students who don't re-enroll and what are the appropriate ways to measure student success and failure. Other scholars have struggled with these problems as well and tend to cast them as historical problems that continue to confound current research practices (Astin, 1975, 2005-6; Braxton, 2005; Noel 1987; Hagedorn, 2005; Hoyt & Winn, 2004; Seidman,

2004; among others). These researchers each attempt to define the different type of attrited student and they each do an adequate job within their own study's context. Hoyt and Winn, however, provide what seems to be a possible starting point for achieving a consistent terminology. Within their study they define sets of characteristics used to describe non-returning students. They then create a taxonomy whereby these characteristics can be used to define uniquely the various types of non-returning students.

Due to the lack of an anchor discipline, there have been vast differences in how researchers approached studies. That is, because there has not been a single academic home for the researchers that conduct this kind of research; their tendency has been to rely on their own disciplinary background for guidance. As such retention models often include things that are convenient (Herzog, 2005). Unfortunately, factors are often selected based on data availability, with additional selections based on theory model fit. Based on these criteria, it seems clear that there is no uniform methodology governing retention analysis (Herzog, 2005).

Although Herzog does make some salient points about the inconsistency of the research design in retention studies, it should be

pointed out that many studies in many disciplines are restricted due to the data that is available. It seems far better to move forward using whatever is accessible than it would be to stand still because of what one does not have. This type of progress can yield practical results; including determining how different perspectives of the limited data might be able to enhance its usefulness. Relying on model fit is not necessarily a bad thing either, although it could be if the model is deemed to be a poor foundation for the research. In fact, replication studies using well-designed models are important to every research discipline.

Conceptually, the problems attributed to the idea of student voluntary withdrawal have been nearly impossible for researchers to resolve. On one level, as noted by Hagedorn, the research design that incorporates the dichotomy of good (retained students) versus bad (non-retained students) usually results in flawed data (2005). She believes that the only thing this dichotomy can reveal is the number of students who were or were not enrolled at a certain point in time, and ascribe them to a positive or negative category, often incorrectly. This relationship says nothing about the goals or standards for success students set for themselves or the various paths that students take to achieve these goals.

Braxton and Hirschy (2005), addressing the same issue, identify the result

of these problems as missing critical links needed to corroborate data.

Hagedorn's point that poor research design results in poor results is

well made, but it seems most researchers in this discipline would balk at

the idea of not being able to do some basic level, dichotomous research on

their own student populations. In fact, it is imperative that researchers

start with the basic data they have about students and build from there. It

is a noble goal to investigate and include such variables as student

attitudes, goals, and other qualitative measures in studies, but even

Tinto's complex model starts with the basic premise that understanding

students and what is needed to educate them should be central to all

research studies focusing on student departure (1993). Astin's research

and resulting model seem to contradict Hagedorn also. He argues for four

variables; specifically, high school grades (GPA), college entrance test

scores (ACT or SAT), student gender and student race, as the most

important for retention studies (1997). He also mentions in his earlier

work that that past academic performance is the strongest predictor for

persistence (Astin, 1975)[7]. Ultimately, it seems that each researcher must

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[7] Both Astin and Tinto are discussed more thoroughly in later sections of this chapter.

do what he or she can to understand his or her student population. This is best achieved by starting with less complex studies and then building in greater complexity with subsequent and follow-up studies.

On the practical side, there have been studies done to create more accurate, measurable relationships. Seidman argues for a uniform set of measures for all institutions, but with recognition that different types of institutions serve different student populations and, therefore, have different retention rates and expectations (2004). Seidman's recommendation was formulated as an alternative to the current requirements set by the federal government for institutions of higher education in reporting their student retention data, not as a comprehensive solution to the problem of how to design research that accurately defines students who leave their colleges and universities. It seems, however, that this is an important first step. As long as the state and federal governments require ill-conceived reports, these reports will continue to be produced.

Some researchers have tried to handle the definition component by suggesting more specific definitions to the terms currently in use. Hoyt and Winn profiled non-returning students and assigned them to the more

meaningful categories of dropouts (those students who do not re-enroll and have no plans to return to higher education), stop-outs (those students who do not re-enroll, but intend to return to the same institution as some point in the future), transfer-outs (those students who do not re-enroll, but plan to enroll at another institution in the future), and opt-outs (those students who do not re-enroll, but have satisfied their personal needs and goals without earning a degree)(2004). It seems clear under this taxonomy that knowledge of both opt-outs and transfer-outs would be important toward determining an institution's true success rate. State institutions should be particularly mindful of intra-state transfer students, since it seems that a one or two year enrollment at a local state institution might facilitate eventual transfer to the student's institution of choice.

Other researchers have argued that the best approach is to understand these students based on educational and attitudinal measures and then categorize them based on their potential to return (Kiser & Price, 2007-8; Padilla, 1999; Woosley, 2004). Finally, there are researchers who believe that longitudinal studies are the best way for institutions to analyze their enrollment data and since these studies can allow students

to change categories over time, which will also alleviate some of the problems of definition (DeBerard, Spielmans, & Julka, 2004; Ishitani & DesJardins, 2002). Although none of these is completely satisfactory, they each make a secondary argument, whether overtly or not, for being true to context. Researchers must carefully define and explain the variables of their own studies in terms of how they make the most sense of their students and their institutions. Every attempt has been made in the current study to follow this principle.

There does seem to be one aspect of the definition problem that is not addressed in any of the background research. Even though many of the studies have thoughtfully designed methods of categorizing the various types of students who leave college, none of them make this same effort for students who do not leave. Although this might sound like a fruitless exercise, in actuality, there are different types of returning students and determining how to categorize them might be beneficial. Similar to identifying the various kinds of students who leave college, there are many ways to define returning students and this knowledge can be important when determining how support services are designed and implemented.

Without any claim of being comprehensive, here are some examples: First, the easiest kind of persisting student to identify is the student who is attending the institution, wants to be there, and is satisfied with his or her program. The second kind of persisting student is one who is attending the institution, but is unsure about higher education in general. This student typically attends because he or she did not know what else to do after finishing high school. Although this type of student will often end up as a non-returner, some of them do persist to graduation and still do not know what to next. The third kind of persisting student is one who is attending the institution, recognizes the importance of a college degree, but feels trapped into attending the particular institution and makes no effort to go elsewhere. Forces such as finances, grades, parental pressure, or relationship issues often keep these students from attending their institution of choice, but they can and do persist to graduation. The fourth kind of persisting student is similar to the third, but does have plans for leaving the institution and attending his or her institution of choice.

This list could continue, but at this length serves the purpose of revealing the issue. But why is this important? When working with

individual students, it is easy to discuss with them how satisfied they are and what their future plans hold. But just as research about the different types of non-returning students adds to our understanding of them and can lead to programs that might support their retention, so would knowledge about the types of returning students be useful. Three of the four kinds of persisting students described above should be recognized for their tendency to be potential non-returning students in the future. It is important to remember that retention research serves to understand why students leave college, but this research must also be used to support the success of those students who persist.

Creating interventions for students who are unsure of the choices they have made can often result in these students being satisfied with their current situation. Professionals who truly put their students first will always support a student's goals, even when achieving those goals means losing the student to a different institution. Albeit not immediately applicable to the study at hand, this brief digression serves to illustrate that the problem of categorizing students does not stop with those who do not persist; even the so-called "successful student" can benefit from further investigation.

Despite the all of the problems encountered in the 1970s and beyond, theories and models do emerge and distinguish themselves from one another. The current prominent theories of student departure, Tinto's (1993) model of student integration and Bean's (1983) model of student attrition, each have their background in research conducted in the 1970s and forward. Although the historical implications of these theories will be addressed, at this point it seems more beneficial to review them in terms of current research.

Prominent Theories

Several theories have been advanced to describe and explain undergraduate persistence. The two most widely used and comprehensive are Tinto's Student Integration Model (SIM) and Bean's Student Attrition Model (SAM). The purpose of this section is to review each model, compare them to one another, and review the resulting theories and studies that developed as a result of these comprehensive approaches to student attrition and retention.

Student Integration Model

In 1975, Tinto became one of the first to address the lack of theory in dropout research in his study "Dropout from higher education: A synthesis of recent research." He identifies the problem as: "Research on student dropout from higher education has also been marked by inadequate conceptualization of the dropout process" (Tinto, 1975, p. 90). He clearly believes this is a problem and he goes on to offer a basis for a solution. It is in this seminal work on student departure that Tinto first introduces his "Dropout as Process: A Theoretical Model of Dropout Behavior" (Tinto, 1975, p.91). This theory provides the groundwork for his interactionalist theory of college student departure, which he introduces in 1987 in *Leaving College: Rethinking the Causes and Cures of Student Attrition*.

In the second edition of this book (1993), Tinto provides an updated version of his theory, now more commonly referred to as the Student Integration Model. Tinto grew his theory from the work of sociologist Emile Durkheim, whose theory of suicide states that individuals are more likely to commit suicide when they lack integration into society (Pampel, 2000). Tinto uses this as the basis of his theory which declares that

54

individuals are more likely to leave higher education when they have not been adequately integrated at the academic or social level (Tinto, 1975, 1987, & 1993).

The common thread is the longitudinal approach he used to build his theoretical model that links individual characteristics, institutional characteristics, and the dropout process (Tinto, 1975, 1987, & 1993). Tinto's theory becomes so well-entrenched in the research area that Braxton notes "Tinto's interactionalist theory possesses near paradigmatic stature in the study of college student departure given that citations to this theory have numbered more than 400 and 170 dissertations have referenced or used it" (1999-2000, p. 93).

The main idea behind Tinto's model, looking now primarily at the most recent version, is that attrition can be viewed as a result of students' pre-entry characteristics, initial goals and commitments once they enter college or university, their academic and social experiences within the institutions, and emerging goals and commitments over the course of their academic career (Tinto, 1993).

Ultimately, Tinto lays the bulk of the responsibility for ensuring that students are retained on the institutions of higher education

themselves, as a whole. Although there are many things an institution can do to support student success, Tinto's Integration Model uses a complex array of variables to demonstrate how institutions are most successful at keeping the students they enroll when they are committed to quality education (Tinto, 1993). The concept of quality education, or "the character of institutional commitment" (Tinto, 1993, p. 204), goes beyond having nationally reputable programs; rather, it is an institutional characteristic exuded through the entire university:

> An institution's capacity to retain students is directly related to its ability to reach out and make contact with students and integrate them into the social and intellectual fabric of institutional life. It hinges on the establishment of a healthy, caring educational environment which enables all individuals, not just some, to find a niche in one or more of the many social and intellectual communities of the institution.
>
> (Tinto, 1993, pp. 204-5)

Relating this concept to the current study, it seems reasonable to assume that students who lack academic preparation from high school are at least initially going to difficulty with academic integration unless the

institution provides the support they need to achieve it. Tinto goes on to write that students can be influenced in their decision to stay or to leave college based on anything and everything they encounter, including classroom experiences, dorm life, campus services, among others (Tinto, 1993).

Were this model to exist in a vacuum, no student would ever finish college, it seems, and no researcher would ever be able to collect the data needed to complete a study using the model. In some respects, the Student Integration Model is a model for perfection, which is a standard no institution can uphold. As such, it is fortunate that Tinto has built-in allowances that make the model much more manageable and realistic. First, institutions must define their educational mission in such a way that it addresses a commitment to student success, without having to achieve a level of perfection (Tinto, 1993). As such, it is important that an institution be open about what it can do for students, including how it will support student learning and foster student development. Putting this broad institutional perspective in action as part of specific programs for retention requires institutions to go "beyond the concern for retention per se to that of the education of students" (Tinto, 1993, pp. 146-7). This

foundation of a commitment to education must be in place before all the other institutional actions can fall in place. While this is a difficult enough task in its own right, it does allow for colleges and universities to define their own standards and focus on their own goals rather than try to conform to the complete model.

Additionally, it is unfair to put the complete onus of student success on the institutions. Tinto clearly acknowledges the student's role in his or her success. This comes in the form of both what they do to make their own success and how they react to what the institution is doing to support them (Tinto, 1993). Students cannot simply apply to a college or university, be admitted, and start to attend without learning something about that college or university. They must recognize their needs and find an institutional fit (Tinto, 1993). If institutions have done their part, then the information is available and students, along with their parents and college counselors, can easily find mission statements, bulletins, statistics, and other institutional information that will help them in the decision-making process.

Although it is an important step in the process of becoming successful, Tinto is careful to point out that it is also a daunting task to

put a potential college student, especially someone right out of high school, in the position of understanding the ramifications of his or her decision (Tinto, 1993). Things such as the location of the institution; cost and financial aid; and truly understanding the expectations of college-level work tend to add to the difficulty of student's making the correct decision, which is why this is given some credence, albeit dubious credence at best, in Tinto's model (1993).

Of greater importance is how students act and react once they are on campus and classes start. In terms of action, students can assist in their own success by being self-motivated, organized, and prepared (Tinto, 1993). These characteristics can be encouraged in students and seem to be discussed with students at most institutions. More telling is how students react to specific support programs made available to them. Tutoring, advising, learning communities and other programs designed to support student success rarely fulfill the needs of all students, but they almost always provide useful ideas, strategies, or insights that can assist every student in some part (Tinto, 1993). Students who react to such programs in a positive way can and will be assisted in their academic goals and, conversely, students who react to these programs negatively

and avoid participating will not receive the benefits (although this does not preclude their success) (Tinto, 1993). The student effect on Tinto's model seems to be the most difficult variable to control and as a result, has the effect of relieving colleges and universities from bearing sole responsibility on their success.

Tinto's complex Student Integration Model was last published in book form in 1993, and even though his more recent research indicates some changes may be in order, he maintains his basic premise: Students entering higher education must be prepared to make a commitment in order to succeed, but it is the responsibility of the institutions themselves to create an environment that will foster this success (Tinto, 2002 & 2004). His more recent research relies heavily on his own theory, but tends to focus on concrete solutions rather than his abstract model. For example, he is an advocate of Learning Communities, a pre-planned schedule of courses that enrolls students with similar interests, and his current research supports his position that these programs increase student success by creating environments in which students readily immerse themselves (Tinto 1997, 1999, 2002, & 2003).

Student Attrition Model

Some describe Bean's (1980; 1982; 1986) model of student attrition as

a competing model of student departure to Tinto's model of student

integration. However, Bean's intent was the creation of psychological

model that would be an alternate to Tinto's sociological model. His

general principle was to use psychological theories to understand better

the student retention process and to provide institutions of higher

education additional foundations for creating retention programs and

developing institutional retention policies (Bean 1980, 1982, 1983, 1986;

Bean & Eaton, 2000; Eaton & Bean, 1995).

Bean (initially working alone, but later in studies with Eaton [1995

& 2000]) bases his research in the area of worker turnover, especially

Price's (1977) model of turnover in work organizations, which emphasizes

the importance of behavioral intentions. Bean argues that students leave

institutions for reasons similar to those causing workers to leave

particular organizations. Specifically, that just as workers attitudes and

behaviors can signal their intention to leave their work organization, so

can a student's attitudes and behaviors signal their intention to leave

school. In both cases, attitudes are formed and influenced by experiences

61

in the organization and these attitudes result in the behaviors that indicate intent (Bean 1980, 1982, 1983, 1986; Bean & Eaton, 2000; Eaton & Bean, 1995).

For students, attitudes are shaped first by background variables such as past academic performance, socioeconomic status, distance from home, and other characteristics that can impress students before they ever even enter college. Organizational determinants such as perceived value of classes, initial success or failure, student development, and adaptability to a new routine tend to act upon the background factors in a positive or negative way to influence the student's satisfaction with the institution. Student satisfaction results in a level of institutional commitment by the student with a higher level of institutional commitment equating to a lower likelihood of the student leaving the college or university. More succinctly, a student's initial attitudes regarding college are intensified by experiences once the student attends college, which in turn, influence the intent to persist or drop out. As attitudes are developing, students will exhibit behaviors that demonstrate this intent (Bean 1980, 1982, 1983, 1986; Bean & Eaton, 2000; Eaton & Bean, 1995).

Eaton and Bean (1995, 2000) eventually modified their model by including coping behavior as a separate measure to help explain a student's adaptation to the campus structure. The student's ability to cope, which is a function of the student's past experiences developed into specific coping skills, is directly related to the student's ability to adapt (Bean & Eaton, 2000; Eaton & Bean, 1995). Their explanation makes the inclusion of coping seem logical and significant: "Since coping is an observable phenomenon that students use to adjust to stressful situations, it can serve as a means to examine adjustment to the college environment" (Bean & Eaton, 2000, p. 618).

In addition to coping behavior, the model is also modified to reflect accurately the importance of background characteristics, including academic preparation, on a student's ultimate intent to stay or leave the college or university he or she is attending. Background characteristics had been adjusted to reflect less influence in the earliest versions of the model (and some even removed at times), but the most recent version has included them and given them the weight of importance they deserve (Bean & Eaton, 2000, 2001; Eaton & Bean, 1995).

Comparing SIM and SAM

Although a comprehensive comparison of Tinto's Student Integration Model and Bean's Student Integration Model is probably a worthwhile undertaking to understand each of them better, the sheer magnitude of such a task precludes it from happening here. However, it does seem valuable at this point to note some important comparisons between the models as they relate to the study at hand.

One immediate similarity that seems worthy of mention is that both models have their basis in the social sciences, with Tinto using his background in sociology to develop his model and Bean using his background in psychology to develop his. Many have noted how these backgrounds present an important *difference* in the models and based on certain context, and I do not disagree with this. However, since both models are designed to explain phenomena that occur in education, and neither draws on any educational theory, it seems that having both come from under the social science umbrella actually presents an area of common ground. This is important because it does allow for some direct or nearly direct cross-over in terminology. For example, both models use social and academic integration as terms to indicate how well an

individual is adapting to college life. Tinto's model is founded on these concepts, with most other variable impacting them in some positive or negative manner. Bean's model also relies heavily on the ideas of social and academic integration, although their importance is seen as a function of how they affect a student's intentions. Although the usage is not identical, the terminology is similar enough that it is easy to move from one to the other without having to switch one's internal lexicon.

The Integration Model and the Attrition Model seem to concur that pre-college characteristics affect how successful students will be in adjusting to college or university life. This is especially important as it relates directly to the study at hand. Due to the complexity of the variables in both models and the availability of data available to the researcher, the current study identified a specific set of pre-college variables and determined their usefulness in indicating student success. The importance given to pre-college variables in both models supports the design of the current study.

Finally, a study comparing the performance of the two models found that both are effective and both complement each other (Cabrera, et al., 1992). The Student Integration Model was found to be more robust.

That is, more of its hypotheses were confirmed. The Student Attrition

Model accounted for more variance, indicating that there were more

significant effects from external factors (Cabrera, et al., 1992).

Related Studies

The purpose of this section of the literature review is to identify and

evaluate other retention studies that share characteristics with the current

study. Although it would be beneficial to find information about each

aspect of the current study, including similar research design, setting,

variables, and participants, this did not happen. However, some of these

features do figure prominently in the literature and were clearly

important to address. The specific characteristics that were identified are

studies that use similar independent variables, such as pre-college

academic data; and studies that have a similar set of participants,

especially first-year students in any special admission program. This

approach allowed me to find information that supported my study, even

without finding any directly similar studies.

There are many retention studies that look at pre-enrollment data,

including those that specifically look at high school generated data such

as rank and GPA; those that look at standardized test scores; and those

that look at pre-matriculation data such as placement test scores[8] (Colton, et al., 1999; Glynn, Sauer, & Miller, 2003; Moore, 2005; Murtaugh, Burns, & Schuster, 1999; Porter, 2003; Reason, 2003). Their findings present a diverse array of analyses that result in findings that seem to contradict one another or corroborate each other, depending on the perspective of the researcher. The purpose of this section is to summarize briefly some specific studies that include pre-college academic data variables and thereby support their inclusion in this study.

Astin (1997) writes that four variables "account for the bulk of variance in retention" (p. 649). Those four variables are high school grades (GPA), college entrance test scores (ACT or SAT), student gender and student race. Astin's work at this time is a follow-up to his earlier and broader observation that past academic performance is the strongest predictor for persistence (Astin, 1975). Other researchers have found these four variables have been consistently significant, also (Peltier et al., 1999). As a result of his conclusions, Astin (1997) creates a formula based on these variables that can be used by colleges and universities to determine their natural or normal retention rate. Although the

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[8] For purposes of consistency and efficiency, these are hereafter grouped together under the umbrella term "pre-college academic data."

demographic variables of student gender and student race are important, it is clear from reading Astin's work that the pre-college academic data represent the original basis for his model.

There are other studies that are based, at least in part, on Astin's work and similarly support the use of pre-college academic data variables. Murtaugh et al. (1999) used survival analysis, a statistical method used when it is important to capture data related to events over time (i.e., the data for the study indicated the non-persistence of students, but also when they stopped attending) to develop a predictive model for student departure. The model used demographic and academic variables to determine the probability of a student's leaving school and looked at an incoming class of first-year students over a five year period. High school GPA was significant in the first-year only and decreased each year thereafter (Murtaugh, et al., 1999).

DeBerard, Spielmans, and Julka (2004) used pre-college academic data variables; demographic variables; student health risk factors such as smoking and binge drinking; and psychosocial factors, such coping ability and social support; to develop a model to predict student retention and student academic achievement. Their subjects consisted of first-year

students who were assessed during the first week of class. Their model proved to be useful for predicting academic success, but not statistically significant for predicting retention (DeBerard, et al., 2004). Despite these findings for the model as a whole, they did find high school GPA to be somewhat predictive of retention, especially in lower GPAs (DeBerard, et al., 2004). This represents a weaker relationship between GPA and retention than has been seen in other reviewed studies, which might be at least partly explained by the study's participants.

In their limitations section of the study, the researchers explain that the participants are first-year students at a selective, private university in northwest Canada and these students are viewed as academic achievers, mostly from supportive, two-parent families (DeBerard, et al., 2004). After considering the extra year of high school that Canadians receive and the fact that private colleges and universities often have greater support services than public institutions, it is possible to conclude that the study has flaws. However, further investigation into the flaws of the study proved to be a useful pursuit. Recognizing where the researchers could have been clearer about their setting or subjects compelled me to be as straight-forward and descriptive as possible throughout my study.

69

At face value, it seems that this study does not support the use of pre-college academic data very well. However, taking into account the eventual limitations that are revealed, and by looking more closely at some of the descriptive statistics, it seems to be a reminder to researchers to clearly identify and describe the variables, participants, and setting of their studies. A quick review of the descriptive statistics included in the study reveals that the participants had an average high school GPA of 3.56 and that there were 204 participants and 173 (or about 85%) were retained to the second-year (DeBerard, et al., 2004). One reason to include descriptive statistics is to use them to understand the population of the study better, but also to determine how to best handle the more complex measures, like the inferential statistics, needed for the study. All statistical measures have limitations and with such a small sample size, so few students who departed, and such a high average GPA from high school, the confidence level for any test using this data would have to be set so low that if a correlated relationship is found, it would probably be nearly meaningless. Ultimately, I found a number of shortcomings with this study, but working through those was helpful to me and further assured me that what I included *and* how I handled these things is sound.

Although the previous study digressed a bit from the subject of reviewing how pre-college academic data are used in other studies, a review of Reason (2003) should serve to bring about closure on this topic. In a meta-study Reason looked a retention research completed since 1990 and specifically focused on the relationship of individual student characteristics and retention. Based on this, he concluded that high school GPA and college entrance test scores were significant predictors of retention on a consistent basis. Further, he deemed that high school GPA and college entrance test scores "were included in nearly every study and often considered student background variables in models that included multiple other variables related to retention" (Reason, 2003, p. 178). This seems to indicate that not only are these variables important when studied in isolation, but they can serve to strengthen the predictive ability of other variables in more complex studies. For the current study, it seems, the error would be in not including these variables.

Unfortunately, even though high school GPA and college entrance test scores are featured so prominently in the literature, the other pre-college academic data I used in my study, specifically the orientation generated variables, are not nearly so abundant. Glynn et al. (2003)

included some of these variables in their study, but to minimal or no effect. This lack of inclusion in other studies is at least partially explained by the declining use of such tests. Many institutions now use services, like those available from ACT, Inc., to place students in beginning courses[9].

Additionally, I was surprised how few studies included high school rank as an independent variable. There seem to be two prevailing reasons for this. First, many view rank as a function of GPA and deem the two to be redundant[10]. Whether or not that is true remains open for debate, but a more practical reason for not including this variable in studies is the recent trend by high schools to eliminate student rank from the data they report to colleges. Finder (2006) reports "Now nearly 40 percent of all high schools have either stopped ranking their students or have ceased giving that information to colleges, according to a survey released last year by the National Association for College Admission Counseling, which represents high school guidance counselors and college admissions officers" (para. 11). As I was able to access high school rank for most of the participants in this study, I decided to include it.

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[9] ACT, Inc.'s "Course Placement Service" is described more completely in Chapter 5.
[10] This idea is discussed more fully in Chapter 5.

Studies involving first-year students in special admission programs are readily available in past retention research. It is interesting to find these and demonstrate that this characteristic is important to include, but in most cases, the interventions and support services that these programs provide for students are being researched. From that perspective, none of them are truly relevant to my study as designed. However, I do think it is important to include them here based on how they can influence how future research about the DST program might evolve. Also, some of them are studies specifically focused on first-year students, which is often considered being in a special program itself.

What is clear from the studies reviewed is that retention from the first- to second-year of college is of great concern to researchers. This is probably due to significant loss of students during this period. According to Tinto (1987), roughly 75% of all attrition occurs during years one and two of college, with most of that group departing during the first year. Despite what one might think, most of these students, possibly as many as 85%, depart on their volition and do so in good academic standing (Tinto, 1987). McGrath and Braunstein (1997) accurately point out that institutionally specific research, grounded in the prevailing theories, is

the most expedient and efficient way for colleges and universities to

develop retention initiatives that will support their own students. Their

study included demographic variables, pre-college academic variables,

and financial variables. Like many other studies, they found that

academic preparation from high school was a significant indicator of

student retention, but only to the point where attending was not a

financial hardship (as indicated by socioeconomic background and/or

receiving adequate financial aid) (McGrath & Braunstein, 1997). Their

study of first-year students was part of a larger strategic planning process

that was charged with improving retention at their school and their

recommendations included both general principles and specific initiatives

that could be implemented and reviewed in follow-up studies (McGrath &

Braunstein, 1997). This approach seems worthwhile and definitely

influenced the study at hand.

Snyder et al. (2002) studied first-year students at a small, private

university, who tested into the university's developmental education

program, by virtue of testing into a developmental education course. They

looked at high school achievement (high school grade point average),

gender, and SAT quantitative and verbal sub-scores. In their study

students were considered successful when retained from the first- to the second-year of college with a 2.5 grade point average. The researchers used logistic regression to measure the statistical significance of the relationship of the independent variable to the dependent variable and ultimately determined that high school achievement (GPA) had the most significant impact on student success as they defined it. This study exemplifies the need for researchers to start looking at discrete data types and build on these in future studies. The researchers use their conclusion to outline their research plan, which grows with increasing complexity. This process of using basic studies as the foundation for future research is a reoccurring theme in this literature review, as it is noted by many of the scholars in their work. Snyder et al. (2002) present a good example of how this really works once the research gets written up and their study adds to the research base of retention studies focused on first-year students.

Despite not finding studies that I would classify as being directly related to my own, I am satisfied with the quality and quantity of the studies that are similar in specific parts. As noted earlier, I did not find any studies that used placement test scores as part of the independent variable set, but two things convinced me to include them in my study

notwithstanding this: First, they are such an important component of the

DST program that anyone familiar with the program would consider the

omission of these scores as an independent variable to be a major error on

my part. My own sensibilities would conclude this also.

The second reason why I decided to include them is the reoccurring

theme of "context" that appears in most of the studies, either explicitly or

implicitly. That is, most of the studies indicated in some manner that

their research was based on the structure or needs of their program or

institution. For example, McGrath and Braunstein (1997) take care to

explain how they formulated their study due to it being part of a larger

strategic planning process. Because their study would be used to shape

future retention initiatives, it was important to them to include financial

variables, due to the difficulties their students had with the financial aid

process (McGrath & Braunstein, 1997). Snyder et al. (2002) were not so

clear in explaining why defining student success needed to include a 2.5

GPA. I assume that this represents a benchmark at their school, indicating

that they, too, were aware of their institution's needs when designing

their study. As a result, completing this section of the literature review

provided me with enough information to ensure that I could complete my study as designed and be able to support the results.

Applying Research

The purpose of this section of the literature review is to illustrate briefly a reoccurring theme from the literature that helped shaped the purpose of this study. In education studies in general, and in retention research more specifically, scholars are calling for theoretical research to be channeled into practical applications. This goes beyond the implications for future research that most studies include. This appeal seems to be a more specific request for researchers to be mindful of how their studies are structured and to ensure that they draw conclusions that can be implemented by others. I initially became aware of this from the writings of Tinto (2006) who declared:

> The fact is that despite our many years of work on this issue, there is still much we do not know and have yet to explore. More importantly, there is much that we have not yet done to translate our research and theory into effective practice. It is therefore not unreasonable to ask what else we need do to further improve the

effectiveness of our work on behalf of increased student retention and enhanced institutional effectiveness. (p. 2)

This idea made me realize that most of the studies I had reviewed did not include specific processes for putting their findings to work, although those that did seemed more complete to me.

Eventually, I found that Tinto's call to action was not being made in isolation and was echoed by others in education. Boyer (1990) seems to be one of the leaders of this movement. Boyer's ideas on this subject are more developed than what Tinto proposes and he makes a very detailed case for restructuring the conventional understanding of academic scholarship. The main point of his argument is that scholarship needs to serve four areas important to academia: discovery, integration, application, and teaching (Boyer, 1990). I took this to mean that research studies need to reveal some bit of new knowledge or present a new perspective on existing knowledge (discovery); these new ideas need to fit into and add to the research base of the discipline (integration); these new ideas need to be put to work and retested for their effectiveness (application); and finally, it all should impact either what is taught in the discipline or how the discipline is taught (teaching). The problem seems

78

to be that too many researchers complete the discovery and integration, but fail to address the application and teaching needs.

Other educators also make an appeal for research that is applicable and useful. Writing from the perspective of a former editor for two well-respected journals for research in education (*Review of Higher Education* and *Research in Higher Education*) and at the time written, the current editor of another (*Higher Education: Handbook of Theory and Research*), Smart (2005) proposed seven characteristics of exemplary quantitative research manuscripts. One of the seven states "Exemplary manuscripts have important implications for both future research and current practice and policy" (Smart, 2005, p. 474). Like Boyer, Smart calls for the removal of the barriers that exist between theoretical and applied research.

In retention research, scholars other than Tinto have also expressed a need for a greater applicability of the work they and their colleagues produce. Braxton, Brier, and Steele (2007) draw on the work of others to produce a list of seven guidelines for colleges and universities that can assist these institutions in improving their student retention rates. One of the stated goals of the paper is "to translate research into a form amenable to the shaping of day-to-day practice in colleges and

universities" (Braxton et al. 2007, p. 378). Jablonski (2005) also draws on the work of others to support her position that research connecting theory and practice is especially important for student affairs professionals to engage in if student affairs is to be accepted as a research discipline.

Although the pieces reviewed in this section are not research articles, per se, they are written works produced by academic scholars. The ideas and proposals of these scholars have influenced and will continue to influence the research produced in journals of higher education. Tinto's stature is noted earlier in this chapter. Boyer's *Scholarship Reconsidered* has been cited in more than 4,000 books, articles, and other written works[11]. Smart, having been an editor at three different refereed journals in higher education seems to be similarly respected.

Scholarship comes in forms other than research, and the works reviewed in this section should be considered as such. Based on this, it is important to acknowledge that the words of these scholars had a profound effect on me and convinced me to accomplish what I perceive as their objectives in this paper. This required some repositioning of the

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[11] The actual figure, generated using a reference search via Google Scholar, was 4,283. Other search engines, including those accessed from academic library websites, generated figures much higher than this.

purpose of the research study and reworking the final chapter to include specific, applicable, recommendations for academic advisors and other student affairs professionals. The next, and final, section of the literature review is included to ensure that there is a scholarly basis for these recommendations.

A Compendium of Student Support Initiatives

As noted above, the purpose of this final section of the literature review is to provide a research-based list of student support services that academic advisors and other student affairs professionals can employ at their own institutions to encourage student success. At this point, my objective is to introduce the various options, describe their functions, and establish their value by briefly referring to background literature. The final section of Chapter 5 will re-present them within a recommendation structure, which is evaluative and more in line with the context of the study. It is anticipated that the suggested actions will be used by academic advisors, student affairs professionals, and others in higher education who are concerned about student success.

The list is not designed to be an exhaustive catalog of possible programs and services, rather it is meant to represent what I regard as an

important set of actions institutions should consider to support first-year students in programs similar to the DST program. Every attempt has been made to keep these options as distinct from one another as possible so that any one of them can be used independently by individual institutions or programs. That is not to say that these options cannot be linked, but they do not have to be. The first item on the list is the only one that should permeate the entire retention program:

Academic Advising – It is difficult to define "academic advising" in such a way that everyone who practices it will be satisfied. For the purpose of this paper, I am going to use the concept of developmental advising as defined by Crookston (1972) and expounded by others over time. Crookston (1972) defines developmental advising as:

> Developmental counseling or advising is concerned not only with a specific personal or vocational decision but also with facilitating the student's rational processes, environmental and interpersonal interactions, behavior awareness, and problem-solving, decision-making and evaluation skills. (p. 12)

In this respect, an academic advisor is concerned about his or her students on many levels. These include working with students to assist

them with the transitioning to college; understanding the curriculum; utilizing campus resources; comprehending the administrative and academic processes of the institution; and defining their long-term and short-term educational goals. These things need to be discussed with individual students within the context of their own values, interests, and abilities. In short, developmental advising provides students with a learning environment that fosters their intellectual and personal growth. Throughout the remaining sections of this paper, "academic advising" refers specifically to "developmental advising."

Within the definition provided, there is one constant feature that makes academic advising such an important component of student success. Habley (1994) wrote "Academic Advising is the only structured activity on the campus in which all students have the opportunity for one-to-one interaction with a concerned representative of the institution" (p.10). This sentiment is echoed by many scholars (Crookston, 1972; Fowler, 2007; Gordon, 1992; Gordon & Habley, 2000; Nutt, 2003; Stowe, 1996; Tinto, 1993). This crucial connection is even more important for students who are considered "at-risk," which would include conditionally

admitted students and students in developmental education. These are both characteristics of students in the DST program.

Mandatory Testing and Course Placement – This initiative requires all students to be accurately placed in beginning courses in English, math, reading, and possibly other areas, depending on the institution. Inherent to this is that the pre-requisite structure will be followed by all students. The success of this initiative is contingent upon both the accuracy of the placement and the strict adherence to that placement by students. In this respect, institutions need not develop placement tests if a current method of placing students has been deemed reliable.

Although the research on mandatory course placement is sparse, there are researchers who support it. Amey and Long (1998) studied the success of underprepared, degree-seeking students at an accredited two-year college and found, among things, that students should complete their developmental course requirements as early in their college career as possible. From their many discrete findings, they ultimately concluded that mandatory placement should be rigorously followed for students in developmental education (Amey & Long, 1998).

Over a four year period, Friedlander (1981-2) studied under-prepared students who followed their developmental course placements as directed and found that these students had higher GPAs, completed more academic course credits (i.e., non-developmental courses), and graduated at a higher rate than the under-prepared students who did not follow their developmental course placements. Although these studies do not provide overwhelming evidence, it should be noted that Maxwell (1979) found that students with the lowest placement scores were the most likely to avoid the developmental courses they needed. Taken together, this information re-affirms for me the recommendation of mandatory course placement. It seems clear that if these are made optional, the students who most need to be in developmental courses are going to suffer the most.

Unfortunately, there is a wrinkle in this requirement and it may take legal action to iron it out. Hadden (2000) and others make the argument that students have the right to fail and making them adhere to their course placements and follow a prerequisite structure takes this right from them. Currently, this is being challenged at the state level in some states, but as long as Hadden's position has not been mandated by

law, the initial premise of this item should be made policy. Additionally, it should be explained that this policy extends to all levels of the discipline. In this respect, even students that place very high should not be allowed to skip courses along the prerequisite structure.

Supplemental Instruction – Supplemental Instruction is program that consists of out-of-class study sessions lead by a former student who earned a high grade in the class. Supplemental Instruction was developed in 1973 at the University of Missouri-Kansas City, which is where the International Center for Supplemental Instruction is housed. Since Supplemental Education is a proprietary program, I want to include the following description of the program, which is from the Center's website:

> Supplemental Instruction (SI) is an academic assistance program that utilizes peer-assisted study sessions. SI sessions are regularly-scheduled, informal review sessions in which students compare notes, discuss readings, develop organizational tools, and predict test items. Students learn how to integrate course content and study skills while working together. The sessions are facilitated by "SI leaders," students who have previously done well in the course and

who attend all class lectures, take notes, and act as model students.

Available at http://www.umkc.edu/cad/si/overview.shtml

Since 1973, SI has been adopted by hundreds of colleges and universities and is now used at virtually all levels of education, from developmental courses to undergraduate and graduate level courses, including use at some medical and law schools. In general, the related research indicates that when SI is used in a course, more students finish the course and do so with higher grades than when the course is taught without SI (Kochenour et al., 1997; Congos & Schoeps, 1999; Stone & Jacobs, 2006)[12].

First-Year Experience: Learning Communities and First-Year Seminars – First-year experience programs can encompass a wide array of educational opportunities for students, such as pre-college week activities (i.e., educational programs and social activities available to students the week before classes start); common summer readings (i.e., providing all new students with a copy of the same book for them to read over the summer and then spending time at the beginning of the year discussing it); or even service learning options. Although these can be essential components of some first-year experience programs, the literature

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[12] Readers interested in learning more about SI are encouraged to access the annotated bibliography available from the Center's website at: http://www.umkc.edu/cad/SI/si-docs/sibib.htm.

overwhelmingly points to learning communities as the most successful

and important opportunity a first-year experience program can provide

for students. First-year seminar classes are a natural fit with learning

communities and are also well-supported by other researchers, so I have

included them here as well. Most of the other options mentioned above,

and many others not mentioned, do not have a solid basis in the

literature, especially as it relates to conditionally admitted and

developmental education students.

"Curricular learning communities are the purposeful restructuring

of an undergraduate curriculum to thematically link or cluster courses

and to enroll a common group of students in these courses" (MacGregor &

Smith, 2005, p. 2). Learning communities are more than just block-

scheduling, although that is needed to make them successful. Because

they work most successfully for first-year students, who learn the

importance of things such as studying in groups, meeting with their

instructors, and utilizing campus resources, it is imperative that they are

designed in such a way that students do not feel isolated from the rest of

campus. This is even more important when the learning community is for

developmental education students, who can feel stigmatized by being in

all the same classes with the same students. Clearly, the easiest way to overcome this is to include some, but not all, of a student's courses in the learning community. Often, having only two linked courses and the rest of the schedule open can still be effective.

The related literature reveals that there are many benefits for institutions that use learning communities. As noted earlier, Tinto (1987) strongly supports their use as a method of increasing student retention. Laufgraben and Shapiro (2004) include such things as empowering students to become active consumers of their education and increasing diversity as two of their long-term benefits. Zhao and Kuh (2004) found that "Participating in learning communities is uniformly and positively linked with student academic performance, engagement in educationally fruitful activities (such as academic integration, active and collaborative learning, and interaction with faculty members), gains associated with college attendance, and overall satisfaction with the college experience" (p.124). Additionally, Tinto and Goodsell (1994) suggest that learning communities for new students should include a First-Year Seminar course and further, should be part of a First-year Experience initiative. My personal experience is that learning communities are becoming so well

established on campuses around the country that students come to college already understanding the benefits and will often request a learning community during their orientation. This bodes well for the long-term viability of these programs.

   Dedicated Faculty – In this usage, my purposeful intent is for "dedicated" to mean both "committed" and "appointed." That is, the instructors in developmental education courses should be assigned to that role solely, and only those faculty members who understand and embrace the challenges of teaching in this framework should be so assigned. Mulvey (2008) states this same view more starkly "The task of identifying, assigning, and supporting effective teachers for developmental-level courses is a difficult one that reflects the college or university's level of commitment to underprepared students" (p.83). Additionally, they should be part of the full-time faculty, provide timely and assistive feedback to students, and be able to teach to multiple learning styles in such a way that it will draw students to become active and independent learners (Mulvey, 2008).

   Although other scholars support positions similar to Mulvey, they make these assertions when calling for reform in developmental education

(Roueche & Roueche, 1999; Smittle, 2003). As reformers, they provide a useful benchmark that should be considered when hiring faculty, but I think finding viable candidates should not be stalled due to candidates not meeting every requisite characteristic on a checklist. I'd argue that hiring good teachers who are committed to the cause of developmental education will satisfy the needs of most programs. Ultimately, this seems to present the biggest challenge of the five student support areas.

These five areas comprise the framework around which I will build my more specific recommendations in Chapter 5. Clearly there are other options that could have been included, but are not. There are some omissions that readers may immediately balk at, and that is to be expected. However, I consider the five options listed above, and especially as I have repositioned them in Chapter 5, to be a complete retention program on their own. Any institution that implemented these options should see marked improvement in their retention of first-year students with the first class that has access to these services.

Chapter 3: Methodology

Background

The purpose of this study is to identify those factors or characteristics that can be used to predict the academic success of students in the Degree Seeking Track program at the Midwestern Research University. To accomplish this purpose the study will use existing data that are stored in an Access database (hereafter to be called the "DST database") maintained by the DST administration. The DST database is used to store information about students in the DST program and is primarily used by the program's academic advisors as a tool for collecting and accessing placement test scores; recording case notes about their advisees; running queries and reports; and amassing additional information that is not held centrally in the university registrar's student information system.

The DST Database actually relies heavily on the university's student information system for much of its data and receives updates on a regular schedule. Although this makes much of the data redundant, the DST Database allows for this redundant data to be viewed with its independently held data. This specific feature, along with the ability to

92

add notes and generate reports, is what makes this a valuable tool while

working with students.

Setting and Participants

Because the DST program is new, both conceptually and as a unit at

the Midwestern Research University, it is appropriate at this point to

provide a detailed description of the program and its students. The DST

functions as an open-enrollment program of the university, although the

entering class for each fall term will be a maximum of 800 students. The

purpose of the DST program is to provide structured support and

services, in the form of intrusive academic advising and tutoring, to

students so that they can succeed in a baccalaureate program or one of a

small number of selected associate degree programs. Students admitted to

the DST program take placement tests in reading, writing,

communication, and mathematics. The curriculum is centered on these

same areas, as well as a College Success Seminar that every student takes

in his or her first quarter.

Students do not apply directly to the DST program, rather they

apply to the undergraduate baccalaureate college and program they are

interested in, and if not admissible to that program, they are offered (as

one option) admission to the DST program. The DST accepts only first-time, first-year students and students with more than three credit hours at another institution will not be admitted to the program. Students who do not meet the admission requirements for the DST program may be offered admission to one of the university's two regionally located branch campuses. All students admitted to the DST program are offered these admission options, also. The regional campuses serve as the academic home for most of the university's associate degree programs, many of which have open enrollment for students with a high school diploma. These programs also offer students a pathway to a baccalaureate program when successfully completed. However, it is the opportunity of being immediately integrated into the more traditional college experience of the main campus that attracts students to the DST program.

Each new student admitted to the DST will meet with his or her academic advisor during summer orientation and they will create a Learning Agenda. The Learning Agenda acts as a contract and indicates the classes a student must take and the grades the student must receive in order to be eligible to transition from the DST to a regularly admitted student in the baccalaureate program the student has selected. Each

baccalaureate program has its own Transition Agreement with the DST program. Each Transition Agreement lists the requirements students must successfully meet to have their program status changed from conditionally admission to regular admission for a particular college and program. The DST has Transition Agreements with colleges that house academic programs in: applied science and technology; liberal arts and sciences; allied health professions; business; education, including criminal justice and other human services; and nursing. Students interested in programs in the colleges that do not have a Transition Agreement with the DST (specifically, the colleges that house academic programs in: music, theater, and broadcasting; engineering; social work; and design, architecture, art, and planning) are typically transitioned to the College of Liberal Arts & Sciences, which houses the university's program for undecided, undeclared, and/or exploratory students. This program, referred to in this study as the Center for Academic Exploration (CAS), can best assist these students in major selection and career-planning.

Every DST Student is required to meet with his or her advisor three times each quarter. At the second or third advising appointment the

95

student and advisor will prepare for registration for the upcoming quarter. As part of this preparation, the student and advisor will fill out an Academic Advising Report (AAR), which is a list of classes the student may register for in the upcoming quarter. In this respect, each term's AAR serves as a focused, working document developed from the Learning Agenda. In other words, the Learning Agenda functions as the "big picture" and the AAR provides timely details. Both documents assist in the tracking of students' progress through the program.

Students not making adequate progress are asked to leave the DST after four quarters. When possible, these students will be counseled into one of the two-year associate degree programs available through the one of the Midwest Research University's regional campuses. There is also a state technical and community college located nearby that is an option for students who find one of this college's specific career-oriented programs might better serve them. It should be noted that if a student attends any other college program before completing his or her DST program, the student becomes ineligible to return to the DST program. This includes alternate programs available through the Midwestern Research University or programs at other institutions. The exception to this is students who

96

receive prior approval to take a course at an institution near their home over the summer.

Sample

The Degree Seeking Track program at the Midwestern Research University enrolled its first group of students in the fall term of 2004. The members of this cohort, 643 first-time, first-year students, comprise the sample for this study. As described more extensively in the previous section, the DST program is a non-degree granting program at the university that provides students with the opportunity to transition into a number of different baccalaureate programs provided they meet specific academic criteria within four quarters of enrollment in the program. The admission process and the academic measures are discussed in greater detail in the previous section, also.

Data Collection

The research project was designed so that no individual student can be identified from how the data are presented. First, the data were extracted from the DST database and all identifying components were removed. To ensure that I would have no way of identifying individuals,

a DST database administrator extracted the data and removed all data fields that could potentially identify individual students. The raw data, in the form of a spreadsheet, was then sent to me electronically. Additionally, the findings are reported in aggregate descriptive statistics, further ensuring that student identities are protected[13].

Data Analysis

The data were analyzed using a variety of descriptive and predictive measures to determine if any inferential relationships exist among the independent and dependent variables. The first step in this process was be to determine and report the mean (average), median, mode, and standard deviation for each data field, or independent variable, both alone and as they relate to the dependent variable. As anticipated, this analysis does not reveal anything conclusive, but it does serve to summarize adequately the dataset.

Additional data analysis in the form of inferential statistical measures, specifically, logistic regression, were generated. The dependent

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[13] Based on the use of data that are both historical and aggregate, the Institutional Review Board at the University of Cincinnati determined that this study does not meet the regulatory criteria for human subject research that requires review by the IRB because it does not meet the definition of "human subject." As such, the IRB required no additional review for this study.

variable in this analysis is student retention to the second year at the

Midwestern Research University. The dependent variable is a

dichotomous variable because it allows for only two conditions (as

defined in chapter 1):

- "Returning Student" (R) is the category to which successful

  students were assigned. For the purposes of this study, a

  "returning student" is one whose first enrollment at the

  Midwestern Research University was as a first-year student in

  the DST program in the 2004 autumn term and was

  additionally enrolled at the university in the 2005 autumn

  term. In short, these are students who persisted through their

  first year of college and were retained and enrolled in their

  second year. For the purpose of data analysis, these students

  were coded using the number one (1).

- "Non-Returning Student" (NR) is the category to which

  unsuccessful students were assigned. For the purposes of this

  study, a "non-returning student" is one whose first enrollment

  at the Midwestern Research University was as a first-year

  student in the DST program in the 2004 autumn term but was

not enrolled at the university in the 2005 autumn term. In short, these are students who did not persist through their first year of college and were not retained or enrolled in their second year. For the purpose of data analysis, these students were coded using the number zero (0).

Logistic regression was selected as the method of generating inferential statistical measures based on a review of number of statistical tests. Logistic regression satisfies a number of needs for the study. First, it allows for the dependent variable in the analysis to be binary (yes or no) and for the independent variables to be continuous and/or categorical (Garson, 2002). The use of logistic regression also provides the opportunity to see the relationship among and between the dependent variable and the independent variables (Menard, 2002). In fact, it is possible to render the results in the form of a formula that predicts the probability of the occurrence as a function of the independent variables (Cohen, et al 2003). Developing a predictive formula was not attempted at this time because it is outside of the scope of this study. The purpose of this study is the identification of significant independent variables.

A number of statistical computer software packages were investigated to determine which one would best satisfy the needs of the researcher. More specifically, I tried to determine which package would be relatively easy to use, provide accurate results with a number of reporting options, and be cost-efficient. Eventually, I selected two tools available for free on the Internet. As a primary statistical package I selected OpenStat, which is an open source package of statistical applications software for students in the social sciences and education. This program was written in C++ language by Professor Bill Miller from Iowa State University and is available as a free download at: http://openstat.en.softonic.com/. I also used an online tool called the Logistic Regression Calculating Page (http://statpages.org/logistic.html) to re-check statistical calculations. This website was written by John C. Pezzullo, Associate Professor in the Departments of Pharmacology and Biostatistics (now retired) at Georgetown University, in Washington, DC.

Chapter 4: Findings

The purpose of this chapter is to report the findings of the study. First, the independent variables are described in detail. The data were then statistically analyzed using both descriptive and inferential measures. The descriptive statistics are reported to provide the reader with a manageable perspective of the data rather than the entire data set. In general, descriptive statistics provide enough summary information about the data for readers to understand the study. The descriptive statistics section for this study includes analysis of the aggregate data for all students and analysis of the data for the two groups as they represent the dependent outcome (i.e., descriptive statistics for returning students and descriptive statistics for non-returning students). The final section of the chapter contains the inferential analysis of the data, which looks at the impact of the independent variables on the dependent variable based on logistic regression.

Independent Variables

It is important at this point to provide additional information about the independent variables. The objective of this section is to demonstrate

what the independent variables actually are and how they are used. As they have currently been presented in this study, they are merely labels. I prefer to move beyond the use of labels and provide an actual context for each, which will, at the very least, create a baseline understanding for readers of the study.

The independent variables are each specific data sets that the subjects have generated about themselves during their pre-college experiences. However, in terms of categorizing them, I have grouped them based on whether they are from a student's high school profile or from a student's placement tests completed at or before the new student orientation each student is required to attend. The distinction may or may not be important as the results become known and comparisons are made, but for me the difference represents a feature that helps in the organization process.

The High School Profile variables are high school grade point average, high school rank, and college entrance exam results. The Placement Test variables are the reading test score, the English writing sample score, and the math placement test score. A description of each follows, starting with the High School Profile variables:

High School Grade Point Average (HSGPA) – HSGPA is reported to the university on each student's high school transcript, which is sent from the high school registrar's office when a student applies to the university. This information is added to the university's student information system, and then it is accessed and captured in the DST database. Because students apply before they graduate, initial data in this field may represent only six or seven semesters of high school grades. Students are required by the university's Office of Admissions to submit a final transcript once they graduate to ensure that a final HSGPA is acquired. This is important for two reasons.

First, each student's admission status can change based on their final one or two semesters of high school. Every year, some students have their admission from their college of choice rescinded due to poor performance in their last year or semester of high school and, similarly, some students are offered admission based on greatly improving their grades. This is especially important in the DST, which tends to have a chaotic reshuffling of its students each summer due to admissibility issues related to changes in from the initial HSGPA to the final HSGPA.

It is also important to note that the requirements for students receiving federal financial aid stipulate that colleges and universities confirm having on file the final high school transcript for these students. Failure to do so can result in the cancellation of financial aid. In the DST program, about 80% of the students receive financial aid. This regulation, combined with the university's diligence in re-evaluating students based on their complete record leads me to believe that the data set used in the study is as complete as possible.

HSGPA is provided on a 4.0 scale, with a variable range of 0.000 to 4.000, as an un-weighted average. A weighted grade point average allows classes designated as "weighted" to count for more points and results in a weighted grade point average that is higher than an un-weighted grade point average. Weighted classes are typically considered more challenging and the weighting is provided as an incentive to students to enroll in these more difficult classes. Weighted grade point average is available for students who went to schools that use this system, but the current study uses un-weighted grade point average data only (and all schools are required to report their data as un-weighted and have the option to report weighted data, also).

High School Rank (HSR) – HSR, like HSGPA, is reported on a student's high school transcript and a final transcript that is stamped with the student's graduation date is required for the final HSR. This is also available as an un-weighted number and a weighted number and the present study uses the un-weighted rank. HSR is generated by taking a student's actual rank in the class (a whole number divisor) and dividing it by the number of students in the class (a whole number dividend) which results in the raw rank (a quotient that will always be less than 1 but greater than 0). The quotient is multiplied by 100 so that is can be expressed as a percent rank. This result is expressed as a number with up to three decimal points and it must always be positive. Because the number of students in high school classes varies greatly, the variable range for HSR is from greater than 0 to 100 (or .001 to 100) with a lower number representing a more favorable rank (i.e., a rank of 100 or 100% represents finishing last in the class). It should be noted that not all high schools rank their students and some use percentile ranks, usually in increments of five percentage points.

College Entrance Tests (CET) – CET are data derived from student's scores on the ACT (formerly also known as the American College Test)

and the SAT Reasoning Test (now also known as the SAT and formerly known as the Scholastic Aptitude Test and the Scholastic Assessment Test), both of which are standardized tests of high school achievement used for college admissions. Both also claim to be able to determine a student's ability to complete college level work.

The ACT, administered by ACT, Inc., is divided into four multiple choice subject tests: English, mathematics, reading, and science reasoning. Subject test scores range from 1 to 36 and scores are reported as positive, whole numbers. The composite score is the average of the four subject tests. The SAT, administered by the College Board, consists of two major sections: critical reading and mathematics. Each section receives a score on the scale of 200–800. All scores are multiples of 10. Total scores are calculated by adding the scores of the sections. Both the ACT and SAT added an optional writing test in 2005, which became mandatory in 2006. The writing test was not available for any subjects included in this study.

In order to have the richest dataset possible for this variable, it was necessary to convert some SAT scores to their ACT equivalent. 276 participants took the SAT and 453 participants took the ACT. There is an overlap of 147 participants who took both. A conversion chart produced

by the College Board was used and is available at:

http://professionals.collegeboard.com/profdownload/act-sat-concordance-tables.pdf (accessed 9/5/2009). By converting the SAT composite scores for those students who did not take the ACT to their ACT equivalents, I was able to use 577 students' test results for this variable.

Reading Test Score (RTS) – All students enrolling in the DST program are required to take the *Degrees of Reading Power Test*, or DRP, a proprietary reading test produced by Questar Assessment, Inc. The DRP is a cloze test, meaning test-takers are given a series of passages to read and must supply missing words for blank spaces (which indicate something has been removed) in the passage. The test consists of 70 multiple choice questions and students receive one point per question answered correctly. A question is answered correctly when the appropriate word is selected to fill in the corresponding blank. Students are not penalized for incorrect answers or unanswered questions. As such, the range of possible scores for this test is 0 to 70. The purpose of the reading test is to determine reading course recommendations for students based on their scores. A reading course is recommended for any student who scores less than 56 on the test. Additionally, students with scores below 45 will have their

English placement adjusted downward by one course. This modification is described more fully as part of the English Placement Test (EPT*)* section that immediately follows this section.

English Placement Test (EPT) – The EPT is used (in conjunction with a student's RTS) to determine a student's English placement into a specific composition course. This ensures that students are beginning their composition courses at the level that is best for them. This is not a test that students pass or fail, and it does not affect admission to the university. It must be completed before registering for any beginning English course.

The EPT is a writing sample that students complete either online before their summer orientation or they complete it in-person on the first day of their orientation. Students who complete the essay online have a five day window to complete an essay based on 2-3 brief articles that are sent to them on the first day of their window. Students who complete the essay in-person have one hour to write their essay in response to a brief article that is given to them at that time. In both cases, students are told to write an essay in response to a specific prompt about the article or articles. The essay must also contain a summary of the article or articles

and a reflective paragraph about their essay. Students using the online option have the time to think about the issues and revise their writing, which probably results in more developed essays from these students. Online writers also submit their essays electronically, as a rich text document, whereas the in-person writers are provided with pens and paper on which to complete their essays. These differences seem to be significant enough to mention at this point, and discuss later in relationship to the conclusions for this independent variable.

Each student's essay, whether completed online or in-person, is read by at least two composition course instructors and evaluated holistically. Essays are then assigned a placement number of 1 – 5, which initially assigns them to a composition course. For students in the DST program, this initial assignment can be modified based on the student's RTS. Table 1 shows how the initial EPT can be impacted by the RTS.

Table 1

Initial English Placement Shown with Modified Placement Due to a RTS

Less than 45

English Placement	Initial Course Placement (RTS is at least 45)	Modified Course Placement (RTS < 45)
1	Prep Reading & Writing I	No Change
2	Prep Reading & Writing II	Prep Reading & Writing I
3	English Comp I/Bridge	Prep Reading & Writing II
4	English Comp I	English Comp I/Bridge
5	English Comp I	No Change

There were a total of 31 modifications made to initial course placements that resulted in students being placed in a lower level course. This represents about 4.8% of all students who took who were placed for that quarter. Most of these modifications were for students initially placed in the Prep Reading & Writing II course being moved into the Prep Reading & Writing I course (N = 26). It should be noted that the study uses the final, or modified, placement data.

Math Placement Test Score (MPT) – The MPT is used to identify the math courses at MRU for which students have the prerequisite math skills and to accurately place students into their first math course at the

university. It is a computer based test that students can take online prior to their orientation or they can take it during the first day of their orientation. It is a series of multiple choice questions presented to the student one at a time that he or she must answer without the use of a calculator. It is a progressive test, meaning that as the student answers questions correctly, subsequent questions will get more challenging. Once the student stops progressing, the system determines the student's level of mathematical preparation and records and displays a placement score. The placement score corresponds to a specific course that the student must take. Table 2 shows the math course placement by score ranges.

Table 2

Math Placement Test Score Ranges and Corresponding Course Placement

Math Placement Score	Course Placement
0 - 300	Elementary Algebra I
301-420	Elementary Algebra II
421-430	Elementary Algebra III
>430	College Level Course*

*Major/program specific

Descriptive Statistics

The sample consists of 643 first-year college students initially enrolled in the DST program in the fall of 2004. Data for the independent variable were first analyzed in aggregate; that is without attention to the dependent variable. The descriptive measures used are mean (average), median, mode, sample range, and standard deviation. These statistics were generated using Microsoft Excel 2007. For the purpose of representing variables in equations, the mean will be represented by the small Greek letter mu (μ) and the standard deviation will be represented by the small Greek letter sigma (σ).

Table 3 shows the number (N), range, mean, median, mode, and standard deviation for each independent variable (HSGPA, HSR, CET, RTS, EPT, and MPT) based on the data from all students in the study, both returning and non-returning students. Table 4 shows the number (N), range, mean, median, mode, and standard deviation for each independent variable (HSGPA, HSR, CET, RTS, EPT, and MPT) based on the data from the returning students in the study. There were 338 returning students in the study, or 52.6% of the subjects. Table 5 shows the number (N), range, mean, median, mode, and standard deviation for each independent variable (HSGPA, HSR, CET, RTS, EPT, and MPT) based on the data from the non-returning students in the study. There were 305 non-returning students in the study, or 47.4% of the subjects.

Table 3

Descriptive Statistics Set for All Subjects (Returners and Non-Returners) and

for Each Independent Variable

Independent Variable	N	Range	Mean (μ)	Median	Mode	Standard Deviation
HSGPA	617	1.18 – 3.86	2.31	2.3	3.0	0.448
HSR	569	0.7 – 100	73.73	75.77	66.67	16.618
CET	577	7 – 29	17.57	17	17	2.955
RTS	639	16 – 70	50.67	52	59	10.28
EPT	639	1 – 5	2.94	3	3	0.802
MPT	642	5 – 705	328.88	335	405	132.424

Table 4

Descriptive Statistics Set for Returners (R) and for Each Independent Variable

Independent Variable	N	Range	Mean (μ)	Median	Mode	Standard Deviation (σ)
HSGPA	329	1.26 – 3.86	2.41	2.39	3	0.45
HSR	305	0.7 – 100	71.79	74.75	66.67	17.682
CET	318	11 – 29	17.69	18	17	2.901
RTS	336	17 – 70	51.42	53	59	10.015
EPT	336	1 – 5	3.01	3	3	0.771
MPT	337	5 – 705	348.84	365	395	139.662

Table 5

Descriptive Statistics Set for Non-Returners (NR) and for Each Independent

Independent Variable	N	Range	Mean (μ)	Median	Mode	Standard Deviation(σ)
HSGPA	288	1.18 – 3.5	2.19	2.2	2.8	0.413
HSR	264	25.28 – 100	75.95	78.11	75	15.025
CET	259	7 – 25	17.41	17	17	3.044
RTS	303	16 – 69	49.84	51	51	10.52
EPT	303	1 – 5	2.86	3	3	0.83
MPT	305	5 – 705	306.84	325	405	136.017

One of the first things this section of the study reveals is the
inconsistency in the data. The study has 643 subjects, but Table 4.3 reveals
that none of the subjects are represented in all of the independent
variables. The values in the N column indicate the number of subjects'
data points captured for that variable and the totals are quite disparate.
The three variables grouped together as High School Profile variables
seem to be especially under-represented, with totals of: 617 for HSGPA,
569 for HSR and 577 for CET. Although these totals appear to be well
below the 643 that each could be, it is probably better to look at the
percent of the potential total that each is in order to make any

assumptions about their usefulness. The totals for these data fields are 96%, 88.5%, and 90% respectively of the potential total each could be. The values for the Placement Test variables are 639 or 99% for RTS; 639 or 99% for EPT; and 642 or 99.8% for MPT.

At this point, it seems equally important to provide some reasons for the missing data. There are students who are accepted to the program without complete High School Profile data. Students who have a GED (General Equivalency Diploma or General Education Diploma) do not have a high school, per se, so are not ranked and do not receive a grade point average. Many of these students are 21 or older and can be admitted to the DST program without taking a college entrance exam. Similarly, for a number of reasons, some international students do not have high school records that are complete and many do not take a college entrance exam. These students can still be admitted to the university under special guidelines. Finally, as noted earlier, some high schools do not provide rank for their students.

Inferential Statistics

Logistic regression was selected as the method of determining if an inferential relationship exists between the independent variables and

dependent variable. Logistic regression is a specific type of generalized linear regression applicable when a study uses a binary dependent variable from a set of independent variables. Unlike linear regressions using continuous variables, logistic regression does not require its independent variables to have a normal distribution, so these calculations are not included as part of the study or the statistical outcomes.

In this study the dependent variable is binary because it has two possible outcomes: Students are either returners (R) for their second year at the university or they are non-returners (NR). Logistic regression estimates the probability of an event occurring for each student on the basis of his or her values on the predictor variables (Gillespie & Noble, 1992). As a result, logistic regression can provide useful information that may be able to help identify students who are at-risk for attrition. Within the scope of this study, however, the independent variables that indicate a strong relationship to the dependent variable will be identified as those that need to be included in future research studies.

The logistic regression model for the relationship of a single independent variable (χ_1) and the dependent variable (Y) is:

$$Y = \beta_0 + \beta_1 \chi_1$$

118

Similarly, the model for the relationship of any number of multiple

independent variables and the dependent variable (Y) is:

$$Y = \beta_0 + \beta_1\chi_1 + \beta_2\chi_2 + \beta_3\chi_3 + \ldots + \beta_k\chi_k$$

The independent variable Y is often referred to as the response

variable or outcome when expressed as part of the model equation.

Similarly, the independent variables χ_1, χ_2, χ_3, and so on are often

referred to as predictor variable 1, predictor variable 2, predictor variable

3, and so on when expressed as part of the model equation. The

parameters in the model are β_0, which is the intercept and β_1, β_2, β_3, et al.,

which are the regression coefficients of χ_1, χ_2, χ_3, and so on. The intercept

is the value of Y when the value of all risk factors is zero (i.e., the value

of Y in someone with no risk factors). For a linear equation, it is the point

where the line crosses the Y axis.

The regression coefficient is the constant (β_1) that represents the

rate of change of Y as a function of changes in the independent variable

(χ_1). In short, it is the slope of the regression line. Each of the regression

coefficients describes the size of the contribution of that independent

variable. A positive regression coefficient means that the independent

variable increases the probability of the outcome, while a negative

regression coefficient means that the independent variable decreases the probability of the outcome. A large regression coefficient means that the independent variable strongly influences the probability of the outcome, while a near-zero regression coefficient means that the independent variable has little influence on the probability of the outcome. It should be noted that because each independent variable in this study has a unique range and the values are incrementally different, the values generated for each regression coefficient cannot be compared to one another. Determining whether or not a regression coefficient is either large or small can only be determined based on the context of its own data set.

In terms of this study, the logistic regression model is used to describe the relationship between one or more predictor variables and an outcome. The predictor variables are HSGPA, HSR, CET, EPT, RTS, and MPT and the possible outcomes are R (assigned 1 in the data set) and NR (assigned 0 in the data set).

Logistic regressions were calculated using OpenStat, an open source package of statistical applications software for students in the social sciences and education. This program, written in C++ language, is made

available online by Professor Bill Miller from Iowa State University and can be downloaded at: http://statpages.org/miller/openstat/. The Logistic Regression Calculating Page, an online tool available at: http://statpages.org/logistic.html (last accessed September 27, 2009) was also used to re-check the accuracy. Initially, single logistic regressions were calculated to determine the relationship of each independent variable individually to the dependent variable. For all statistical tests, the level of significance was set at 0.05.

For each independent variable, a complete list of values for a variable was submitted with a corresponding 1 or 0 to indicate a returning (R) or non-returning (NR) student and logistic regressions were calculated. As explained later, based on these results, paired logistic regressions were then calculated first using HSGPA data paired with HSR data and then EPT scores and MPT scores. Each of these was paired data sets were submitted with a corresponding 1 or 0 to indicate a returning (R) or non-returning (NR) student. Results were returned and grouped in the following sections: Descriptives; Overall Model Fit; Coefficients and Standard Errors; and Odds Ratio. A brief description of each of these sections follows:

Descriptives: This section contains summary information about the particular data set submitted. It provides the number of cases, or individual pieces of data submitted, that are equal to zero (i.e., X cases have Y=0) and the number of cases that are equal to one (i.e., X cases have Y=1). More simply, for any independent variable submitted, this field indicates how many were identified as each possible outcome of the dependent variable, where the "0" cases are the number of non-returners and the "1" cases are the number of returners. Additionally, this section returns the mean and standard deviation for the independent variable. Although redundant to the information provided in the descriptive statistics section of this chapter, it does allow for re-checking of these outcomes. It is also interesting to note the slight difference in the figures when calculated to four decimal points instead of three.

Overall Model Fit: This section provides the results used to determine whether or not the submitted frequency distribution differs from a theoretical distribution. In the language of statistics, the values returned determine whether or not a linear relationship exists. Overall Model Fit returns three values (chi square, df, and p) that are used to determine if the independent variable has an impact on the dependent

variable. The value of chi square is used to compare observed results with expected results and see if the result is likely. The value of df, or degrees of freedom, is always equal to the number of independent variables used in the regression.

The most telling value provided for in this section is p (p-value), or the level of significance. The p-value is the probability of obtaining a test statistic at least as extreme as the one that was actually observed. In studies that require a hypothesis test, a p-value smaller than the level of significance selected by the researcher requires rejecting the null hypothesis. In this study there are no hypotheses to test, but there is an underlying question of whether or not each independent variable seems to impact the dependent variable. In each case the possible answers are that the particular independent variable does impact the dependent variable or that the particular independent variable does not impact the dependent variable. By using this construct and knowing that I only want to include further analysis of those independent variables that do seem to impact the dependent variable, I can safely accept as statistically significant those independent variables with a p-value less than 0.05, which is the level of significance was that was set for this study. In a study with a true

hypothesis/null hypothesis test design, this would correspond to rejecting the null hypothesis for those independent variables with a p-value greater than or equal to 0.05.

Coefficients and Standard Errors: This section returns the values for the constants of the linear equation ($Y = \beta_0 + \beta_1\chi_1$) for the given data set. These include the regression coefficients, standard error value, and y-intercept. Each of these is defined earlier in this chapter.

Odds Ratio: This section returns the values for the odds ratio (O.R.). The odds ratio is the predicted change in the odds of the dependent variable occurring when the predictor variable is increased by 1 unit. When the odds ratio is less than 1, increasing the value of the predictor variable results in decreasing odds for the dependent variable occurring. When the odds ratio is greater than 1, increasing the value of the predictor variable results in increasing odds for the dependent variable occurring. In short, the odds ratio for a predictor tells the relative amount by which the odds of the outcome increase (O.R. greater than 1.0) or decrease (O.R. less than 1.0) when the value of the predictor value is increased by 1 unit. The odds ratio provided falls within a 95% confidence interval, which is also provided. One important characteristic of the odds

ratio is that the values can be compared among the independent variables because each represents the factor by which the odds will change and statistically because the concept of "odds" is a consistent measure.

Table 6 displays the logistic regression values returned, as described above, for each independent variable as it relates to the dependent variable. Degrees of freedom are not provided in the table since this value is 1 in each in each case. Table 7 displays the logistic regression values returned for the two cases of paired independent variables (HSGPA paired with HSR and EPT paired with MPT). Degrees of freedom are not provided in the table since this value is 2 in each in each case. Immediately following the tables is a brief section that serves to summarize and explain the data. Although the data were generated and are provided for the paired independent variables, discussion and interpretation of these data will be limited. The purpose of the study is to identify baseline variables that can be used in future studies, so recognizing that these pairs are significant, within the context of this study, which is all that needs to be concluded. The focus of the paper will remain on individual variables.

Table 6

Logistic Regression Calculations for Each Independent Variable (IV)

IV	Descriptives				Overall Model Fit		Coefficients and Standard Errors				Odds Ratio & 95% Confidence Interval		
	Y=0	Y=1	(μ)	(σ)	Chi Square	p	Coeff.	StdErr	P	Y Inter-cept	Odds Ratio	Interval Low	Interval High
HSGPA	288	329	2.3070	0.4475	40.7954	0.0000	1.2196	0.2012	0.0000	-2.6683	3.3860	2.2825	5.0229
HSR	264	305	73.7253	16.6037	9.0289	0.0027	-0.0156	0.0053	0.0033	1.3004	0.9845	0.9743	0.9948
CET	259	318	17.5633	2.9642	1.2080	0.2717	0.0311	0.0284	0.2728	-0.3409	1.0316	0.9758	1.0906
RTS	303	336	50.6714	10.2712	3.7654	0.0523	0.0150	0.0078	0.0533	-0.6570	1.0151	0.9998	1.0307
MPT	305	337	328.8801	139.3148	14.6795	0.0001	0.0022	0.0006	0.0002	-0.6234	1.0022	1.0011	1.0034
EPT	303	336	2.9421	0.8019	5.8608	0.0155	0.2405	0.1000	0.161	-0.6037	1.2720	1.0456	1.5475

Table 7

Logistic Regression Calculations for Paired Independent Variables (IV)

IV	Descriptives				Overall Model Fit		Coefficients and Standard Errors				Odds Ratio & 95% Confidence Interval		
	Y=0	Y=1	(μ)	(σ)	Chi Square	p	Coeff.	StdErr	P	Y-Intercept	Odds Ratio	Interval Low	Interval High
HSGPA			2.3221	0.4408			1.2690	0.2491	0.0000		3.5574	2.1833	5.7964
HSR	262	305	73.8538	16.4758	38.6506	0.0000	0.0005	0.0064	0.9356	2.8195	1.0005	0.9880	1.0132
MPT			2.9404	0.8014			0.1271	0.1061	0.2310		1.1356	0.9223	1.3982
EPT	305	335	328.4185	139.252	15.8830	0.0004	0.0020	0.0006	0.0015	0.9139	1.0022	1.0007	1.0032

127

Based on the data returned from the individual logistic regressions, four of the independent variables have a statistically significant impact on the dependent variable and two of the independent variables do not impact the dependent variable. With the p-value for the study set at 0.05 level of significance, HSGPA (p-value = 0.0000); HSR (p-value = 0.0027); EPT (p-value =0.0155); and MPT (p-value =0.0001), each with a p-value < 0.05 can each be seen as having an impact on the dependent variable. Conversely, CET (p-value = 0.2717) and RTS (p-value = 0.0523), each with a p-value > 0.05 can be seen as not having an impact on the dependent variable.

HSGPA seems to be the most impactful of the independent variables. It has a regression coefficient of 1.2196, which seems to be a large value when considering the range and unit size for this variable. Since this value is positive, it increases the probability of the dependent outcome. Additionally, with an odds ratio value of 3.3860, HSGPA is also the independent variable that most increases the likelihood of the dependent variable's presence (i.e., the likelihood that a student will return for a second year of college and thus be categorized as R, or a

returner). With each increase in the HSGPA by one unit, students are 3.386 times more likely to be a returner.

HSR has a negative regression coefficient (-0.0156) indicating that this independent variable decreases the probability of the dependent outcome. It also has an odds ratio value that is less than 1 (0.9845), which means increasing its value results in decreasing odds for the dependent variable occurring. Both of these results make sense considering that HSR is the only independent variable in which a lower value is more favorable than a higher value. This relationship exists because this value is modified so that it represents a percentile rank. With that in mind, it should be noted that with a regression coefficient value so close to 0 that it has only a small influence on the probability of the dependent outcome. Additionally, based on an odds ratio value so close to 1, changes to the HSR by one unit have almost no influence on the likelihood of student to be a returner.

The remaining statistically significant independent variables based on their p-value are EPT and MPT. The regression coefficient for EPT is 0.2405 and for MPT is 0.0022. The regression coefficient for EPT indicates it is an impactful independent variable. With an odds ratio value of

1.2720, increases by one unit to its value can increases the likelihood of the dependent variable's presence (i.e., the likelihood that a student will return for a second year of college and thus be categorized as R, or a returner). With each increase in the EPT by one unit, students are 1.272 times more likely to be a returner. The regression coefficient for MPT indicates a fairly small influence on the probability of the dependent outcome. Additionally, with an odds ratio value of 1.0022, it seems that changes to the MPT by one unit have a very small influence on the likelihood of student to be a returner.

Chapter 5: Discussion

The purpose of this chapter is to draw the study to a close by interpreting the findings and drawing conclusions; and using these conclusions to outline the implications of the study. The significance of the study are detailed in three distinct sections: "Implications for Theory" (demonstrating how the research fits within and impacts the research discipline of student success); "Suggestions for Future Research" (recommending how subsequent studies can improve on the current study add to the research discipline); and "Recommendations for Retention Programs" (suggesting specific actions colleges and universities can take to most effectively impact the success of their students, especially their first-year, conditionally admitted students).

Tradition dictates that I would normally include a section about "identifying the important limitations of the study" in this chapter and I do think that information is pertinent. As I was writing, it became clear to me that I was addressing the limitations within each section, including the three implications sections, and that they are more useful in that context, so that is where they are found.

Interpretations and Conclusions

This section starts with a discussion of the independent variables that were shown not to have an impact on the dependent variable, followed by a discussion of each independent variable that did impact the dependent variable.

Discussion of Independent Variables

At this point, I am going to examine each independent variable and see how and why it does or does not impact the dependent variable, using the findings for each as a starting point. I have chosen to look first at the two non-impactful variables, College Entrance Tests (CET) and Reading Test Scores (RTS), followed by the impactful independent variables individually. Included with each variable are suggestions about how they could be made to be more useful in future studies.

College Entrance Test (CET) – This independent variable, with a p-value of 0.2717, was shown not to impact the dependent variable of whether or not a student returns for a second year of college. To me, this represents one of the most interesting and perplexing findings of the study. This variable, which is based on true ACT composite scores and

ACT composite scores converted from SAT composite scores, seems as if it should impact the dependent variable, based on what ACT, Inc. states on their website:

> Early-alert efforts are among the most effective ways to boost student retention. For early identification of at-risk students, you need information beyond what is usually contained in high school transcripts and applications for admission. The ACT Information System provides comprehensive data to identify at-risk students before they enroll.

> http://www.act.org/path/postsec/retain.html (Accessed 09/21/2009).

Taken at face-value, this says to me that ACT scores should, by identifying those students who are at-risk, should also identify, conversely, those students who are not at-risk and therefore should be a successful predictor variable in this study.

Initially, I did not understand why this variable did not appear to be statistically significant, but my eventual conclusion about this seems plausible: Because students starting in the DST program have already been identified as "at-risk," based on the university's admission criteria,

their ACT scores are not going to be of further use in identifying the at-risk group within those students already identified as at-risk. In other words, if this study looked at all new first-year students at the university, the composite ACT score probably would be useful at identifying those students who should be in the DST program (or some other definition of "at-risk"), but it would not be useful at delving deeper into this sub-group for additional information.

Although I am satisfied with the outcome for this independent variable in the study, it seems clear to me that ACT data can and should be used beyond the admission process. Further exploration of the ACT, Inc. website revealed a number of potential options for using this data. One important service that is provided, but not used at the Midwestern Research University is the Course Placement Service. The Course Placement Service uses the ACT subscores in English, math, reading, and science, in conjunction with some additional assessment tools to develop specific course placement guidelines for individual institutions. This service is focused on placing students so they have the best chance at being successful:

The Course Placement Service uses advanced statistical techniques to assess each student's probability of success, allowing institutions to make the best placement decisions possible. Using this service, institutions can study the accuracy of their course placement procedures and select optimum cutoffs.

http://www.act.org/path/postsec/advise.htmlcores

Although there is an additional cost for this service, there is also the cost-savings institutions will realize by not having to administer placement tests to future in-coming students. If the Midwestern Research University were ever to take advantage of this service, I think the data generated would be ideally suited for a study such as this one.

Reading Test Scores (RTS) – This independent variable, with a p-value of 0.0523, was shown not to impact the dependent variable in this study. Although I initially thought this would be a statistically significant variable in the study, after contemplating the issue more carefully, I now understand why the RTS is not statistically significant. My preliminary attempts at trying to understand these results were inaccurate, mostly due to my own flawed logic. However, I have now identified what I

believe to be the main reason that explains why this independent variable

is does not impact the dependent variable and how this could be rectified.

It is relevant at this point to mention that at the time of the study

the results of this test were optional[14]. That is, students who scored at a

placement level indicating they should take a reading course were

recommended to take one, but were not required to do so. Based on how

convincingly this was presented to them, some students took a reading

course and some did not. Data relating to who did and who did not follow

the recommendations were not captured for this study, which is a

shortcoming and should certainly be included in future studies, if

available. However, by focusing on those students who were

recommended to take a reading course, there are obviously two categories

for them: Those students who did take a reading course and those

students who did not take a reading course. Both present possibilities that

could skew the findings for this variable.

By looking first at those students who were recommended to take a

reading course and did so, it is easy to jump to the conclusion that these

students were overburdened with an extra developmental course and this

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[14] This is no longer true. The DST now requires students whose RTS indicates the need for a reading
course to take and pass a reading course in order to be admitted to their four-year degree program.

extra work impeded their progress enough to cause them to stop attending. Admittedly, my initial, knee-jerk, reaction was akin to this. After thinking about it, I realized that this explanation does not make much sense. Although the addition of a reading course might, in certain cases, cause a student to become overworked and eventually drop-out, so would testing in such a way that the student needed two developmental English courses rather than one, or two developmental math courses rather than one. Yet both of these variables were deemed to be significant.

Along these lines, I also concluded that if any course in any of the developmental disciplines proved to be so demanding as to result consistently in students leaving the program, then it seems that the problem would lie with either the course or the placement, not the students. Such a course would only create problems, not solve them. The purpose of developmental course work is to provide students with the skills to overcome their under-preparedness, not provide them with another measure of it. This made me realize the answer was not obvious or easy.

At this point, I began to think about the RTS in comparison to the math and English placements and focused on the most noticeable

difference, which is that these tests determine required courses students must take, whereas the RTS only presents students with options. Directly related to this is that math and English test results did impact student success and part of this success would be completing the courses as required. In this respect, it is easy to see that they are tied directly to student success as defined in this study. Conversely, as an optional course area, reading does not connect to student success in the study.

Because the data set for reading includes all those students who did not take a course as suggested, the data used in the study are not complete enough to impact the dependent variable. This explained the findings, at least in terms of the statistical measures used, but I felt inclined to find out more. It was important to me to do more than just determine how to get the statistics to work out, especially since I don't foresee anyone trying to replicate this study. I wanted to determine if this variable should be changed to a requirement based on the premise that taking a reading course, when needed, is beneficial to students and supports their success beyond the scope of this study. In this respect, I want to do what is needed for the students and make the data for future studies as useful as possible.

Based on earlier research reviewed in Chapter 2, I knew that students who take required courses as needed are more successful than those who do not. By considering reading placement scores in this context, it became clear that the opposite of my original assumption, which I had already debunked, should be true. In other words, if students who were recommended to take a reading class did so, they should be more successful than those students who opted not to. If I were able to run the statistical measures used in the study on the data of students who took a reading course as suggested, I assume that an impact on the dependent variable would be revealed and such results would seem to indicate that it should be required for students to take a reading course if needed. If my assumption is not true, then it should remain optional. Unfortunately, I was unable to run the statistical measures in the manner prescribed, so I needed to support my assertion based on the available research.

A review of the background literature does seem to confirm the premise that the DST should make reading courses required for students who test into them. Amey and Long (1998), as reported earlier, found that, in general, students who take their developmental courses as early

in college as possible do better than their counterparts who delay or avoid these courses. More specifically, they found that students who take their developmental courses in English and reading early in college are more likely to complete their 2-year degree (Amey & Long, 1998). In a similar study, Cox, Friesner, and Khayum (2003) found that:

> Students who enter college underprepared to read at the college level and who take and pass a reading skills course experience significantly greater success in college over the long term compared to similarly underprepared students who either do not take, or do not pass, such a course. (p. 189)

Two of their success criteria were total credits earned and grade point average, for which they found that students who passed a reading course earned an average of almost 10 more credits and had a .44 higher grade point average than students who did not take or did not pass a reading course (Cox et al, 2003). In both cases the importance of reading as it relates to success in all college courses was pointed out.

These studies represent just a scintilla of the available research on developmental reading courses, but they clearly and succinctly help to bring my speculation full-circle: The RTS was not shown to impact the

dependent variable in this study because students were not required to follow the recommendations they were given based on their scores. As such, it is not a component of success as defined in the study. The MPT and EPT do impact the dependent variable because their results indicate courses that are required by students to complete their DST program. This means the MPT and EPT are components of student success in the study. Further, by requiring students to follow their RTS results, it would not only be a component of success as defined in the study, but a benefit to students in all future college coursework and the related data would also be useful to future research studies. All of these data sets could probably provide even more significant results if student class enrollment information and grades the students received could be incorporated into the study. At this point, I am satisfied that this explanation of the RTS data accounts for most, if not all, of why this variable was not a significant indicator of student success in the study.

There is one more thing about the reading test that I would like to address: The conditions under which students take this test might deter them from doing as well as they can on it. Because I work with many of the DST students during their New Student Orientation, which is when

they take their reading tests, I know that students do not always do as well as they should on it. This is the only placement test that students must take on-site during the orientation itself. Both the EPT and the MPT have an online option that many, if not most, students use to take these tests at home, before they attend orientation.

The challenge with administering tests during orientation itself is that there is so much information being disseminated and so many other things happening that it becomes difficult for students to focus when they are taking their placement tests. Add to this that students are trying to fit in socially and the result is that students do not always perform as well as they can on these tests. The impact of taking placement tests during orientation is unknown and probably varies from test to test. It is known that almost all new DST students take the MPT at home and online; and more than half, and in some years almost 75%, of new DST students take the EPT test at home and online, so these tests are probably less impacted than the reading test, which every new DST student takes during orientation.

If taking the reading test during orientation does prevent students from doing as well on the test as they should, I suggest the DST

investigate using the online version of the test. The current agreement between Questar Assessment, Inc., the company that owns the test, and the DST program does not provide for use of the online version. My assumption is that this agreement was made before the online test existed and that updating this should be looked into.

Reading is so important to all facets of education that being able to generate the most useful results from this test should be given a high priority. Although this tangent about the online reading test is a bit off focus, I felt compelled to mention based on the same thing that acted as an impetus for the study. That is, I want to see students succeed and this seems like a minor modification that could assist in achieving that goal.

High School Grade Point Average (HSGPA) – This independent variable, with a p-value of 0.0000, was shown to impact the dependent variable. It also returned a positive regression coefficient (1.2196), which indicates that it increases the probability of the dependent outcome. Additionally, with an odds ratio value of 3.3860, a student is 3.386 times more likely to be a returner with each increase in the HSGPA by one unit. As I started this study, I thought that this independent variable would have an impact on the dependent variable and once I reviewed the

143

research I found on this subject, I was absolutely convinced it would be. I have always viewed a student's HSGPA as being an important value. HSGPA is based on all of a student's grades for four years of high school. This means that it truly captures the student's performance during that time and contains enough data to absorb outlying grades. In this respect, a student with a "B" average, for example, is neither overly punished for a few poor grades nor overly rewarded for a few outstanding grades. Similarly, students with much higher averages (or much lower averages) have earned these distinctions over time, rather than in a single class or term.

This is important because it does influence the expectations I have for a student, especially in terms of their ability to be successful. I don't mean that I necessarily expect students with high averages in high school to earn high averages in college, but I do expect those students to have a better understanding of what they need to do to succeed (and possibly, a better understanding of the benefits of success). These students have experienced success and have developed strategies to achieve that success. In most cases, these students will perform well, or at least adequately, across all academic areas.

Similarly, I do not expect that students with low averages in high school will be doomed to have low averages in college, but I do expect these students to have a less developed (and possibly, less realistic) understanding of what it takes to succeed. These students have experienced success on an inconsistent level, if at all, so they need assistance with developing strategies for success, as well as working on academic subject areas.

In short, HSGPA is something that I immediately turn to when first meeting with a student because it can tell me at what level has a student been successful during his or her four years of high school. This helps me set some expectations about what the student will need to do to be successful. It has been my experience that students in the DST program who enter with a strong HSGPA, tend to do better on placement tests and transition to their college of choice sooner than those students who enter the program with a weak HSGPA. Although part of this success can be attributed to being better prepared academically, the students with a strong HSGPA also do things that assist them with this success much more frequently than their counterparts. Specifically, these students use tutoring services, participate in study groups, set up and keep

145

appointments with their academic advisors, and meet with their professors outside of class with much greater frequency and consistency than other students. Although I recognize that HSGPA is influenced by many things that I have not addressed, for me, it has always been a strong indicator of success. The literature related to HSGPA, which is reviewed thoroughly in Chapter 2, provides ample evidence for the importance of this variable, especially when looking at student success of first-year students. All of these factors serve to verify the findings for HSGPA in this study.

High School Rank (HSR) – This independent variable, with a p-value of 0.0027, was shown to impact the dependent variable. It returned a negative regression coefficient (-0.0156), which indicates that it decreases the probability of the dependent outcome. Additionally, with an odds value of 0.9845, a student is 0.9845 times less likely to be a returner with each increase in the HSR by one unit. It is important to remember that for this variable, a lower value is better. At first, it seems that the odds ratio value is almost negligible because it is so close to 1; however, the "unit" for this independent variable is 0.001, which would represent a miniscule change in any one HSR value.

This independent variable is based on HSGPA, which means it captures all of the anomalies of and is subject to all the complexities of the previous independent variable. More importantly, it is also developed over a student's high school career, which is why I am similarly satisfied with its role in the study. Despite being satisfied with the HSR findings, I am not sure if it needs to be included as an independent variable in future studies. Since it is based on HSGPA, I am concerned that it does not add any value to the study. Also, as reported in Chapter 2, fewer and fewer high schools are reporting student rank on the transcripts they send to college admissions offices. Unless I can figure out how to compare the results of HSGPA to HSR and determine if they are unique, then I will probably include both in any future studies. Of course, even that is contingent on the HSR being reported by enough high schools to be useful.

English Placement Test (EPT) - This independent variable, with a p-value of 0.0155, was shown to impact the dependent variable. It returned a positive regression coefficient (0.2405), which indicates that it increases the probability of the dependent outcome. Additionally, with an odds

value of 1.2720, a student is 1.2720 times more likely to be a returner with each increase in the EPT by one unit.

This independent variable is based on each student's writing score, which is a holistically generated whole number from 1 to 5 that initially places each student into his or her first composition course. For many years, this test was only available as part of the first day of the New Student Orientation. I believe that making it available to students online has improved the test and the quality of the results and also that students greatly help themselves by taking it online. Although each year a number of students still complete this test at their orientation, in recent years, most students used the online option to complete this test.

There is a concern that students who use the online option will be given an unfair advantage in the placement process. After all, these students benefit from the extra time they receive to complete their essays. However, because the online essays are printed from the electronic files sent by the students and the in-person essays are handwritten, the essays are easily distinguished. The contextual issues of each type of essay are taken into consideration during the evaluation process, which seems to ensure that all results are accurate. Not only is the process, which

includes using a comprehensive evaluation rubric, reviewed and revised each year, but the evaluators (readers) are instructors from the composition courses themselves and each writing sample is evaluated by at least two readers. It is based on these features that I thought this independent variable would be significant, as it has been shown to be.

Math Placement Test (MPT) - This independent variable, with a p-value of 0.0001, was shown to impact the dependent variable. It returned a positive regression coefficient (0.0022), which indicates that it increases the probability of the dependent outcome. Additionally, with an odds value of 1.0022, a student is 1.0022 times more likely to be a returner with each increase in the MPT by one unit.

This independent variable is, much like EPT, one that I thought would be significant and has been shown to be. As a progressive and objective test with outcomes tied to specific course placements, it has been checked and recalibrated each year and often no changes to the course placement guide are required. Continued maintenance to the test should allow it to provide for accurate placement for years to come.

Final Conclusions

If I were using the results to draw absolute conclusions for the study, I would state that the independent variables College Entrance Tests (CET) and Reading Test Scores (RTS), with p-values of 0.2717 and 0.0523 respectively, do not impact the dependent variable and should not be studied any further. However, because the purpose of this study is to begin an exploration for further study of the retention of first-year students in developmental education programs, such as those in the DST program at the Midwestern Research University, I think it would be short-sighted at this point just to accept such and move forward.

Keeping in mind the exploratory purpose of the study, I do think the findings lend themselves to important and useful generalizations. First, the study achieved the objectives set forth in the introduction. Specifically, it tested a number of student academic performance and readiness measures and their impact on the dependent variable of student success. This was done to begin building a set of variables that future studies can use to go beyond simply looking at impact and eventually make a predictive model for student success. This can, in turn, lead to interventions and programs for those students in the greatest danger of

not achieving success. Additionally, modifications to those variables that did not impact student success should allow them to be more useful in future studies. For CET results, program administrators need to determine the cost-to-benefit of purchasing additional data about incoming students from ACT, Inc. In the case of the RTS, the benefit to students is there, now they just need to be told to take advantage of it. By making reading courses required when needed, our students will be better served and the data for future studies will be more powerful.

Implications for Theory

From a theoretical perspective, the study shows that retention research about first-year students can provide useful results. There are both High School Profile variables and Placement Test variables that can generate useful data about students and these data can be used to assist students in achieving academic success. In this respect, the study supports the existing research about these variables. However, the study does break new ground in terms of the participants and setting. There is a gap in the research when considering some of the unique features of the participants: They are not only first-year students, but also starting in a new program designed for conditionally admitted students. In this

151

respect, they are both developmental education students and at-risk students. I found nothing in the background literature that addressed these characteristics collectively.

Noticeably lacking were research studies that looked at new programs for conditionally admitted students. This is surprising considering the recent growth in these kinds of programs. I did find some descriptive studies about these programs, but they typically reviewed the services offered by the program and identified some characteristics of their students, but without any analysis or insight. Although I don't think this study fills the gap, I do think it helps. It also provides information that others researching this kind of program will find useful, and demonstrates one way of connecting piecemeal research from related studies to show how it relates to a broader issue that is not addressed in the research. In some respects, this is similar to the triangulation process used in qualitative studies and is a method of using research that can be found in the "Related Studies" section of the literature review of this paper. More importantly, I hope they can use the research found here to forego that process.

There is extensive research about first-year students, including those first-year students in developmental education and considered at-risk. Most of this research pertains to students at community colleges or other 2-year institutions. The DST program is part of the main undergraduate campus of Midwestern Research University. After reviewing some of these studies, it became clear to me that this difference probably does not warrant identifying this feature of the study as unique. It does present an interesting perspective, but I am not sure how the campus location or type can be seen as relevant, especially since I only gave it a cursory mention earlier in the study.

Moving beyond the participants and setting, it is possible to see that the way I organized the independent variables could be a unique treatment and add to the literature of student persistence. In particular, by identifying each independent variable as either a High School Profile variable or a Placement Test variable, I created another layer for analysis. This seems unique and may influence how others understand the connections and interactions of the factors that impact student success. Although the results here were insignificant, the groupings are informative on their own: High School Profile variables use a student's

complete four-year high school record to provide an accurate measure of the student's academic background. Placement Test variables are used to determine a student's readiness for specific courses in math and English, as well as a student's preparedness for college level reading. These distinctions are important and could be useful to others towards better understanding the complexity of the problem of student departure.

Suggestions for Future Research

There are a number of suggestions that I have for researchers who are going to study student success in the future. The first thing to consider is the independent variables used. In general, I would encourage researchers to include both quantitative and qualitative variables, since they both seem to be important in educational research. That is, the data generated by statistical measures provide specific, generalizable numbers; while qualitative methods preserve the context of a study's participants and provide the rich details that serve to interpret and explain. The current study used quantitative variables, but as the researcher, I was also in the field and able to provide descriptions about specific aspects of the variables. I was also able to speculate on why the findings turned out the way they did. I really feel that this is a quantitative study that

incorporated descriptive support of the data, findings, and conclusions, which gave it a qualitative dimension. Due to the use of historical data, it was not possible to include any true qualitative variables.

Because the study is based on quantitative measures, I am going to start there. The biggest shortcoming of this study is the lack of demographic data. By including race and gender in future studies, the results would immediately become more meaningful. Astin (1997) considers these two demographic factors, along with high school grade point average and college entrance exam scores the most critical variables to include when researching college student retention. I also think that high school size, as represented by an actual number or a descriptor, and high school type, most usually defined as urban, suburban, or rural, would serve to improve the results also. Because so many underprepared students need financial assistance to attend college, including Socio-Economic Status data in future studies might prove to be beneficial as well.

There are other academic variables that should be included, most importantly ACT/SAT sub-scores, which some find even more important than the composite scores. I would also suggest moving beyond the "pre-

college data" structure that I have used here. Although this is useful because it identifies students who might be in danger of not succeeding before they even start taking classes, I would encourage future researchers to couple this with a student's first quarter grades, which are highly indicative of future success. Along these lines, it seems extremely important to include the courses students enrolled for and the grades they received in those courses, which is another shortcoming of this study.

From a qualitative perspective, information about students' goals, self-confidence, attitudes, and behaviors is all important and can impact their future success. Developing an assessment tool to capture this information is beyond the skills of most researchers, so it is fortunate that the Learning and Study Skills Inventory (LASSI) already exists. The following description of the LASSI is taken from its website:

> The LASSI is a 10-scale, 80-item assessment of students' awareness about and use of learning and study strategies related to skill, will and self-regulation components of strategic learning. The focus is on both covert and overt thoughts, behaviors, attitudes and beliefs that relate to successful learning and that can be altered through educational interventions. Research has repeatedly demonstrated

that these factors contribute significantly to success in college and that they can be learned or enhanced through educational interventions such as learning and study skills courses.

Available at:

http://www.hhpublishing.com/_assessments/LASSI/index.html

This tool is used at more than 2,000 institutions of higher education and provides the next level of information that will add to the research used to understand and support our students.

ACT, Inc. also has services that capture qualitative data about students. More information is needed about how they can enhance an institution's knowledge of its first-year students, but the services ACT, Inc. has available do present an opportunity to delve more deeply into student background information. This is an area of study that connects to both Tinto's and Bean's models in a manner that is more complex than the current study.

The dependent variable is another matter. There are so many ways to define student success that individual researchers need to do what is best for their student population. Ideally, what is best for their study is

based on what is best for their students. Researchers can define student persistence in based on academic terms (quarters, semesters, etc.), years, graduation, or any number of other timeframes. They can also define it based on other progress features, such as completion of the sophomore year and having completed the foreign language requirement. There are a multitude of factors that can be combined, but the point is for individuals to decide based on what is going to best inform them about their students.

I also suggest that a prediction formula, as discussed in Chapter 3 of this study, be developed and to compute the probability for each student of persisting through the end of his or her first year of college. This is a natural next step for anyone interested in student success. This research can lead to proactive actions that can be used to assist students, even before they take a single college course. Many of the commercially produced statistics software packages, such as SAS, will easily generate such a formula. Incorporating some or all of the additional variables suggested for further research would allow for the creation of a well-developed formula.

Lastly, I believe that student success and retention is an area that is aptly situated for action research. I think that most professionals in

158

higher education would prefer to do things that motivate student success, rather than just learn about it. I also think that most professionals who work with first-year students know enough about their own institution and its resources to develop interventions and programs that can be implemented easily and that will provide feedback quickly. With these ideas in mind, I encourage future researchers in this area to design their studies in such a way as to have an immediate and positive impact on the study participants. It seems simple enough to me: The best way to encourage student success is to create conditions that encourage students to be successful.

Recommendations for Retention Programs

The following list of recommendations represents some of the options for real-world use for this research project. There are two contextual issues that readers should be aware of: First, the following list is structured such that I am making my recommendations to "retention programs." The reason for this is twofold: on one level, this avoids the clumsy repetition of "programs for conditionally admitted students taking developmental courses, like those in the DST program" and similar appellations. Using the more encompassing "retention programs" is not

meant to exclude these programs. In fact, they are the primary audience for this list and although I want to remain true to the purpose of the study, I also think most of these programs exist as part of an institution's larger retention strategy. Furthermore, I chose to use "retention programs" because I think there is also a wider audience than just programs structured like the DST program and so I want this list to be open to to any program with the purpose of assisting students persist in college. The second contextual issue is that in order to fulfill the purpose of the study, the following recommendations are described in terms of first-year students who are at-risk, but again, the actual application could be wider, so I want to keep this open to all who might find it useful.

Recommendation 1: Retention programs are encouraged to implement an Intrusive Academic Advising system – As an academic advisor myself; this selection is probably no surprise and might even seem to be self-serving. However, my experience tells me that quality academic advising is truly the foundation upon which a successful student retention program is built. Although academic advising of almost any type is important to all students, it is extremely beneficial to first-year students, such as those in the DST program, to be part of an "intrusive" academic advising program.

Intrusive academic advising, which is a specific kind of developmental advising, is proactive, rather than reactive. It requires advisors to be aware of their advisee's progress in classes and be aware of other things that impact student success such as adjustment issues; health and wellness; financial aid and finances; and even academic preparation from high school.

In an intrusive advising system, the advisor attempts to work with the student on particular issues before they become a problem. Earl (1987) focuses on the action-oriented approach advisors must use in an intrusive program and defines this in terms of advisors involving themselves with students and motivating students to seek help when needed. My own experience tells me that this is accomplished through mandatory advising appointments for students, interaction and communication with students' instructors, and referring students to other campus resources, when needed. It is also critical that the advisor-advisee relationship start early in the student's college career, with summer orientation being the ideal first meeting.

Recommendation 2: Retention programs are encouraged to develop a First-Year Experience initiative based on Learning Communities linked to a First-

Year Seminar – First-year experience programs can include any number of components and accomplish many objectives. The purpose of this recommendation is not meant to restrict these possibilities; rather, it is to urge those professionals who are charged with designing and maintaining these programs to build them on this foundation. As a reminder, it is imperative that Learning Communities are structured in such a way that students in a special program do not feel barred from the rest of campus. This is an opportunity to integrate them into the campus community.

Recommendation 3: Retention programs are encouraged to place students in courses accurately and require students to adhere to those placements – Accurate course placement can be achieved by using placement tests developed internally by the institution; by investing in proprietary placement test system, such as Accuplacer, ASSET, or COMPASS; by utilizing outside placement services, such as those provided by ACT, Inc.; or by combining these options so each area tested achieves the best fit. Although it might be possible to achieve accurate course placement by reviewing students' high school courses and grades, this is not suggested as there is too much inconsistency in course titles and content. The success of this recommendation relies on the accuracy of the placement

results, requiring students to follow those results, enforcing the pre-requisite structure in all disciplines, and applying these rules to all students. If followed, these things do not become identified with the program, but characteristic of the way the institution ensures that all students are taking the correct courses in the correct order.

Recommendation 4: Retention programs are encouraged to invest in Supplemental Instruction – Supplemental Instruction is a system of connecting peer-facilitated study sessions to challenging courses. The study sessions are led by qualified and trained undergraduate SI leaders who attend classes with students and encourage students to practice and discuss course concepts in sessions. In most classes, study sessions are open to all students, but not required.

Ideally, programs will be able to implement SI into all of the developmental courses they offer, although it will take time to get to this level of usage. In developmental classes, there are models that require students to attend a certain number of study sessions. This is often determined by the student's most recent grade on a test or paper in the class. In most cases, sessions are well-attended and as a result, these students do not feel isolated in their attempts at understanding the often

163

confusing concepts of the course. It is important to remember that Supplemental Instruction is appropriate for any class, taught at any level.

Ultimately, Supplemental Instruction provides the following benefits: assistance in courses where the need is greatest; proactive approach to learning new material; identifying and solving particularly challenging course issues before they become problems; increased student attendance; and increased mutual support among students. Each of these benefits will assist students in their developmental courses, but also throughout their college careers.

Recommendation 5: Retention programs are encouraged to use full-time faculty who are specifically trained to teach developmental courses – Clearly the most important consideration when selecting developmental faculty is an individual's enthusiasm for working with students in developmental classes. It is also important that, once selected, these individuals be given a full-time appointment within the developmental education department. In reality, in today's academic climate, it is rare when any academic unit has the luxury of not using adjunct faculty or other part-time instructors. This being the case, I think developmental education departments should strive to create a core of full-time faculty members and a qualified pool of

adjunct instructors to employ as needed. It is important that this core group of full-time faculty exists so that developmental education can be recognized as an academic unit that has the same standing within the institution as other departments.

Creating a free-standing department in which to house these faculty members seems equally important. This gives them the autonomy to develop the curriculum and student outcomes as they see fit. Lastly, although the lofty standards for faculty set by Mulvey (2008) and others (Roueche & Roueche, 1999; Smittle, 2003) represent a laudable goal, Kozeracki (2005) presents an alternate way of achieving this goal. Although not addressing her colleagues directly, Kozeracki (2005), writing about the challenges of staffing developmental courses, makes a rational argument for hiring the best candidates available and supporting them with faculty development initiatives. In particular, she writes that faculty in developmental education need to be supported at the institutional level, the departmental level, and the informal level, with this last type taking the form of one-on-one discussions with colleagues and small group gatherings within the department (Kozeracki, 2005). It seems likely that the hiring of faculty will present the greatest challenge

165

at most institutions. Achieving an independent department with a nucleus

of developmental educators with full-time faculty status seems

particularly difficult due to the marginalized status most of these

departments and their instructors currently occupy.

In closing, these five recommendations represent what I would

consider a complete retention program on their own, at least from the

perspective of academic preparation and support. Any institution that

implemented these programs would be in a good position to see marked

improvement in their retention of first-year students with the first class

that has access to these services. However, retention is far too

complicated an issue to be solved by providing student services alone.

Both Tinto (1975, 1987, & 1993) and Bean (1980, 1982, 1983, 1986; and with

Eaton, 1995, 2000) make a case for institutional responsibility for the

problem of abating student departure. Both models start with the premise

that student attrition is a systemic concern that puts the responsibility of

keeping students enrolled on the institution itself, with top-down

approaches for addressing the problem (Cabrera, Nora, and Castaneda,

1993). Within that framework, the problem was looked at from the

perspective of having filtered down to the DST program. The solutions

that are proposed were done so assuming that they would be part of a

broader retention strategy, not an isolated set of programs. I mention this

as cautionary reminder and hope all who are concerned with the success

of their students have the opportunity to do the same.

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