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ADMISSION CRITERIA FOR SCHOOLS OF BUSINESS:
COMMON PREREQUISITES AND ACADEMIC PERFORMANCE IN
UPPER-LEVEL BUSINESS COURSEWORK

by

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A dissertation submitted in partial fulfillment of the requirements
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ABSTRACT

Schools of business within the Florida State University system have state-mandated common prerequisites that students are required to complete prior to formal admission into baccalaureate business programs. As such, the common prerequisites serve as minimum admission requirements for schools of business in the state of Florida. This study sought to determine the ability of these discipline specific admission criteria to predict academic performance in upper-level business coursework. This study looked at existing data for 860 students in the College of Business Administration at the University of Central Florida. Findings of the study demonstrate that there is a positive and moderate to strong correlation between the final grade earned in each individual course within the common prerequisites and the cumulative academic performance in upper-level business coursework. The strength of the correlation varied among the individual prerequisites, however, each individual prerequisite was positively correlated. Regression findings also demonstrate that the common prerequisites may, with certain student populations such as native students and students pursuing quantitative business majors, be a rather effective predictor of program performance. Most problematic of the findings was that the predictive ability was not equivalent across different student populations. This suggests that as admission criteria or screening mechanisms designed to select students most likely to be successful in the program, the state-mandated common prerequisites were not effective for all student populations. Findings of this study have implications for schools of business, as well as other disciplines, as they evaluate the common prerequisites required by their institution or consider best practices and policies to improve student retention, graduation, and other outcomes.

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CHAPTER ONE: INTRODUCTION

Public institutions of higher learning in the state of Florida have state-mandated common prerequisites that students are required to complete prior to formal admission into certain baccalaureate degree programs (Common Prerequisite Manual, 2012-2013). Common prerequisites are groupings of individual prerequisite courses and whereas an individual prerequisite is associated with a specific course, common prerequisites are associated with a specific academic program. As formally defined by the Florida Board of Governors, common prerequisites are “lower-division courses that are required for progression into the upper division of a particular baccalaureate degree program ... at any public institution of higher education in Florida” (Florida Board of Governors, 2013). As such, the common prerequisites for baccalaureate business programs serve as the minimum admission requirements for schools of business. These requirements are in addition to the admission criteria required for admission to the institution (Common Prerequisite Manual, 2012-2013). This dissertation focused on the business common prerequisites within the state of Florida, with the purpose of determining the ability of these discipline specific admission criteria to predict student performance in upper-level business coursework.

General Background: The Business Common Prerequisites

As presented in the *Common Prerequisite Manual* (2012-2013), the seven courses that comprise the common prerequisites required for students seeking to complete a Bachelor of Science degree in business are:

1. ACG X021 Financial Accounting
2. ACG X071 Managerial Accounting

3. ECO X013 Macroeconomics
4. ECO X023 Microeconomics
5. CGS X100 Computer Fundamentals for Business
6. MAC X233 Concepts of Calculus*
7. STA X023 Statistics*

*ECO 3401 Quantitative Business Tools I (substitute for MAC X233 and STA X023 at the University of Central Florida)

The letter X in the referenced course numbering is used to denote that any level course is acceptable (Common Prerequisites Manual, 2012-2013). As an example, ACG X021 indicates that ACG1021, ACG 2021, ACG 3021, and ACG 4021 would all be acceptable courses. In practice, because the common prerequisites are required for admission into upper division programs and are completed by students at either a community college, state college, or university prior to admittance into an upper-division program, the business common prerequisites are all offered at the 2000 level as it is expected students will complete these courses prior to entering their junior year.

Receiving institutions may approve a course substitute if the substitute course is comparable and contains advanced treatment of the required course concepts, as determined by the receiving institution (Common Prerequisites Manual, 2012-2013). At the University of Central Florida, ECO 3401 Quantitative Business Tools I is an acceptable substitute for STA X023 and MAC X233, as it is deemed to be a comparable course offering advanced treatment of the required course concepts. Within business, available programs of study vary depending upon the specific institution; however, typical major areas of concentration include: Accounting, Economics, Finance, General Business, Management, and Marketing. As presented in the 2012-

2013 Common Prerequisites Manual, the common prerequisites are applicable to all programs of study for students earning a Bachelor of Science in Business Administration in the state of Florida. Although schools of business have one set of common prerequisites for all programs of study, this is not necessarily the case in other disciplines where common prerequisites may vary among different programs of study within a discipline (Common Prerequisite Manual, 2012-2013). The seven courses comprising the business common prerequisites are not unique to business programs within the state of Florida. Each of the courses is standard lower level coursework of an accredited business program and many of the courses are used as admission requirements for business programs outside the state of Florida. It is however, unusual for the courses to be a state-mandated admission requirement.

Problem Statement

Prerequisites are established for one of two reasons: (1) to increase the likelihood of student success, or (2) health or safety concerns (Abou-Sayf & Miari, 2007). The focus of this dissertation was the first of the two reasons, specifically increasing the likelihood of student success in upper-level business coursework. The literature advises that excessive prerequisite requirements may create an unnecessary increase in time to graduation, which in turn may also increase the likelihood of a student dropping out (Abou-Sayf & Miari, 2007; Abou-Sayf, 2008; Pascarella & Terenzini, 2005). Conversely, insufficient prerequisite requirements for business students may lead to inadequate preparation and poor performance in upper-level business coursework (Choudhury, Robinson, & Radhakrishnan, 2007; Danko, Duke, & Franz, 1992; Davis, 2009; D'Souza & Maheshwari, 2010; Huang, O'Shaughnessy, & Wagner, 2005; Pharr & Lawrence, 2007; Pharr, Bailey, & Dangerfield, 1993; Plutsky & Wilson, 2000; Truell & Woosley, 2008; Von Allmen, 1996; Yang & Raehsler, 2007). It is a delicate balance to achieve

prerequisite requirements that do not unnecessarily increase time to graduation, but also adequately prepare students for success in upper-level coursework. This study sought to determine if the business common prerequisites can be used to predict academic performance in the program and the likelihood of program completion.

When looking at the predictive power of individual course prerequisites, numerous scholars have found statistically significant results supporting the argument that successful completion of a prerequisite class is positively correlated with successful completion of the next course in the curriculum sequence or the target course (Baard & Watts, 2008; Biggers, 2006; Choudhury, Robinson, & Radhakrishnan, 2007; Coley, 1973; Danko, Duke, & Franz, 1992; Davis, 2009; Donovan & Wheland, 2009; D'Souza & Maheshwari, 2010; Huang, O'Shaughnessy, & Wagner, 2005; Von Allmen, 1996). This is assuming the prerequisite course provides foundational knowledge that is required, or will enhance the student's ability to master the learning objectives of the target course. From their creation in 1996, the intent was that Florida's common prerequisites would provide the "foundational content" so that students would be adequately prepared for the "content of upper-division courses" (Office of Program Policy Analysis & Government Accountability, 2008). However, it is critical to note that simply adding additional prerequisites does not necessarily improve academic performance, and in fact may potentially have the unintended negative consequence of increasing the attrition rate (Abou-Sayf & Miari, 2007; Abou-Sayf, 2008). Therefore, selection of appropriate prerequisites is highly important to student success.

Supporting the argument that decisions regarding the selection of course prerequisites should be data driven, Baker (2008) found that a larger number of prerequisites in and of itself did not improve academic performance in target courses. Studies in which the prerequisite

courses provided foundational knowledge for the target course, such as a study conducted at the Barry Kaye College of Business at Florida Atlantic University, concluded that the average prerequisite grade earned by students in two prerequisite classes, Calculus and Statistics, was a significant factor contributing to academic success in the target course of Quantitative Methods (Davis, 2009). Likewise, a study at Hampton University conducted by D'Souza and Maheshwari (2010) examined factors influencing the academic performance of students in a Quantitative Methods course concluding that the prerequisite course, Pre-calculus, was a statistically significant factor in student performance. It is important to note that D'Souza and Maheshwari's (2010) study originally included the three prerequisite courses of: Pre-calculus, Calculus, and Statistics. The final regression model, however, only found one prerequisite course, Pre-calculus, to be statistically significant to the grade earned in Quantitative Methods. This result is further evidence that a larger number of prerequisites does not necessarily provide greater predictive power. These findings are in agreement with the results of an earlier study completed by Pharr, Bailey, and Dangerfield (1993) that found business prerequisites to not only have statistically significant predictive ability, but to also be better predictors of performance in upper-level business coursework than more general measures such as American College Testing (ACT) and Scholastic Achievement Test (SAT) scores.

Also relevant to the topic is the fact that a student may successfully complete an Associate of Arts degree without meeting all of the common prerequisites that are required for admission into a specific discipline, such as a school of business. Within the state of Florida, a Bachelor of Science in Business Administration is a minimum of 120 credit hours. Ideally, the common prerequisites are completed within the first 60 credit hours or as part of the Associate of Arts degree, and then an additional 60 upper-level credit hours of business coursework are

completed (Common Prerequisites Manual, 2012-2013). If the common prerequisites are not successfully completed during the freshman and sophomore years, additional credit hours are required and time to degree completion is extended. In response to this concern, in the fall of 2013 the state of Florida implemented a new statute, *Florida Statutes Section 1007.23(3)*, requiring students pursuing an Associate of Arts degree to formally declare a baccalaureate degree program prior to earning 30 credit hours (Florida Board of Governors, 2013). The institution granting the Associates degree is then responsible for advising the student of the common prerequisites of the intended baccalaureate degree program. Details of how this new statute will be put into practice are currently unknown and results have yet to be seen. The issue of credit hours is also germane, particularly in light of *Florida Statutes Section 1009.286* implemented in 2009. The statute is designed to “encourage students to complete their baccalaureate degree as quickly and efficiently as possible” (University of Central Florida website, n.d.). The encouragement comes in the form of a tuition surcharge added to each credit hour taken in excess of the total number of credit hours required for degree completion.

Significance of the Study

As noted by Rohr, in a global economy the successful education of business students is “essential for the United States to compete” (Rohr, 2013, p. 196). It therefore follows that preparing future business leaders is key to the global competitiveness of the United States and that decisions regarding admission criteria for schools of business should be data driven.

Unfortunately, although an abundance of literature focuses on cognitive factors used as university admission criteria, previous research has largely “overlooked discipline specific admission criteria at the undergraduate level” such as the common prerequisites for schools of business (Truell & Woosley, 2008, p. 348). Similar to how a course prerequisite is designed to

provide essential foundational material for the target course, common prerequisites are designed to provide foundational material essential for a specific program (Choudhury et al., 2007; Pratt, 1980; Yang & Raehsler, 2007). Ultimately, appropriate common prerequisites are designed to maximize student success and minimize student failure, within a specific program (Office of Program Policy Analysis & Government Accountability, 2008; Pharr et al., 1993). According to the Association to Advance Collegiate Schools of Business (AACSB) Executive Vice President and Chief Operating Officer, Dan LeClair, business students represent approximately 20% of all undergraduate students globally (LeClair, 2013). Consequently, a study focusing on the ability of the business common prerequisites to predict success in upper-level business coursework will provide higher education professionals with valuable information in their quest to maximize success and minimize failure for a large and growing student population pursuing a baccalaureate degree in business.

Conceptual Framework

The construct of prior knowledge was the conceptual framework used to guide the study. Selection of this framework was based upon the underlying assumption that learning is a developmental or building process, and that skills learned in one stage or level become tools used in the construction of new skills in a subsequent stage or level (Choudhury et al., 2007; Fischer, 1980; Hoz, Bowman, & Kozminsky, 2001; Kirschner, 2002; Yang & Raehsler, 2007). It therefore follows that standards must be created as to the necessary skills or “tool kit students bring to class” (Evensky, Kao, Yang, Fadele, & Fenner, 1997, p. 631). This ‘tool kit’ that students bring to class may be thought of as prior knowledge. The sequencing of course prerequisites is ideally designed to provide students with the opportunity to acquire foundational knowledge that will increase the likelihood of success in subsequent classes (Jackson, 1992;

Pratt, 1980; Zais, 1976). This foundational knowledge then represents the prior knowledge that students bring to future courses. In a similar vein, the business common prerequisites represent prior knowledge students have at the point of entry into a business program and were designed to increase the likelihood of success in the program.

When students proceed to upper-level coursework with prior knowledge or a ‘tool kit’ that is accurate and robust, and it is then activated at the appropriate time, this prior knowledge may provide a solid foundation to be used in the building of new knowledge (Evensky, et al., 1997; Hoz et al., 2001). This basic concept forms the rationale for the requirement of prerequisite coursework or the requirement of a specific ‘tool kit’ that students must bring to class. Common prerequisites are the minimum admission criteria for schools of business and in this sense are comparable to general university admission requirements as they are standards that must be met prior to entry. Just as academic performance in high school, as measured by high school grade point average and standardized test scores, is commonly used as a measure of a student’s prior knowledge or the level of knowledge possessed at the point of entry into higher education, academic performance in the common prerequisites may be used as a measure of a student’s prior knowledge at the point of entry into an upper-division program.

Lack of prior knowledge, inaccurate prior knowledge, prior knowledge that is insufficient for the current task, and/or inappropriately activated, may increase the level of cognitive load experienced while learning new concepts and is associated with greater difficulty in learning (Bannert, 2002; Hay, Wells, & Kinchin, 2008; Kirschner, 2002). When learning new tasks or concepts, the majority of cognitive resources are allocated to working or short-term memory. Unlike long-term memory, working memory has limited capacity. When an individual experiences a heavy cognitive load and the use of working memory reaches capacity, the ability

to form “deeper construction and automation of schemata” is limited and thus learning is hindered (Bannert, 2002, p. 139).

In this study, prior knowledge, considered to be pertinent to the successful completion of a Bachelor of Science in Business Administration degree, was represented by the final course grade earned in each common prerequisite class and by the cumulative grade point average (GPA) earned in the common prerequisite coursework as a whole. It was assumed that this prior knowledge, represented by course grades and GPA, was acquired as a result of completing the common prerequisites. In reality, it is not possible to exclude prior knowledge that may have been acquired through other life experiences. This is particularly true for older students who may have a vast array of experiences that may be used for learning (Merriam, Caffarella, & Baumgartner, 2006).

As the business common prerequisites are required for formal admission into a baccalaureate business program, it would seem logical that this admission requirement is based upon the assumption that mastering the content of these seven courses provides knowledge that will in turn, increase the likelihood of academic success in upper-level business coursework. Therefore, the goal of the study was to determine the relationship between academic performance in the business common prerequisites, representing the student’s prior knowledge in the subject area of business, and the subsequent academic performance in upper-level business coursework. To this end, a student’s cumulative College of Business Administration (CBA) GPA was used as a measure of academic performance in upper-level business coursework. The working theory being that students earning a higher common prerequisites GPA have a greater level of prior business knowledge and enter the program with a more robust ‘tool kit.’ These students consequently experience a lighter cognitive load while completing upper-level business

coursework and this is in part reflected by a higher CBA GPA and a greater likelihood of program completion. Figure 1 is a visual representation of this predicted relationship.

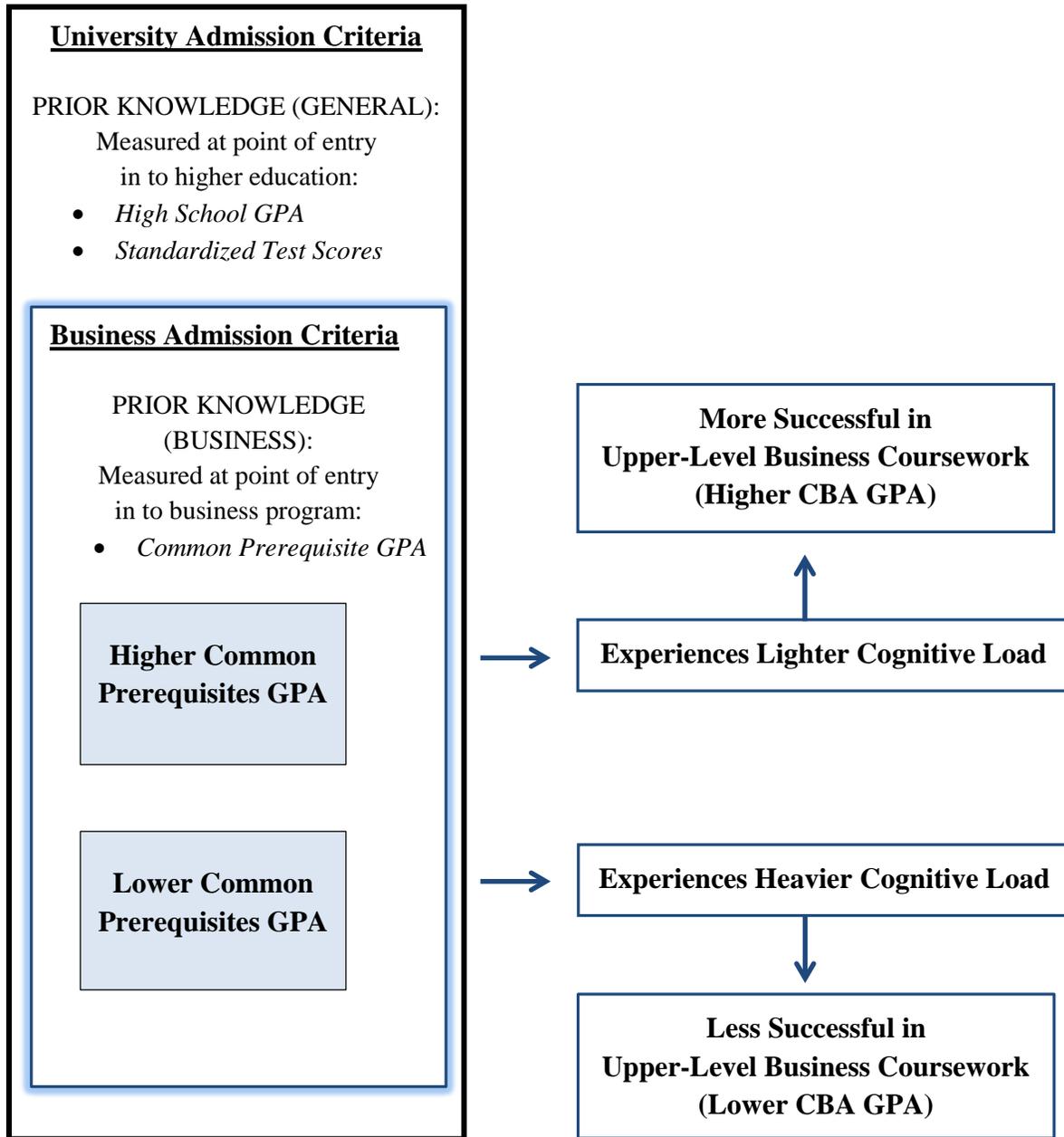


Figure 1: The relationship between prior knowledge, represented by common prerequisite GPA, and academic performance in upper-level business coursework, represented by CBA GPA

Research Questions

For this study, the research questions were:

1. Do students who perform better in the business common prerequisites subsequently perform better in upper-level business coursework?
2. Is the business common prerequisite grade point average an equally effective predictor of performance in upper-level business coursework for both native and transfer students?
3. Is the business common prerequisite grade point average an equally effective predictor of performance in upper-level business coursework for each of the business majors?

Table 1 designates the independent and dependent variable associated with each research question and the corresponding relationship of each variable to the conceptual framework of prior knowledge.

Table 1

Relationship between Research Questions, Research Variables, and Conceptual Framework

Research Question	Independent Variable (a measure of prior knowledge)	Dependent Variable (a measure of academic performance)
Question 1	Grade in each prerequisite course, GPA for prerequisite coursework, Repeat attempts	Cumulative CBA GPA
Question 2 <i>(subsets based upon native or transfer status)</i>	Grade in each prerequisite course	Cumulative CBA GPA
Question 3 <i>(subsets based upon major)</i>	Grade in each prerequisite course	Cumulative CBA GPA

Definition of Terms

The terms below are used throughout the study and are defined as follows:

Common Prerequisites. As defined by the Florida Board of Governors in regulation title and number *8.010 Common Prerequisites*, common prerequisites are “lower-division courses that are required for progression into the upper division of a particular baccalaureate degree program ... at any public institution of higher education in Florida” (Florida Board of Governors, 2013).

Common Prerequisite Manual. Section 1007.25(5), Florida Statutes requires the Department of Education to “develop a centralized database containing the list of courses ... that meet the prerequisite requirements for each baccalaureate degree program” (Florida Department of Education Memorandum, October 12, 2009, p. 1). The *Common Prerequisite Manual* is updated annually and is the official on-line source of all state-approved common prerequisites for baccalaureate degree programs in the state of Florida.

Florida Board of Governors. As explained on the Florida Board of Governors website (2013), the Board “oversees the operation and management” of Florida’s public universities. The Board is comprised of a total of seventeen members of which fourteen are appointed by the Governor of Florida. The remaining three members are the Chair of the Advisory Council of Faculty Senates, the Commissioner of Education, and the Chair of the Florida Student Association.

Gordon Rule. The Florida State Board of Education Rule 6A-10.030/Board of Governors Articulation Resolution requires all students pursuing an Associates of Arts or Bachelor’s degree to successfully complete, with a C- or better, 12 credits of writing and six

credits of mathematics as admission criteria into upper-division programs (Statewide Articulation Manual, revised 2011).

Lower-division Course. This study defined lower-division coursework as 1000 and 2000 level undergraduate courses. The lower-division designation is based upon the course numbering system. For business students within the state of Florida, lower-division courses include the general education requirements and the common prerequisites, both of which must be satisfied prior to admittance into a business program.

Native Student. This study defined a native student as a student who enters a baccalaureate granting institution as a freshman, completes the common prerequisites at the same baccalaureate granting institution, and is then granted admission into the business program of said baccalaureate granting institution.

Transfer Student. This study defined a transfer student as a student transferring into the business program of a baccalaureate granting institution after the completion of an Associate of Arts degree. An Associates of Arts degree requires a minimum of 60 credit hours, however, there is no maximum limit on the number of hours an individual student may take in efforts to complete the Associates of Arts degree.

Upper-division Course. This study defined upper-division coursework as 3000 and 4000 level undergraduate courses taken within the student's chosen program of study, business.

Delimitations of the Study

The researcher defined several parameters of the study that delimit the results.

1. The study only included students who began upper-level business coursework in the Fall 2010 semester.

2. Students were only included in the study if each of the program prerequisites were successfully completed with a final course grade of C or higher prior to, or by the completion of, the Fall 2010 term.
3. For students not currently enrolled, the CBA GPA at the last term of enrollment was used. This resulted in variance in the number of upper-level business credit hours contributing to the CBA GPA. Students within the sample may have graduated with 60 or more upper-level credit hours, or at the other end of the spectrum, students may have only one term of enrollment in upper-level coursework with minimal credit hours contributing to the CBA GPA. The researcher chose to include all students regardless of the number of upper-level credit hours completed, as requiring a minimum number of upper-level credit hours would have excluded students who voluntarily or involuntarily exited the business program due to a poor academic start in upper-level coursework.

Summary

Schools of business would be prudent to make data driven decisions as it relates to common prerequisites, as error on either side, insufficient prerequisites or excessive prerequisites, has serious implications for the academic success of business students. In this dissertation, a quantitative study using correlation and regression analysis was conducted to determine the ability of common prerequisites to predict academic success in upper-level business coursework. Findings of this study have implications for schools of business, as well as other disciplines, as they evaluate the current common prerequisites required within the state of Florida or consider best practices and policies to improve student retention, graduation, and outcomes.

CHAPTER TWO: LITERATURE REVIEW

Introduction

The scope of the current literature does not address the predictive power of common prerequisites. The literature does address the predictive power of a specific prerequisite course on a specific target course, but does not consider the predictive power of a specific group of prerequisites, such as Florida's business common prerequisites, on the successful completion of a specific program, such as a baccalaureate degree in business. The lack of peer reviewed work in this area emphasizes the need for this study.

Florida's business common prerequisites are in practice the minimum admission criteria for schools of business within the state. Therefore, this chapter will open with a brief historical overview on the broader topic of general university admission criteria prior to discussing the business common prerequisites, which for purposes of this study were considered a subset of general university admission criteria. The origin of Florida's common prerequisites will then be discussed to offer a general historical background on the issue and also provide context to the current situation. The purpose of this study was to determine the predictive power of the business common prerequisites as it relates to subsequent academic performance in upper-level business coursework. To this end, literature on retention and student success is highlighted with a limited focus on academic performance, as measured by grade point average, as an indicator of student success. Following the discussion on student success, the origins of course prerequisites are presented and literature speaking directly to the ability of academic performance in a prerequisite class to predict academic performance in a target course for a variety of disciplines is reviewed. In order to provide an objective and thorough review of the literature, limitations to be considered in the interpretation of the quantitative findings associated with the predictive

power of prerequisites is also addressed. To further refine the scope of the literature and move to the heart of the study, a review of the literature addressing academic performance in business prerequisites and subsequent academic performance in upper-level business classes, as well as program success, will conclude this chapter and present a comprehensive review of the literature as it relates to the research questions.

Admission Criteria: A Historical Overview

Since the founding of Harvard in 1636, admission criteria have been used within the United States to determine eligibility for entrance to institutions of higher learning (Cabrera & Burkum, 2001; Karabel, 2005). Harvard's original admission criteria, knowledge of Greek and Latin, was based upon its lofty mission to educate the clergy (Brubacher & Rudy, 1997). Although these original admission requirements may be very different than admission standards of today, Johnson (2000) contends that the issues faced today are in substance no different than those faced during Colonial times: "the balance of quantity and quality" (Johnson, 2000, p. 2). Institutional reputation is based in large part on selectivity and by its very definition, selectivity means keeping some applicants out (Zwick, 2007). Admission standards are screening mechanisms that are designed to select applicants who are most likely to be successful in terms of collegiate academic performance and degree completion (Cabrera & Burkum, 2001). This definition applies whether the topic is general university admission criteria or discipline specific criteria such as common prerequisites; the intent is to select applicants most likely to be successful in collegiate academic performance and ultimately degree completion. Florida's common prerequisites were originally established to allow for ease of articulation and to provide the "foundational content" for students to be adequately prepared for upper-division courses (Office of Articulation, 2010; Office of Program Policy Analysis & Government Accountability,

2008; Statewide Articulation Manual, revised 2011). Thus, as with general university admission criteria, the intent is to use the criteria as a tool to help select students who are most likely to be academically successful.

While general university admission requirements vary considerably based upon the type of institution, the vast majority of four year institutions, approximately 93%, do indeed have some type of criteria for screening out applicants (Cabrera & Burkum, 2001). According to the National Association for College Admission Counseling's (NACAC) 2011 report entitled *State of College Admission*, admission criteria most important in the decision making process are, in order of importance: (1) grades in college preparatory courses, (2) strength of high school curriculum, (3) standardized test scores, and (4) overall high school (GPA). These decision-making criteria have remained largely unchanged over the last seventeen years as presented by the NACAC's national survey. Based upon these criteria, colleges and universities in the United States accept, on average, two-thirds of applicants (Clinedinst, Hurley, & Hawkins, 2011).

Although there are both proponents and opponents on the use of these types of admission criteria, there is a body of literature (Berry & Sackett, 2009; Burton & Ramist, 2001; Cimetta, D'Agostino, & Levin, 2010; Rohr, 2013; Stumpf & Stanley, 2002) supporting the validity of these criteria in selecting applicants most likely to have academic success in college. The two most popular standardized admission tests, the Scholastic Achievement Test (SAT) and the American College Testing (ACT), both have a correlation of approximately .4 with first year college GPA, which in turn is correlated with degree completion (Pascarella & Terenzini, 2005; Stumpf & Stanley, 2002; Zwick, 2007). Additionally, the literature demonstrates that admission tests, such as the SAT and ACT, when used in conjunction with high school grades have greater predictive power than high school grades alone (Stumpf & Stanley, 2002; Zwick, 2007).

Admission criteria, such as high school GPA and standardized test scores, are commonly used as a proxy for a student's level of prior knowledge and potential for collegiate academic success. Standardized testing as a means of screening applicants is not without its opponents who argue that admission criteria such as the SAT and ACT limit access for minority and low income applicants, and there is literature that supports this contention as well (Zwick, 2007). This issue does not, however, dismiss the validity of these tests to accurately select applicants most likely to be successful in college. If the institutional goal is to select applicants most likely to succeed, then these types of admission criteria are effective in achieving that goal.

The Origin of Florida's Common Prerequisites

The establishment of state-mandated common prerequisites for baccalaureate programs in Florida can be traced directly back to the broader issue of articulation. Articulation, as defined by Cohen and Brawer, is "the movement of students or, more precisely, the students' academic credits, from one point to another" (Cohen & Brawer, 2003). As early as the 1960s, higher education professionals in Florida had concerns regarding the transfer of credits for students transitioning from two-year institutions to four-year institutions. In efforts to improve the vertical transition from one educational system to the next, in 1971, Florida was the first of the 50 states to implement a statewide articulation agreement (Anderson, Sun, & Alfonso, 2006). Today, policy literature (Falconetti, 2009; Knoell, 1990; Wellman, National Center for Public Policy and Higher Education, & Institute for Higher Education Policy, 2002) consistently notes the Florida Statewide Articulation Agreement as an example of one of the most advanced, well-defined and successful statewide articulation agreements in the country. This national standing is based upon the agreement's stated purpose of providing "the efficient and effective progression and transfer of students within the system and allowing students to proceed toward

their educational objectives as rapidly as their circumstances permit” (Office of Articulation, 2010, p.1). Florida’s postsecondary education system is designed to encourage students pursuing a baccalaureate degree to first complete an Associate of Arts degree and then transfer to a four-year institution to complete the last 60 credit hours of the baccalaureate degree. This approach is known as the 2 + 2 system and its proliferation is evidenced by the fact that half of the baccalaureate degrees awarded in the state each year are to transfer students (Office of Articulation, 2010). Viewed in this light, Florida’s Statewide Articulation Agreement serves constituents by creating an educational environment that provides for an efficient use of the student’s time as well as the taxpayer’s dollar.

Although Florida’s agreement is quite comprehensive in its scope, as it relates to this dissertation topic and the issue of articulation, the agreement uses a three pronged approach to facilitate the postsecondary transfer of credit from the state’s colleges to universities: (1) the establishment of a Statewide Course Numbering System allowing the transferability of credit for equivalent courses taught by faculty with comparable credentials, (2) the establishment of the Associate of Arts degree as the transfer degree, and (3) the establishment of the General Education Requirements, Gordon Rule Requirements, and Common Prerequisites for baccalaureate degree programs (Office of Articulation, 2010). The third prong of the agreement, the establishment of common prerequisites for baccalaureate programs, is the topic of this dissertation. Although Florida’s Statewide Articulation Agreement was created in 1971, it was not until 1996 that the agreement was modified under legislative mandate, *Title XLVIII Chapter 1007.25(5) Florida Statutes*, to include the establishment of common prerequisites for baccalaureate degree programs (Statewide Articulation Manual, revised 2011). The statute is presented in Appendix A.

As presented in the Common Prerequisites Manual (2012-2013), the state's official repository of information concerning the common prerequisites, a total of 215 degree programs have common prerequisites. The common prerequisites for a specific program are required to be the same for all postsecondary institutions within the state. This requirement was designed to allow for ease of transfer of credit among Florida institutions and hence the direct relationship to the broader issue of articulation (Statewide Articulation Manual, revised 2011). All public institutions within the state, with the exception of the New College of Florida, are required to abide by regulations governing common prerequisites. The New College of Florida, due to the "unique nature of its curriculum and its special mission to create innovative, highly personalized educational experiences," is exempt from this regulation (Florida Board of Governors, 2012-2013). In addition to exemption from regulations governing common prerequisites, the New College of Florida is also not required to use common course codes as mandated by the State Articulation Agreement for all other public institutions within the Florida state system (Statewide Articulation Manual, revised 2011). Nonetheless, according to the Florida Board of Governor's website, the New College of Florida is "responsible for continuing to work towards smooth transition for transfer students."

Successful completion, as defined by each particular institution, of the state required common prerequisites for a specific program, does not guarantee admission into that program. Specific programs of a particular institution may have additional requirements such as a minimum grade point average for the common prerequisites, a minimum overall grade point average, or other additional criteria. It should also be noted that a common prerequisite course may itself have a course prerequisite. An example may be found within the business common prerequisites which contain Concepts of Calculus. The course Concepts of Calculus has a

prerequisite course, College Algebra, although College Algebra is not considered part of the business common prerequisites (Common Prerequisite Manual, 2012-2013).

The common prerequisites for each baccalaureate degree program were originally created in 1996 by discipline specific committees comprised of faculty from public institutions within the state (Statewide Articulation Manual, revised 2011). The common prerequisites were to provide “the foundational content” so that students would be adequately prepared for the “content of upper-division courses” (Office of Program Policy Analysis & Government Accountability, 2008). Evaluation of the impact of this regulation was virtually nonexistent until March of 2008 when the Office of Program Policy Analysis & Government Accountability (OPPAGA) published a report entitled *Inconsistent Implementation of Common Prerequisites Creates Barriers to Effective 2+2 Articulation*. The report charged that participating universities, the Florida Board of Governors, and the Florida Department of Education were not effectively implementing the common prerequisites. Furthermore, the report claimed that 65% of the universities evaluated were implementing the common prerequisites in ways that hindered rather than improved transition to baccalaureate programs within the state.

In 2010 the OPPAGA reported that steps had been taken to implement the recommendations provided in their 2008 report, and at that time presented a positive assessment of the implementation and oversight of the common prerequisites. Additionally, an annual review process for making revisions to the common prerequisites was created (Office of Program Policy Analysis & Government Accountability, 2010). A flowchart of the review process is presented in Appendix B. Universities and colleges may submit requests for revisions to common prerequisites which are then reviewed by discipline specific faculty committees. The revisions are then forwarded to an Oversight Committee who in turn forwards the revisions to

the Articulation Coordinating Committee for final approval. The composition of the current Articulation Coordinating Committee includes representation from the State University System, the Florida College System, public K-12 education, career and technical education, non-public education, and students (see Appendix C). Once revisions are approved, appropriate changes are then made to the state's official source of information regarding common prerequisites, the *Common Prerequisite Manual*, and universities and colleges update their catalogs accordingly.

Academic Performance as a Measure of Student Success

Student success within higher education may be defined in numerous ways; however, the more common measures of student success include: grades, persistence to the sophomore year, length of time to degree completion, and graduation. More inclusive measures of student success may also include aspects more difficult to measure such as student satisfaction and acquisition of desired knowledge, as well as post-college employment and income performance (Kuh, Kinzie, Buckley, and Hayek, 2006). The work of one of the most prominent scholars in the field, Tinto's Student Integration Model (1993) has driven much research in the area of student retention with a specific focus on strategies to better integrate students into both the social and academic communities of the college campus. Tinto's model is based upon the assertion that increased integration will deepen student commitment, which in turn will increase the likelihood of student retention. Astin's research (1993) identified environmental factors impacting student satisfaction, such as institutional characteristics, residential status, academic major, and involvement with faculty and peers, as he contended that satisfaction influenced student retention. A more recent study by Kuh, Kinzie, Schuh, and Whitt (2005), *Documenting Effective Educational Practice*, presents best practices for student success that were gathered from twenty strong-performing colleges and universities. In this study, higher than predicted

graduation rates and better than predicted National Survey of Student Engagement (NSSE) scores were used as measures of student success. Consistent with Kuh's previous research interests, this study focused on institutional characteristics and organizational culture as the primary factors influencing student retention.

Although there are numerous ways to define student success, for purposes of this study, the definition of student success was limited in scope to a purely academic focus. Student success was defined as students who complete their baccalaureate business degree and/or students who are in good academic standing and remain in progress to complete their baccalaureate business degree. Both of the criteria used to define student success in this study, degree completion and being in good academic standing, are contingent upon a student's grade point average. Successful completion of a bachelor's degree in business within the Florida State University System requires: (1) a minimum institutional GPA of 2.0, (2) a minimum major GPA of 2.0, and (3) a minimum college of business GPA of 2.0. Therefore, students were classified as in good academic standing when all three of the aforementioned GPAs were 2.0 or higher.

Although grade point average is a commonly used measure; it is an imperfect measure as it is influenced by a multitude of factors (Jackson, 1992; Pascarella & Terenzini, 2005; Pharr & Lawrence, 2007). Some of the most well-established factors influencing academic performance include a student's level of motivation and maturity, time allocated to academic studies, and level of academic rigor. These factors are beyond the scope of this study and will not be measured. Academic rigor, one of the most notable factors swaying grade point average, is itself subjectively determined, and may vary greatly among sectors within higher education, institutions, programs of study, and even faculty. As Roueche (2002) notes, more students than ever before have expectations of attending college and receiving high grades, however many of

these students are unaware of the preparation and commitment required to earn high grades. These naive expectations combined with higher education's focus on increased access, and the various economic, cultural, and political forces that are exerted on higher education, create an environment where maintaining academic rigor is increasingly difficult. Academic rigor is often delineated by 'level of thinking', as defined by Bloom's taxonomy, with greater rigor being associated with critical thinking skills and application of concepts, and conversely, content knowledge acquisition and recall associated with less rigor (Zais, 1976). As of late, institutions of higher learning have taken a very public hit on the front of academic rigor. The findings in Arum and Roksa's (2011) *Academically Adrift: Limited Learning on College Campuses* present a scathing review of student learning asserting that due to a lack of academic rigor, approximately 45% of students in higher education do not improve their critical thinking skills in their first two years of college.

Acknowledging that grade point average is a limited measure of learning and student success, it is still however, a minimum requirement that must be met for graduation, and therefore a standard benchmark used for awarding degrees in higher education. The fact that degree completion is ultimately contingent upon grade point average is inescapable. Furthermore, based upon decades of research within higher education, Pascarella and Terenzini consider grade point average the "lingua franca of the academic world, the keys to ... program and degree completion ... and to employment opportunities" (Pascarella & Terenzini, 2005, p. 396). Students whose first year GPA is in the top two quintiles are two to three times more likely to graduate than students whose GPA is in the bottom three quintiles. Additionally, emphasizing the importance of grade point average, Pascarella and Terenzini go as far as

asserting that grade point average “may very well be the single best predictor of ... degree completion” (Pascarella & Terenzini, 2005, p. 396).

High school GPA is commonly used as university admission criteria due to its correlation with first year college GPA. In a similar vein, collegiate GPA, along with successful completion of common prerequisites, is used as admission criteria to upper division programs. These admission standards, whether they be at the university or discipline specific level, are screening mechanisms designed to select applicants who are most likely to be successful in terms of degree completion (Cabrera & Burkum, 2001). Again, it is important to note that grade point average is not a perfect measure of student learning, nor a perfect measure of academic rigor. Pascarella and Terenzini, describe GPA as more of a reflection of “a student’s performance relative to other students” and not necessarily an accurate measure of learning (Pascarella & Terenzini, 2005, p. 396). Nonetheless, GPA is considered to be one of the best, if not the best, predictors of degree completion and a commonly accepted measure of student knowledge (Pascarella & Terenzini, 2005). Therefore, for this study, student success was contingent upon GPA.

The Origins of Prerequisites

The origins of course prerequisites can be found in the all-encompassing field of study of curriculum, and more specifically curriculum design or curriculum organization. Although the value of curriculum has been contemplated for centuries by philosophers and educators, curriculum as a specialized field of study in the United States did not exist until the 20th century (Jackson, 1992; Pratt, 1980). Modern curriculum theory has its roots in the work of Johann Friedrich Herbart, a German philosopher whose educational teachings took hold in America during the latter half of the 19th century. Herbart’s educational theories emphasized that effective teaching “required systematic attention be given to the selection and organization of

subject matter” (Zais, 1976, p. 4). It was not however until 1918 that the first book devoted specifically to the topic of curriculum, Franklin Bobbitt’s *The Curriculum*, was published. This seminal work marks the birth of curriculum as its own dedicated field of study. Later during the 1930s, state departments of education and institutions of higher education began to acknowledge curriculum as a legitimate field of study, and in 1937 Columbia University established its Department of Curriculum and Teaching (Jackson, 1992; Pratt, 1980, Zais, 1976).

Interestingly, the Latin root meaning for the word “curriculum” is “racecourse.” This points to the conception that many students have – that the curriculum is simply something that must be covered in “their race toward the finish line or a diploma” (Zais, 1976, p. 6). Although there is no universal agreement or one definition of curriculum, curriculum specialists today do more broadly define their field to include the entire range of student experiences rather than simply a listing of courses (Jackson, 1992). Within the study of curriculum, curriculum design or curriculum organization is the area most closely associated with the concept of prerequisites. Curriculum design deals with the “arrangement of the components or elements of a curriculum” and creates the ordering or sequencing of courses over time, answering the question of when, in relation to other courses, a specific course is to be taken (Zais, 1976, p. 16). This speaks directly to the conceptual framework of prior knowledge and the premise that a prerequisite course is designed to provide prior knowledge in efforts to enhance the likelihood of academic success in subsequent courses.

The Latin root meaning for “prerequisite” is comprised of two components: (1) “pre” or “prae” meaning before or in advance of, and (2) “requisite” or “requisitus” meaning required or necessary for a particular purpose. *Merriam-Webster Learner’s Dictionary* (2013) defines prerequisite as “something that you officially must have or do before you can have or do

something else.” This definition fits the application of a course prerequisite within higher education as the successful completion of a prerequisite course is required before the student may progress to the next course in the curriculum sequence or what is typically referred to as the target course. In theory, prerequisite courses are designed to identify knowledge that should be acquired prior to entering the target course, rather than knowledge to be obtained or achieved during the target course (Abou-Sayf & Miari, 2007; Choudhury et al., 2007; Pratt, 1980). Therefore, in the strictest sense, successful completion of a prerequisite course represents prior knowledge that is thought to be necessary for the successful completion of the next course in the curriculum sequence, the target course, or at a minimum, prior knowledge that will increase the student’s likelihood of success in the target course. In practice, the establishment of prerequisites may be based on enrollment management objectives and even faculty preferences, rather than pure academic principles. Additionally, prerequisites may become outdated if not frequently reevaluated (Abou-Sayf & Miari, 2007; Abou-Sayf, 2008).

Institutions of higher learning must not ignore their responsibility in establishing appropriate prerequisites, as needed. However, American society places great value on equality of opportunity and therefore educational decisions that may present a barrier or exclude certain students require sound justification (Pratt, 1980). Ragas (2013) refers to prerequisites as ‘roadblocks’ implying that they allow or prevent access and as such may be considered a type of barrier to admission into upper-division programs. Even with statistical justification of prerequisite requirements, caution should be exercised in their utilization as correlation does not indicate causality (Abou-Sayf & Miari, 2007). It is important that all prerequisites are carefully scrutinized prior to their initial implementation and thereafter reviewed or updated as needed (Bruning, 2007; Pratt, 1980).

The Predictive Power of Prerequisites

Given that a prerequisite course is to provide knowledge that should be acquired prior to entering the target course, an obvious question is: “does the successful completion of a prerequisite course increase the likelihood of academic success in the target course?” Simply put, do the benefits justify the costs? Looking to the literature (Brown-Hendershott, 2008; Choudhury et al., 2007; Coley, 1973; Danko, Duke, & Franz, 1992; Donovan & Wheland, 2009; Easter, 2010; Huang, O’Shaughnessy, & Wagner, 2005; McCall, Allen, & Fike, 2006; Pharr & Lawrence, 2007; Pharr, Bailey, & Dangerfield, 1993; Plutsky & Wilson, 2000; Potolsky, Cohen, & Saylor, 2003; Truell & Woosley, 2008; Von Allmen, 1996; Yang & Raehsler, 2007), there are numerous studies from varied academic disciplines that do in fact demonstrate successful completion of a prerequisite course increases the probability of academic success in the target course and therefore provide supporting evidence for the implementation of course prerequisites. Several scholars have found the academic performance of prerequisites to be statistically significant to academic performance in Chemistry I and Chemistry II. Using stepwise regression, Coley (1973) found academic performance in Chemistry 31, the prerequisite course for Chemistry 1A, to be a statistically significant predictor of academic performance in Chemistry 1A. Of the five independent variables in Coley’s original model (prerequisite chemistry course grade, chemistry placement test score, ACT scores, high school chemistry grade, and high school algebra grade), the prerequisite chemistry course grade, Chemistry 31, was found to be the single best predictor accounting for approximately 18% of total variance in the final course grade of Chemistry 1A. Coley’s (1973) findings were that students who successfully completed the prerequisite course of Chemistry 31 with a grade of C or better had a 67% chance of receiving a final course grade of A or B in the target course, Chemistry 1A. This

is in comparison to students who did not successfully complete the prerequisite course and had only a 32% chance of earning an A or B grade in the target course (Coley, 1973). In addition to statistical significance, these findings indicate a practical significance of the prerequisite requirement in that students who successfully complete the prerequisite course are more likely to earn an A or B in the target course.

In a similar study, Easter (2010) found that out of nine statistically significant independent variables, the prerequisite grade of Chemistry 1 was the single best predictor of academic performance in Chemistry II. Adjusted R squared values for the nine predictor variables ranged from 1.8% to 18.3% with the prerequisite course grade of Chemistry I accounting for 18.3% of the variance in Chemistry II final course grades (Easter, 2010). These results reinforce Coley's (1973) findings and provide further evidence to support the enforcement of the Chemistry I prerequisite.

Based upon anecdotal evidence from students who had performed poorly in Chemistry I at an open enrollment institution, and data demonstrating a strong negative correlation between ACT mathematics scores of said students and withdrawal rates in Chemistry I, Donovan and Wheland (2009) conducted a study to determine the relationship between mathematical ability and academic performance in Chemistry I. Donovan and Wheland's (2009) correlational study compared academic performance and retention in Chemistry I prior to and after the implementation of a mathematics prerequisite. Results indicated that earning a prerequisite grade of an A or B was positively correlated with academic success in Chemistry I, while earning a prerequisite grade of C corresponded to virtually the same academic performance as not having taken the prerequisite course. Additionally, it was found that the withdrawal rate in Chemistry I was higher prior to the implementation of the prerequisite requirement, and that

students meeting the prerequisite requirement through the use of transferred credit were somewhat more likely to withdraw from Chemistry I. Findings of the study led to the conclusion that some screening of students, even at open enrollment institutions, “is justified if one is concerned with student success and retention” (Donovan & Wheland, 2009, p. 380). That both the institution where the prerequisite course was taken and the level of academic performance in the prerequisite course are correlated with academic performance and retention also has implications for admission decisions into upper-level programs.

Just as Donovan and Wheland’s study recommended requiring a prerequisite grade of B or higher, a study conducted by Potolsky, Cohen, and Saylor (2003) with first year nursing students also found that a grade of B or higher was necessary in order for the prerequisite course to have a statistically significant impact on the final grade of the target course. Potolsky, Cohen, and Saylor (2003) conducted a study with the purpose of determining the relationship between grade point average of prerequisite science courses and grade point average of first semester nursing students. This correlational study found a statistically significant relationship ($r = .77, p = .01$) between grade point average of the prerequisite science courses (anatomy, physiology, microbiology, organic chemistry, and inorganic chemistry) and first semester grade point average of 37 nursing students. Despite the small sample size, the results indicate a strong relationship between the prerequisite grade and the subsequent first semester grade point average. Recommendations were that to reduce attrition and improve academic performance, baccalaureate nursing programs should consider implementing as part of admission criteria, a required grade point average of B or higher for prerequisite science courses. Potolsky, Cohen, and Saylor’s final recommendation also stated that programs should consider “denying

admission to students who have failed and then repeated prerequisite science courses” (Potolsky, Cohen, & Saylor, 2003, p. 250).

In efforts to determine factors influencing academic success, McCall, Allen, and Fike (2006) conducted a correlational study with 424 students at the Texas Tech doctor of pharmacy degree program. Factors found to be significantly associated with a higher first year program GPA and cumulative program GPA were: pre-pharmacy GPA, completion of an advanced biology course, completion of an advanced chemistry course, and a Bachelor of Science degree. In addition, students who had taken an advanced biology course or earned a Bachelor of Science degree were significantly more likely to graduate on time (McCall, Allen, & Fike, 2006). As with Potolsky, Cohen, and Saylor (2003), the findings of McCall, Allen, and Fike’s (2006) study may be useful to admission committees in making informed decisions when selecting applicants most likely to be successful in completing a program. As it relates to the construct of prior knowledge, these studies are presented as evidence to support Evensky’s argument that “learning is a developmental, building process” and that “skills mastered in prior stages become tools for construction of new skills” (Evensky, 1997, p. 630).

Cautions when Interpreting Quantitative Findings

Abou-Sayf and Miari (2007) warn that quantitative studies validating the predictive power of prerequisites should be thoroughly evaluated and tempered with caution. This does not in any way dismiss the importance of these findings or the significance of the implications for policy and practice. It does however imply that a thorough and thoughtful interpretation of quantitative findings is prudent. First, results indicating a high correlation between prerequisite performance and target course performance may in part be a result of the “spuriousness of the relationship” (Abou-Sayf & Miari, 2007, p. 2). As stated by Abou-Sayf and Miari, “good

students tend to perform well on most courses while poor students tend to perform poorly on most courses” and this phenomenon may lead to inaccurate results (Abou-Sayf & Miari, 2007, p. 2). If good students tend to well in general on all their courses, the correlation between performance in a prerequisite course and performance in the target course may in part be attributed to this phenomenon and not necessarily due to the fact that the prerequisite course was successfully completed. A second reason for a cautious interpretation of quantitative findings is the “persistence factor” (Abou-Sayf & Miari, 2007, p. 2). Successfully completing the prerequisite course requires spending an additional term in school, and students who have successfully persisted and have not dropped out or been disqualified, are generally better students. Therefore, better performance in the target course may to a degree be a result of data being gathered from a better or more seasoned population of students. Conversely, in practice, it is not uncommon in some institutions for faculty to waive prerequisite requirements for students with an exceptionally strong academic history. This practice may render highly inaccurate results where students who completed the prerequisite course actually have lower performance in the target course (Abou-Sayf, 2008).

Another limitation associated with quantitative studies and further reason for a cautious interpretation of results is the possible human error that may occur with grading (Abou-Sayf, 2008). A common methodology employed in quantitative studies of prerequisites is to compare academic performance in the target course during a term when prerequisite requirements were enforced, with academic performance in the target course during a term when prerequisite requirements were waived. In studies where it may be concluded that there was no significant difference in academic performance in the target course between terms with prerequisites enforced and terms with prerequisites waived, Abou-Sayf (2008) warns that these findings may

simply be a result of grading practices or specifically grade inflation. Faculty often have a typical grade distribution and may unconsciously grade to the distribution or unknowingly compensate for weak performance leading to inaccurate results. Finally, it must be remembered that the results may indicate that there is a relationship or correlation between prerequisite performance and target course performance, but this does not prove causality and it may not be concluded that the successful completion of the prerequisite course caused the successful completion of the target course (Abou-Sayf, 2008; Abou-Sayf & Miari, 2007; Lomax, 2007; Pharr & Lawrence, 2007). In addition to a statistically significant correlation, establishing the plausibility of a causal relationship requires a “cogent argument, theoretical support, and collaborative research results” (Pharr & Lawrence, 2007, p. 167).

Business Prerequisites and Academic Performance in Upper-level Business Classes

The literature demonstrates that general university admission requirements are fairly effective in predicting collegiate academic performance, and that academic performance in a prerequisite course is correlated with academic performance in the target course. The next logical question becomes - are discipline specific admission criteria, such as Florida’s business common prerequisites, effective in predicting academic performance in upper-level business coursework? As no studies on the predictive ability of business common prerequisites were found, the literature was reviewed for studies addressing the relationship between business prerequisites and academic performance in target courses. In support of prerequisite and program specific criteria, Davis (2009), in a study with 301 undergraduate business students at Florida Atlantic University, found that the average GPA on two prerequisite classes, Calculus and Statistics, was positively correlated with academic success in an introductory business class, Quantitative Methods. In her recommendations, Davis (2009) emphasized the importance of

prior knowledge, as measured by overall college GPA and average prerequisite GPA of the two courses, and its significance in the advising and screening of students. These findings were later validated by D'Souza and Maheshwari (2010) whose quantitative study resulted in a multiple regression model for predicting academic performance in Quantitative Methods that included both current college GPA and the prerequisite grade for Pre-Calculus. D'Souza and Maheshwari's (2010) study took a comprehensive approach in that the original model included nine independent variables and considered a broad array of factors such as student demographics, course structure, instructional methods, student motivation, as well as traditional cognitive measures. The final model contained four variables, two of which were current college GPA and a prerequisite grade, and explained 51% of the variation in the dependent variable, the course grade in Quantitative Methods. If education professionals can be armed with information that may explain approximately one-half of the variation in grades for a specific course, this may be useful information in program planning and policy creation.

In addition to statistical significance, these findings have practical implications as Quantitative Methods, although a standard course found within the core business curriculum, is a challenging course with relatively high failure rates. Davis (2009) as well as D'Souza and Maheshwari's (2010) studies confirmed performance in Quantitative Methods to be very important as it is itself a prerequisite to more advanced business coursework, yet both studies stated a course failure rate of 30% or higher. It should be noted that D'Souza and Maheshwari (2010) originally evaluated three prerequisite courses, Pre-Calculus, Statistics, and Calculus, and concluded that only one prerequisite, Pre-Calculus, was statistically significant in terms of performance in the target course. This is pointed out to highlight that selection of appropriate

prerequisites is key, and it should not be assumed that simply imposing prerequisite requirements will solve performance problems in target courses.

Supporting this critical point, Baker (2008) examined the relationship between admission requirements for nursing programs and student success on the National Council Licensure Exam for Registered Nurses (NCLEX-RN) and found that there was not a statistically significant relationship between the number of prerequisite courses required for admission and NCLEX-RN pass rate. In her study, Baker (2008) collected data from ten public community colleges in the state of Arizona, all with similar curriculum but very different prerequisite admission requirements. Baker (2008) was unable to reject the null hypothesis that nursing programs with a greater number of prerequisite requirements will not have a higher pass rate on the licensing exam than nursing programs with fewer prerequisite requirements. This leads to the conclusion that emphasis must be placed on the selection of appropriate prerequisites that provide the foundational knowledge upon which the target course or courses will build, and that simply adding additional prerequisite requirements does not result in successful or improved academic performance (Baker, 2008; D'Souza & Maheshwari, 2010).

Whereas D'Souza and Maheshwari (2010) evaluated prerequisites for the target course of Quantitative Methods, research conducted by Rochelle and Dotterweich (2007) examined academic performance of students in the target course of Business Statistics and found prior academic performance in Quantitative Methods to be statistically significant. Rochelle and Dotterweich's research was conducted at a mid-sized regional state university with the purpose of developing a model to "predict academic success in Business Statistics" (Rochelle & Dotterweich, 2007, p. 20). The original model contained eight independent variables and a dependent variable of final grade point average in the Business Statistics course. Results

indicated three of the eight independent variables, the student's mean number of absences, the student's cumulative GPA, and the student's Quantitative Methods course grade, were highly related to the dependent variable as indicated by the following individual Pearson correlation coefficients: -0.547, 0.665, and 0.603 (Rochelle & Dotterweich, 2007).

Due to concerns of multicollinearity among the independent variables, partial correlation coefficients were also calculated to provide a more accurate picture of the relationship among the variables. Results of the partial correlation coefficients confirmed the same three independent variables to be highly related to the final course grade in Business Statistics; however, the partial correlation coefficients revealed the relative importance of each variable to be slightly different. Whereas the Pearson correlation coefficient produced results indicating that the student's cumulative GPA (0.665) was the strongest predictor with the prerequisite grade in Quantitative Methods (0.603) the second strongest predictor, results from the partial correlation coefficients indicated that the student's mean number of absences (-0.408) was the strongest predictor with the prerequisite grade of Quantitative Methods (0.393) a very close second (Rochelle & Dotterweich, 2007). Based upon these results, one of Rochelle and Dotterweich's (2007) recommendations was that efforts to strengthen students' foundational knowledge should be made by allocating resources such as tutoring and extended lab hours to the Quantitative Methods course in efforts to improve academic performance in Business Statistics. These results emphasize the important role that prior knowledge, as reflected in prerequisite course grade, may play in the construction of new knowledge and academic performance in a target course.

Although it may be intuitive that policy makers consider mathematical foundational knowledge to be beneficial for students entering a Business Statistics course, selection of the most appropriate prerequisite course is not always obvious. In a study conducted at a Mid-

Western university where students could choose among two prerequisite course options, Choudhury, Robinson, and Radhakrishnan (2007) evaluated academic performance in Business Statistics, as measured by final course grade, for three separate groups of students. The first group was native students who completed the prerequisite course of Data & Chance, the second group was native students who completed the prerequisite course of Finite Mathematics, and the third group was transfer students who completed the prerequisite course of Finite Mathematics. The Data & Chance course was thought to be the more appropriate prerequisite choice for Business Statistics as Data & Chance is itself an introductory statistics course. Despite this presumption, findings of the study revealed that for native students, those who completed the Finite Mathematics prerequisite earned a significantly higher grade in Business Statistics. Specifically, 22.15% of students who took Finite Mathematics earned a grade of A, compared with only 12.75% of students who took Data & Chance. These findings were not, however, found for students who transferred in the Finite Mathematics prerequisite, leading Choudhury et al., (2007) to conclude that further research was needed to determine the relationship between where the prerequisite is taken and subsequent performance in the target course. Nonetheless, Choudhury et al., stress the importance of selecting the most suitable prerequisite course as this “provides students with necessary background knowledge needed to succeed in the subsequent course” (Choudhury et al., 2007, p. 28). These results are highlighted as evidence that without empirical results, even assumptions of experts within the field may be flawed when it comes to selection of appropriate prerequisites.

Whereas Choudhury et al.(2007), and Rochelle and Dotterweich (2007) sought to determine the relationship between prerequisites and the target course of Business Statistics, Baard and Watts (2008) conducted a study seeking to determine if Business Statistics would be

an appropriate prerequisite for the target course of Principles of Finance. Beard and Watts (2008) conducted a four-year study with Finance and Accounting majors at an Australian public university. Findings of the study indicated that in each of the four years, students completing Business Statistics prior to taking Principles of Finance received a statistically significant higher grade in Principles of Finance. In each of the four years respectively, the mean grade in the Principles of Finance course for students who had completed the Business Statistics course was 59.2, 59.1, 44.6, and 62.4, as compared to the mean grade in the Principles of Finance course for students who had not completed Business Statistics: 31.2, 27.9, 15.8, and 49.2 ($p = .000$ in each of the four years). As a key prerequisite for Finance and Accounting majors, administrators were concerned with student performance in the Principles of Finance course. Rising enrollments were accompanied by increasing course failure rates. Results of the study led to the recommendation that in order to improve resource allocation and provide “students with the minimum level of understanding required to undertake advanced subjects,” administrators should consider requiring Business Statistics as a prerequisite to Principles of Finance (Beard & Watts, 2008, p. 9). Furthermore, Beard and Watts (2008) stated that implementation of Business Statistics as a prerequisite may decrease student risk of failing Principles of Finance and therefore decrease the necessity of Finance and Accounting majors repeating the course.

The findings of a similar study conducted by Blaylock and Lacewell (2008) confirm Beard and Watts’ (2008) results, demonstrating that performance in mathematical prerequisite coursework is predictive of performance in the Principles of Finance course. Through regression analysis, Blaylock and Lacewell (2008) found three predictor variables to significantly contribute to academic performance in Principles of Finance. Accounting for approximately 43% of the variance (adjusted $R^2 = .4276$) in the Principles of Finance course grade, statistically significant

variables were: the number of prior math classes successfully completed (at the level of College Algebra or higher), the age of a student's last accounting class (length of time elapsed since completing the prerequisite accounting class), and the prerequisite Statistics grade. As expected, both the number of prior math classes successfully completed and the prerequisite Statistics grade were positively correlated with the final course grade in Principles of Finance; however, unexpectedly the age of a student's last accounting class was also positively correlated. Blaylock and Lacewell's (2008) interpretation of these findings was that it was possible that students entering the program with higher math aptitude would voluntarily chose to complete the accounting courses earlier in their academic career, and therefore the length of time elapsed since completing the course would be greater for those students.

Reinforcing the argument that adequate quantitative foundational knowledge improves the likelihood of success in business coursework, research (Von Allmen, 1996; Yang & Raehsler, 2007) demonstrates that mathematical ability, as measured by the course grade in Calculus and Pre-calculus, is positively correlated with academic success in Intermediate Microeconomics. Von Allmen (1996) found both academic performance in Calculus and Introductory Microeconomics to be statistically significant, at the .05 level, to the final course grade in Intermediate Microeconomics. Von Allmen's (1996) final model correctly predicted 29.3% of the final course grades in Intermediate Microeconomics and correctly predicted 95.9% of the final course grades within one full letter grade of the actual grade. Yang and Raehsler (2007) built upon Von Allmen's work and conducted an ordered-probit model using 488 business students enrolled in Intermediate Microeconomics at Clarion University, a public university located in western Pennsylvania. Findings of the study indicate that the combined GPA of two math classes (Pre-calculus and Calculus) and the grade earned in Introductory

Microeconomics to both be statistically significant predictors ($p = .000$) of academic performance in Intermediate Microeconomics, while the cumulative overall GPA to only be marginally significant ($p = .205$). These results support the argument that adequate mathematical foundational knowledge improves student likelihood of success in Intermediate Microeconomics and that the course sequencing, Introductory Microeconomics as a prerequisite to Intermediate Microeconomics, is beneficial in terms of developmental learning.

As enrollment in business programs continues to grow and administrators are simultaneously faced with increasingly limited resources, using screening mechanisms or procedures to limit enrollment to those students most likely to be successful in a course or program is not uncommon. Research conducted at San Francisco State University focused on the need for screening mechanisms into accounting programs and presents useful information for institutions facing rapidly growing enrollment and the need to effectively allocate scarce resources (Danko, Duke, & Franz, 1992; Huang, O'Shaughnessy, & Wagner, 2005). The goal of Danko, Duke, and Franz's (1992) study was to create a model that would predict academic success in Intermediate Accounting while also minimizing the error of excluding students who may possibly be successful. Although the prerequisite course of Financial Accounting was one of the original predictor variables, using multiple regression analysis, the final model explaining the greatest amount of variance (approximately 42%) contained only two predictor variables, overall GPA, and an accounting diagnostic examination score. Success was defined as earning an Intermediate Accounting course grade of C or better, resulting in one of two dichotomous groups: those earning a C or higher, and those earning below a C. Findings of discriminant analysis predicted, with an accuracy of approximately 70%, that students with an overall GPA of 2.7 or higher, or students earning a diagnostic examination score of 55% or higher would be

successful. If the model had been used as a screening mechanism, it would have excluded 50% or more of the students who did not pass the course with a C or higher. Representing the students who would have been incorrectly found to be unsuccessful and therefore wrongly excluded from admission into the course, the Type I error was 14.3% (Danko et al., 1992). In terms of ease of policy implementation, an appealing feature of this model is that it provided two screening criteria, however only one of the two need be met. In practice, the diagnostic examination would only need to be administered for students seeking to enroll in Intermediate Accounting with an overall GPA below 2.7.

A second study by Huang, O'Shaughnessy, and Wagner (2005) conducted at the same institution, San Francisco State University, also concluded that there was a statistically significant relationship between the accounting diagnostic examination score and academic performance in Intermediate Accounting. However, unlike the study conducted by Danko et al., Huang et al., found the prerequisite (Accounting Cycle) grade to also be statistically significant ($p = .001$) and concluded that both the diagnostic examination score and prerequisite grade were predictors of the final course grade in Intermediate Accounting (Huang, O'Shaughnessy, & Wagner, 2005). The prerequisite course, Accounting Cycle, was a newly created course that replaced the previous prerequisites, Financial Accounting and Managerial Accounting. These changes were put in place due to a curriculum change impacting the learning objectives of the original two prerequisite courses. Even more revealing were results indicating that when the new prerequisite course, Accounting Cycle, was taken at San Francisco State University, a passing grade was a better predictor of performance in Intermediate Accounting than a passing grade in both of the previous prerequisite courses (Financial Accounting and Managerial Accounting) when the prerequisites were taken at a community college (Huang et al., 2005).

These findings demonstrate that curriculum changes necessitate the review of established prerequisites (Pratt, 1980; Zias, 1976). Additionally, as in the study conducted by Choudhury et al. (2007), the institution where the prerequisite course is taken may be relevant in terms of academic performance in the target course.

Business Prerequisites and Program Success

Although there is an abundance of literature evaluating the relationship between academic performance in a prerequisite course and academic performance in the subsequent target course, no studies were found on the relationship between Florida's business common prerequisites and the subsequent academic performance in upper level business coursework. Intuitively it would seem that as the common prerequisites are used as admission criteria for programs of study within business, the underlying assumption is that these courses provide foundational knowledge that should increase the likelihood of academic success in said program. Therefore, it logically follows that performance in the common prerequisites should have some predictive value as it relates to student performance in the program or program success. However, as noted by Truell and Woosley (2008), research on the relationship between admission criteria and student success for the undergraduate population has almost exclusively focused at the institutional level and largely overlooked discipline specific criteria and its relationship with student success. Just as institutional admission criteria are designed to differentiate among large pools of applicants and select those most likely to be successful in collegiate coursework, discipline specific admission criteria are created to select applicants most likely to be successful in a specific program. The goal is to maximize student success and minimize student failure (Office of Program Policy Analysis & Government Accountability, 2008; Pharr & Lawrence, 2007; Pharr et al., 1993; Truell & Woosley, 2008). According to Pharr

et al., policy makers have a “responsibility to counsel students out of programs for which they have a high probability of failure and into programs for which they demonstrate interest and aptitude” (Phar et al., 1993, p. 3).

While there were no studies on Florida’s business common prerequisites and program success, similar research evaluating the predictive ability of business admission requirements was conducted by Truell and Woosley (2008) using the records of 284 business students at a large, public Midwestern university. Logistic regression was used as the purpose of the study was to determine if the selected independent variables, the GPA of each of the foundational courses required for admission into the program as well as other variables of interest such as ACT or SAT scores, could be used to predict if admitted students would actually complete or graduate from their respective programs. Findings of the study demonstrate that all of the required prerequisites (Accounting prerequisite GPA, Economics prerequisite GPA, Computer prerequisite GPA, and Statistics prerequisite GPA) were statistically significant at the .05 level. The variable most influential in predicting program completion ($p = .001$ and $B = .8$) was the Statistics prerequisite GPA with the final model indicating that a higher grade in the prerequisite course was associated with a greater likelihood of program completion (Truell & Woosley, 2008). Other researchers (Baard & Watts, 2008; Blaylock & Lacewell, 2008; Davis, 2009) found a statistically significant relationship between performance in Statistics and a specific target course such as Quantitative Methods or Principles of Finance. Truell and Woosley’s (2008) study, however, differs in that the relationship is not between the prerequisite course of Statistics and performance in a target course, but rather between the prerequisite and program completion.

In a somewhat similar vein, research using the records of 455 business students was conducted by Pharr and Lawrence with the stated purpose to “examine the efficacy of admission requirements as predictors of academic success in core business coursework;” therefore the dependent variable in this study was the business core GPA, which is a significant component of the business program (Pharr & Lawrence, 2007, p. 162). The admission requirements or independent variables were the following five prerequisite courses: Financial Accounting, Managerial Accounting, Principles of Economics I, Principles of Economics II, and Statistics. The course content of these prerequisites was considered to provide the “foundational material underlying the design of subsequent business coursework” and that “mastery of this foundational material ... is necessary for success in upper level coursework” (Pharr & Lawrence, 2007, p. 166).

Additionally, Pharr and Lawrence (2007) sought to determine if the admission requirements were equally effective predictors of academic success in the business core for two subpopulations of students. The first subpopulation was students who completed all prerequisite coursework at the degree-granting institution or native students, and the second subpopulation was students who transferred in the prerequisite coursework or transfer students. The impetus driving the reevaluation of the admission requirements was a significant change in the business core curriculum that was to be implemented over the following five year period. Based upon the literature (Abou-Sayf, 2008; Abou-Sayf & Miari, 2007; Ausubel, 1968; Bruning, 2007; Jackson, 1992; Pratt, 1980; Zais, 1976), a reevaluation of prerequisites and/or admission requirements is warranted when implementing such curriculum changes, as it is logical that changes made to the content of the core curriculum, may in turn necessitate changes in the foundational material. Regression analyses were used to create two separate models: one with the dependent variable

being the traditional business core GPA and the second with the dependent variable being the new business core GPA. Findings of the study indicate that the correlation between prerequisite GPA and the traditional business core GPA, for both transfer and native students to be relatively similar (adjusted $R^2 = .48$ and adjusted $R^2 = .52$, respectively). However, after implementing the new business core, the correlation between the original prerequisite GPA and the new business core GPA was significantly lower for transfer students, adjusted $R^2 = .26$, as compared to native students, adjusted $R^2 = .56$ (Pharr & Lawrence, 2007). These results revealed that with the implementation of the new business core, the correlation between the prerequisites and subsequent performance in the core slightly improved for native students (adjusted $R^2 = .52$ and increased to adjusted $R^2 = .56$), while the opposite was found to be true for transfer students (adjusted $R^2 = .48$ and decreased to adjusted $R^2 = .26$). An important differentiating factor associated with the work of Pharr and Lawrence (2007) is that their study calls into question the basic assumption that a 'one size fits all' approach for admission requirements is appropriate. In fact, these findings led Pharr and Lawrence (2007) to recommend two different admission policies be implemented based upon the student's status as either a native or transfer student, as it was concluded that the institution where the student completed the prerequisite coursework was significant in terms of performance in the revised business core.

The prerequisite courses used in the work of Pharr and Lawrence (2007) are five of the seven courses contained within Florida's state-mandated business common prerequisites, and thus make the work of Pharr and Lawrence (2007) the most comparable to this study. Building upon the work of Pharr and Lawrence (2007), this study also considered the predictive ability of two additional courses which are part of Florida's state-mandated business common prerequisites: Computer Fundamentals for Business and Concepts of Calculus. Additionally, this

study differed in that rather than using the business core as the dependent variable, this study used the College of Business GPA which included both performance in the business core and coursework in the major. Furthermore, in addition to evaluating the subpopulations of native and transfer students, this study also sought to determine if the common prerequisites were equally effective predictors of academic performance in upper-level business coursework for the student subpopulations representing five different programs of study within business (Accounting, Finance, General Business, Management, and Marketing).

Summary

Prerequisites are designed to identify knowledge that should be acquired prior to entering the target course, rather than knowledge to be obtained or achieved during the target course (Abou-Sayf & Miari, 2007; Choudhury et al., 2007; Pratt, 1980). In a similar fashion, business common prerequisites are intended to identify foundational knowledge that business students should acquire prior to entering a business program of study. Applying Evensky's (1997) analogy, business common prerequisites are the 'tool kit' that business students should bring to their program of study. Ideally, this 'tool kit' is designed to include foundational knowledge that will increase the student's likelihood of successful program completion. This is based upon the underlying assumption that learning is a developmental or building process, and that skills learned in one stage or level become tools used in the construction of new skills in a subsequent stage or level (Choudhury et al, 2007; Fischer, 1980; Kirschner, 2002; Yang & Raehsler, 2007). Although as a whole the literature (Abou-Sayf, 2008; Baard & Watts, 2008; Biggers, 2006; Choudhury, Robinson, & Radhakrishnan, 2007; Coley, 1973; Danko, Duke, & Franz, 1992; Davis, 2009; Donovan & Wheland, 2009; D'Souza & Maheshwari, 2010; Huang, O'Shaughnessay, & Wagner, 2005; Von Allmen, 1996) focuses on course prerequisites rather

than common prerequisites, the preponderance of evidence presents a strong argument that academic performance in a prerequisite course is positively and moderately related to academic performance in the subsequent target course. It seems logical that a similar relationship would exist between academic performance in the business common prerequisites and academic performance in business programs of study. The limited literature (Pharr & Lawrence, 2007; Pharr et al., 1993; Truell & Woosley, 2008) available on business prerequisites and program success does in deed confirm that the relationship is positive in direction, and moderate in strength.

CHAPTER THREE: METHODOLOGY

Introduction

Students seeking admission into an upper-level business program must successfully complete, as defined by the receiving institution, the common prerequisite courses (ACG X021, ACG X071, ECO X013, ECO X023, CGS X100, MAC X233, and STA X023) prior to formal admission into the program. At the most basic level, this study sought to determine how effective these admission criteria are at selecting students who will be academically successful in upper-level business classes.

This study examined the relationship between academic performance in the business common prerequisites and the subsequent academic performance in upper-level business classes, as measured by GPA. In this manner, GPA was used to evaluate academic performance with a higher GPA indicating stronger academic performance. All attempts of each course within the common prerequisites, as well as all attempts of upper-level business coursework, were included in the respective calculations of GPA. Calculation of the upper-level business GPA will serve as the only exception, in that per university policy at UCF, grade forgiveness may be exercised a maximum of two times per individual student. All attempts, without the use of any grade forgiveness, were used in the calculation of the common prerequisites GPA. All attempts of the common prerequisites were used as it is not uncommon for transfer students to enter the university with multiple attempts for one individual common prerequisite course. This is a result of the Florida State College system allowing unlimited attempts of grade forgiveness. Data were collected on the total number of repeat attempts needed, per student, to successfully pass, with a grade of C or higher, the common prerequisite coursework.

An additional area of interest was determining whether the common prerequisites are equally effective at predicting academic performance across different student populations. Student populations of interest included native and transfer students as well as the different business majors. The business major populations studied were: Accounting, Finance, General Business, Management, and Marketing. This line of questioning is based upon the literature (D'Souza & Maheshwari, 2010; Pharr & Lawrence, 2007; Truell & Woosley, 2008) which supports the contention that possible differences may exist in the predictive ability of admissions criteria for native and transfer students, and that the quantitative nature of business common prerequisites may be a more accurate predictor for the majors within business that are more quantitative in nature, such as Accounting and Finance majors.

Population and Setting

The population of interest for the study was business students at the University of Central Florida. The University of Central Florida, located in Orlando, Florida, is the nation's second-largest university and the largest of the eleven institutions within the State University System. The University is comprised of twelve colleges offering degrees at the undergraduate, graduate and doctoral level. As of Fall 2012, University enrollment was 59,767 students, with 8,682 of those students within the College of Business Administration (CBA).

The University's enrollment is comprised of a diverse group of students with the following student profile: 61% White, 18% Hispanic/Latino, 10% Black/African American, 5% Asian, 1.5% Multi-racial, 2% Non-resident Alien, 2% Not Specified, and 0.5% other. The profile of incoming freshman for the Fall 2012 term presented an average combined Math and Critical Reading SAT score of 1244 and an average high school GPA of 3.91. In the 2011-2012 academic year, the University enrolled 6,471 freshman and 11,014 transfer students. The

University's large transfer population is generated through the DirectConnect to UCF program which guarantees access to the University for graduates from four partner institutions: Valencia College, Seminole State College, Lake-Sumter State College and Eastern Florida State College. With enrollment of 8,682 students, the CBA is the University's third-largest college, conferring a total of 881 undergraduate degrees in the spring of 2013. The CBA is accredited by the Association to Advance Collegiate Schools of Business (AACSB) and is the third-largest AACSB accredited college of business in the world (University of Central Florida website, n.d.).

Data Collection Plan and Analysis

The purpose of this study was to determine whether a relationship exists between academic performance in the business common prerequisites and the subsequent academic performance in upper-level business coursework, as measured by the cumulative CBA GPA. The study looked at existing data to calculate the common prerequisite GPA as of Fall 2010 for a sample size of 860 students and the subsequent cumulative CBA GPA at the end of Spring 2013 for said sample. Spring 2013 was chosen as the date to calculate the CBA GPA as this is equivalent to a six-year time-to-degree completion.

At the conclusion of the Spring 2013 term, all students from the Fall 2010 term sample, both those currently enrolled and those not currently enrolled, were included in the analysis. Students who were not currently enrolled included: (1) students who were not currently enrolled as a result of degree completion, (2) students who were not currently enrolled as a result of voluntary discontinuation, and (3) students who were not currently enrolled as a result of non-voluntary academic disqualification. For students who were not currently enrolled, the cumulative CBA GPA at the last term of enrollment was used.

Purposeful sampling was used for the study. Existing student databases were used to search for student enrollment records within the University of Central Florida's CBA for the Fall 2010 semester. From this database, students were then filtered to select students "newly admitted" in the Fall 2010 term to the CBA and enrolling in their first upper-level business class(es). As of Fall 2010, these newly admitted business students would have had a minimum of approximately 60 credit hours completed. As part of the admission requirements to the CBA, all common prerequisite courses should be completed or in progress for the sample students. Therefore, students who were included in the analysis would have previously completed all common prerequisites or be in the process of completing all common prerequisites, and in the fall of 2010, were starting the process of completing the additional 60 credit hours of upper-level coursework required for completion of a Bachelor of Science in Business Administration.

Research Question 1

Do students who perform better in the business common prerequisites subsequently perform better in upper-level business coursework?

In answering Research Question 1, a quantitative study was conducted to first determine the correlation between academic performance in each of the individual courses within the common prerequisites (measured by final course grade) and academic performance in upper-level business coursework (measured by the cumulative CBA GPA). In order to determine the direction and strength of the relationship between academic performance in each individual common prerequisite course and academic performance in upper-level business coursework, the Pearson product-moment correlation coefficient was calculated. Scatterplots were also created to provide a visual representation of the relationship between each of the two variables, and to verify the linearity assumption associated with the Pearson.

Multiple linear regression to create a model predicting the cumulative CBA GPA was then conducted. The model contained two independent variables: (1) CPP GPA, representing the GPA for common prerequisite coursework as a whole, and (2) Repeat Flag, a binary variable representing the number of repeat attempts (0 for no repeat attempts and 1 for one or more repeat attempts) that were taken to earn a C or higher on the common prerequisite coursework. The assumptions associated with multiple linear regression analysis of independence, homogeneity, normality, linearity, and noncollinearity were each tested. The coefficient of determination was used as a measure of effect size and interpreted according to the standards established by Cohen, where $R^2 = .01$ represents a small effect, $R^2 = .09$ represents a medium effect, and $R^2 = .25$ represents a large effect (Lomax, 2007). As both Research Questions 2 and 3 also used multiple linear regression analysis, the above stated assumptions and measure of effect size also applies to these questions as well.

Research Question 2

Is the business common prerequisite grade point average an equally effective predictor of performance in upper-level business coursework for both native and transfer students?

Multiple linear regression was also used in answering Research Question 2. However, Research Question 2 differed in that it used the GPA earned on each of the individual prerequisite courses as the independent variables, rather than the GPA earned on the common prerequisite coursework as a whole as in Research Question 1. This provided individual regression coefficients for each prerequisite course and established the relationship between each course and the cumulative CBA GPA. Two separate models were created, each using a specific subset of the sample, to predict the dependent variable of cumulative CBA GPA. The first model used the subset of native students, while the second model used the subset of transfer students.

Results were then interpreted, based upon R^2 values, to determine if the two prediction models were equally effective at predicting academic performance in upper-level business coursework.

Research Question 3

Is the business common prerequisite grade point average an equally effective predictor of performance in upper-level business coursework for each of the business majors?

Analysis for Research Question 3 closely mirrored that of Research Question 2; both questions attempted to predict academic performance in upper-level business coursework using the GPA earned on each of the individual prerequisite courses and hence utilized multiple linear regression. However, the student population of interest in Research Question 3 was the student's chosen business major, which served as the differentiating factor from the analysis of Research Question 2. As with Research Question 2, separate models were created using subsets of the sample and each model provided individual regression coefficients for each prerequisite course. In this case, there were five separate models, one for each of the business majors being studied (Accounting, Finance, General Business, Management, and Marketing). Results were then interpreted, based upon R^2 values, to determine if the five prediction models were equally effective at predicting academic performance in upper-level business coursework for each of the business majors.

Table 2

Summary of Relationship between Research Questions, Variables, and Database

Research Question 1: Do students who perform better in the business common prerequisites subsequently perform better in upper-level business coursework?

- **Independent Variables:** Prerequisite GPA (for each of the individual prerequisite courses), Common Prerequisite GPA, and a binary variable for number of repeat attempts (0 = zero repeat attempts and 1 = one or more repeat attempts)
 - **Dependent Variable:** Cumulative CBA GPA
-

Research Question 2: Is the business common prerequisite grade point average an equally effective predictor of performance in upper-level business coursework for both native and transfer students?

- Two Separate Models (using subsets of Native and Transfer Students)
 - **Independent Variables:** Prerequisite GPA (for each of the individual prerequisite courses)
 - **Dependent Variable:** Cumulative CBA GPA
-

Research Question 3: Is the business common prerequisite grade point average an equally effective predictor of performance in upper-level business coursework for each of the business majors?

- Five Separate Models (using subsets of student major)
 - **Independent Variables:** Prerequisite GPA (for each of the individual prerequisite courses)
 - **Dependent Variables:** Cumulative CBA GPA
-

Authority to Conduct Study

Prior to beginning data collection, the researcher completed the appropriate process as identified by the Institutional Review Board (IRB) at UCF. The study required the use of a dataset created from existing student records and did not involve any direct contact with human subjects. All regulations under the Federal Educational Rights and Privacy Act (FERPA) to protect confidentiality and security of student records were followed.

Originality Report

In order to ensure originality of work, the UCF College of Graduate Studies requires each student completing a dissertation or thesis to submit their manuscript to Turnitin, a software program used to detect plagiarism. Therefore, as required, the manuscript will be uploaded to Turnitin for review. An acceptable score, as defined by the researcher's graduate advisor, will be between 0 and 10%.

Summary

Although all students within the Florida State University System are required to successfully complete the common prerequisites prior to formal admission into a business program, little research has been conducted to determine the relationship between academic performance in these seven courses and the subsequent academic performance in the program. If in fact these seven courses provide the foundational knowledge needed to be successful in a business program, or at the very least increase the likelihood of program success, then the data should indicate that these research variables are positively correlated.

Additionally, using academic performance in the common prerequisite as the independent variables in multiple linear regression analysis, academic performance in upper-level classes and the likelihood of program completion could be predicted. This information would provide administrators with input that may potentially be used to establish additional program admission requirements, such as a minimum common prerequisites GPA, in efforts to admit only students most likely to complete the program, therefore increasing student graduation outcomes. Acceptable levels of type I and type II errors, as determined by the institution, could then be established to maximize student success and minimize student failure while working within the

guidelines of the institution's enrollment management goals. If, however, the findings do not indicate that academic performance in the common prerequisites is reflective of academic performance in the program, then the obvious question is: "what is the benefit of imposing these prerequisite requirements and does this benefit outweigh the costs?"

CHAPTER FOUR: DATA ANALYSIS AND FINDINGS

Introduction

This study examined the relationship between academic performance in the business common prerequisites and the subsequent academic performance in upper-level business classes, as measured by GPA. The study sought to determine if performance in state-mandated prerequisite coursework was predictive of performance in upper-level coursework in B.S.B.A. programs at the UCF. The first section of this chapter presents descriptive statistics on the study variables and is followed by the findings for each of the three research questions. The chapter then concludes with a brief summary of these findings.

Descriptive Statistics

The sample for this study was 860 business students at the UCF. The College of Business Administration (CBA) at the UCF is a restricted access college in that UCF students seeking admission into the college must meet minimum college admission criteria prior to formally declaring a business major and receiving admission into the college. Part of these admission criteria includes successful completion of the General Education Program (GEP) and the business common prerequisites. All 860 students in the sample had completed these admission criteria upon entering the CBA in the Fall term of 2010 or were in process to complete these admission criteria by the end of the Fall 2010 term. Therefore, these students were classified by the college as ‘newly admitted’ students in the Fall of 2010, and the Spring 2013 term would equate to a six-year time to degree completion for this cohort of students.

The sample was comprised of 267 native students, students who entered UCF as freshman, and 593 transfer students, students coming to UCF from another institution. The large number of students entering the college as transfer students is a result of UCF’s DirectConnect

program. DirectConnect guarantees university admission to students with an Associates of Arts degree from four partner institutions (Valencia College, Seminole State College, Lake-Sumter College, and Florida Eastern College). All students in the sample were declared in a Bachelor of Science in Business Administration (B.S.B.A.) program and majored in the following areas: 252 Accounting majors, 190 Finance majors, 113 General Business majors, 140 Management majors, and 165 Marketing majors. For the sample as a whole, the mean GPA in the business common prerequisites, CPP GPA, was 3.03 ($SD = .56$), and the mean cumulative CBA GPA was 2.80 ($SD = .68$). The cumulative CBA GPA was taken at the conclusion of the Spring 2013 term, the end point of the study. Both students enrolled as of Spring 2013 and those not enrolled as of Spring 2013 were included in the study. For students that were not enrolled, the cumulative CBA GPA at the last term of enrollment was used. Students not enrolled at the conclusion of the Spring 2013 term included those who had graduated with their B.S.B.A. degree (approximately 70% of the sample), and those who had voluntarily discontinued and/or were non-voluntarily academically disqualified.

Research Question 1

To address Research Question 1 regarding the relationship between academic performance in the business common prerequisites and the subsequent academic performance in upper-level business coursework, correlation and multiple regression analyses were conducted. The course grade in each prerequisite class and the cumulative CBA GPA were used as measures of academic performance for the business common prerequisites and upper-level business coursework, respectively. For all research questions throughout this study, the grade earned in each prerequisite class was represented on a standard four-point scale by the average of all attempts in that specific class, and likewise, all attempts in upper-level classes were used in the

calculation of CBA GPA on the same four-point scale. It should be noted that all students in the sample were admitted into the CBA, therefore at some point in their academic career earned a C or better in all of the common prerequisite classes. Consequently, even in the worst case scenario of multiple failing attempts, each student at some point passed the prerequisite class with a C or better and therefore the GPA for each prerequisite class is greater than zero. Additionally, throughout this study, the variable ECO 3401 was represented by either the grade earned in ECO 3401, if that specific course was completed, or by the average of the grades earned in STA 2033 and MAC 2233 if the prerequisite classes were taken prior to admission to UCF. Native students would have completed ECO 3401, while transfer students would most likely have completed STA 2033 and MAC 2233. Regardless, the variable was called ECO 3401.

With a sample size of 860 and at an alpha level of .05, the Pearson correlation coefficient for each course indicates a statistically significant ($p < .001$) and positive relationship between the grade earned in the business common prerequisite class and the student's cumulative CBA GPA (see Table 3). Specifically, results indicate a weak positive relationship with CGS 2100 Computer Fundamentals for Business ($r = .21$), and a moderate positive relationship with ACG 2021 Financial Accounting ($r = .33$), ACG 2071 Managerial Accounting ($r = .35$), ECO 2013 Macroeconomics ($r = .45$), and ECO 2023 Microeconomics ($r = .37$). Interestingly, the common prerequisite class demonstrating the strongest positive correlation was ECO 3401 Quantitative Business Tools I ($r = .50$). Regardless of whether the student was a native student completing ECO 3401 or a transfer student completing STA 2023 and MAC 2233, both student populations would, if following the recommended course sequencing, be completing the prerequisite(s) in the term immediately preceding admission into CBA.

Table 3

Summary of Correlations Between Upper-Level GPA and Individual Prerequisite Course Performance (N = 860)

Prerequisite Course	<i>r</i>	<i>p</i>
ACG2021	.33	< .001
ACG2071	.35	< .001
ECO2013	.45	< .001
ECO2023	.37	< .001
ECO3401	.50	< .001
CGS2100	.21	< .001

Multiple linear regression analysis was then conducted, creating a model to predict the cumulative CBA GPA. The model contained two independent variables, the first being Repeat Flag, a binary variable representing the number of repeat attempts (0 representing no repeat attempts, and 1 representing one or more repeat attempts) required by the student to achieve a minimum grade of C in each prerequisite class. The second independent variable, CPP GPA, was a variable reflecting the GPA of the six common prerequisite classes using all attempts of each class.

Prior to running the regression model, the following major assumptions associated with regression analysis were checked and found to be met: initial outlier check, linearity, normality, independence, homogeneity of variance, and noncollinearity. In checking for initial outliers to identify data points that may skew the location of the best fit line, scatterplots did not identify any obvious outliers. Providing further confirmation that there were no data points to skew the

best fit line, Cook's distance was found to be at a maximum of .03, well within the rule of thumb for this measure of less than one. In checking for linearity, scatterplots of studentized residuals were largely found to be within the acceptable range of -2 and 2, with only a handful of values outside of the desired range. Skewness (-0.95) and kurtosis (1.28) were within the acceptable range as well, indicating the data to be normally distributed. The assumption of independence of observations was found to be met as the studentized residuals did not increase or decrease with the values of either the independent or dependent variables. Additionally, homogeneity of variance appeared to be met as the scatterplot of studentized residuals to predicted values reflected an even spread. Noncollinearity was tested using the Variance Inflation Factor (VIF) and found to be at a maximum of 1.37, which is considerably less than the desired outcome of less than 10, indicating the assumption of noncollinearity to be met.

Regression results (see Table 4) indicate that the model was a statistically significant predictor, $F(2, 857) = 199.84, p < .001$, of the cumulative CBA GPA. The model explained approximately 32% of variance in the cumulative CBA GPA, as indicated by the R^2 value. The prediction equation (Equation 1) was:

$$\text{Cumulative CBA GPA} = .81 - 0.07(\text{Repeat Flag}) + 0.66(\text{CPP_GPA}). \quad (1)$$

The independent variable Repeat Flag was not a statistically significant predictor ($p = .21$). Conversely, the independent variable CPP_GPA was a statistically significant predictor ($p < .001$) with each letter grade increase in the student's program prerequisite GPA resulting in a .66 increase in upper-level GPA.

Based upon the results of the correlation and regression analysis, the answer to Research Question 1 is yes, there is a relationship between performance in the common prerequisites and performance in upper-level coursework. There was a correlation between academic performance in each of the six common prerequisite classes completed prior to admission into CBA and the subsequent academic performance in upper-level coursework completed after admission into CBA. In general, students who performed better in the common prerequisites tended to also have better academic performance in upper-level coursework within the college.

Table 4

Summary of Linear Regression Analysis for Course Repeats and Prerequisite GPA Predicting Upper-Level GPA (N = 860)

Variable	<i>B</i>	<i>SE B</i>	β
Constant	0.81	0.13	
One or more repeat courses	-0.07	0.06	-.04
Prerequisite GPA	0.66	0.04	.54**
<i>R</i> ²		.32	
<i>F</i>		199.84**	

p* < .05. *p* < .01.

Research Question 2

To address Research Question 2 and determine if the business common prerequisites are an equally effective predictor of academic performance in upper-level business coursework for both native and transfer students, multiple linear regression analysis was conducted using two separate models, one for native students and one for transfer students. Each model contained six independent variables, one representing the grade earned in each of the six prerequisite classes.

The structure of Research Question 2 differed from Research Question 1 in two noteworthy ways. First, rather than viewing the sample as an aggregate, two separate models were created to provide a more refined view of the relationship between the dependent and independent variables for two student sub-populations, natives ($n = 267$) and transfers ($n = 593$). Second, in Research Question 2, the model used the grade earned in each prerequisite class, rather than the prerequisite GPA as a whole, therefore allowing a more sophisticated analysis of the relationship between prerequisite performance and performance in upper-level coursework.

Regression results (see Table 5) indicate both models to be a statistically significant predictor ($p < .001$) of the cumulative CBA GPA. Specifically, the model for the native students sub-population found performance in the common prerequisite classes was a statistically significant predictor, $F(6, 260) = 39.71, p < .001$, of the cumulative CBA GPA. The model explained a large amount, approximately 48%, of variance in the cumulative CBA GPA, as indicated by the R^2 value. Five of the six independent variables were a statistically significant predictor ($p < .05$) of the cumulative CBA GPA. The prerequisite class of ECO 2023 Microeconomics was the only class not statistically significant ($p = .96$) for the sub-population of native students. The prediction equation for the sub-population of native students, Equation 2.a, was:

$$\begin{aligned} \text{Cumulative CBA GPA} = & 0.83 + 0.09(\text{ACG2021}) + 0.14(\text{ACG2071}) + \\ & 0.13(\text{ECO2013}) - 0.002(\text{ECO2023}) + 0.20(\text{ECO3401}) + 0.16(\text{CGS2100}). \end{aligned} \quad (2.a)$$

The model for the sub-population of transfer students was also found to be a statistically significant predictor, $F(6,568) = 51.45, p < .001$, of the cumulative CBA GPA, and with an R^2 of

.35 explained comparatively less of the variance in CBA GPA than did the model for native students. As with the native model, only one of the six independent variables was not a statistically significant predictor, however, for transfer students this variable was CGS 2100 Computer Fundamentals ($p = .12$), rather than ECO 2023 Microeconomics as with the native model. For both student sub-populations, natives ($B = 0.20$) and transfers ($B = 0.24$), the prerequisite class having the greatest impact on CBA GPA was ECO 3401 Quantitative Business Tools I. These findings are in alignment with the results of the correlation analysis performed in Research Question 1 showing ECO 3401 to have the strongest correlation with CBA GPA ($r = .50$). The prediction equation for the sub-population of transfer students, Equation 2.b, was:

$$\begin{aligned} \text{Cumulative CBA GPA} = & 0.72 + 0.09(\text{ACG2021}) + 0.07(\text{ACG2071}) + \\ & 0.20(\text{ECO2013}) + 0.13(\text{ECO2023}) + 0.24(\text{ECO3401}) - 0.06(\text{CGS2100}). \end{aligned} \quad (2.b)$$

Based upon the results of the regression analysis, the answer to Research Question 2 is unequivocally no. Academic performance in the common prerequisites is not an equally effective predictor of performance in upper-level coursework for native and transfer students. Academic performance in prerequisite classes was a much better predictor of upper-level academic performance for native students ($R^2 = .48$) than it was for transfer students ($R^2 = .35$).

Table 5

Summary of Linear Regression Analysis for Individual Prerequisite Courses Predicting Upper-Level GPA by Student Type (N = 860)

Variable	Native (<i>n</i> = 267)			Transfer (<i>n</i> = 593)		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Constant	0.83	0.15		0.72	0.15	
ACG2021	0.09	0.04	.13*	0.09	0.03	.11**
ACG2071	0.14	0.04	.21**	0.07	0.03	.08*
ECO2013	0.13	0.04	.18**	0.20	0.04	.23**
ECO2023	0.00	0.04	-.01	0.13	0.04	.15**
ECO3401	0.20	0.04	.28**	0.24	0.04	.25**
CGS2100	0.16	0.04	.21**	-0.06	0.04	-.06
<i>R</i> ²		.48			.35	
<i>F</i>		39.71**			51.45**	

p* < .05. *p* < .01.

Research Question 3

To address Research Question 3 and determine if the business common prerequisites are an equally effective predictor of academic performance in upper-level coursework for each of the different business majors, multiple linear regression was conducted using a separate model for each of the five business majors (Accounting, Finance, General Business, Management, and Marketing). Regression results (see Table 6) indicate all models to be a statistically significant

predictor ($p < .001$) of the cumulative CBA GPA. Specifically, the model for the Accounting major sub-population ($n = 252$) was found to be a statistically significant predictor, $F(6, 245) = 27.89, p < .001$, of the cumulative CBA GPA. The model explained approximately 41% of variance in the cumulative CBA GPA, as indicated by the R^2 value. Although the model itself was statistically significant, three of the independent variables (ACG 2021 Financial Accounting, ECO 2023 Microeconomics, and CGS 2100 Computer Fundamentals) were not statistically significant ($p > .05$). Surprisingly, one of the three independent variables found not to be a statistically significant predictor of academic performance in the Accounting program was an Accounting course. Nevertheless, the model as a whole accounted for a large portion (41%) of the variance in a student's academic performance in the Accounting program. The prediction equation for the sub-population of Accounting majors, Equation 3.a, was:

$$\begin{aligned} \text{Cumulative CBA GPA} = & 0.07 + 0.05(\text{ACG2021}) + 0.13(\text{ACG2071}) + \\ & 0.19(\text{ECO2013}) + 0.05(\text{ECO2023}) + 0.37(\text{ECO3401}) + 0.07(\text{CGS2100}). \end{aligned} \quad (3.a)$$

The model for the sub-population of Finance majors ($n = 190$) was also a statistically significant predictor, $F(6, 183) = 20.70, p < .001$, of the cumulative CBA GPA, and with an R^2 of .40, likewise explained a relatively large amount of the variance in the cumulative CBA GPA. Two of the six independent variables (ACG 2071 Managerial Accounting and CGS 2100 Computer Fundamentals) were not statistically significant ($p > .05$), however as with the Accounting majors, the model itself explained a relatively large portion (40%) of the variance in academic performance in the Finance program. The prediction equation for the sub-population of Finance majors, Equation 3.b, was:

$$\begin{aligned} \text{Cumulative CBA GPA} = & 0.70 + 0.18(\text{ACG2021}) + 0.02(\text{ACG2071}) + \\ & 0.18(\text{ECO2013}) + 0.16(\text{ECO2023}) + 0.18(\text{ECO3401}) - 0.002(\text{CGS2100}). \end{aligned} \quad (3.b)$$

The model for the sub-population of General Business majors ($n = 113$) was also found to be a statistically significant predictor, $F(6, 106) = 12.28, p < .001$, of the cumulative CBA GPA. Similar to the Accounting and Finance models, the General Business model also explained a large amount of variance, approximately 41%, in the cumulative CBA GPA, as indicated by the R^2 value. Despite the fact that the model itself was statistically significant, three of the independent variables (ACG 2021 Financial Accounting, ECO 2023 Microeconomics, and CGS 2100 Computer Fundamentals) were not statistically significant ($p > .05$). The prediction equation for the sub-population of General Business majors, Equation 3.c, was:

$$\begin{aligned} \text{Cumulative CBA GPA} = & 0.84 + 0.07(\text{ACG2021}) + 0.14(\text{ACG2071}) + \\ & 0.31(\text{ECO2013}) + 0.09(\text{ECO2023}) + 0.21(\text{ECO3401}) - 0.11(\text{CGS2100}). \end{aligned} \quad (3.c)$$

The model for the sub-population of Management majors ($n = 140$) was found to be a statistically significant predictor, $F(6, 133) = 11.53, p < .001$, of the cumulative CBA GPA, yet with an R^2 of .34 explained comparatively less of the variance in the cumulative CBA GPA. Four of the six independent variables (ACG 2021 Financial Accounting, ACG 2071 Managerial Accounting, ECO 2023 Microeconomics, and CGS 2100 Computer Fundamentals) were not statistically significant ($p > .05$) for Management majors. The prediction equation for the sub-population of Management majors, Equation 3.d, was:

$$\begin{aligned} \text{Cumulative CBA GPA} = & 1.07 + 0.10(\text{ACG2021}) - 0.001(\text{ACG2071}) + \\ & 0.20(\text{ECO2013}) + 0.02(\text{ECO2023}) + 0.35(\text{ECO3401}) - 0.05(\text{CGS2100}). \end{aligned} \quad (3.d)$$

Finally, the model for the sub-population of Marketing majors ($n = 165$) was found to be a statistically significant predictor, $F(6, 158) = 14.19, p < .001$, of the cumulative CBA GPA, but as with the model for Management majors, explained comparatively less of the variance ($R^2 = .35$) in the cumulative CBA GPA than the models for Accounting, Finance and General Business majors. Three of the independent variables (ACG 2021 Financial Accounting, ECO 2023 Microeconomics, and Computer Fundamentals) were not statistically significant ($p > .05$). The prediction equation for the sub-population of Marketing majors, Equation 3.e, was:

$$\begin{aligned} \text{Cumulative CBA GPA} = & 0.92 + 0.05(\text{ACG2021}) + 0.15(\text{ACG2071}) + \\ & 0.15(\text{ECO2013}) + 0.11(\text{ECO2023}) + 0.22(\text{ECO3401}) - 0.02(\text{CGS2100}). \end{aligned} \quad (3.e)$$

Interestingly, for each of the five models, the prerequisite classes of ECO 3401 Quantitative Business Tools I and ECO 2013 Macroeconomics were statistically significant predictors of academic performance in that particular major. Conversely, the prerequisite class CGS 2100 Computer Fundamentals was not a statistically significant predictor of performance in any of the five majors. These findings are consistent with the results of the correlation analysis associated with Research Question 1 where of the six common prerequisite classes, ECO 3401 Quantitative Business Tools I ($r = .50$) and ECO 2013 Macroeconomics ($r = .45$) were found to have the strongest correlation with CBA GPA, and CGS 2100 Computer Fundamentals was found to have the weakest correlation with CBA GPA ($r = .21$).

Based upon the results of the regression analysis, the answer to Research Question 3 is no. Although the model for each major was found to be statistically significant, the common prerequisites were not equally effective at predicting academic performance in upper-level coursework across the five business majors. The models for Accounting, Finance, and General Business majors accounted for a larger amount of variance in the cumulative CBA GPA (R^2 of .41, .40, and .41, respectively) than did the models for Management and Marketing majors (R^2 of .34 and .35, respectively).

Table 6

Summary of Linear Regression Analysis for Individual Prerequisite Courses Predicting Upper-Level GPA by Major (N = 860)

Variable	Accounting (n = 252)			Finance (n = 190)			General Business (n = 113)			Management (n = 140)			Marketing (n = 165)		
	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β
Constant	0.07	0.26		0.70	0.24		0.84	0.32		1.07	0.27		0.92	0.25	
ACG2021	0.05	0.05	.05	0.18	0.06	.22**	0.07	0.07	.09	0.10	0.06	.13	0.05	0.06	.06
ACG2071	0.13	0.06	.14*	0.02	0.06	.03	0.14	0.07	.17*	0.00	0.06	-.01	0.15	0.06	.19*
ECO2013	0.19	0.06	.20**	0.18	0.06	.22**	0.31	0.08	.36**	0.20	0.07	.23**	0.15	0.06	.18*
ECO2023	0.05	0.05	.05	0.16	0.06	.20**	0.09	0.08	.11	0.02	0.07	.03	0.11	0.06	.13
ECO3401	0.37	0.05	.38**	0.18	0.06	.21**	0.21	0.08	.22*	0.35	0.07	.40**	0.22	0.06	.27**
CGS2100	0.07	0.06	.06	0.00	0.07	-.01	-0.11	0.08	-.12	-0.05	0.06	-.06	-0.02	0.06	-.03
R^2		.41			.40			.41			.34			.35	
F		27.89**			20.70**			12.28**			11.53**			14.19**	

* $p < .05$. ** $p < .01$.

Summary

The findings of this study demonstrate that there is a positive and moderate to strong correlation between the final grade a student earned in each individual course within the common prerequisites and the student's cumulative academic performance in upper-level business coursework. The strength of the correlation varied among the individual prerequisites, however, each individual prerequisite was positively correlated. Additional findings indicate that the common prerequisites are a statistically significant predictor of academic performance in upper-level coursework, although they are not equally effective at predicting performance among different student populations. The closing chapter will present conclusions drawn from these findings and the resulting implications as it relates to practice and policy within higher education and future research in the area.

CHAPTER FIVE: OVERVIEW, IMPLICATIONS, AND CONCLUSIONS

Introduction

The previous chapter presented the quantitative findings that resulted from this study. This chapter will begin with an overview of the study including the research questions and study findings accompanied by highlights of the literature review as it relates to said findings. This will be followed by the implications of the study for practice and policy within higher education as well as recommendations for future research. Finally, the chapter will close with conclusions that were drawn from the study as a whole.

Overview

Students pursuing a baccalaureate business degree from a public institution within the state of Florida are required to satisfactorily complete, as defined by the individual institution, the state-mandated business common prerequisites prior to formal admission into the program. As such, academic performance in the business common prerequisites serves as the minimum admission criteria for baccalaureate business programs in Florida. This study sought to determine if there was a relationship between academic performance in the state-mandated admission criteria, the business common prerequisites, and subsequent academic performance in the program. In other words, are the state-mandated admission criteria effective at predicting program success or are they potentially an unnecessary barrier to program admission?

Abou-Sayf and Miari (2007) suggest that prerequisites should be established for one of two reasons: (1) to increase the likelihood of student success, or (2) health or safety concerns. In practice we may also find the establishment of prerequisites to be based on enrollment management objectives and faculty preferences (Baard & Watts, 2008; Bruning, 2007; Danko et al., 1992; Huang et. al., 2005). Nonetheless, as a whole, the literature strongly supports the

contention that successful completion of an individual prerequisite class is positively correlated with successful completion of the next course in the curriculum sequence or the target course (Baard & Watts, 2008; Biggers, 2006; Blaylock & Lacewell, 2008; Choudhury et al., 2007; Coley, 1973; Danko, Duke et al., 1992; Davis, 2009; Donovan & Wheland, 2009; D'Souza & Maheshwari, 2010; Easter, 2010; Huang et. al., 2005; Rochelle & Dotterweich, 2007; Von Allmen, 1996; Yang & Raehsler, 2007). This is however assuming the prerequisite course provides foundational knowledge that is required, or will enhance the student's ability to master the learning objectives of the target course (Jackson, 1992; Pratt, 1980; Zais, 1976). As noted in the literature review, from their creation in 1996 Florida's common prerequisites were established with the intent to provide the "foundational content" to adequately prepare students for the "content of upper-division courses" (Office of Articulation, 2010; Office of Program Policy Analysis & Government Accountability, 2008).

Although the literature abounds with studies on the relationship between an individual prerequisite class and target class, no peer reviewed literature was found on the relationship between the common prerequisites, as a set of classes, and program performance. In the literature we consistently find scholars noting the statistically significant relationship between performance in a prerequisite class and the target course, yet they also advise that excessive prerequisite requirements may create an unnecessary increase in time to graduation, which in turn may also increase the likelihood of a student dropping out (Abou-Sayf & Miari, 2007, Abou-Sayf, 2008; Baard & Watts, 2008; Biggers, 2006; Blaylock & Lacewell, 2008; Choudhury et al., 2007; Pascarella & Terenzini, 2005 Rochelle & Dotterweich, 2007; Von Allmen, 1996; Yang & Raehsler, 2007). Consequently herein lies the crux of the problem; it is a delicate

balance to achieve prerequisite requirements that do not unnecessarily increase time to graduation, but that also adequately prepare students for success in upper-level coursework.

Regardless, as enrollment in business programs continues to grow and administrators are simultaneously faced with increasingly limited resources, program prerequisites that act as effective screening mechanisms by limiting enrollment to those students most likely to be successful in a program are critical for many institutions. While this study focused on business programs, the same argument may be made for any program with growing enrollment and limited resources. Although some would contend that this is a new phenomenon, Johnson (2000) asserts that the admission issues faced today are in substance no different than those faced during Colonial times: “the balance of quantity and quality” (Johnson, 2000, p. 2). Admission standards are simply screening mechanisms designed to select students who are most likely to be successful in terms of academic performance and ultimately degree completion (Cabrera & Burkum, 2001). In theory, Florida’s common prerequisites were established for exactly such a reason (Office of Articulation, 2010; Office of Program Policy Analysis & Government Accountability, 2008; Statewide Articulation Manual, revised 2011).

This study answered three research questions in efforts to determine if in fact there was a relationship between academic performance in the business common prerequisites and academic performance in upper-level coursework for 860 students in the CBA at UCF. For purposes of this study, academic performance in the business common prerequisites served as a proxy for prior knowledge considered pertinent to the successful completion of a baccalaureate business degree, while academic performance in upper-level business coursework served as a proxy of student success in the program. Both academic performance in the common prerequisites and academic performance in upper-level coursework were measured by GPA on a four point scale

using all attempts. The overarching purpose of this study was addressed in the following three research questions:

- (1) Do students who perform better in the business common prerequisites subsequently perform better in upper-level business coursework?
- (2) Is the business common prerequisite grade point average an equally effective predictor of performance in upper-level business coursework for both native and transfer students?
- (3) Is the business common prerequisite grade point average an equally effective predictor of performance in upper-level business coursework for each of the business majors?

Findings from Research Question 1 do in fact demonstrate that prior knowledge, represented by academic performance in the business common prerequisites, is positively correlated with subsequent academic performance in the business program. These findings support the original underlying assumption associated with the conceptual framework of this study in that learning is a developmental or building process where skills learned in one stage or level become tools used in the construction of new skills in a subsequent stage or level (Choudhury et al., 2007; Fischer, 1980; Hay et al., 2008; Hoz et al., 2001; Kirschner, 2002; Yang & Raehsler, 2007). Prior knowledge that is accurate and robust provides a solid foundation to be used in the building of new knowledge. Conversely, when foundational or prior knowledge is inaccurate or insufficient, the cognitive load experienced while learning new tasks is increased and learning is hindered (Bannert, 2002; Hay et al., 2008; Kirschner, 2002). Academic performance in all of the common prerequisite classes, representing prior knowledge or knowledge at the point of program entry, was found to be positively correlated with academic

performance in the program. Two particular classes, ECO 3401 Quantitative Business Tools I and ECO 2013 Macroeconomics, were found to have the strongest correlation with upper-level business GPA, as indicated by the correlation coefficients ($r = .50$ and $r = .45$, respectively). While the literature as a whole focuses primarily on the relationship between one prerequisite class and one specific target class, the findings of this study correlate performance in a set of prerequisite classes to overall program performance. The correlation results of this study imply that the relationship between the common prerequisites, as a set of prerequisites, to that of program performance, is comparable to the correlation of one prerequisite class to a specific target class in that it is positive in direction and moderate to strong in strength.

Of the three questions, Research Question 1 took the simplest approach using a linear regression model with only two independent variables predicting the cumulative CBA GPA. The first predictor was a binary variable representing the number of repeat attempts (0 for no repeat attempts and 1 for one or more repeat attempts) taken to earn a C or better in each class in the common prerequisites, and the second predictor was the GPA of the common prerequisite classes as a whole. Although the model itself was statistically significant, $F(2, 857) = 199.84, p < .001$, only one of the two predictor variables, the common prerequisite GPA, was statistically significant ($B = 0.66, p < .001$). The number of repeat attempts a student took to earn a minimum grade of C in each prerequisite class was not a statistically significant predictor of the cumulative CBA GPA ($p = .21$). It should be noted that the statistically significant predictor, the common prerequisite GPA, was calculated using all attempts. Therefore in this manner, although the number of repeat attempts is not visible, it is nonetheless factored into the equation, albeit in an indirect manner.

While Research Questions 2 and 3 also used multiple linear regression, these analyses were more refined in that each research question focused on specific sub-populations of the sample in order to provide a more thorough explanation of the relationship between the variables. Research Question 2 sought to determine if the common prerequisites were equally effective, among native and transfer students, in predicting performance in upper-level business coursework. Native students would have completed the common prerequisites at UCF, while transfer students most likely would have completed the common prerequisites at their previous institution. As with Research Question 1, the dependent variable in Research Question 2 was program performance. This differs from the literature as a whole, which has largely focused on the predictive ability of one prerequisite as it relates to a single target class. Results of Research Question 2 clearly demonstrate that academic performance in the common prerequisites was a more effective predictor of program performance for native students than it was for transfer students. Despite the fact that the sample size for the native student model ($n = 267$) was less than half the size of that for the transfer student model ($n = 593$), both models were statistically significant at an alpha level of .05. However, based upon the R^2 values, the model for native students ($R^2 = .48$) was a much better predictor of the cumulative CBA GPA than the model for transfer students ($R^2 = .35$).

These findings were not surprising as they are consistent with the literature and point to the fact that the institution where the prerequisite class was taken is highly relevant in terms of subsequent academic performance. The difference in predictive ability between the two student populations may be a result of several factors such as institutional differences in student populations (level of academic preparedness, maturity, motivation, life situation, etc...), institutional differences in level of academic rigor, and/or possible issues related to the student's

transition and acclimation to the new institution (Choudhury et al., 2007; Donovan & Wheland, 2009; Huang et. al., 2005; Pharr & Lawrence, 2007). These findings are obviously most relevant to institutions such as UCF where transfer students represent a substantial percentage of incoming students, and to colleges, such as CBA who admit a disproportionately high percentage of transfer students.

Research Question 3 sought to determine if the common prerequisites were equally effective, across the five business majors, in predicting academic performance in upper-level business coursework. The models for each of the five majors (Accounting, Finance, General Business, Management, and Marketing) were found to be statistically significant predictors, at an alpha level of .05, of the cumulative CBA GPA. As somewhat anticipated due to the quantitative nature of the common prerequisites, the prerequisites were most effective in predicting upper-level academic performance for the business majors that are associated with more quantitative coursework, the Accounting ($R^2 = 41\%$) and Finance ($R^2 = 40\%$) majors. The data demonstrate the link between the quantitative nature of the prior knowledge and academic performance in highly quantitative business majors. Unexpectedly however, the model for General Business majors was also an equally effective predictor of upper-level academic performance, as indicated by an R^2 of 41%. On the surface this may appear puzzling as the label 'General Business' would seem to imply by its very name a general degree program with little quantitative focus. Quite the contrary, examination of the General Business curriculum revealed a different story as up to 75% of the classes comprising the major may be selected from the Accounting, Finance, or Economics majors. The label of General Business may therefore be somewhat misleading to those outside the discipline as the curriculum is still largely quantitative in nature. Finally, the models for Management and Marketing majors were also found to be statistically significant

predictors of the CBA GPA, however, with an R^2 of 34% and 35%, respectively, explained less of the variance in CBA GPA. It is to be expected that the quantitative nature of the common prerequisites would be less pertinent foundational knowledge for programs with comparatively less emphasis on mathematical concepts and computational skills.

It is noteworthy that in both Research Questions 2 and 3, for each of the seven models comprised of the different student populations (the two student types studied in Research Question 2 and the five student majors studied in Research Question 3), the only two prerequisite classes that were statistically significant predictors of the cumulative CBA GPA in each model, were ECO 3401 Quantitative Business Tools I and ECO 2013 Macroeconomics. This is an interesting finding in that although Economics is a business major, Economics majors were not included in this study, yet foundational knowledge from this discipline is clearly germane to academic performance for all business majors studied. Conversely, the prerequisite class of CGS 2100 Computer Fundamentals for Business was found to be a statistically significant predictor of the cumulative CBA GPA in only one of the seven models, the model for the population of native students. These findings validate the correlation analysis conducted in Research Question 1 that found ECO 3401 Quantitative Business Tools I ($r = .50$) and ECO 2013 Macroeconomics ($r = .45$) to have the strongest correlation, relative to the other prerequisite classes, with the cumulative CBA GPA, while CGS 2100 Computer Fundamentals for Business ($r = .21$) was found to have the weakest correlation. It would seem to some degree to be expected that courses designed and taught by CBA faculty would be more likely to provide appropriate foundational knowledge for business students than a course designed and taught outside of the college. As noted in the literature, a prerequisite course is most beneficial when it provides prior knowledge that enhances the student's ability to master the learning objectives of the target course or in this

case the learning objectives of the academic program (Abou-Sayf & Miari, 2007; Fischer, 1980; Jackson, 1992; Pratt, 1980; Zais, 1976). It is reasonable to assume that faculty within a specific discipline would have a more complete understanding of the learning objectives associated with their own programs, than would faculty outside of their discipline.

Taken as a whole, the findings from this study indicate that there was a positive and moderately strong relationship between academic performance in the common prerequisites and academic performance in the program. The relationship was not, however, consistent among different student populations. Nonetheless, there is evidence to support the contention that the common prerequisites do indeed provide “foundational content” that prepares students for the “content of upper-division courses” (Office of Program Policy Analysis & Government Accountability, 2008). Specifically, two of the common prerequisite courses, ECO 3401 Quantitative Business Tools I ($r = .50$) and ECO 2013 Macroeconomics ($r = .45$), demonstrated a strong and positive correlation with program performance implying that the foundational knowledge acquired in these courses does in deed provide students with the “necessary background knowledge needed to succeed in the subsequent course” or in this case the academic program (Choudhury et al., 2007, p. 28).

Particularly noteworthy was the study finding that the common prerequisites were not equally effective at predicting performance across the different student populations contained within the sample. Regression results from Research Questions 1, 2 and 3 demonstrate that academic performance in the common prerequisites may be used with some, but not necessarily all, student populations to somewhat accurately predict program performance. Specifically, regression models for the student populations of native students, Accounting majors, Finance majors, and General Business majors were moderately effective predictors of program

performance. This statement is based upon the R^2 values of each model that confirm the models for native students, Accounting majors, Finance majors and General Business majors accounted for 48%, 41%, 40% and 41%, respectively, of the variance in the cumulative CBA GPA.

Implications for Practice and Policy

Based upon the correlation and regression results from this study, it is recommended that a comprehensive review of the learning outcomes associated with the common prerequisites be conducted. This would be done at the institutional level and then also collaboratively at the state level. The learning outcomes of the lower-level classes should ideally be evaluated in terms of their effectiveness in preparing students for success in upper-level coursework. As learning is a developmental or building process, learning outcomes in lower-level prerequisite coursework is relevant to student success in the upper-division program (Abou-Sayf & Miari, 2007; Fischer, 1980; Jackson, 1992; Pratt, 1980; Zais, 1976). Courses within the common prerequisites with a weaker correlation to upper-level performance and/or less ability to effectively predict performance in upper-level coursework should be thoroughly evaluated to determine what modifications may be made to improve the course effectiveness in terms of preparing students for coursework in upper-division classes. The common prerequisite class with the weakest correlation to program success in this study was CGS 2100 Computer Fundamental for Business ($r = .21$). Additionally, it was found that this particular course was not a statistically significant predictor of cumulative CBA GPA for any of the seven student populations studied. An evaluation of prerequisite learning outcomes should first begin with CGS 2100, Computer Fundamentals for Business, as its effectiveness was conspicuously substandard when compared to the other prerequisite classes. It is significant to note that the common prerequisites were established in 1996 and as a technology based course, frequent review and updating of the

learning objectives would likely be even more critical for the course to remain relevant. If an improvement in correlation and predictive ability cannot be demonstrated, then an argument may be made that CGS 2100, Computer Fundamentals for Business, does not have a place within the state-mandated common prerequisites as it does not truly provide foundational content to adequately prepare students for upper-division courses. As noted in the literature, excessive or superfluous prerequisites may create an unnecessary increase in time to graduation, which in turn may also increase the likelihood of a student dropping out (Abou-Sayf & Miari, 2007; Abou-Sayf, 2008; Pascarella & Terenzini, 2005). A prerequisite with little correlation and/or predictive ability, as it relates to program performance, is therefore hard to justify.

In addition to an evaluation of the learning outcomes associated with CGS 2100, it is recommended that the learning outcomes associated with ACG 2021, Financial Accounting, are also thoroughly evaluated. The regression results of Research Question 3 revealed that ACG 2021, Financial Accounting, was not a statistically significant predictor of academic performance for students in the Accounting major. This finding is shocking and further investigation is recommended as it seems counterintuitive that an Accounting class would not be predictive of academic performance in the Accounting program.

As a matter of college policy, a system to review existing prerequisites and evaluate the establishment of new prerequisites that combines faculty expertise with quantitative analysis is recommended. Within higher education the establishment of course prerequisites is typically done through a qualitative approach or one in which faculty teaching the target course establish prerequisite requirements based on their professional determination of the required entry skills for the target course. This is often done based upon anecdotal evidence or faculty determinations that may or may not be supported by quantitative findings (Abou-Sayf, 2007). A system that

combines the experience and expertise of its faculty along with quantitative findings would most likely provide appropriate prerequisites while also limiting unwarranted prerequisite restrictions. Additionally, over time when revisions are made to upper-level curriculum, a reevaluation of course prerequisites and their associated learning outcomes is recommended as curriculum modifications to upper-level coursework may necessitate modifications to course content in the associated lower-level course prerequisites (Bruning, 2007; Pharr & Lawrence, 2007).

As noted in the study findings, specifically Research Question 2, prerequisite coursework that had been transferred into the student's upper-division program from another institution had the weakest relationship to academic performance in upper-level coursework within the student's declared major. As minimum admission requirements or screening mechanisms, the findings of this study demonstrate that the state-mandated common prerequisites are not terribly effective at predicting program success for the transfer student population, approximately 69% of the students within this study. Descriptive statistics show us that while native and transfer students entered the CBA with almost identical common prerequisite GPAs (means of 3.03 and 3.04, respectively), the GPA of native students remained constant while the GPA of transfer students declined, as measured by the cumulative CBA GPA (means of 3.05 and 2.69, respectively). Put simply, the mean common prerequisite GPA of native students, 3.03, was a highly accurate predictor of program performance as measured by the cumulative CBA GPA, 3.05; however, the mean common prerequisite GPA of transfer students, 3.04, was not an accurate predictor of program performance as measured by the cumulative CBA GPA, 2.69. In practice, we see that what on the surface appears to be equivalent foundational knowledge, equivalent common prerequisite GPAs of the two student populations, does not translate to equivalent academic performance in the upper-division program. It may be concluded that as admission criteria, the

common prerequisites were highly effective for 31% of the students in the sample and that these students completed the coursework providing the required foundational knowledge at the baccalaureate granting institution. While Florida's Statewide Articulation Agreement encourages the 2 + 2 approach for baccalaureate attainment, the findings demonstrate a greater predictive ability when the lower-level prerequisite coursework and upper-division coursework are completed at the same institution.

There may be numerous reasons for this difference in correlation and predictive ability between the two student populations. However, as it relates to the scope of this study and the conceptual framework of prior knowledge, the researcher focused on the issue of curriculum alignment between lower-division coursework and upper-division coursework within the academic program. This is a complicated issue and one in which substantial collaboration between institutions would be required in order to affect any significant change. Curriculum alignment and coordination of learning outcomes is a challenge within one institution; coordination among multiple institutions and multiple faculty groups is a mammoth task. Nonetheless, it is recommended that steps be taken to better align curriculum and the associated learning outcomes between partnering institutions. This is of particular importance for colleges and/or institutions where transfer students represent a substantial percentage of incoming students.

In addition to issues of curriculum alignment, differences in organizational culture between the different sectors in higher education cannot be ignored as these differences may also be factors influencing student performance in the upper-division program. Students transitioning from a state college to a state university are faced with various additional challenges as they attempt to adapt to a new educational environment. From the literature, we know that

institutional factors, specifically organizational culture, influence student commitment, retention and ultimately success (Astin, 1993; Kuh et. al., 2005; Tinto, 1993). As noted earlier, these environmental factors are beyond the scope of this study. Nonetheless, they are of critical importance for educators within the state of Florida where structurally and economically the 2 + 2 approach for baccalaureate attainment is encouraged thus requiring students to navigate multiple educational environments.

Finally, it is recommended that in evaluating the common prerequisites and their associated learning outcomes, consideration should be given as to what curriculum modifications may be implemented to increase the relevance of the prerequisite coursework to academic performance in the less quantitative business majors of Management and Marketing. The findings of Research Question 3 demonstrate, as indicated by the R^2 values, that the ability of the common prerequisites to predict academic performance for Management and Marketing majors was comparatively less than for Accounting, Finance and General Business majors. Ideally, modifications to the curriculum would increase the relevance of the prerequisite coursework to performance in upper-level Management and Marketing coursework, without decreasing its relevance to the more quantitative majors.

Implications for Future Research

Within the Florida State University system, a total of 215 degree programs have state-mandated common prerequisites that serve as the minimum admission requirement for upper-division programs (Statewide Articulation Manual, revised 2011). As noted in the literature review, peer reviewed studies on the effectiveness of these state-mandated admission requirements were not found. This would suggest the opportunity for future inquiry into the relationship between common prerequisites of other disciplines and academic performance in

that specific program. Although this study focused on business students, insufficient prerequisites, excessive prerequisites or simply irrelevant prerequisites, have serious implications for the academic success of all students. As such, the findings of this study have implications for not only schools of business, but also other disciplines as they evaluate the current common prerequisites required within the state of Florida or consider best practices and policies to improve student success.

This study evaluated the relationship between performance in the common prerequisites and program performance for seven separate student populations (native students, transfer students, accounting majors, finance majors, general business majors, management majors, and marketing majors). Additional information would be derived from a study that further refined the student populations by considering both the student type, native or transfer, and student major in one model. This would be a logical progression in refining the regression results and would most likely reveal an even greater disparity in predictive ability among the different student populations. Based upon the findings from Research Question 2 and 3 of the current study, we would expect to detect the strongest predictive ability among native students pursuing a quantitative major and the weakest predictive ability among transfer students pursuing a non-quantitative major.

In order to shed light on some of the underlying causes creating the disparity in predictive ability among the different student populations, a qualitative study, surveying the different student populations regarding their perceptions of the extent to which the common prerequisites prepared them for performance in the upper-division program, is recommended. This would allow the voice of students to be heard and bring a new perspective to the dialogue. Specifically,

it would be interesting to undertake a pre and post student survey, comparing the perceptions of native and transfer students, as the groups enter and then exit the upper-division program.

Conclusions

The findings of this study have been evaluated thoroughly and tempered with caution. It was considered that the moderate to strong correlation between academic performance in the common prerequisites and academic performance in the program may potentially have been in part a result of the spuriousness of the relationship. As noted by Abou-Sayf and Miari (2007), “good students tend to perform well on most courses while poor students tend to perform poorly on most courses” and this phenomenon may have some impact (Abou-Sayf & Miari, 2007, p. 2). Furthermore, findings of this study indicate that there was a relationship or correlation, but this does not imply causation. It may not be concluded that the successful completion of the business common prerequisites caused academic success in the business program (Abou-Sayf, 2008; Abou-Sayf & Miari, 2007; Lomax, 2007; Pharr & Lawrence, 2007).

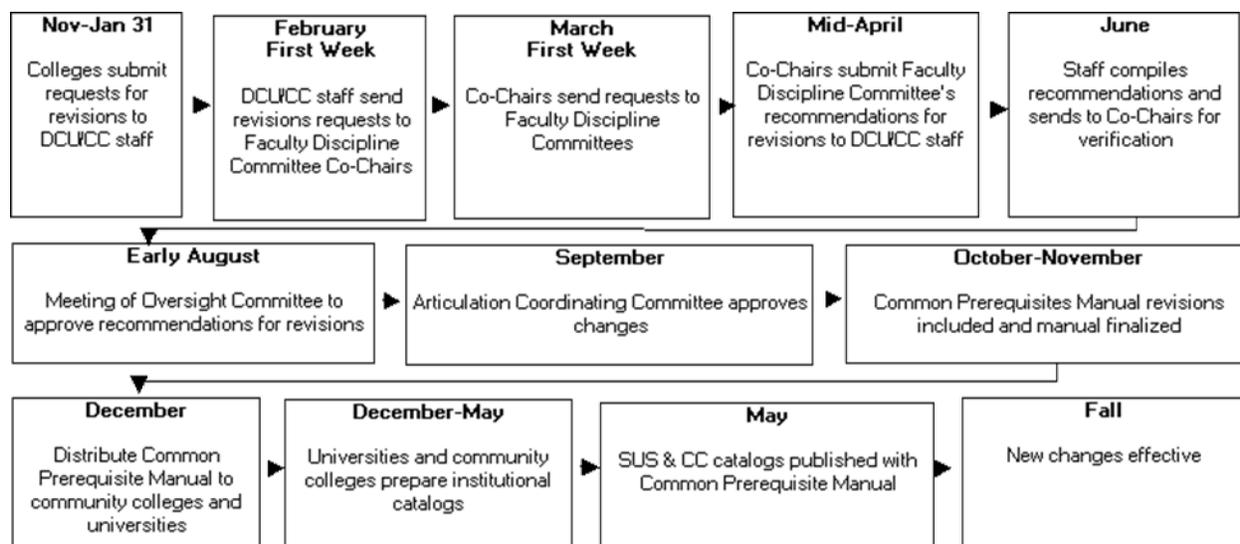
Nonetheless, even when considering the limitations associated with quantitative results, the findings of this study do demonstrate that the business common prerequisites provide a minimum, yet adequate foundation to be used in the building of new and more complex knowledge in upper-level business coursework. Regression findings also demonstrate that the common prerequisites may, with certain student populations such as native students and students pursuing quantitative business majors, be a rather effective predictor of program performance. Most problematic of the findings was that the predictive ability was not equivalent across different student populations. This suggests that as admission criteria or screening mechanisms designed to select students most likely to be successful in the program, the state-mandated common prerequisites were not effective for all student populations.

APPENDIX A: TITLE 48 CHAPTER 1007.25(5) FLORIDA STATUES

(5) The department shall identify common prerequisite courses and course substitutions for degree programs across all institutions. Common degree program prerequisites shall be offered and accepted by all state universities and Florida College System institutions, except in cases approved by the State Board of Education for Florida College System institutions and the Board of Governors for state universities. The department shall develop a centralized database containing the list of courses and course substitutions that meet the prerequisite requirements for each baccalaureate degree program.

(Source: Online Sunshine)

APPENDIX B: FLOWCHART OF COMMON PREREQUISITES REVISION PROCESS



(Source: Florida Board of Governors website)

APPENDIX C: ARTICULATION COORDINATING COMMITTEE (ACC) MEMBERS

State University System	Florida College System	Public K-12 Education
<p>Dr. Jennifer N. Buchanan Assistant Vice President, Faculty Development & Advancement Florida State University jbuchanan@admin.fsu.edu</p>	<p>Dr. Edwin Massey President Indian River State College emassey@irsc.edu</p>	<p>Dr. Fran Adams Superintendent Indian River County Schools Fran.Adams@indianriverschools.org</p>
<p>Dr. William E. Hudson, Jr. Vice President, Student Affairs Florida A&M University william.hudsonjr@famuedu</p>	<p>Dr. Barbara Sloan Provost & Vice President of Academic Affairs Tallahassee Community College sloanb@tcc.fl.edu</p>	<p>Dr. Walter Christy Director of Secondary Programs Brevard County Schools Christy.Walter@Brevardschools.org</p>
Career and Technical Education	Nonpublic Education	Students
<p>Dr. Falecia Williams Campus President, West Campus Valencia College fawilliams@valenciacollege.edu</p>	<p>Dr. David Persky Assistant to the President St. Leo University David.Persky@saintleo.edu</p>	<p>Ted Stratton 2011-12 Gubernatorial Fellow Florida College System ted.stratton@fldoe.org</p>
<p>Susan Miller Director, Curriculum and Instruction, Hillsborough Technical Education Centers Hillsborough County Schools susan.miller@sdhc.k12.fl.us</p>	<p>Dr. Betty Tilton Keiser University bhtilton@aol.com</p>	

(Source: Florida Board of Governors website)

APPENDIX D: IRB APPROVAL LETTER



University of Central Florida Institutional Review Board
 Office of Research & Commercialization
 12201 Research Parkway, Suite 501
 Orlando, Florida 32826-3246
 Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Human Research

From: **UCF Institutional Review Board
 #1 FWA00000351, IRB00001138**

To: **Helen M. Becker**

Date: **April 29, 2014**

Dear Researcher:

On 04/29/2014, the IRB approved the following research until 4/28/2015 inclusive:

Type of Review: Submission Response for UCF Initial Review Submission Form
 Project Title: Business Common Prerequisites and Academic Performance in
 Upper-level Business
 Coursework Investigator: Helen M
 Becker
 IRB Number: SBE-14-10266
 Funding Agency:
 Grant Title:
 Research ID:
 N/
 A

The scientific merit of the research was considered during the IRB review. The Continuing Review Application must be submitted 30 days prior to the expiration date for studies that were previously expedited, and 60 days prior to the expiration date for research that was previously reviewed at a convened meeting. Do not make changes to the study (i.e., protocol, methodology, consent form, personnel, site, etc.) before obtaining IRB approval. A Modification Form **cannot** be used to extend the approval period of a study. All forms may be completed and submitted online at <https://iris.research.ucf.edu>.

If continuing review approval is not granted before the expiration date of 4/28/2015, approval of this research expires on that date. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

IRB Coordinator

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