Library Instruction's Relationship to Student Success

A Dissertation submitted
to the Graduate School
Valdosta State University

in partial fulfillment of requirements
for the degree of

DOCTOR OF PUBLIC ADMINISTRATION

in Public Administration

in the Department of Political Science
of the College of Humanities and Social Sciences

May 2019

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ABSTRACT

This pilot study examines the relationships between library instruction, first-time, full-time freshmen retention, and first-year cumulative grade point average (GPA). The researcher examined first-time, full-time freshmen at Valdosta State University (VSU) over the course of three years, from Fall 2015 through Spring 2018. Relationships between the variables were tested for statistical significance using Chi-squared test, binomial logistic regression, and multiple linear regression.

The study sought to determine if library instruction is an effective strategy for improving student engagement and academic achievement. Library instruction is positively associated with both retention and cumulative GPA. Students who attend library instruction are more likely to be retained and have higher GPAs. Attending library instruction improves student engagement. Students learn essential research and information literacy skills, which helps them succeed in the classroom. Cumulative GPA is positively associated with retention. Students with a higher GPA are 77% more likely to be retained. Increasing engagement and freshmen GPA has long-lasting benefits that improve student outcomes.

Library instruction is both a predictor of student success and an intervention for at-risk students. Increasing engagement and students' interest and confidence in their research abilities is beneficial. Information literacy is a component of many high-impact education practices (Riehle & Weiner, 2013). Students learn key information literacy concepts during library instruction. This research supports the importance of libraries and library instruction in the future of student success at colleges and universities, which directly connects to the success of the colleges and universities as institutions.

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Chapter I

INTRODUCTION

Overview of the Pilot Study: *Assessment of Library Instruction Contributions to Retention at Valdosta State University*

This pilot study's purpose is to examine the relationship between library instruction and first-time, full-time freshmen retention and first-year cumulative grade point average (GPA) at Odum Library at Valdosta State University (VSU). This analysis will evaluate library instruction's contribution to first-time, full-time freshmen retention rates and GPA at VSU. Library instruction is a service where a librarian works closely with students, teaching them research and information literacy skills.

Information literacy is a key component of many high-impact education practices (Riehle & Weiner, 2013). Information literacy includes research skills and related skills, including the ability to recognize an information need, analyze and critique information, as well as understand how information is produced. Information literacy is a complex set of concepts that are difficult to learn and fully understand (see Table 1). Ideally, information literacy should be introduced throughout the curriculum and college experience. Learning should be cumulative and progress as the student progresses through their course-work. Students are expected to graduate with information literacy skills (Riehle & Weiner, 2013).

Table 1. Information Literacy Concepts and Student Outcomes*

Learning Objectives	Student Outcomes
Authority is constructed and contextual	Students learn to think critically about authority and how it can vary by topic, context, and timeframe.
Information creation as a process	Students learn that information can be created in a variety of formats and contexts. The process can affect the perception of the information and its usefulness.
Information has value	Students learn to think critically about the value and cost of information as they consume and produce it.
Research as inquiry	Students learn that research is an iterative process of asking questions. Researchers ask questions, research to find the answer, and the answers contribute to the existing body of knowledge. As researchers develop a greater understanding of their field, the questions become more complex.
Scholarship as conversation	Students learn that scholarship is an ongoing conversation. In order to participate in the conversation, students need to be familiar with the topic. Established participants tend to lead the conversation and are respected as experts.
Searching as strategic exploration	Students learn that searching for information is a complex process. Students learn to use a combination of focused search strategies such as selecting a discipline-specific database and brainstorming strategies that expand their research. Students learn to consider the results of their search strategy and modify their strategies bases on their results. Students learn that it is normal to change search strategies, to try multiple search strategies, and to seek help from librarians and other experts.

*Information literacy is a set of advanced concepts that can be introduced during library instruction classes but must be reinforced and practiced for the students to develop their skills.
Source: Adapted from the Framework for Information Literacy for Higher Education (American Library Association, 2015)

Librarians and the resources available in the library play a critical role in how students acquire information literacy. Librarians teach information literacy concepts in library instruction sessions. During library instruction, everyone receives the same instruction, ensuring that all students have equal access. Librarians also teach information

literacy concepts to individuals when they ask for research help. Individual instruction alone is not enough because it is initiated by the student. Students who do not choose to contact a librarian miss out on important skills. The library's resources are essential. Students learn and practice information literacy by finding information and using it for their classes. The library houses the majority of that information, both online and in print. Students need to learn how to use the library's online resources in order to find the materials they need.

Common learning objectives and student outcomes are summarized in Table 2. Some objectives relate directly to information literacy concepts. For example, refining the search is related to both "Research as Inquiry" and "Searching as Strategic Exploration." Other learning objectives build a foundation of research skills that are needed before students can apply information literacy concepts. For example, accessing resources from off-campus is not an information literacy concept, but students need to access the library resources to do their research.

Table 2. Library Instruction Learning Objectives and Student Outcomes

Learning Objectives	Student Outcomes
Using the library web site	Students can find the online resources they need for their assignments: catalog, databases, course-specific research guides.
Locating basic information about the library	Students can find frequently asked questions, including hours.
Accessing resources from off-campus	Students can log into library resources and do their research from any location.
Asking for help	Students are encouraged to ask for help and can do so in a variety of formats: in-person, chat, phone, by appointment.
Locating items within the library	Students can find the physical books and journals they need for their research.
Selecting a database for research	Students learn how to select a database or research guide to begin their research.
Using keywords and indexed terms	Students learn how to translate their search topic from vernacular language to keywords. Students learn the difference between keyword searching and using indexed search terms.
Refining the search using database options: date range, full text, peer review, language, and other options	Students learn how to refine their search by using options available in the database. The criteria used to refine the results are set by the professor.
Evaluating articles: peer review, primary versus secondary	Students learn how to recognize primary and secondary articles. Students learn how to find out if an article is from a peer reviewed journal.
Managing search results: saving results, downloading articles	Students learn how to save results so they can return to them later.

Library instruction can be examined as both a risk factor and an intervention. Failure to attend a required library instruction class can serve as a risk factor. Library instruction is scheduled by the professor during regular class time, and students are required by their professor to attend. Failure to attend the class is a cause for concern because it can indicate a lack of engagement with the class and support services (the library). Additionally, during library instruction students learn important research skills

they will need to complete assignments and succeed in their classes. Failure to attend the class and acquire these skills could negatively affect a student's success.

Library instruction could serve as an intervention for students at-risk for lower grades or withdrawal. Students benefit from library instruction that introduces information literacy concepts early in their college career. Findings from the Assessment in Action (AiA) projects demonstrate that freshmen and new students "receiving this instruction perform better in their courses than students who do not" (Brown & Malenfont, 2017, p. 1). Additionally, "project findings demonstrate different ways that information literacy contributes to inquiry-based and problem-solving learning, including effective identification and use of information, critical thinking, ethical reasoning, and civic engagement" (Brown & Malenfont, 2017, p. 2). Library instruction, especially instruction that focuses on information literacy, teaches students the critical thinking and research skills they need to succeed in their classes.

In recent years, colleges and universities have been exploring ways to improve student outcomes, including student success and retention (Matthews, 2012; Murray, Ireland, & Hackathorn, 2016). Student success is difficult to define because it includes many factors. Student success refers to a combination of a student's ability to persist, or return each semester, GPA, and the time it takes to graduate. This research project focuses on two measures of student success: GPA and retention. Retention also has multiple definitions, the most common of which are: freshmen returning in the fall, for their second year; students returning the following semester, which can include returning in spring after completing a fall semester; or students returning in fall for their third, fourth, or subsequent years.

Many universities are developing interventions to improve student success and retention. These interventions rely on data and statistical analyses. Universities collect and store a vast amount of data on students and store it in their data warehouse. Analytics programs determine which students are at risk of failing, withdrawing, or not returning. If a student is at risk, then the university can initiate an intervention. Interventions are designed based on these risk factors and delivered to students at the point of need. For example, a wellness check can be initiated for a student who suddenly stops attending class. Academic interventions, such as tutoring, are another possibility.

Libraries have the potential to actively participate in the university's risk and intervention processes. Library usage could be recorded and added to the university's data warehouse. The library could deliver interventions, such as workshops on how to do research. There are many ways to use the library, and research is needed to determine which measures of library usage can be used as a risk factor. Attending library instruction is one measure that is relatively easy to implement because professors already regularly record class attendance. Library-based interventions and their effect on student outcomes should also be researched.

Theoretical Framework of the Study

Student engagement is one theory explaining how library usage may contribute to student outcomes like retention, achievement, or GPA. Students who are engaged in the university setting and actively using services and resources are more likely to succeed, whereas students who are not engaged are at increased risk. There is a growing body of research that demonstrates library usage is positively correlated or associated to student outcomes and retention. Articles about libraries and retention share theories that the

library's services enhance student engagement, which enhances retention (Emmons & Wilkinson, 2011; Grallo, Chalmers, & Baker, 2012; Haddow, 2013; Haddow & Joseph, 2010; Mezick, 2007; Mezick, 2015; Soria, Fransen, & Nackerud, 2013; Soria, Fransen, & Nackerud, 2014). Theories of student engagement and retention help explain how the library indirectly or partially contributes to student outcomes. Low (or no) library usage could potentially be used as a factor to identify students at increased risk of withdrawing.

Attending a required, but not strictly enforced, library instruction session has been used as a predictor for retention (Gammell, Allen, & Banach, 2012). Gammell et al. (2012) used attending a required library orientation as one of four measures of student engagement. The researchers' goal was to find more effective early indicators for students at risk of withdrawing so that earlier interventions could be staged. Students were required to attend a three-part library orientation. The orientation was included in student's class schedules, but there was no penalty for missing all or part of the orientation. Their results indicated that library orientation attendance was "an excellent early indicator of engagement and the likelihood of remaining on campus over the first two years" (Gammell et al., 2012, p. 14). Attending the in-person library orientation session was the most powerful predictor of retention and "students who did not take the training or who took only the online assessment were almost twice as likely to drop out as students who attended a live session, regardless of level of academic risk" (Gammell et al., 2012, p. 16).

The relationship between library instruction and GPA has been studied by several researchers, with mixed results. Wong & Cmor found that the frequency of attending library instruction positively correlated with student achievement (2011). The more

library instruction classes offered and attended, the greater the effect on student GPA. In their 2013 study, Soria et al. used four library instruction variables to examine the impact of library usage on retention and success: workshops, course-integrated instruction, and two specific workshops called Intro to Library Research Part 1 and Intro to Library Research Part 2. Course-integrated instruction had a negative relationship with GPA that was statistically significant. The other three variables had positive relationship to GPA that was not statistically significant. In 2014, Soria et al. used a single workshop variable and found no significant relationship between workshops attended and GPA.

First-year GPA has been found to be a statistically significant predictor of retention (Westrick, Le, Robbins, Radunzel, Schmidt, 2015; Whalen, Saunders, & Shelley, 2009). First-year GPA also can predict future academic success (Tucker & McKnight, 2017). However, some researchers have found that first-year GPA is not statistically significant or practically significant (Kiser & Price, 2008). One reason for the mixed results is that each student body is unique and much of the research is granular, examining only a portion of the college experience or a single institution or types of institution. There needs to be more "integrated understanding of how multiple variables affect student degree attainment" (Whalen et al., 2009, p. 408). With a better understanding of which variables predict retention, it is possible to quickly identify which students are at risk and plan an appropriate intervention to help them succeed in college and be retained.

Currently, there is little literature examining the potential affect that library instruction has on GPA and retention. More research should be done in at least three related areas. 1) What affect does attending library instruction have on student GPA and

retention? 2) Does the frequency of library instruction affect student GPA and retention? 3) Does the type of library instruction affect student GPA and retention? Wong's & Cmor's (2011) research study demonstrating a positive correlation between attending library instruction and student achievement is encouraging, but it needs to be expanded. Further research is needed that controls for demographics and other covariates and uses more stringent statistical analyses. Gammell et al. (2012) took a different approach to students attending library instruction, treating it as an engagement measurement and not as a direct contributor to student outcomes. This research could also be repeated and expanded. Whether attending library instruction is a variable in its own right or a measure of engagement is a difficult question that can only be answered in the context of the institution.

Another avenue of research would be to examine how library instruction fits into the institutional mission and supports student learning. Results indicate that the frequency of library use and attending library instruction could increase the impact on student outcomes (Soria et al., 2014; Wong & Cmor, 2011). Research needs to be conducted on the frequency of library instruction to determine if there is an ideal number of classes or if the number varies by field of study. The term library instruction covers a broad range of activities, from orientations with little information literacy content to classes that are entirely information literacy focused. Research is needed on the types of library instruction and effective teaching methods. This would include designing assessments for library instruction. If library instruction can be assessed more effectively, then perhaps those assessments could be linked to student outcomes (Oakleaf, 2010).

Significance of the Study

This study focuses specifically on library instruction and its relationship to student retention and GPA. Several factors set it apart from previous research. First, no one has examined the relationship between library instruction and retention. Gammell et al. (2012) research was a library instruction workshop unconnected to a specific class's content. The library instruction classes examined in this project are requested by the professor, delivered as part of a regularly scheduled college course, and tailored to the class's content. Second, library attendance is already collected and added to VSU's data warehouse. Research utilizing this data demonstrates why other academic libraries should work with their institution's data warehouse and collect attendance data. Third, this research has a robust methodology that could be replicated elsewhere. Student outcomes and retention are complex topics with many possible definitions and contributing factors. Every institution is unique, with a different student body, learning environment, class offerings, and teaching ethos. Since every institution is unique, Haddow (2013) suggests that institutions should focus on their academic library's contributions to student outcomes. The goal should be replicable methodology instead of broadly generalizable results.

Project Selection

This assessment examines the relationship between library instruction and student outcomes, specifically focusing on student retention and GPA. Odum Library is part of VSU, a regional comprehensive university under the University System of Georgia (USG). VSU serves over 11,000 undergraduate and graduate students. The majority of

students come from Georgia, but the student population includes students come from across the country and internationally (Office of Institutional Research, n.d.).

The focus on library instruction was chosen for several reasons. Library instruction is the primary way that students learn to use the library. It includes basic skills, such as looking for books and articles on a topic, and more advanced skills, including critically evaluating the resources they found. Tutorials and working with a librarian individually supplement instruction. However, a library instruction class is the most efficient way to reach an entire class and ensure all the students receive the same instruction. Library instruction is one of the few library services where the librarians can easily collect user information by collecting attendance. Attendance is collected for all library instruction classes and entered into VSU's data warehouse. There are five reference librarians teaching library instruction. Library instruction is time intensive in both the preparation and the teaching. It would be informative to determine if library instruction has a positive association with student outcomes.

Research Questions

- Research Question 1: Is there a statistically significant relationship between attending library instruction and first-time, full-time freshman retention?
- Research Question 2: Is there a statistically significant relationship between attending library instruction and GPA for first-time, full-time freshman?
- Research Question 3: Is the difference between the retention rate of first-time, full-time freshmen who attend one library instruction session and the retention of first-time, full-time freshmen who attend multiple (>1) library instruction sessions statistically significant?

- Research Question 4: Is there a statistically significant relationship between GPA and first-time, full-time freshman retention?

Organization of the Study

This study includes five chapters. Chapter 2 will provide a literature review of assessment in academic libraries, the role of data and data warehouses in higher education, and the existing research on library usage and student outcomes. A brief review of the history of assessment in academic libraries will be examined, followed by a review of the barriers that inhibit assessment in academic libraries. The literature review examines the broader context of data's role in higher education, and then focuses on the data warehouse's role in managing data and assessment. Next, the literature review examines primary studies that research the connection between library usage and student outcomes.

Chapter 3 describes the methods used to collect and analyze the data. This research examines the relationship between library instruction and cumulative first-year GPA and first-time, full-time freshman retention while controlling for gender, race/ethnicity, and socioeconomic status. All the data will be requested from VSU's data warehouse. Independent variables are library instruction attendance and cumulative first-year GPA. Dependent variables are first-time, full-time freshman retention and first-year cumulative GPA. GPA is a dependent variable in the second research question and an independent variable in the fourth research question. For this assessment, library instruction will be defined as: librarian(s) delivering instruction to a class face-to-face Attendance for library instruction is collected for each library instruction session and recorded in VSU's data warehouse. The dependent variable, first-time, full-time

freshman retention, is defined as first-time, full-time freshmen returning the following fall semester, beginning their second year (University System of Georgia, n.d.). First-year cumulative GPA is defined as the cumulative GPA at the end of the spring semester. The first research question will be examined using Chi-squared Test and binomial logistic regression. The second research question will be examined using multiple linear regression. The third research question will be examined using Chi-squared Test and binomial logistic regression. The fourth research question will be examined using binomial logistic regression.

Chapter 4 will report the results of the data analysis outlined in Chapter 3. Descriptive statistics of the variable will be presented, along with relevant characteristics of the dataset. The results of the statistical analysis will be used to evaluate the null and alternative research hypotheses presented in Chapter 3. The results will be discussed, including any unexpected results.

Chapter 5 will examine the significance of the results presented in Chapter 4. The results will be discussed and related to the literature review. The literature on library usage and student outcomes frames library usage as a measure of student engagement. This research examines library instruction attendance as a measure of student engagement; therefore, the results will be examined within the context of student engagement. The results will be examined in relation to the research questions. Research limitations, including the data available, scope, and generalizability will be considered. The research project's contributions to librarianship and higher education will be discussed. Directions for future research and replication of the research will be considered. Finally, there will be a summary conclusion.

Summary

This assessment will demonstrate whether library instruction is positively associated with student GPA and retention. This research will illustrate the positive contributions of library instruction as well as its potential use as a predictor for retention. If library instruction is positively associated with GPA and retention, then freshmen students who do not attend library instruction are at higher risk of not being retained. This study will also demonstrate the need for future research on the role of library usage, specifically library instruction, and how it interacts with student success and retention. Further research is needed to determine how library instruction can be used as a predictor of and intervention for at risk students. Library instruction could be used to measure student engagement, in which skipping a required library instruction class is a risk factor. Library instruction or related services, such as a research appointment with a librarian, could be used as an intervention, delivering research instruction to the student at the point of need.

Chapter II

LITERATURE REVIEW

Problem Statement and Overview

In today's environment, universities are held accountable to many stakeholders, including students and their parents, government agencies, regional and/or other accreditors, and professional organizations. Measures of success in universities are no longer enrollment of students. They have shifted to meaningful student and university outcomes. Outcomes are defined by the university's response to internal and external pressures and communication (Mezick, 2015; Oakleaf, 2010). Retention and student success are two common outcomes found in almost all universities. Universities are devising ways to measure and assess their ability to reach targeted outcomes. Each part of the institution, including the academic library, is asked to demonstrate their value by proving how they support institutional outcomes. Data warehouses, with their ability to store and sort vast amounts of data for analysis, are one important tool in this process. Libraries have the potential to contribute data to these warehouses and use that data to inform decisions about what resources and services to provide. The data warehouse could be used to assess and evaluate library resources and services by relating them to university outcomes.

Libraries must collaborate with university-wide assessment efforts to demonstrate that library resources and services support outcomes are important to the university. Research projects are needed to demonstrate library value by showing library resources

and services support student-centered outcomes. These research projects require a type of library usage tracking relatively new to the field. Research projects demonstrating how the use of library resources and services support student outcomes require library usage data tied to a specific student and his or her outcomes (Matthews, 2012; Oakleaf, 2010). The following is a review of the literature exploring the history of assessment in academic libraries, barriers to new forms of assessment, the role of data and data warehouses in higher education and the research demonstrating the library's impact on student outcomes.

Assessment in Academic Libraries

Libraries have a long history of collecting statistics, dating back to 1908. The Association of Research Libraries (ARL) began publishing statistics in 1961 (Association of Research Libraries, n.d.). The nature of the statistics collected has evolved in parallel with developments in librarianship. For example, as library technologies evolved, new categories were added to statistics collections such as microform use, serials use, and interlibrary loans, among others. Much of the statistical data traditionally collected by libraries are based on output and input assessments. Inputs are the things purchased by the library such as journal subscriptions, books purchased, and renovations to the space. Outputs are the work generated by librarians and staff including books checked out, books cataloged, number of interlibrary loan requests, and number of reference questions answered (Hufford, 2013). Librarians value these measures and statistics because they help inform the library's management.

Universities are interested in outcomes based assessment measures relevant to the institution's mission and goals (Matthews, 2012; Mezick, 2015; Oakleaf, 2010). The

implementation of outcomes based assessment in academic libraries has been piecemeal, with a few libraries moving forward and publishing results. In 2002, the Association of Research Library (ARL) E-Metrics project examined how academic libraries relate their input and output measures to institutional outcomes. During the course of their project, the researchers found there was "little work towards actually identifying linkages and developing models that ARL member libraries could use to determine how best to measure their impact on the outcomes of the universities they support" (Fraser, McClure & Leahy, 2002, p. 506), and they recommend academic libraries work with their institution to identify institutional goals and outcomes, as well as operationalize library measures and statistics relating to university outcomes. Academic libraries need a balance of outcomes based assessment as well as input and output measures (Fraser et al., 2002). A mix of both types of measures provides a more complete picture of the library's usage and impact.

There are several barriers to implementing outcomes-based assessment in academic libraries including privacy, confidentiality, and customer service. Outcomes based assessment at the individual level looks at the library usage and outcomes of individual students (Murray et al., 2016). This type of assessment requires library usage data linked to an individual and their data in the data warehouse, raising concerns about privacy and security. Libraries have a long history of protecting the privacy of their patrons. The American Library Association (ALA) realized the potential for library records to be used by non-library agencies in the early 1970s when the Internal Revenue Service (IRS) tried to use library circulation records to form a list of suspects for an investigation on bomb manufacturing (Wilkes & Grant, 1995). ALA adopted its "Policy

on Confidentiality of Library Records" in 1971; it has since been updated twice. The policy encourages all libraries to have a formal (i.e. written) policy that protects library users' confidentiality (American Library Association, 2006). Protecting the privacy and confidentiality of library patrons remains important as libraries explore new ways to implement outcomes based assessment (Magi, 2007; Matthews, 2012; Nackerud, Fransen, Peterson, & Mastel, 2013; Wilkes & Grant, 1995). Finally, there is the concern that collecting library usage data will impede customer service, decreasing the likelihood that a student will use the library resources or services (Nackerud et al., 2013).

There are several ways to collect data tied to individual users' library activities while protecting their right to privacy. For some library activities, it is possible to "track user data without tying the data to specific user transactions" (Nackerud et al., 2013, p. 134). Nackerud et al. (2013) accomplished this by tracking the action generally, for example tracking the act of logging into a database, number of books checked out, signing up for a library workshop but not recording the actual resource such as the database name or search topics, book titles, or topic of the workshop. This approach is a step between not collecting personally identifiable data on library use at all and linking personally identifiable data to the actual resources used and university collected data.

Another way to protect library users' privacy is to collect personally identifiable data tied to library use, pair it with university collected data, and then strip out the identifiable data to protect the individual's privacy. A key point is that once the users' library data is paired with other data collected by the university, it is anonymized and decoupled from the personal identification information (Matthews, 2012). In this way, researchers analyze demographics using the library without identifying specific

individuals. For example, researchers could to look at how undergraduates use the library and its resources and how those usage patterns differ from graduate students.

Collecting information about the user's identity impedes the provision of some library services. For example, asking students for any form of identification at the reference desk could discourage students from seeking help. In these cases, the library must decide if perceived accessibility of service is more important to the mission than strict collection of user information for each interaction (Nackerud et al., 2013). The type and level of data gathered must be carefully considered to protect students' privacy and not impede their use of library resources and services. In the past few years, some research projects have used personally identifiable data collected as students used the library to assess the library's impact on various outcomes such as retention, grade point average, and graduation rates.

An increasing number of library researchers have argued academic libraries need to collaborate with their institutions to define outcomes, develop assessment measures to combine library usage data and university data, collect personalized library usage data, and develop secure methods for collecting and storing usage and assessment data (Fraser et al., 2002; Matthews, 2012; Nackerud et al., 2013; Oakleaf, 2010; Soria et al., 2013). An assessment system, such as a data warehouse, allows assessment data to be entered for a variety of library usage variables and collected over time. Future efforts to demonstrate and improve libraries value to stakeholders will require rich data sets that track library usage and tie it to the user's demographics. To prove that institutional outcomes are being reached, the library must demonstrate its impact on student enrollment and other outcomes, and this cannot be done without knowing who is using

the library, when they are using it, and what resources they are using (Matthews, 2012; Oakleaf, 2010).

Data in Higher Education

Academic libraries have the potential to participate in their institution's data collection and analyses. Once the decision is made to collect personally identifiable data on library use, the data needs to be stored securely and used productively. Library user's privacy should be protected both during data collection and once the information on library use is linked to other data gathered by the university. Before any data is gathered, the library administration and university administration should work together to determine what types of analyses are important to both parties, how those analyses can be generated, and what data needs to be collected. However, data alone is not enough. The library and university need a way to analyze the data. Personally identifiable records of library use can be securely stored in the university's data warehouse. The data warehouse can generate analyses that show what groups are using the library, what services that group utilizes, and if library use correlates to higher retention rates and grade averages. Data warehouse analyses can demonstrate the library's impact on student retention, highlight weak areas to address with marketing, outreach, or collection development, and generate data needed for data-based decision making. Data warehouse analyses should be used in conjunction with other forms of data such as statistics and surveys to provide a complete picture of the library's added value to the university (Fraser et al., 2002; Matthews, 2012).

Higher education has adapted data warehouses and analytics to address two problems that all higher education institutions face: student recruitment and success. Data

warehouses and analytics are used to analyze risk factors that negatively impact student success. Student success is usually thought of as a student's ability to persist or return each semester, grades, and time it takes to reach graduation. If risk factors can be identified early enough, an intervention can be staged that will help the student stay on track. By identifying risk factors for at-risk students and identifying predictive trends, institutions can create a plan to better support their students, including designing interventions that improve student success (Picciano, 2012).

Data warehouses and analytics can be used to answer questions about student experiences. Luan (2002) provides a set of traditional business questions translated into higher education concerns (Figure 1). Several of these questions can be translated into library administrative questions. For example "Who are my loyal customers?" could be "Who are the students using the most library resources?" Once they determine which student population the library primarily serves, then library administration can plan accordingly. Perhaps it is most prudent to expand the resources for that student population, or the administration can investigate why other student populations are underutilizing the library and take steps to change that.

Figure 1. Comparison of Data Mining Questions in Education and the Corporate World

Questions in the Business World	*Counterpart Questions in Higher Education*
Who are my most profitable customers?	Who are the students taking most credit hours?
Who are my repeat website visitors?	Who are the ones likely to return for more classes?
Who are my loyal customers?	Who are the persisters at our university, college?
What clients are likely to defect to my rivals?	What type of courses can we offer to attract more students?

Source: Luan, 2002, p. 28.

Data warehouses and analytics are changing how universities use data. Advances in technology make it possible to record vast quantities of data. Computing power allows researchers to run analytic programs that process massive amounts of data. Data warehouses are designed to make analysis easier by providing a way to collect, organize, and make data available on a scale that was once unthinkable. A data warehouse holds a vast quantity of institutional data that is organized and ready to be used in a variety of applications (Luan, 2002; Picciano, 2012; Wagner & Ice, 2012; Zhao & Luan, 2006).

One of the strengths of data warehouses is that all the information is ready to be analyzed. It does not need to be collected after a need is realized, and it does not need to be exported from the data warehouse to be used (Luan, 2002). Users of the data define their need and use the appropriate presentation tool to answer their need. Users of data warehouse information range from upper level administration to human resources, enrollment management, and teaching faculty. Potentially everyone working in the university could need and use data from the data warehouse. Presentation tools are used to extract or present such data. They range from simple tools, such as running a standard report at regular intervals, to statistical analyses, to the newest suite of data mining tools. Data warehouses can be used for simple but important reports or for the most innovative type of data queries such as data mining.

Data warehouses are ideally suited for storage, security, and analysis of large quantities of data. Data warehouses are defined as "an integrated, subject-oriented, time-variant, non-volatile database that provides support for decision making" (Inmon, 1996 as cited in Guan, Nunez, & Welsh, 2002, p. 171). In other words, a data warehouse is a centralized database that pulls data from the entire organization and defines and

standardizes that data according to rules, thus making it more comparable and easier to analyze. Data is organized by subject and time. Data is "non-volatile" meaning it is never lost or removed. A data warehouse continuously grows as data is added and provides a complete history of the organization (Guan, Nunez, & Welsh, 2002).

End-user participation is critical in designing and implementing a data warehouse. Data sources must be identified and correct data collected and transferred. Once data is transferred to the data warehouse, it must be integrated, which means the data must be tidied up, organized, defined, and standardized (Guan et al., 2002). All this work at the front of the process will make the data available for later analysis. Luan states "It is a major rule in the data mining community that a data mining project cannot be successful if the investigator is not a domain expert who is very tuned to the granular data" (2002, p. 30). The investigator, or researcher, must be both a subject matter expert and familiar with statistics. Many of the presentation tools used by administrators and faculty do not require this level of dual expertise, but advanced data mining techniques and the initial set-up of the data warehouse do need both statistical and subject matter expertise.

Data mining is the future of data analysis in higher education. Data mining differs from traditional statistical analysis in that it is designed to find patterns and relationships among the examined variables. Traditional statistics begins with a question and seeks to answer that question. A theory is developed based on existing knowledge, and statistical evidence can either support or not support that theory. Theory can clarify data mining results, but the data mining is not theory based. Traditional statistics research is concerned with sample size, variability within the sample, sample bias, and generalizability. Data mining can use an entire population or a defined subset for

analysis. Data mining frequently "focuses on prediction accuracy at an individual level" (Zhao & Luan, 2006, p. 12).

Skeptics of data mining point out the lack of theoretical basis as a weakness of data mining. However, data mining has proven very successful in business because it works, and this has won over skeptics. Higher education uses predictive analytics to enhance "learner relationship management" (Luan, 2002, p. 29). Learner relationship management includes marketing to potential students but goes beyond that to include collecting student feedback and planning for enough courses, in the right disciplines, and with enough staff and faculty (Luan, 2002; Picciano, 2012). Data mining is the key to learner relationship management and customized student experiences. With predictive analyses, universities can predict when a student struggles and needs support. Also, if a student is likely to withdraw or transfer, the university could reach out to the student to encourage him or her to stay (Luan, 2002; Zhao & Luan, 2006).

Academic libraries need to collaborate with their institution's data warehouse as well as other relevant departments, including those working to improve student retention and develop interventions for at-risk students. The library and institution can work together to determine what measures and statistics can be related to student outcomes. Also, the library and institution will have to define a privacy and data collection policy to protect students' privacy and not impede their use of library resources and services. Once these steps are complete, library usage data can be mapped to the data the university collects on each individual. Data analysis, including both traditional statistics and data mining methods, can help identify patterns of library use. Library use can be considered as a measure of student engagement. Student engagement enhances retention, while a

lack of engagement is a risk factor for withdrawal or low success (i.e. poorer grades) (Haddow, 2013; Haddow & Joseph, 2010; Mezick, 2007; Mezick, 2015; Murray et al., 2016). Not using the library can be used as a predictive measure that indicates students are not engaged and therefore are at-risk. Academic libraries can develop interventions that positively impact students, thus increasing the probability they will be retained and successful (Murray et al., 2016). Identifying predictive indicators of library usage, or non-use, and relevant interventions requires data on individual's library usage to be connected to the data the institution collects and thoughtful data analysis.

Impact of Academic Libraries on Student Outcomes

There is a small but growing body of literature researching the connection between library usage and student outcomes. It is difficult to find well-designed and generalizable research articles on library use and student outcomes. This is partially a definition problem and partially due to the numerous potential variables. Different researchers select different measures of library use, and might select different control variables. Further complicating the research are the various ways student outcomes such as engagement, retention, and persistence are defined. In response to this, Haddow (2013) suggests researchers should focus on deeply analyzing a single institution and their academic library using replicable methodology. The resulting research would be useful to the institution, and while it might not be generalizable, it could be replicated by other institutions. This literature review examines two areas of research that contribute to the knowledge of the relationship between library usage and student outcomes. These two areas are statistical research methodologies using institutional and individual level

research, and statistical research articles examining library instruction and student outcomes.

Statistical methodologies examining the library's impact on student outcomes can be divided into institutional and individual level research. Institutional level research uses institutional library variables and institutional retention or graduation rates to calculate correlations (Murray et al. 2016). Often this data is pulled from public data sets, including the Integrated Postsecondary Education Data System (IPEDS), the American Library Survey (ALS), the Association of Research Libraries (ARL), and the Association of College and Research Libraries (ACRL). Individual level research uses library usage data and retention, GPA, or graduation data that is linked to an individual's record (Murray et al., 2016). Publicly available data has the advantage of being freely available. Many institutions contribute their statistics and historical data exists. Research from a large public data set is generalizable. Individual level data, especially for library usage, requires planning to determine what data to collect and standardize that collection. Unlike institutional data, individual data may not be collected until someone recognizes a need and requests it. Both methods have contributed to the literature on the library's impact on student outcomes.

Institutional level research has demonstrated the library's impact on student outcomes. Mezick (2007) used data from IPEDS, ARL, and ACRL to examine the impact of library expenditures and the number of professional library staff on student retention. Library expenditures had a statistically significant and positive correlation with student retention. The relationship was strongest among baccalaureate colleges. Also, the number of professional staff had a statistically significant and positive correlation with student

retention. This relationship was strongest in doctoral-granting institutions. Emmons & Wilkinson (2011) used data from IPEDS and ARL to examine the relationship between academic library staff, collections, use, and services on retention and graduation. They controlled for gender, race/ethnicity, and socioeconomic status. The researchers found that the only library variable with a statistically significant impact was library staff. Library staffing was positively correlated to and statistically significant for retention and graduation. The impact was greater for graduation. Emmons & Wilkinson theorize this is because the positive impact of library staff have on student success is incremental and builds over time.

Crawford (2015) used data from IPEDS and ALS to examine the impact of several library services on graduation rate and retention. Crawford used the publically available data to create a library service index to serve as a "surrogate for average use of the library by individual students" (Crawford, 2015, p.48). Statistics for a number of library variables were compiled and divided by the student FTE (full time equivalent) to determine the average student library usage for the year. Crawford found that the "total services index per FTE had positive and significant correlations" (2015, p. 55) to 4-year, 5-year, and 6-year graduation rates and retention. However, the impact was small. Another library variable, library expenses per FTE, and institutional variables, including student service expenses per FTE and instruction expenses per FTE, are also positively correlated with three graduation rates and retention.

Individual level research has been used to examine the relationship between library use and student outcomes. Several researchers have studied the impact of library use on student achievement and/or retention using statistical analyses that demonstrate a

relationship or correlation. Most studies include more than one variable. Researchers frequently select variables already being collected as part of the daily administration of library services. For example, Haddow & Joseph (2010) used logins to library computers, logins to electronic resources that require authentication, and library loans. Haddow (2013) omitted the logins to computers and used the other two variables. Soria et al. (2013) used a mix of automatically collected data points and library service use. The automatic data points included electronic resource logins, loans, interlibrary loans, and computer logins. Library service usage was tracked through registration, class lists for library instruction, and contact information (Internet IDs) for research appointments and online chats. A similar set of variables was used again in 2014 by these researchers (Soria et al., 2014).

Collecting student usage of library services that are an interaction between the student and librarian requires planning. Data collection needs be systematic but unobtrusive. Nackerud et al. (2013) describe the process their library used to identify library usage variables where they could track library users' access of library services or resources. The usage data was linked to users' library records and personally identifiable information. Their goal was to standardize data collection and collect data linked to the user's personally identifiable information, yet maintain "an acceptable degree of user privacy" (p. 144). The data collected can be used for descriptive statistics, painting a picture of library use by various demographics, and for statistical analysis looking at how library use relates to other variables.

A few researchers include service variables in their research. Library services include a variety of activities in which the student interacts with a librarian or library

employee. This type of research is typically limited to a single institution, due to the personalized nature of the data collected. Some examples include research appointments, chat services, workshops, and library instruction. Librarians offer workshops on a variety of research topics or as an orientation to the library and its resources. Librarians teach library instruction at the professor's request. It is relevant to the course and focuses on research and information literacy skills the professor wants to the class to learn to do well in the course or on a specific assignment. Soria et al. include both workshops and instruction variables in the 2013 study and used the workshop variable in the 2014 study. Gammell et al. (2012) use workshop attendance and Wong & Cmor (2011) use library instruction attendance. In each of these cases the data was derived from a single institution, which limits the generalizability of the results.

Research on the impact of library instruction and workshops is inconsistent. In a single study, Soria et al. (2013) have shown that library instruction has no impact or a slightly negative impact on student outcomes, some workshops have no impact, and one workshop has a positive correlation to freshmen returning in their second semester but no correlation to GPA. In their 2013 study, Soria et al. (2013) include four separate variables for workshops and instruction: Intro to Library Research 1 and Intro to Library Research 2, both of which are taken alongside a freshman writing course; Workshop, not associated with a specific course; Instruction, taught for a class at the request of the professor. Instruction had a small, negative, statistically significant impact on GPA. The researchers state that "students who participated in a course-integrated instruction session reported a .08 decrease in GPA compared to their peers" (Soria et al., 2013, p. 155). They also found that attending the Intro to Library Research 2 was positively correlated with

returning for their second semester; “The odds ratio suggests that students who enrolled in the ‘Intro to Library Research Part 2’ course were 7.08 times more likely to return for the following semester” (Soria et al., 2013, p. 155, p. 160). There is a potential problem to consider in the data collection for the instruction variable. The data used was based on the class taught, and the entire class roster was entered for instruction. This does not account for students who did not attend the library instruction class. Another consideration is the small scale of the research; the researchers examined one semester of data, looking at whether the first-time students returned in their second semester and their GPA at the end of the first semester. In 2014, Soria et al. used a single workshop variable. Workshops attended did not have an impact on retention or cumulative GPA. In this study, the researchers were looking at the retention, first-time freshmen students returning for their second year, and first-year cumulative GPA.

Attending library instruction is positively correlated to retention. Gammell et al. (2012) examine student participation in library orientation and its impact on retention. New students were required to attend an online session with an information literacy test and an in-person library session. The researchers measured the level of students’ attendance: 1) completed the online test and attended the library session, 2) completed the online test and did not attend the library session, and 3) did not participate in either. Attending the library session and completing the online portion are positively associated with GPA and retention. The researchers found that:

> failure to complete training in how to use library resources appears to have particularly deleterious academic consequences as this measure is predictive of

> GPA in the first, $r = .26$, $p < .001$, and second, $r = .24$, $p < .001$, semesters. (Gammell et al., 2012, p. 14)

They also found attending and completing the in-person library orientation was the most powerful predictor of retention (Gammell et al., 2012).

Frequency of attending library instruction is positively correlated with student achievement (Wong & Cmor, 2011). The number of library instruction sessions offered to and attended by students affects the level of impact library instruction has on student outcomes. Wong & Cmor (2011) examined the impact of the number of times students attended library instruction (WKS) on GPA at graduation (GPA). The data set was divided into 45 discipline-based sample groups. Wong & Cmor (2011) theorized that different disciplines had different criteria for grading, affecting GPA, and different information needs, and therefore library instruction would differ. As the number of library instruction sessions offered increased, percentage of sample groups (disciplines) showing a positive correlation between WKS and GPA increased. For example, among groups offered one instruction session, only 15% showed any correlation. Among groups offered three or four sessions, 50% showed a positive correlation. Only one sample group was offered five library instruction sessions, English Language & Literature. This sample group was the only one with a strong positive correlation (Wong & Cmor, 2011). The other sample groups had weak, medium, or no correlation. None of the sample groups showed a negative correlation. This research does not address other factors that influence student achievement, and the statistics are limited to proving a relationship without addressing relationship causation or directionality.

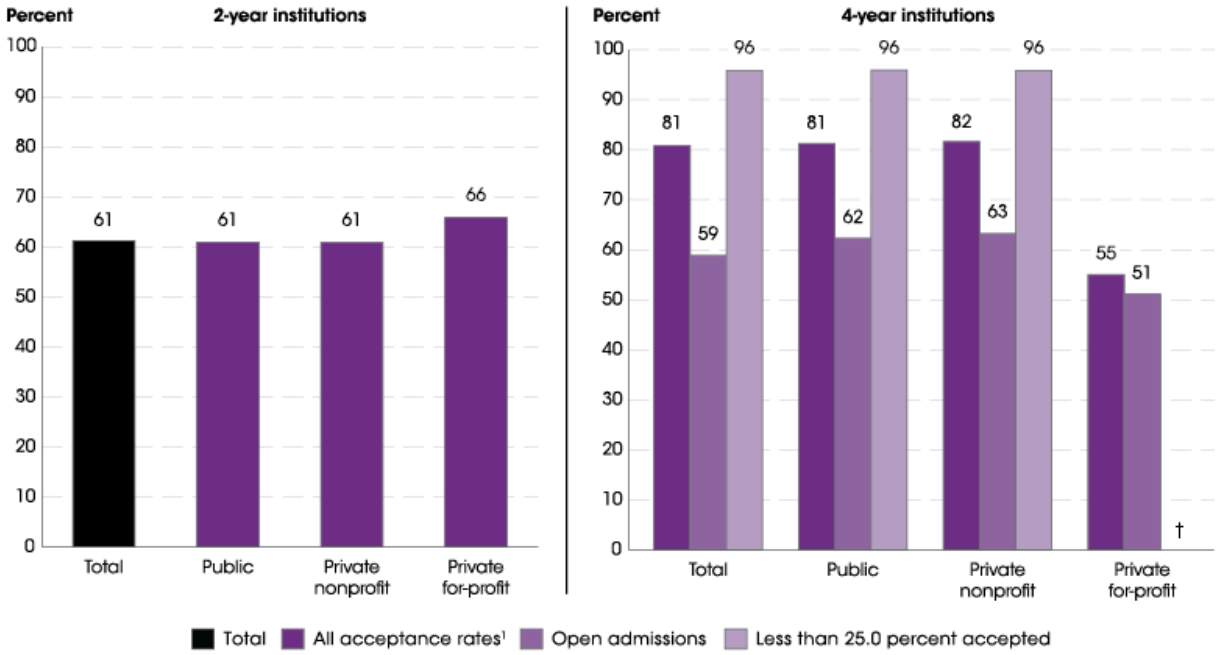
Several research studies could be replicated and expanded upon. Wong's & Cmor's (2011) research study demonstrating a positive correlation between attending library instruction and student achievement is encouraging. Their research has limited generalizability. Further research is needed that controls for demographics and other covariates and uses more stringent statistical analyses. Using library instruction as a measure of engagement (Gammell et al., 2012) opens up new research possibilities. Whether attending library instruction is a variable in its own right or a measure of engagement is a difficult question that can only be answered in the context of the institution. Institutional level research using publically available datasets provides a method for examining the relationship between library use and student outcomes. Several researchers have used variables from publically available data sets to examine the relationship between library use and student outcomes (Crawford, 2015; Emmons & Wilkinson, 2011; Mezick, 2007). This type of research methodology can be adapted to examine relationship between library instruction and student outcomes. The benefits of institutional level research include the results' generalizability. The field needs a larger body of research that uses a mix of in-depth research studies and larger scale generalizable studies. With a larger body of research, the relationship between library uses, including library instruction, and student outcomes can be better understood.

Retention & GPA

Higher education institutions are under pressure to improve retention rates (Kiser & Price, 2008; Tucker & McKnight, 2017; Whalen et al., 2009). Retention rate is the percentage of students who return to their institution the next fall. Low retention rates for first-time, full time students are an endemic problem at higher education institutions

across America. The National Center for Education Statistics (NCES) collects and reports on education statistics in the United States, including *The Condition of Education 2017* report (U.S. Department of Education, 2017). In the 2014-2015 academic year, retention rate for first-time, fulltime students at 4-year institutions was 81 percent (U.S. Department of Education, 2017, p. 268). Retention rates for first-time, fulltime students varied by the selectivity of the institution: "at the least selective institutions (i.e., those with open admissions) the retention rate was 62 percent, while at the most selective institutions (i.e., those that accept less than 25 percent of applicants) the retention rate was 96 percent" (U.S. Department of Education, 2017, p. 268) (see Figure 2).

Figure 2 Percentage of first-time, full-time degree-seeking undergraduates retained at 2- and 4-year degree-granting institutions, by institution level, control of institution, and acceptance rate: 2014 to 2015.



† Not applicable.

1 Includes institutions that have an open admission policy, institutions that have various applicant acceptance rates, and institutions for which no acceptance rate information is available.

NOTE: Degree-granting institutions grant associate's or higher degrees and participate in Title IV federal financial aid programs. Retained first-time undergraduates are those who returned to the institutions to continue their studies the following fall. Although rounded numbers are displayed, the figures are based on unrounded estimates.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Spring 2016, Fall

Enrollment component; and Fall 2014, Institutional Characteristics component. See *Digest of Education Statistics 2016*, table 326.30.

Source: (U.S. Department of Education. 2017, p. 268).

Enrolling students is not enough if they leave before graduating. Failure to complete the degree has negative consequences for students, affecting their future employment opportunities and intellectual growth (Kiser & Price, 2008). Institutions are increasingly expected to collect data and use empirical methods, including statistics, to improve retention and graduation (Whalen et al., 2009). To accomplish this, researchers need to identify variables that interact with retention and graduation. There are many possible variables, including pre-college variables, early college variables, and variables

that are academic versus those that are nonacademic (Kiser & Price, 2008; Westrick et al., 2015; Whalen et al., 2009). Once researchers have a better understanding of which variables predict success, or lack thereof, institutions can identify which students are at-risk of leaving or not graduating and develop interventions for those students (Cabrera, Nora, & Castaneda, 1993; Whalen et al., 2009).

A number of factors influence a student's decision to continue or leave an institution. Westrick et al. (2015) suggest that retention is a "multiple hurdle system" (p. 26). The three hurdles are: "academic eligibility, financial resources, and motivation" (Westrick et al., 2015, p.26). Research studies examining GPA as a risk-factor and predictor focus on academic eligibility. Research on GPA and retention seems to suggest that GPA is one of the most important factors in being retained. Nevertheless, it is important to recognize the other two hurdles, finances and motivation, and include them in research and the development of holistic models of retention (Allen, Robbins, Casillas, & Oh, 2008; Westrick et al., 2015). Including financial resource variables such as socioeconomic status of students' parents or financial aid allows researchers to investigate the relationship between financial resource variables and academic achievement or retention (Westrick et al., 2015; Whalen et al., 2009).

First-year GPA has been found to be a statistically significant predictor of retention and future GPA (Tucker & McKnight, 2017; Westrick et al., 2015; Whalen et al., 2009). Student GPA almost always makes a statistically significant contribution to retention and persistence (Pascarella & Terenzini, 2005; Westrick et al., 2015). Westrick et al. state that

> Recent studies using ACT scores, high school GPA, SES, psychosocial factors, interest-major congruence, and academic performance as predictors of retention and timely degree attainment (Allen et al., 2008; Allen & Robbins, 2010; Robbins et al., 2006) found that 1st-year academic performance was the strongest predictor of retention through the 1st and 3rd years, and of degree attainment within 4 years. (2015, p. 26)

First-year GPA is one of the best predictors for retention, persistence, graduation, and future academic achievement (Tucker & McKnight, 2017; Westrick et al., 2015; Whalen et al., 2009). Westrick et al. (2015) examined a mix of pre-college variables and college variables, including ACT scores, high-school GPA, and parents socioeconomic status and 1st-year and 2nd-year cumulative GPA. The researchers found that "1st-year GPA was found to be the best predictor of 2nd- and 3rd-year retention" (Westrick et al., 2015, p. 43). Tucker & McKnight (2017) "assessed the feasibility of using precollege success indicators to identify at-risk students" (p. 1). The researchers also included college variables: semester admitted and first-year GPA. They found that any GPA above 2.15 increased the probability of students' future academic success. Whalen at al. (2009) examined 1–year retention and 6-year retention and graduation rates, looking at pre-college and college variables. The researchers found that several variables, including first-year GPA, were "statistically significant predictors of retention to the second year" (p. 407). Whalen at al. (2009) found that

> students with higher GPAs at the end of their first college year were significantly ($p < .001$) more likely to be retained, rather than not retained, compared to students with lower year-one GPAs; students with an additional grade point unit

(e.g., a 3.00 (“B”) versus a 2.00 (“C”) GPA on the usual 4-point range) were nearly 3.5 times as likely as students with a one-unit lower GPA to be retained, rather than not retained, to the second year. (p. 418)

Kiser & Price (2008) found that first-year GPA is not statistically or practically significant. Several reasons could explain why some researchers find GPA to be statistically significant and others do not. First, much of the research is granular, examining only a portion of the college experience or a single institution or type of institution. Examining only a portion of the college experience provides an incomplete understanding of how variables interact. Second, each student body is unique. Researchers should consider how the population at institutions differ and consider how definitions of at-risk and the relevant variables may differ (Tucker & McKnight, 2017; Whalen et al., 2009). Several researchers argue that there needs to be a more “integrated understanding of how multiple variables affect student degree attainment” (Whalen et al., 2009, p. 408). Institutions need to “develop degree attainment models” using a variety of variables, including both academic and nonacademic variables, as well as pre-college and early college variables, that leverages their institutional data (Whalen et al., 2009, p. 408). Library instruction, as well as other forms of library usage, is one variable of student engagement and learning that could be included in research on relationship between retention and GPA.

Theories of Motivation, Engagement & Persistence

Motivation and engagement have a relationship with student outcomes, including retention and academic success (GPA). Research indicates that motivation and engagement predict students’ retention and academic success (Kuh, Kinzie, Buckley,

Bridges, & Hayek, 2006; Reason, Terenzini, & Domingo, 2006). One reason researchers focus on engagement is that they believe it is malleable. Engagement is one of the few predictors of student success that universities and college can influence. Interventions designed to improve student success frequently focus on engagement as a means to improve learning and retention (Fredricks, Blumenfeld, & Paris, 2004; Kuh et al., 2006; Pascarella & Terenzini, 2005).

Motivation and engagement are related but distinct concepts. Reeve defines the difference between the two as "motivation is a private, unobservable psychological, neural, and biological process that serves as an antecedent cause to the publically observable behavior that is engagement" (2012, p. 151). Engagement connects motivation to student outcomes. Student motivation influences the level of engagement which then influences outcomes (Kuh et al., 2006; Reeve, 2012; Reeve & Tseng, 2011). The relationship between motivation, engagement, and student outcomes is not linear in one direction. Motivation and engagement are linked and influence each other (Reeve, 2012).

Motivation variables have some influence on retention and can be operationalized in multiple ways, with each focusing on different aspects of motivation. One measure of motivation may have a significant effect on retention, while another has an indirect effect, and yet another has no effect (Allen et al., 2008). Motivation variables are not directly and routinely collected by institutions. Surveys are one way of collecting data on motivation. For example Kiser & Price (2008) used a survey that included questions about future "career plans", "life goals", and "reasons for attending college" (p. 426). Allen et al. (2008) used a survey to collect information on several constructs, including:

"Academic Discipline", "Commitment to College", and "Social Connection" (p. 650). They found that "college commitment has a direct effect on staying" and "academic self-discipline" had an effect on first-year academic achievement, which in turn had an indirect effect on retention (Allen et al., 2008, p. 661). In other words, some measures of motivation had a direct effect on retention. Other measures of motivation had an indirect effect; these measures affect academic achievement, which is the strongest predictor for retention and future achievement.

Engagement is a multifaceted concept (Fredricks et al., 2004; Gunuc & Kuzu. 2015; Kahu, 2013; Reeve, 2012). Engagement has been defined many ways, frequently focusing on students' educational activities. Focusing on students' activities neglects the cognitive dimensions of engagement (Gunuc & Kuzu. 2015). Gunuc & Kuzu define the "concept of student engagement…as the quality and quantity of students' psychological, cognitive, emotional and behavioural reactions to the learning process, as well as to in-class/out-of-class academic and social activities, to achieve successful learning outcomes" (2015, p. 588). This definition includes the focus on observable behaviors, in and out of class, as well as the internal cognitive components of engagement.

Engagement as a construct is generally considered to have three components: behavioral engagement, emotional engagement, and cognitive engagement (Fredricks et al., 2004; Reeve & Tseng, 2011). Behavioral engagement is the observable behavior where students participate in class and the environment positively and are involved in learning activities both inside and outside of class. Emotional engagement is students' emotional reaction within the class, to the instructor, or the institution (Fredricks et al., 2004). Emotional engagement and motivation are sometimes conflated, and the terms are

used interchangeably; although, they are not the same thing (Fredricks et al., 2004). Cognitive engagement focuses on the students' use of strategic learning strategies and self-regulation (Fredricks et al., 2004; Reeve & Tseng, 2011).

Engagement is considered malleable, and it can be influenced by changing the learning environment (Fredrick et al., 2004; Reeve & Tseng, 2011). Conceptualizing engagement as three components, behavioral, emotional, and cognitive, implies that engagement is directional, but it is actually multidirectional. The environment, and changes in the environment, drive the level of engagement. However, student engagement influences the environment and positively reinforces itself. Reeve & Tseng (2011) suggest that a fourth component, agentic engagement, exists. Agentic engagement is "students' constructive contribution" to instruction, where students proactively attempt to personalize instruction and influence the way the class is taught (Reeve & Tseng, 2011, p. 258).

Engagement is a complex construct that can be defined and operationalized many different ways. It is frequently conceptualized as three or four components that are distinct yet frequently overlap. Engagement is multidirectional, in that the environment can influence engagement, and engagement can affect the environment and future engagement levels. Due to its complexity, engagement is a challenging concept to define and research (Fredricks et al., 2004; Reeve & Tseng, 2011).

There are many models of student persistence. Persistence is when a student continues to be enrolled at a specific institution until graduation. When a student leaves an institution they are no longer persisting, and this can be referred to generally as withdrawal or attrition. Students can leave for several reasons, including withdrawing and

not continuing their education, withdrawing with the intent to continue their education at a later date, or transfer to another institution (Allen et al., 2008; Westrick et al., 2015). Retention is a specific type of persistence defined as when freshmen return and reenroll for their second year of college.

Tinto's model of persistence is the "dominant sociological perspective" (Kuh et al., 2006, p. 11). Tinto suggests persistence is a result of academic integration and social integration. The level of integration affects the student's level of goal commitment and institutional commitment (Tinto, 1975; Metz, 2004). Tinto's theory, developed in 1975, has been revised and expanded numerous times by Tinto (1987, 1993) and other researchers (Bean & Metzner, 1985; Cabrera et al., 1993; Kuh et al., 2006; Metz, 2004). Tinto's theory is well known, and it formed the basis of many subsequent models; however, it has a lot of critics. There is little empirical support for Tinto's theory. Other criticisms include the lack of inclusion of two-year schools (Bean & Metzner, 1985; Metz, 2004), the inapplicability to non-traditional groups of students (Bean & Metzner, 1985), the original factors included in the model (Bean, 1980; Metz, 2004), and a lack of generalizability (Kuh et al., 2006; Metz, 2004). In 1987, Tinto expanded the model to include "five major theoretical bases for developing and understanding the evolving nature of student persistence research…psychological, societal, economic, organizational, and interaction factors" (Metz, 2004, p. 195).

Bean & Metzner (1985) revised and expanded Tinto's model (1975) to develop an attrition model for nontraditional students. They suggest social integration is different for nontraditional students who live off-campus and commute than traditional students who live on campus. Their model incorporates background, academic, and environmental

variables, academic and psychological outcomes, and intent to leave as factors that influence a student's decision to dropout (Bean & Metzner, 1985, p. 491). The model addresses environmental factors that affect nontraditional students such as hours of employment, outside encouragement, and family responsibilities (Bean & Metzner, 1985). Cabrera et al. (1993) found that both Tinto's model (1987) and Bean's model (Bean, 1980; Bean, 1982; Bean & Metzner, 1985) were both valid, with different strengths and weaknesses, and could be combined to form a single more comprehensive model (Cabrera et al., 1993; Kuh et al., 2006).

Reason et al. (2006) suggest that the first year of college is extremely important. During their first year, students make greatest gains in learning and cognitive development (p. 149-150). The growth and success of students' first year influences future achievement and outcomes, persistence, and graduation. Their model incorporates student precollege characteristics and experiences, organizational factors, student experiences in the classroom, experiences outside the classroom, curricular experiences, and how these factors influence student learning and persistence (Reason et al., 2006, p. 154). Reason et al.'s model

> implies that growth in [academic competence] is a function primarily of student engagement in three particular venues: the curriculum (e.g., the courses taken and major field of study), the classroom (e.g., pedagogical approaches and behaviors of instructors), and the out-of-class activities in which students engage. Generally, the more actively students involve themselves in the curricular and co-curricular experiences of college, the more growth they can expect to experience. (2006, p. 154)

Reason et al. (2006) found "various forms of engagement were also powerful predictors of growth in academic competence" (p. 170). They suggest that first-year students should be given multiple opportunities to "engage in and practice advanced cognitive activities, including opportunities to analyze, synthesize, judge, and apply information" (Reason et al., 2006, p.170). Cognitive activities improves students' learning and academic competence.

There is no single theoretical model that accounts for all the factors that influence student persistence and outcomes. Many factors influence student success in college. Kuh et al. (2006) reviewed the literature on student success, examining the "policies, programs, and practices that can make a difference to satisfactory student performance in postsecondary education" (p. 3). Factors that affect student success were group into four categories: 1) student background characteristics, precollege experience, and enrollment patterns, 2) student behaviors, activities, and experience in postsecondary education, 3) institutional conditions, 4) student outcomes and success indicators during and after college (Kuh et al., 2006, p. iii – v). Many persistence models address factors from some or all of these categories, but no one model comprehensively includes all the factors from all the categories. Viewed collectively, persistence models can provide a holistic picture of persistence (Kuh et al., 2006).

Variables Selected for this Pilot Study

Library instruction was selected for the library usage study for several reasons. Library instruction includes information literacy concepts, as well as practical how-to research skills. Assignments that involve research, analysis and evaluation of information, and its use in a paper or project are the types of cognitive activities that

improve students' learning and academic competence, which contributes to their outcomes (GPA and retention) (Reason et al., 2006). Library instruction supports these activities, providing another venue for students to apply those skills. Students can practice research and information literacy skills with a librarian present to answer questions and provide guidance. Additionally, attendance records for library instruction are relatively easy to collect as professors regularly collect class attendance. Student privacy is protected by only collecting attendance data as the topics they research and resources they use are not collected. Also, data is entered into the data warehouse, which maintains student privacy standards. Finally, some research indicates that attending a required library instruction session is a measure of student engagement (Gammell et al., 2012).

The student outcomes selected for this study are first-time, first year freshmen retention and first-year cumulative GPA. These two variables are frequently studied student outcomes, as discussed in the literature review. Other measures exist, such as persistence and graduation rates, but the data set for this project only includes three years; there is currently not enough longitudinal data for persistence and graduation research. Additionally, some research indicates the first-year is instrumental in determining students' future success (Reason et al., 2006).

The control variables, gender, race/ethnicity, and socioeconomic status, were selected based on previous research. Emmons & Wilkinson (2011) examined student variables used in education research on outcomes and found the "variables most consistently cited as factors in the literature are race, SES, and gender" (p. 131). Some researchers use Pell grant status (received a grant, or not received) as a measure of

socioeconomic status (Gammell et al., 2012). VSU collects Pell grant status, therefore this variable is used as a measure of SES. VSU also collects data on gender and race/ethnicity, so these variables could be included. Gender is frequently used as a control variable; however, the research on whether gender is a significant predictor is mixed. Some researchers have found that gender is related to research, while others have not (Whalen et al., 2009). Race/ethnicity is frequently used as a control variable. Research indicates that there are race/ethnicity differences in college preparation, which can affect first-year GPA and retention (Kuh et al., 2006). However, not all researchers find race/ethnicity to be significant predictors for retention (Whalen et al., 2009). Whalen at al. (2009) suggest in studies that include other control variables that race/ethnicity and gender may still affect retention, but their partial effects are not significant.

Summary

This research examines the relationship between library instruction, retention, and GPA. Retention is influenced by many factors including academic eligibility, i.e. grades, and motivation or engagement. Attending library instruction is examined as a student engagement measurement. Engagement can be operationalized in many different ways, including attending library instruction (Gammell et al., 2012).

Engagement influences student students' academic achievement (GPA) and retention (Bean & Metzner, 1985; Cabrera et al., 1993; Kuh et al., 2006; Pascarella & Terenzini, 2005; Reason et al., 2006; Tinto, 1975; Tinto, 1987). Engagement can be increased by providing students meaningful educational activities that encourage cognitive development. For example, research and writing assignments that require the use of library resources and the synthesis of information (Kuh et al., 2006). Behavioral

engagement is observable student behavior as they participate in learning activities (Fredricks et al., 2004). In this research, attending library instruction is a variable that measures behavioral engagement.

Students have to clear three hurdles to successfully be retained: academic achievement, motivation, and finances (Westrick et al., 2015). Engagement is used in this research rather than motivation because behavioral engagement can be observed. Motivation and engagement are related concepts and influence one another. It is difficult to clearly define where motivation ends and engagement begins, and they are sometimes conflated in the research (Fredricks et al., 2004). GPA is used as a measure of academic achievement. First-year GPA is one of the best predictors for retention, persistence, graduation, and future academic achievement (Tucker & McKnight, 2017; Westrick et al., 2015; Whalen et al., 2009). Financial status is examined as a control variable and is measured by Pell Grant status. It is difficult to clearly identify whether engagement (attending library instruction) or academic achievement (GPA) has a relationship with retention.

Engagement may influence academic achievement and retention directly or indirectly. If increased levels of engagement are associated with increased levels of retention, then engagement had a direct effect on retention. If increased levels of engagement are associated with higher GPAs, and higher GPAs are associated with retention, then engagement indirectly effected retention. It is less likely engagement would have a direct effect on retention and an indirect effect on GPA since maintaining a sufficient GPA is a prerequisite for retention.

This research focuses on first-year students. It is possible that attending library instruction in the first year will have a positive, statistically significant relationship with retention and/or GPA. Students' success and engagement in their first year influences their future achievement and retention (Reason et al., 2006). However, it is also possible that a positive relationship between attending library instruction and retention and/or GPA requires more time and opportunities to participate in library instruction (Wong & Cmor, 2011). In the future, it would be helpful to conduct the research with four or more years of data. First-year results could be compared to four-year or six-year results.

This research examines institutional data from VSU. There is limited research on library instruction and student outcomes. The research that does exists focuses on a single institution (Gammell et al., 2012; Soria et al., 2013; Soria et al., 2014; Wong & Cmor, 2011). This allows for in-depth and informative research, but it is not generalizable. Part of the value of these research studies lies in their ability to be replicated (Haddow, 2013). Examining library instruction and student outcomes on a larger scale would allow for more generalizable conclusions. Unfortunately, academic libraries rarely collect attendance in their library instruction classes.

With such a small body of research on the topic, it is not possible to draw any definite or generalizable conclusions about the impact of library instruction on student outcomes. The pilot project tests the feasibility of collecting personally identifiable library use data and integrating that data with the university's data warehouse. Personally identifiable data is a record of a specific student using a library resource or service, in other words a record of library use that is tied to the student's personal information. This

pilot project is a small scale experiment to determine the relationship between library instruction and retention and GPA. The following questions will be examined:

- Research Question 1: Is there a statistically significant relationship between attending library instruction and first-time, full-time freshman retention?
- Research Question 2: Is there a statistically significant relationship between attending library instruction and GPA for first-time, full-time freshman?
- Research Question 3: Is the difference between the retention rate of first-time, full-time freshmen who attend one library instruction session and the retention of first-time, full-time freshmen who attend multiple (>1) library instruction sessions statistically significant?
- Research Question 4: Is there a statistically significant relationship between GPA and first-time, full-time freshman retention?

This research will add to the existing literature on engagement and retention, with results that clarify the relationship between engagement and retention. Behavioral engagement, operationalized as attendance in library instruction or presentations, influences retention (Gammell et al., 2012). Increasing engagement is believed to increase academic achievement and retention (Fredricks et al., 2004; Kuh et al., 2006; Westrick et al., 2015). In addition, the results will add to the research on library instruction and academic achievement as well as academic eligibility and retention (Soria et al., 2013; Soria et al., 2014; Wong & Cmor, 2011; Westrick et al., 2015).

Chapter III

METHODOLOGY

The purpose of this dissertation research is to examine whether library instruction has a positive influence on students' outcomes, specifically retention and GPA. Retention is influenced by many factors, as is GPA. This research will look at the relationship between library instruction and retention, library instruction and GPA, and the number of library instruction sessions attended and retention. In addition, the research will examine the relationship between GPA and retention. This research is focused on a specific institution, Valdosta State University (VSU).

Research examining the relationship between library instruction and student success variables varies greatly. Overall, research indicates that attending library instruction has either no relationship with retention and GPA or a positive relationship with retention and GPA. Attending multiple library instruction sessions has a stronger relationship with retention and GPA than attending only one session. Attending library instruction improves retention both directly and indirectly. When attending library instruction is positively associated with GPA, and GPA is positively associated with retention, then library instruction has indirectly improved retention by improving GPA. One possible explanation for these relationships is student engagement.

Engagement may influence GPA and retention directly or indirectly. When increased levels of engagement are associated with higher GPA or retention, then engagement had a direct effect. When increased levels of engagement are associated with

higher GPAs, and higher GPAs are associated with retention, then engagement indirectly effected retention. This dissertation research will contribute to the body of research on the relationship between attending library instruction and retention and GPA.

Research Questions & Hypotheses

The following comparative analysis will examine the relationships between attending library instruction, student retention, and GPA. The following questions and hypotheses will be examined:

Research Question 1: Is there a statistically significant relationship between attending library instruction and first-time, full-time freshman retention?

- $H1_0$ There is no statistically significant relationship between attending library instruction sessions and first-time, full-time freshman retention.
- $H1_a$ There is a statistically significant relationship between attending library instruction and first-time, full-time freshman retention.

Research Question 2: Is there a statistically significant relationship between attending library instruction and GPA for first-time, full-time freshman?

- $H2_0$ There is no statistically significant relationship between attending library instruction and GPA.
- $H2_a$ There is a statistically significant relationship between attending library instruction and GPA.

Research Question 3: Is the difference between the retention of first-time, full-time freshmen who attend one library instruction session and the retention of first-time, full-time freshmen who attend multiple (>1) library instruction sessions statistically significant?

- $H3_0$ There is no statistically significant difference between first-time, full-time freshman retention and students attending one library instruction session and those attending multiple library instruction sessions.
- $H3_a$ There is a statistically significant difference between first-time, full-time freshman retention and students attending one library instruction session and those attending multiple library instruction sessions.

Research Question 4: Is there a statistically significant relationship between GPA and first-time, full-time freshman retention?

- $H4_0$ There is no statistically significant relationship between GPA and first-time, full-time freshman retention.
- $H4_a$ There is a statistically significant relationship between GPA and first-time, full-time freshman retention.

Procedures & Statistical Analyses

For the first four hypotheses, the researcher will compare the retention and GPA for all first-time, full-time freshmen students who attended library instruction to the retention and GPA for first-time, full-time freshmen who did not attend library instruction. Three cohort years will be examined: (1) Fall 2015 (includes Fall 2015 through Spring 2016, n=1410), (2) Fall 2016 (includes Fall 2016 through Spring 2017, n=1529), and (3) Fall 2017 (includes Fall 2017 through Spring 2018, n=1729). The three cohort years will be combined and examined together. The researcher was granted approval for the research by the Institutional Review Board (IRB) at Valdosta State University (see Appendix B).

A cohort is composed of all first-time, full-time freshmen students who began in the Fall semester. Each cohort year will only include first-time, full-time freshmen because retention is defined as first-time, full-time freshmen returning the following Fall semester at the beginning their second year (University System of Georgia, n.d.). Students who return the following Fall are retained (retention variable).

The cohorts will be examined to determine if there are statistically significant and meaningful relationships between library instruction attendance and retention; library instruction attendance and GPA; and GPA and retention.

The first hypothesis (H1) will be examined using Chi-squared Test and binomial logistic regression. The second hypothesis (H2) will be examined using multiple linear regression. The third hypothesis (H3) will be examined using Chi-squared Test and binomial logistic regression. The fourth hypothesis (H4) will be examined using binomial logistic regression.

Data Sources

The statistical analyses use data collected at VSU. VSU collects data on library instruction attendance, gender, Pell Grant status, race/ethnicity, first-year cumulative GPA, and first-time, full-time freshmen retention. The VSU reference librarians began collecting attendance for library instruction sessions in the Fall 2013 semester. VSU's Data Warehouse created an application (app) for the reference department to track student attendance to library instruction. When professors schedule library instruction, they provide the reference department with the class's Course Registration Number (CRN), a unique identifier for the class. The data warehouse app allows the library to pull

the class roster for each CRN. Once library instruction is complete, the attendance is logged into the portal, recording which students attended library instruction.

The data warehouse collects extensive data on each student. The library instruction attendance data is added to the student's individual data in the data warehouse. Librarians do not have access to student data, which protects students' privacy. The librarians contact the Office of Institutional Research when they are ready to review statistics on library instruction attendance or run more complicated statistical analysis. Data Warehouse and Strategic Research can pull the relevant data and ensure that it is depersonalized, or not associated with data that can identify the students.

Variables

The independent variables are attending library instruction session(s) and first-year cumulative GPA. Attending library instruction will be examined as a categorical variable. For the first and second research questions, library instruction as a categorical variable simply counts if a student attended library instruction at least once during either Fall or Spring semester. It does not examine how many sessions the student attended. For the third research question, library instruction as a categorical variable will have two categories: students who attended one library instruction session and students who attended more than one library instruction session. A student may attend multiple library instruction sessions because more than one professor requested instruction for their course. However, each course can only be entered in the data warehouse once per semester. If a professor schedules multiple library instruction sessions for their course, only the attendance for the first library instruction session is entered.

First-year cumulative GPA is the cumulative GPA calculated at the end of the second, i.e. Spring, semester. First-year cumulative GPA will be examined as both an independent variable and dependent variable. In the second hypothesis, H2 there is no relationship between attending library instruction and GPA, attending library instruction is the independent variable and GPA is the dependent variable. The fourth hypothesis, H4 there is no relationship between GPA and retention, examines the relationship between GPA and retention. For the fourth hypothesis, GPA is the independent variable and retention is the dependent variable.

Several other variables are believed to affect student retention rates. In order to determine if library instruction attendance is associated with retention, it is necessary to look at these other variables too. The control variables are: gender, race/ethnicity, and socioeconomic status (measured as Pell recipient or not). VSU collects Pell grant status; therefore, this variable is used as a measure of socioeconomic status (SES). VSU also collects data on gender and race/ethnicity. All the variables are described Tables 1-4 of Appendix A.

Limitations

There are several limitations to this research. Library instruction is only one way that students interact with librarians. Collecting library instruction attendance does not account for other student interactions such as asking questions at the reference desk or meeting with a librarian to get research help. The librarians do not collect names or VSU student identification card numbers of the students they work with. Another limitation is the lack of data for courses that schedule more than one library instruction session in a semester. Each course can only be entered in the data warehouse once per semester.

Future research should include collecting this data and exploring the impact of attending multiple library instruction sessions. Finally, the research is not generalizable because it is limited to a single institution. However, the research methodology could be applied at other schools if they have a similar data warehouse and can collect library instruction attendance information.

Conclusion

This dissertation contributes to the research on the relationship between attending library instruction and retention and GPA. The research questions posit the existence of a relationship between attending library instruction sessions and retention and GPA.

The statistical examination analyzes several possible relationships between attending library instruction, retention, and GPA. To determine the nature of these relationships, logistic regression, Chi-Squared Test, and linear regression will be conducted.

This research further examines the relationship between library instruction attendance and student outcomes. Two student outcomes were selected for study: retention and GPA. The data for this project was obtained from institutional data collected by VSU. While the institutional findings have limited generalizability, they are replicable and the same methodology could be used elsewhere. As colleges and universities develop their data warehouses and collect data on students' use of libraries, research can be more definitive on the relationship between student use of the library and student outcomes such as retention and GPA. Once enough institutions conduct research on library instruction and student outcomes, there will be a body of research large enough to draw generalizable conclusions.

This research demonstrates the need for future research on the role of library instruction and how it influences student success and retention. The scope of this project is very focused; other items that warrant examination include classes that schedule multiple library instruction sessions and other forms of instruction that occur outside the classroom. Further research is needed to determine how library instruction can be used to predict retention and student success (GPA), as well as the influence of library instruction on retention, persistence after the second year, graduation, and GPA. There needs to be research on the potential use of library instruction as an intervention for at-risk students. The literature discussed in Chapter 2 suggests that library instruction has a neutral or positive relationship with retention, and this positive relationship increases as the number of library instruction sessions attended increase. This relationship illustrates the positive contributions of library instruction, as well as its potential use as a predictor for retention.

Chapter IV

RESULTS

Relationship of Library Instruction to Retention & Grade Point Average (GPA)

The results and observations presented in this chapter are exploratory and descriptive, allowing for the author to explain her conclusions and leaving room for the reader to draw their own conclusions from the data. These findings cannot represent all factors that contribute to first-time, full-time freshman retention and GPA. However, they are intended to further the study of library instruction and how it contributes to first-time, full-time freshman retention and GPA. The relationship between the variables has been examined and tested for statistical significance using logistic regression, linear regression and Chi-square test.

This chapter contains the results of analyses performed to address the research questions. Analyses were performed on Fall 2015 (n = 1410), Fall 2016 (n = 1529), and Fall 2017 (n = 1729) semesters. First-time, full-time freshman retention is defined as when a first-time, full-time freshmen student returns the following fall semester, beginning their second year (University System of Georgia, n.d.). The implications of the results will be further discussed in Chapter V.

Research Question 1

Research Question 1 asks, is there a statistically significant relationship between attending library instruction and first-time, full-time freshman retention? The first null hypothesis $H1_0$ states there is no statistically significant relationship between attending

library instruction sessions and first-time, full-time freshman retention. The alternative hypothesis $H1_a$ states there is a statistically significant relationship between attending library instruction and first-time, full-time freshman retention. Cross-tabulation and binomial logistic regression is used to determine the probability of being retained given the independent variables.

Cross-tabulation results between attending library instruction and first-time, full-time freshmen retention supports the alternative hypothesis. Attending library instruction and first-time, full-time freshmen retention are both categorical variables. Library instruction attendance has two categories: 0 (did not attend) and 1 (did attend). Retention has two categories: 0 (were not retained) and 1 (were retained). They were analyzed using cross tabulation and the Chi-square test in order to study the relationship between these two categorical variables. The cross-tabulation used the full data set, Fall 2015-2017. Table 3 is the result of the cross-tabulation and chi-square test in SPSS. Retention was higher in the group of students who attended library instruction than it was in the group who did not. Of the students who were retained, 72.60% did attend library instruction and 64.80% did not attend library instruction. The difference is statistically significant, $p < 0.001$, which means we can reject the null hypothesis.

Table 3. Cross-tabulation of Attendance and Retention, 2015-2017.

			Library Instruction Attendance		Total
			Did Not Attend	Attended	
Retention	Not Retained	Count	1048	462	1510
		% within Attendance	35.20%	27.40%	32.30%
	Retained	Count	1931	1227	3158
		% within Attendance	64.80%	72.60%	67.70%
Total		Count	2979	1689	4668
		% within Attendance	100.00%	100.00%	100.00%

Chi-square = 30.167, $p < 0.001$

Binomial logistic regression is used to determine the probability of being retained given the independent variables. Pretests were run for the binomial logistic regression model used for the research question, and the assumptions were fully met. Binomial logistic regression was run using the full data set, Fall 2015-2017, in SPSS. The dependent variable is retention (RETAINED), the independent variable is library instruction attendance (LIBRARY INSTRUCTION), and the control variables are gender (GENDER), Pell Grant status (PELL RECIPIENT), and race/ethnicity (Asian/ETHNICITY). Tables 4-6 summarize the results of the binomial logistic regression.

The Omnibus Tests of Model Coefficients (Table 4) indicates that there is a statistically significant relationship (chi-square = 86.247, $p < 0.001$) between at least one of the predictor variables and the retention.

Table 4. Omnibus Tests of Model Coefficients for Research Question 1

		Chi-square	df	Sig.
Step 1	Step	86.247	10	.000
	Block	86.247	10	.000
	Model	86.247	10	.000

The Nagelkerke R-square (Table 5) indicates that this model accounts for only 2.6% of the variability in retention.

Table 5. Model Summary for Research Question 1

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	5790.429[a]	.018	.026

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

N=4668

The essential findings of the logistic regression for RQ1, including the odds ratio (Exp(B)) and the statistical significance of the predictor variables, can be found in Table 6 below.

Table 6. Variables in the Equation for Research Question 1

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	TOTAL_ATTEND(1) **[0= did not attend Library Instruction, 1=did attend Library Instruction]**	.350	.067	27.067	1	.000***	1.419	1.244	1.619
	GENDER(1) **[0=female, 1=male]**	-.375	.064	33.921	1	.000***	.688	.606	.780
	PELL_RECIPIENT_IND(1) **[0= no, 1=yes]**	-.234	.068	11.916	1	.001***	.792	.693	.904
	RACE_ETH **[0=American Indian or Alaska Native]**			14.163	7	.048*			
	RACE_ETH(1) **[1=Asian]**	-.697	1.099	.402	1	.526	.498	.058	4.296
	RACE_ETH(2) **[2=Black or African American]**	-1.212	1.066	1.293	1	.256	.298	.037	2.404
	RACE_ETH(3) **[3=Hispanic]**	-1.351	1.071	1.590	1	.207	.259	.032	2.114
	RACE_ETH(4) **[4=Multiracial]**	-1.530	1.074	2.032	1	.154	.216	.026	1.775
	RACE_ETH(5) **[5=Native Hawaiian or Other Pacific Islander]**	-2.211	1.474	2.251	1	.134	.110	.006	1.969
	RACE_ETH(6) **[6=Unreported]**	-1.470	1.127	1.702	1	.192	.230	.025	2.092
	RACE_ETH(7) **[7=White]**	-1.351	1.066	1.607	1	.205	.259	.032	2.091
	Constant	2.184	1.066	4.202	1	.040*	8.886		

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

a. Variable(s) entered on step 1: TOTAL_ATTEND, GENDER, PELL_RECIPIENT_IND, RACE_ETH.

NOTE: **[BRACKETED BOLD]** text manually typed in to clearly label categorical variables.

If a student attended library instruction, they are 59% more likely to be retained (Odds ratio (OR) = 1.419, $p < 0.001$) than students who did not attend library instruction. Male students are 41% more likely to be retained (OR = 0.688, $p < 0.001$) than female students. Pell grant recipients are 44% more likely to be retained (OR = 0.792, $p < 0.01$)

than students who do not receive a Pell Grant. The results suggest that none of the race/ethnicity predictors have a statistically significant effect on retention. The null hypothesis can be rejected, since there is a statistically significant relationship between library instruction and first-time, fulltime freshmen retention.

Results from the Chi-square and binomial logistic regression provide support for the hypothesis of a statistically significant relationship between library instruction attendance and first-time, full-time retention. Results of the Chi-square test show a statistically significant difference in the retention of students that attended library instruction. Although the logistic regression also indicated there was a statistically significant relationship between library instruction and retention of FTFT freshmen, it should be stressed that it accounted for only 2.6% of the goodness of fit of the model. Library instruction attendance had the most influence of the variables examined. Students who attend library instruction are 59% more likely to be retained than students who did not attend library instruction. This supports the idea that students who do not attend library instruction are at greater risk of not being retained. Gender and Pell Grant status also affect retention, slightly less than library instruction attendance. Male students are 41% more likely to be retained than female students. Pell Grant recipients are 44% more likely to be retained than students who did not receive a Pell Grant. Library instruction attendance, gender and Pell Grant status all have a statistically significant relationship with retention.

Research Question 2

Research Question 2 asks, is there a statistically significant relationship between attending library instruction and GPA for first-time, full-time freshman? The second null

hypothesis $H2_0$ states there is no statistically significant relationship between attending library instruction and GPA. The alternative hypothesis $H2_a$ states that there is a statistically significant relationship between attending library instruction and GPA.

A multiple linear regression analysis was done to determine if there was a statistically significant relationship between library instruction and GPA. Results from linear regression provide support for the hypothesis of a statistically significant relationship between library instruction attendance and GPA. Pretests were run for the linear regression model used for the research question and the assumptions were fully met. The data set included cohorts from Fall 2015-2017. All three cohorts (Fall 2015, Fall 2016, Fall 2017) had cases that did not include data for spring cumulative GPA, and 424 cases missing the spring cumulative GPA were removed from the data set. The dependent variable is GPA (SPRING CUMULATIVE GPA), the independent variable is library instruction attendance (LIBRARY INSTRUCTION), and the control variables are gender (GENDER), Pell Grant status (PELL RECIPIENT), and race/ethnicity (RACE/ETHNICITY). Table 7 summarizes the results of the linear regression.

Table 7. Model Summary table for Research Question 2

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.204[a]	.042	.041	.87765	.042	184.115	1	4238	.000***
2	.258[b]	.066	.066	.86636	.025	112.124	1	4237	.000***
3	.269[c]	.072	.072	.86365	.006	27.673	1	4236	.000***
4	.334[d]	.112	.110	.84579	.039	26.820	7	4229	.000***

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

a. Predictors: (Constant), GENDER

b. Predictors: (Constant), GENDER, PELL_RECIPIENT_IND

c. Predictors: (Constant), GENDER, PELL_RECIPIENT_IND, TOTAL_ATTEND

d. Predictors: (Constant), GENDER, PELL_RECIPIENT_IND, TOTAL_ATTEND, RACE.01, RACE.07, RACE.06, RACE.05, RACE.04, RACE.02, RACE.03

e. Dependent Variable: FULL_CUMULATIVE_GPA

Multiple linear regression analysis revealed an overall R-square of 0.112, indicating that 11.2% of the variation in GPA is explained by the model. Gender accounts for 4.2% of the variability observed in GPA, Pell Grant status accounts for an additional 2.5%, library instruction attendance accounts for an additional 0.6%, and race/ethnicity accounts for an additional 3.9%.

Results from the multiple linear regression provide support for the hypothesis of a statistically significant relationship between GPA and library instruction attendance. The results suggest that gender, Pell Grant status, library instruction attendance, and race/ethnicity account for 11.2% of the variability in cumulative GPAs. However, attending library instruction only accounts for a very small (0.6%) portion of the variation observed GPA, therefore library instruction cannot be considered a strong predictor for GPA.

Research Question 3

Research Question 3 asks, is the difference between the retention of first-time, full-time freshmen who attend one library instruction session and the retention of first-time, full-time freshmen who attend multiple (>1) library instruction sessions statistically significant? The third null hypothesis $H3_0$ states there is no statistically significant difference between first-time, full-time freshman retention of students attending one library instruction session and those attending multiple library instruction sessions. The alternative hypothesis $H3_a$ states that there is a statistically significant difference between first-time, full-time freshman retention of students attending one library instruction session and those attending multiple library instruction sessions. Cross-tabulation and binomial logistic regression is used to determine the probability of being retained given the independent variables.

The data set included cohorts from Fall 2015-2017. Cumulative GPA was included as a control variable in the binomial logistic regression. The data set included cases who attended library instruction cohort and had spring cumulative GPA data. Cases that did not attend library instruction were not part of this analysis and were removed. Sixty-two cases that did not include data for spring cumulative GPA were removed from the data set. The final data set included 1627 cases.

Cross-tabulation results between library instruction attendance and first-time, full-time freshmen retention fails to reject the null hypothesis. Table 8 is the results of the cross-tabulation and chi-square test in SPSS. Attending library instruction and first-time, full-time freshmen retention are both categorical variables. The two categories for Library Instruction Attendance are 1 (students attended library instruction once, n =

1334) and 2 (students attended library instruction more than once, n = 293). There is no statistically significant difference in the retention of students who attended one session and students who attended multiple sessions of library instruction. The results were not statistically significant, $p > 0.05$, which means we cannot reject the null hypothesis.

Table 8. Crosstabulation of Attending Single versus Multiple Library Instruction Sessions and Retention

			Library Instruction Attendance		
			Attended One Session	Attended More Than One Session	Total
Retention	Not Retained	Count	324	79	403
		% within Attendance	24.30%	27.00%	24.80%
	Retained	Count	1010	214	1224
		% within Attendance	75.70%	73.00%	75.20%
Total		Count	1334	293	1627
		% within Attendance	100.00%	100.00%	100.00%

Chi-square = 0.922, $p>0.05$

Binomial logistic regression is used to determine the probability of being retained given the independent variables. Pretests were run for the binomial logistic regression model used for research question and the assumptions were fully met. The dependent variable is retention (RETAINED), the independent variable is library instruction attendance (LIBRARY INSTRUCTION), and the control variables are gender (GENDER), Pell Grant status (PELL RECIPIENT), race/ethnicity (RACE/ETHNICITY), and Spring Cumulative GPA (SPRING CUMULATIVE GPA). Tables 9-11 summarize the results of the binomial logistic regression.

The Omnibus Tests of Model Coefficients for Research Question 3 (Table 9) indicates there is a statistically significant relationship (chi-square = 275.682, $p < 0.001$) between at least one of the predictor variables and retention.

Table 9. Omnibus Tests of Model Coefficients for Research Question 3

		Chi-square	df	Sig.
Step 1	Step	275.682	11	.000
	Block	275.682	11	.000
	Model	275.682	11	.000

The Nagelkerke R-Square (Table 10) indicates that this model accounts for 23% of the variability in retention.

Table 10. Model Summary for Research Question 3

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	1545.871[a]	.156	.231

a. Estimation terminated at iteration number 20 because maximum iterations has been reached. Final solution cannot be found.

N = 1627

The essential findings of the logistic regression are found in the Variables in the Equation for Research Question 3 (Table 11).

Table 11. Variables in the Equation for Research Question 3

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	TOTAL_ATTEND(1) **[0= attended 1 Library Instruction, 1= attended more than 1 Library Instruction]**	-.080	.161	.245	1	.620	.923	.674	1.266
	GENDER(1) **[0=female, 1=male]**	-.123	.132	.870	1	.351	.884	.683	1.145
	PELL_RECIPIENT_IND(1) **[0= no, 1=yes]**	-.199	.138	2.089	1	.148	.820	.626	1.073
	RACE_ETH **[0=American Indian or Alaska Native]**			19.657	7	.006*			
	RACE_ETH(1) **[1=Asian]**	-18.888	19388.695	.000	1	.999	.000	.000	.
	RACE_ETH(2) **[2=Black or African American]**	-19.001	19388.695	.000	1	.999	.000	.000	.
	RACE_ETH(3) **[3=Hispanic]**	-19.741	19388.695	.000	1	.999	.000	.000	.
	RACE_ETH(4) **[4=Multiracial]**	-19.484	19388.695	.000	1	.999	.000	.000	.
	RACE_ETH(5) **[5=Native Hawaiian or Other Pacific Islander]**	-20.943	19388.695	.000	1	.999	.000	.000	.
	RACE_ETH(6) **[6= Unreported]**	-17.892	19388.695	.000	1	.999	.000	.000	.
	RACE_ETH(7) **[7=White]**	-19.513	19388.695	.000	1	.999	.000	.000	.
	FULL_CUMULATIVE_GPA	1.153	.083	193.535	1	.000***	3.168	2.693	3.727
	Constant	17.586	19388.695	.000	1	.999	43406993.080		

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

a. Variable(s) entered on step 1: TOTAL_ATTEND, GENDER, PELL_RECIPIENT_IND, RACE_ETH, FULL_CUMULATIVE_GPA,

NOTE: **[BRACKETED BOLD]** text manually typed in to clearly label categorical variables.

Students with a higher GPA are 76% more likely to be retained (Odds Ratio (OR) = 3.168, $p < 0.001$). The results suggest that library instruction attendance and the control variables (gender, Pell Grant recipient, race/ethnicity) do not have a statistically

significant effect on retention. The null hypothesis cannot be rejected, since library instruction attendance does not have a statistically significant relationship.

Results from the Chi-square and binomial logistic regression indicate the null hypothesis cannot be rejected; there is no statistically significant difference between first-time, full-time freshman retention of students attending one library instruction session and those attending multiple library instruction sessions. Results of the Chi-square test show there is no statistically significant difference in the retention of students that attended library instruction once or more than once. Results from the binomial logistic regression indicate the model is statistically reliable, although it only explains 23% of the variation in first-time, full-time freshman retention. Spring cumulative GPA is the only variable examined that was statistically significant. Students with a higher GPA are 76% more likely to be retained. Library instruction attendance, gender, Pell Grant recipient, race/ethnicity did not have a significant effect on retention. The finding that attending more than one library instruction session did not have an effect is not surprising. The timeframe examined for each student is brief, examining their library instruction attendance during their freshman year. Only a small subset of freshmen attended more than one library instruction session.

Research Question 4

Research Question 4 asks, is there a statistically significant relationship between GPA and first-time, full-time freshman retention? The fourth null hypothesis $H4_0$ states there is no statistically significant relationship between GPA and first-time, full-time freshman retention. The alternative hypothesis $H4_a$ states that there is a statistically significant relationship between GPA and first-time, full-time freshman retention.

Binomial logistic regression is used to determine the probability of being retained given the independent variables. Pretests were run for the binomial logistic regression model used for research question and the assumptions were fully met. The data set included cohorts from Fall 2015-2017. Some cases did not include data for spring cumulative GPA, 424 cases missing the spring cumulative GPA were removed from the data set. The dependent variable is retention (RETAINED), the independent variable is GPA (SPRING CUMULATIVE GPA), and the control variables are gender (GENDER), Pell Grant status (PELL RECIPIENT), and race/ethnicity (RACE/ETHNICITY). Tables 12-14 summarize the results of the binomial logistic regression.

The Omnibus Tests of Model Coefficients for Research Question 4 (Table 12) indicates there is a statistically significant relationship (chi-square = 828.299, $p < 0.001$) between at least one of the predictor variables and the retention.

Table 12. Omnibus Tests of Model Coefficients for Research Question 4

		Chi-square	df	Sig.
Step 1	Step	828.299	10	.000
	Block	828.299	10	.000
	Model	828.299	10	.000

The Nagelkerke R-square (Table 13) indicates that this model accounts for 26% of the variability in retention.

Table 13. Model Summary for Research Question 4

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	4053.261[a]	.177	.260

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

N = 4244

The essential findings of the logistic regression are found in the Variables in the Equation for Research Question 4 (Table 14).

Table 14. Variables in the Equation for Research Question 4

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	FULL_CUMULATIVE_GPA	1.225	.050	609.134	1	.000***	3.404	3.088	3.752
	GENDER(1) **[0=female, 1=male]**	.029	.081	.123	1	.725	1.029	.877	1.207
	PELL_RECIPIENT_IND(1) **[0= no, 1=yes]**	-.071	.085	.711	1	.399	.931	.789	1.099
	RACE_ETH **[0=American Indian or Alaska Native]**			31.842	7	.000***			
	RACE_ETH(1) **[1=Asian]**	-1.135	1.179	.928	1	.335	.321	.032	3.239
	RACE_ETH(2) **[2=Black or African American]**	-.946	1.137	.692	1	.405	.388	.042	3.605
	RACE_ETH(3) **[3=Hispanic]**	-1.429	1.144	1.560	1	.212	.240	.025	2.255
	RACE_ETH(4) **[4=Multiracial]**	-1.426	1.147	1.545	1	.214	.240	.025	2.276
	RACE_ETH(5) **[5=Native Hawaiian or Other Pacific Islander]**	-2.133	1.573	1.840	1	.175	.118	.005	2.584
	RACE_ETH(6) **[6=Unreported]**	-1.466	1.220	1.444	1	.230	.231	.021	2.523
	RACE_ETH(7) **[7=White]**	-1.413	1.136	1.547	1	.214	.243	.026	2.257
	Constant]	-.777	1.141	.463	1	.496	.460		

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

a. Variable(s) entered on step 1: FULL_CUMULATIVE_GPA, GENDER, PELL_RECIPIENT_IND, RACE_ETH.

NOTE: **[BRACKETED BOLD]** text manually typed in to clearly label categorical variables.

If a student has a higher GPA, they are 77% more likely to be retained (Odds Ratio (OR) = 3.404, $p < 0.001$). The results suggest that gender, Pell Grant recipient, and race/ethnicity do not have a significant effect on retention. The null hypothesis can be rejected, since there is a statistically significant relationship between GPA and retention.

Summary of Results

The research examines four hypotheses on the relationships between attending library instruction, retention, and GPA at VSU. The statistical analyses for Research Questions 1 and 2 indicate library instruction is associated with retention and GPA. The statistical analysis of Research Question 4 indicates GPA is associated with retention. Together these results support the importance of providing library instruction and encourages expanding library instruction offerings in the future.

These results indicate that library instruction effects retention both directly and indirectly. The results for Question 1 support library instruction's direct effect on retention. The results for Research Questions 2 and 4 support library instruction's indirect effect on retention. Library instruction effects GPA, and GPA effects retention. These results reinforce the research finding that library instruction effect retention.

The number of times first-time, full-time freshmen attend library instruction is not associated with retention. The finding that attending more than one library instruction session did not have an effect is not surprising. The time examined is brief, looking at library instruction over two semesters. Only a small subset of freshmen attended more than one library instruction session, 1334 students attended one session and 293 students attended more than one session. The idea that more library instruction has a greater influence on GPA is worth exploring over a longer period of time in the future.

The primary focus of this research is to examine the relationships between library instruction, retention, and GPA. The results of the statistical analysis indicate a statistically significant but very small relationship between library instruction and retention, and between library instruction and GPA. Although the predictors only

represent a small amount of variation in the dependent variable, the relationships presented are of interest. Library instruction is just one of many factors that VSU is utilizing to foster student success. These results should be examined as part of a larger picture of student success strategies. Further research could be valuable in justifying the need for library instruction and how it fits in with other student success strategies.

Library instruction has implications that extend beyond the first year of college and GPA and retention. Attending library instruction and participating in a group class activity fosters students' self-confidence in using library resources. It also encourages students' engagement and helps them realize there are people on campus who will answer their questions, provide research support, and generally care about their success. Learning library and information literacy skills are the basis for life-long learning, which helps students investigate questions even after they have graduated and move into their careers.

Future research should include larger data sets, with more years of individual level data and/or more institutions included in the data set. Another avenue of research would investigate the effects of library instruction on information literacy skills and how former students utilize them in their career and post-graduate life.

All of these findings will be examined in greater detail in Chapter 5.

Chapter V

DISCUSSION

Library instruction is a high-impact teaching practice that contributes to student success. The literature review frames library instruction as a measure of student engagement. Engagement is malleable and can be increased by providing meaningful educational activities, including research assignments that encourage cognitive development. During library instruction, librarians teach students the research and information literacy skills they need to successfully complete their assignments and finish their courses.

Library instruction is one of the factors that enable student success. This analysis examines whether or not library instruction is associated with two measures of student success: GPA and retention. Is library instruction associated with first-time, full-time freshman retention? Is library instruction associated with GPA? Is there a difference in the retention of students who attend multiple library instruction sessions as compared to student who attended one session? Is GPA associated with first-time, full-time freshman retention?

This research project is an exploratory pilot. The data set is limited to a single institution, VSU, and has limited generalizability. However, the relationships between the variables are analyzed using binomial logistic regression, Chi-squared test, and multiple linear regression. The results indicate a statistically significant relationship between library instruction and retention, library instruction and GPA, and GPA and retention.

The methodology could be replicated at other academic libraries. The results provide support for the role of library instruction in student success and a need for further research.

Library Instruction & Retention

The first research question asks if there is a statistically significant relationship between attending library instruction and retention. Library instruction has a very small positive association with retention. Students who attend library instruction are 59% more likely to be retained than students who did not attend. However, the model only accounts for 2.6% of the variation in retention. Despite the small variation, the results are statistically significant and positive.

The size of the relationship is consistent with previous research. In most cases the size of the association was small or very small. Therefore, it is unsurprising the relationship in this research is small. However, finding library instruction has a statistically significant positive association strengthens the body of research that has found a positive association between library instruction and retention.

The results of previous research examining library instruction and retention have been a mix of no association, negative association, and positive association (Gammell et al., 2012; Soria et al., 2013; Soria et al., 2014; Wong & Cmor, 2011). The inconsistency in research results is problematic. It is not possible to generalize from such isolated and varied results. It is difficult to answer the question "Is library instruction associated with retention?" with a simple yes or no. Even if researchers found stronger results, it could not be generalized to another institution because each institution is unique, with a unique student body. Also, library instruction varies in its format and delivery, making it hard to

agree on a single definition. This makes it hard to directly compare library instruction at different institutions. In this research, two control variables have a statistically significant relationship with retention: gender and Pell Grant status. Male students are 41% more likely to be retained than female students. Pell Grant recipients are 44% more likely to be retained than students who did not receive a Pell Grant.

Library Instruction & GPA

The second research question asks if there is a statistically significant relationship between attending library instruction and GPA. Library instruction has a very small positive association with GPA. Attending library instruction only accounts for 0.6% portion of the variation observed in GPA. Library instruction cannot be considered a strong predictor for GPA. However, the results are statistically significant and positive. Although library instruction only represents a small amount of variation in the dependent variable, the relationships presented are of interest. The size of the association is consistent with previous research. In all cases where library instruction was found to have an association with GPA, the relationship was very small.

This research contributes to the body of research examining the relationship between library instruction and GPA. Previous research examining library instruction and retention has found a mix of no association, negative association, and positive association (Soria et al., 2013; Soria et al., 2014; Wong & Cmor, 2011). Frequently there is no association. In one instance Soria et al. (2013) found a very small negative association. Wong & Cmor (2011) examined the association of library instruction to GPA within disciplines. Their findings varied by discipline: some had no association, some were weak and positive, and one was strong and positive. This research is consistent with

Wong & Cmor's (2011) results, finding a small positive relationship between library instruction and GPA.

The question "Is library instruction associated with GPA?" cannot be answered definitively. In this research, gender, Pell Grant status, library instruction attendance, and race/ethnicity account for 11.2% of the variability in cumulative GPAs.

Frequency of Library Instruction

The third research question asks if attending multiple library instruction sessions has a different effect on retention than attending a single session. Attending more than one library instruction session does not have a different effect on retention. Students who attended only one session were compared to those who attended two or more sessions. There is no difference between the two groups of students.

This result is consistent with previous research done by Wong & Cmor (2011) and Emmons & Wilkinson (2011). Wong & Cmor (2011) found disciplines that offered fewer library instruction programs had no association between library instruction attendance and GPA, or a weak positive association. One discipline offered their students five library instruction sessions during a three year program. This group was the only one with a strong positive association between attending multiple library workshops and GPA at graduation (Wong & Cmor, 2011). The positive effect of attending library instruction increases as the number of session attended increased over several years. Therefore, it is unlikely such an effect would occur over the course of a single year, such as freshmen year.

Emmons & Wilkinson (2011) found that library staffing was positively correlated to and statistically significant for retention and graduation. However, the impact was

greater for graduation. In both cases the positive effects of interacting with library staff increased over time. Learning research and information literacy skills is an incremental process. The positive effects of library instruction, and other interaction with library staff, accumulate over time as students have more interactions.

The current research examines library instruction provided during the students' freshmen year. Only a small subset of freshmen attended more than one library instruction session: 1,334 students attended one session, and 293 students attended more than one session. Future research should examine the question over multiple years of students' college careers, from freshmen to senior year and graduation. Another factor to consider is students' major. Different disciplines have different expectations for students' research and information literacy skills. Where students are expected to acquire those skills varies by discipline.

GPA & Retention

The fourth research question asks if there is a statistically significant relationship between GPA and first-time, full-time freshman retention. Spring cumulative GPA is positively associated with retention. Students with a higher GPA are 77% more likely to be retained. The results also suggest that gender, Pell Grant recipient, and race/ethnicity are not associated with retention. The model is statistically reliable and explains 26% of the variation in first-time, full-time freshman retention.

First-year GPA is not always a statistically or practically significant predictor of retention (Kiser & Price, 2008). These research findings are both statistically significant and practically significant. This research is consistent with previous research that identifies GPA as one of the most important predictors for retention. Many factors

influence retention and other measures of student success. First-year GPA is one of the best predictors for retention, persistence, graduation, and future academic achievement (Tucker & McKnight, 2017; Westrick et al., 2015; Whalen et al., 2009).

Students' GPAs are a predictor of retention. This research does not investigate the relationship of first-year GPA to other student outcomes, such as persistence beyond the freshmen year, GPA in the sophomore, junior or senior years, or graduation. However, research has shown that first-year GPA is one of the predictors for these student outcomes (Tucker & McKnight, 2017; Westrick et al., 2015; Whalen et al., 2009). This research suggests that academic strategies that improve first-year GPA could improve retention, future academic success (GPA), and graduation. This is the core idea behind identifying at-risk students and staging early interventions. Interventions are designed to improve success (GPA), retention, or both. Library instruction could be used as interventions that improve both student success and student engagement. Library instruction teaches students information literacy and research skills they need to complete class assignments.

Library Instruction & Student Success

Student outcomes are a serious issue facing all higher education institutions. Retention, persistence, success (GPA) and graduation are several student outcomes that institutions collect data on and try to improve. Retention and persistence are important outcomes. It is not enough to admit new students if those students leave before graduating. Failing to complete a degree is potentially harmful to students' futures, resulting in increased debt, decreasing future employment opportunities, and harming their intellectual growth. Academic success is also important, as it is a prerequisite for

retention, persistence, and graduation. Graduation is the end goal for most students and represents successful completion of the degree and the future opportunities having a degree affords.

This research focuses on two student outcomes: retention and GPA. Retention and GPA are related. Retention is a threefold problem. In order to be retained, students must address three problems: academic achievement, motivation, and finances (Westrick et al., 2015). GPA is a measure of academic achievement. Library instruction is a measure of behavioral engagement, a similar concept to motivation but more easily observed and measured. Engagement can be operationalized in many different ways, including attending library instruction (Gammell et al., 2012).

Library instruction is positively associated with retention and GPA. Freshmen students who do not attend library instruction are at higher risk of not being retained and having lower GPAs. Not attending a required library instruction class can be used as a risk factor. Conversely, attending library instruction could be used as an intervention for at-risk students. Interventions could be more than just traditional library instruction. Research appointments with a reference librarian deliver similar content, customized to that student's particular research needs. Workshops and library instruction not associated with a specific class can teach similar research and information literacy concepts to a group of students.

GPA is positively associated with retention. Increasing freshmen GPA has long-lasting benefits that improve student outcomes. First-year GPA is one of the best predictors for retention, persistence, graduation, and future academic achievement (Tucker & McKnight, 2017; Westrick et al., 2015; Whalen et al., 2009). Institutions

should develop a variety of strategies to improve students' academic achievement. Library instruction is just one of many possible interventions.

Engagement is a complex construct and one of the few predictors of student success that universities and colleges can influence. Engagement can be increased by providing students meaningful educational activities that encourage cognitive development. Most interventions are designed to improve student success work through engagement. The intervention focuses on increasing student engagement with the learning process and environment, which in turn leads to improved learning and retention (Fredricks et al., 2004; Kuh et al., 2006; Pascarella & Terenzini, 2005; Reeve & Tseng, 2011).

Engagement can be conceptualized as three components: behavioral, emotional, and cognitive. There are many ways to operationalize engagement, depending on what component is being measured. Behavioral engagement is observable student behavior as they participate in learning activities both inside and outside of class (Fredricks et al., 2004). Participation in the library instruction session is another measure of behavioral engagement.

Emotional engagement is students' emotional reaction to the professor or librarian, and to the institution during learning activities (Fredricks et al., 2004). Within the context of library instruction, emotional engagement is how students feel during and after the instruction session. Increasing students' comfort level with research and asking questions is a major goal for every instruction session. Students often are more confident in their research skills and more comfortable asking for assistance after library instruction (Paterson & Gamtso, 2017).

Cognitive engagement is students' willingness and ability to participate in learning activities. One aspect of this is students' valuing learning and their motivation or willingness to learn. The other aspect is students' ability to use advanced learning strategies (Fredricks et al., 2004). For example, regulating their learning environment to stay on-task and using strategies such as summarizing, elaborating, and organizing class material (Fredricks et al., 2004). Library instruction is designed to increase cognitive engagement. Librarians teach students research strategies and information literacy concepts that support cognitive development.

Professors who schedule library instruction do so because they believe that it benefits their students. Students who actively participate in a library instruction session are engaged in the learning process. Engaging with the learning activities during library instruction improves students' emotional engagement with research, librarians, and the library. Learning and practicing research and information skills improves students' comfort and confidence. This also improves students' ability to apply learning strategies, which increases their cognitive engagement. Students who attend library instruction are better equipped to do research and do better on their class assignments.

Limitations & Future Directions

There are several limitations to the current study. First, the study focuses on a single institution and has limited generalizability. The research successfully tests the feasibility of collecting library instruction attendance and integrating that data with the university's data warehouse. This research project demonstrates that library instruction attendance can be routinely collected and integrated with the university's data warehouse.

Data remains secure and can be analyzed while protecting individuals' privacy. Other institutions can implement similar procedures and replicate the methodology.

Academic libraries need to collaborate with their institutions to define student outcomes and determine which measures and statistics can be related to those outcomes. Library instruction is just one example of library use. Other library use variables have been examined in the literature, such as database and electronic resource use. Data analyses can be used to identify whether various measures of library use are associated with student outcomes. If library use variables are positively associated with student outcomes, then not using those library resources can be used as a predictive measure for at-risk students. In addition, libraries could develop interventions for at-risk students based on which services are positively associated with student outcomes. Identifying predictive indicators of library usage and relevant interventions requires routine data collection of students' library usage connected institutional data and thoughtful data analysis.

Second, the timeframe examined is three years and the scope is limited to freshmen. The first year is a critical measure of future success. First-year GPA is one of the best predictors for retention, persistence, graduation, and future academic achievement (Tucker & McKnight, 2017; Westrick et al., 2015; Whalen et al., 2009). The timeframe, three years of data, is limited due to when data was collected. Data collection began in fall of 2013, but the first two years have gaps due to inconsistent collection and recording. Three years of freshmen data is sufficient for pilot research. However, ongoing data collection and future research with a larger data-set is warranted.

Attending library instruction in the first year has a small positive, statistically significant association with retention and GPA. A stronger positive relationship between attending library instruction and retention and GPA may require more time and opportunities to participate in library instruction (Wong & Cmor, 2011). Future research could examine the effect of library instruction over the course of a student's college career. Does the effect increase or lessen as the student goes through their junior and senior years? Another avenue of research would include collecting data from students after graduation to investigate the long-term effect that library instruction had on their careers and post-graduate lives.

Third, the current study focuses on library instruction to the exclusion of other forms of library assistance. The library supports student learning by teaching research and information literacy skills through personal interactions with a librarian at the reference desk, through online chat and email, and research appointments. The study also excludes online library classes and tutorials. Providing online instruction and assistance is a challenge. At Odum Library, the librarians have addressed this primarily through asynchronous tutorials, recorded library instruction videos, and personalized assistance. Professors can schedule online library instruction sessions delivered through Blackboard Collaborate. Typically a few students will attend the "live" session and the librarian records the session for the rest of class to participate asynchronously. Personalized research appointments allow students to work one-on-one with a reference librarian. The benefits of research appointments include focused instruction and research assistance for the student's topic. Research appointments are available both online and in-person. However, the librarians do not collect attendance data for research appointments. Also, it

is not possible to collect usage data on which students used asynchronous videos or tutorials. A comprehensive overview of student success should include all of these student-librarian interactions. However, collecting student data unobtrusively, without raising barriers, is a challenge.

Finally, further research is needed to determine if library instruction can be used as a risk-factor or predictive factor for retention. Research is needed on the use of library instruction as an intervention for at-risk students. Can the library play a proactive role in the intervention of at-risk students?

Summary

Library instruction supports student retention and GPA. Attending and participating in library instruction strengthens all three aspects of engagement: emotional, cognitive, and behavioral. In addition to increasing engagement, library instruction also teaches students college success skills. During library instruction students learn essential research and information literacy skills to apply during class. Students' confidence in their own abilities, their comfort level in seeking help from a librarian, and their research abilities improve as a result of attending library instruction. All these factors make library instruction an important component of student success.

Library instruction contributes to higher retention rates both directly and indirectly. Freshmen students who attend library instruction have higher retention rates and higher GPAs. Library instructions' direct support for retention is measured in Research Question 1, where students who attend library instruction are 59% more likely to be retained. Library instruction's indirect support of library instruction is supported by the results of Research Questions 2 and 4. Library instruction is positively associated

with higher GPA and students with higher GPAs are 77% more likely to be retained. If library instruction increases GPA, even a little, then it is indirectly contributing to retention. Increasing freshmen GPA has long-lasting benefits that improve student outcomes, including retention, persistence, graduation, and future academic achievement. Library instruction is one effective strategy for improving students' retention and academic achievement.

Library instruction is a vital part of the future and growth of academic libraries. This research supports the importance of libraries and library instruction in the future of student success at colleges and universities, which directly connects to the success of the colleges and universities as institutions. Attending and participating in library instruction fosters students' self-confidence and engagement with the library. The benefits of a positive library experience extends beyond the library. Students realize there are people on campus who will answer their questions, provide research support, and are invested in their success. Awareness and willingness to use campus services helps students improve their grades, persistence, and reach graduation. The benefits of library instruction extend beyond graduation. Students learn information literacy and critical thinking skills through their college career. Library instruction is one avenue where students are explicitly taught information literacy and practice applying their information literacy skills. Information literacy skills are the basis for life-long learning, which helps students investigate questions after they have graduated and moved into their careers.

REFERENCES

Allen, J., Robbins, S. B., Casillas, A., & Oh, I. S. (2008). Third-year college retention and transfer: Effects of academic performance, motivation, and social connectedness. *Research in Higher Education*, *49*(7), 647-664.

American Library Association. (2006, July 7*). Policy on confidentiality of library records*. Retrieved from http://www.ala.org/advocacy/intfreedom/statementspols/otherpolicies/policyconfidentiality

American Library Association. (2015). *Framework for information literacy for higher education*. Retrieved from http://www.ala.org/acrl/standards/ilframework

Association of Research Libraries. (n.d.). *Origins: What are the origins of ARL Statistics?* Retrieved from https://www.arlstatistics.org/about/Origins

Bean, J. P. (1980). Dropouts and turnover: The synthesis and test of a causal model of student attrition. *Research in Higher Education, 12*(2), 155-187.

Bean, J. P. (1982). Student attrition, intentions, and confidence: Interaction effects in a path model. *Research in Higher Education*, *17*(4), 291-320.

Bean, J. P., & Metzner, B. S. (1985). A conceptual model of nontraditional undergraduate student attrition. *Review of Educational Research*, *55*(4), 485-540.

Brown, K., & Malenfont, K. J. (2017). *Academic library impact on student learning and success: Findings from Assessment in Action team projects.* Chicago: Association of College and Research Libraries. Retrieved from http://www.ala.org/acrl/sites/ala.org.acrl/files/content/issues/value/findings_y3.pdf

Cabrera, A. F., Nora, A., & Castaneda, M. B. (1993). College persistence: Structural equations modeling test of an integrated model of student retention. *The Journal of Higher Education*, *64*(2), 123-139.

Crawford, G. A. (2015). The academic library and student retention and graduation: An exploratory study. *portal: Libraries and the Academy*, *15*(1), 41-57.

Emmons, M., & Wilkinson, F. C. (2011). The academic library impact on student persistence. *College & Research Libraries*, *72*(2), 128-149.

Fraser, B. T., McClure, C. R., & Leahy E. H. (2002). Toward a framework for assessing library and institutional outcomes. *portal: Libraries and the Academy*, *2*(4), 505-528.

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, *74*(1), 59-109.

Gammell, W. J., Allen, G. J., & Banach, P. S. (2012). Leveraging existing data: Indicators of engagement as early predictors of student retention. In *Proceedings of the First Annual North East Regional Learning Analytics (NERLA) symposium* (pp. 9-17).

Grallo, J. D., Chalmers, M., & Baker, P. G. (2012). How do I get a campus ID? The other role of the academic library in student retention and success. *The Reference Librarian*, *53*(2), 182-193.

Guan, J., Nunez, W., & Welsh, J. F. (2002). Institutional strategy and information support: The role of data warehousing in higher education. *Campus-wide Information Systems*, *19*(5), 168-174.

Gunuc, S., & Kuzu, A. (2015). Student engagement scale: Development, reliability and validity. *Assessment & Evaluation in Higher Education*, *40*(4), 587-610.

Haddow, G. (2013). Academic library use and student retention: A quantitative analysis. *Library & Information Science Research*, *35*(2), 127-136.

Haddow, G., & Joseph, J. (2010). Loans, logins, and lasting the course: Academic library use and student retention. *Australian Academic & Research Libraries*, *41*(4), 233-244.

Hufford, J. R. (2013). A review of the literature on assessment in academic and research libraries, 2005 to August 2011. *portal: Libraries and the Academy*, *13*(1), 5-35.

Inmon, W. H. (1996). Building the data warehouse. New York: John Wiley & Sons Inc.

Kahu, E. R. (2013). Framing student engagement in higher education. *Studies in Higher Education*, *38*(5), 758-773.

Kiser, A. I. T., & Price, L. (2008). The persistence of college students from their freshman to sophomore year. *Journal of College Student Retention: Research, Theory & Practice*, *9*(4), 421-436.

Kuh, G. D., Kinzie, J., Buckley, J. A., Bridges, B. K., & Hayek, J. C. (2006). *What matters to student success: A review of the literature* (Vol. 8). Washington, DC: National Postsecondary Education Cooperative. Retrieved from https://www.ue.ucsc.edu/sites/default/files/WhatMattersStudentSuccess(Kuh,July 2006).pdf

Luan, J. (2002.) Data mining and its applications in higher education. *New Directions for Institutional Research 2002*(113), 17-36.

Magi, T. J. (2007). The gap between theory and practice: A study of the prevalence and strength of patron confidentiality policies in public and academic libraries. *Library & Information Science Research*, *29*(4), 455-470.

Matthews, J. R. (2012). Assessing library contributions to university outcomes: The need for individual student level data. *Library Management*, *33*(6/7), 389-402.

Metz, G. W. (2004). Challenge and changes to Tinto's persistence theory: A historical review. *Journal of College Student Retention: Research, Theory & Practice*, *6*(2), 191-207.

Mezick, E. M. (2007). Return on investment: Libraries and student retention. *The Journal of Academic Librarianship*, *33*(5), 561-566.

Mezick, E. M. (2015). Relationship of library assessment to student retention. *The Journal of Academic Librarianship*, *41*(1), 31-36.

Murray, A., Ireland, A., & Hackathorn, J. (2016). The value of academic libraries: Library services as a predictor of student retention. *College & Research Libraries*, *77*(5), 631-642.

Nackerud, S., Fransen, J., Peterson, K., & Mastel, K. (2013). Analyzing demographics: Assessing library use across the institution. *portal: Libraries and the Academy*, *13*(2), 131-145.

Oakleaf, M. 2010. *The value of academic libraries: A comprehensive research review and report.* Chicago, IL: Association of College and Research Libraries. Retrieved from http://www.acrl.ala.org/value/?page_id=21

Office of Institutional Research. (n.d.). *Valdosta State University fact book 2016-2017*. Retrieved from http://www.valdosta.edu/administration/institutional-research/documents/factbook/2016factbook.pdf

Pascarella, E. T., & Terenzini, P. T. (2005). *How college affects students: A third decade of research* (Vol. 2). San Francisco, CA: Jossey-Bass.

Paterson, S. F., & Gamtso, C. W. (2017). Information literacy instruction in an English capstone course: A study of student confidence, perception, and practice. *The Journal of Academic Librarianship*, *43*(2), 143-155.

Picciano, A. G. (2012). The evolution of big data and learning analytics in American higher education. *Journal of Asynchronous Learning Networks*, *16*(3), 9-20.

Reason, R. D., Terenzini, P. T., & Domingo, R. J. (2006). First things first: Developing academic competence in the first year of college. *Research in Higher Education*, *47*(2), 149-175.

Reeve, J. (2012). A self-determination theory perspective on student engagement. In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 149-172). New York: Springer.

Reeve, J., & Tseng, C. M. (2011). Agency as a fourth aspect of students' engagement during learning activities. *Contemporary Educational Psychology*, *36*(4), 257-267.

Riehle, C. F., & Weiner, S. A. (2013). High-impact educational practices: An exploration of the role of information literacy. *College & Undergraduate Libraries*, *20*(2), 127-143.

Soria, K. M., Fransen, J., & Nackerud, S. (2013). Library use and undergraduate student outcomes: New evidence for students' retention and academic success. *portal: Libraries and the Academy*, *13*(2), 147-164.

Soria, K. M., Fransen, J., & Nackerud, S. (2014). Stacks, serials, search engines, and students' success: First-year undergraduate students' library use, academic achievement, and retention. *The Journal of Academic Librarianship*, *40*(1), 84-91.

Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research, 45*(1)*,* 89-125.

Tinto, V. (1987). *Leaving college: Rethinking the causes and cures of student attrition*. Chicago, Ill.: University of Chicago Press.

Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition* (2nd ed.). Chicago: The University of Chicago Press.

Tucker, L., & McKnight, O. (2017). Assessing the validity of college success indicators for the at-risk student: Toward developing a best-practice model. *Journal of College Student Retention: Research, Theory & Practice*, *0*(0), 119. https://doi.org/10.1177/1521025117696822

U.S. Department of Education. (2017). *The condition of education 2017*. Retrieved from https://nces.ed.gov/pubs2017/2017144.pdf

University System of Georgia. (n.d.). *Retention rates definitions*. Retrieved from http://www.info.usg.edu/documents/Retention_Rates_Definitions.pdf

Wagner, E., & Ice, P. (2012). Data changes everything: Delivering on the promise of learning analytics in higher education. *Educause Review*, *47*(4), 32-42.

Westrick, P. A., Le, H., Robbins, S. B., Radunzel, J. M., & Schmidt, F. L. (2015). College performance and retention: A meta-analysis of the predictive validities of ACT® scores, high school grades, and SES. *Educational Assessment*, *20*(1), 23-45.

Whalen, D., Saunders, K., & Shelley, M. (2009). Leveraging what we know to enhance short-term and long-term retention of university students. *Journal of College Student Retention: Research, Theory & Practice*, *11*(3), 407-430.

Wilkes, A. W., & Grant, S. M. (1995). Confidentiality policies and procedures of the reference departments in Texas academic libraries. *RQ 34*(4), 473-485.

Wong, S. H. R., & Cmor, D. (2011). Measuring association between library instruction and graduation GPA. *College and Research Libraries*, *72*(5), 464-473.

Zhao, C., & Luan, J. (2006). Data mining: Going beyond traditional statistics. *New Directions for Institutional Research*, *2006*(131), 7-16.

APPENDIX A:

Statistical Tests and Variables Tables

Table A1. Research Question 1 Statistical Tests and Variables

Question	Statistical Tests	Variables	Dependent, Independent, or Control Variable?
Research Question 1: Is there a statistically significant relationship between attending library instruction and first-time, full-time freshman retention?	Chi-squared Test Binomial Logistic Regression	TOTAL_ATTEND • library instruction attendance • categorical • 0 = not attend • 1 = attended (at least once, is not a count of how many times attended)	Independent
		RETENTION • retention • categorical • 0 = not retained • 1 = retained	Dependent
		GENDER • categorical • 0 = female • 1 = male	Control
		PELL_RECIPIENT_IND • Pell Grant recipient • categorical • 0 = no • 1 = yes	Control
		RACE_ETH • categorical • American Indian or Alaska Native = 0 • Asian = 1 • Black or African American = 2 • Hispanic = 3 • Multiracial = 4 • Native Hawaiian or Other Pacific Islander = 5 • Unreported = 6 • White = 7	Control

Table A2. Research Question 2 Statistical Test and Variables

Question	Statistical Test	Variables	Dependent, Independent, or Control Variable?
Research Question 2: Is there a statistically significant relationship between attending library instruction and GPA for first-time, full-time freshman?	Multiple Linear Regression	TOTAL_ATTEND • library instruction attendance • categorical • 0 = not attend • 1 = attended (at least once, is not a count of how many times attended)	Independent
		FULL_CUMMULATIVE_GPA • continuous	Dependent
		GENDER • categorical • 0 = female • 1 = male	Control
		PELL_RECIPIENT_IND • Pell Grant recipient • categorical • 0 = no • 1 = yes	Control
		RACE_ETH • categorical • American Indian=Race.01 • Asian=Race.02 • AA=Race.03 • Hispanic=Race.04 • Multiracial=Race.05 • Hawaiian=Race.06 • Unreported=Race.07 • Caucasian=Race.08	Control

Table A3. Research Question 3 Statistical Tests and Variables

Question	Statistical Tests	Variables	Dependent, Independent, or Control Variable?
Research Question 3: Is the difference between the retention of first-time, full-time freshmen who attend one library instruction session and the retention of first-time, full-time freshmen who attend multiple (>1) library instruction sessions statistically significant?	Chi-squared Test Binomial Logistic Regression	TOTAL_ATTEND • library instruction attendance • categorical • 1 = attended 1 session • 2 = attended 2 or 3 sessions	Independent
		RETENTION • retention • categorical • 0 = not retained • 1 = retained	Dependent
		GENDER • categorical • 0 = female • 1 = male	Control
		PELL_RECIPIENT_IND • Pell Grant recipient • categorical • 0 = no • 1 = yes	Control
		RACE_ETH • categorical • American Indian or Alaska Native = 0 • Asian = 1 • Black or African American = 2 • Hispanic = 3 • Multiracial = 4 • Native Hawaiian or Other Pacific Islander = 5 • Unreported = 6 • White = 7	Control
		FULL_CUMMULATIVE_GPA • continuous	Control

Table A4 Research Question 4 Statistical Test and Variables

Question	Statistical Test	Variables	Dependent, Independent, or Control Variable?
Research Question 4: Is there a statistically significant relationship between GPA and first-time, full-time freshman retention?	Binomial Logistic Regression	FULL_CUMMULATIVE_GPA • continuous	Independent
		RETENTION • retention • categorical • 0 = not retained • 1 = retained	Dependent
		GENDER • categorical • 0 = female • 1 = male	Control
		PELL_RECIPIENT_IND • Pell Grant recipient • categorical • 0 = no • 1 = yes	Control
		RACE_ETH • categorical • American Indian or Alaska Native = 0 • Asian = 1 • Black or African American = 2 • Hispanic = 3 • Multiracial = 4 • Native Hawaiian or Other Pacific Islander = 5 • Unreported = 6 • White = 7	Control

APPENDIX B:

Valdosta State University Institutional Review Board Protocol Exemption Report

Institutional Review Board (IRB)
For the Protection of Human Research Participants
PROTOCOL EXEMPTION REPORT

PROTOCOL NUMBER: 03546-2017

INVESTIGATOR: Ms. Laura B. Wright

SUPERVISING FACULTY: Dr. Bonnie Peterson

PROJECT TITLE: *Library Instruction & Retention.*

INSTITUTIONAL REVIEW BOARD DETERMINATION:

This research protocol is **Exempt** from Institutional Review Board (IRB) oversight under Exemption **Category 4**. You may begin your study immediately. If the nature of the research project changes such that exemption criteria may no longer apply, please consult with the IRB Administrator (irb@valdosta.edu) before continuing your research.

ADDITIONAL COMMENTS:

☒ ***If this box is checked, please submit any documents you revise to the IRB Administrator at irb@valdosta.edu to ensure an updated record of your exemption.***

Elizabeth W. Olphie *10/26/2017*

Elizabeth W. Olphie, IRB Administrator Date

Thank you for submitting an IRB application.
Please direct questions to irb@valdosta.edu or 229-259-5045.

Revised: 06.02.16