A Dissertation

entitled

The Influences of Community College Library Characteristics on Institutional Graduation Rates: A National Study

by

Lindsay S. English

Submitted to the Graduate Faculty as partial fulfillment of the requirements for the

Doctor of Philosophy Degree in Higher Education

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An Abstract of

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Given the national and growing attention on community college learning outcomes, this study examines the influences of libraries’ or learning commons’ characteristics on institutional graduation rates. The theoretical and conceptual frameworks used to support this study are Astin’s Theory of Involvement and his I-E-O Model respectfully; however, based on the results future researchers should consider exploring expenditure models. The data set used was created by using 5 different national sources including 4 IPEDs surveys and the Library Statistics Program, also conducted by the National Center of Educational Statistics. The significant predictors of institutional graduation rates were then used to create a blocked regression model to determine influence. The results indicated that three of the original 41 independent variables did have a significant predictive power over institutional graduation rates. The three variables included the percentage of students under the age of 25, total expenditures for other information resources (including fees for database searches such as DIALOG and Nexis-Lexis), and total expenditures for current serials (ongoing subscription commitments such as periodicals, newspapers, etc.).
For Phil, my husband. Your love, support, and belief in me has made this work possible.

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List of Abbreviations

AACC ................... American Association of Community Colleges
ACRL ..................... Association of College and Research Libraries
ALS ........................ Academic Library Survey
ARL ........................ Association of Research Libraries

CCSSE ..................... Community College Survey of Student Engagement

FTE ........................ Full-time Equivalent

I-E-O .......................... Input-Environment-Output

IPEDS ........................ Integrated Post-secondary Educational Data System

LRC .......................... Learning Resource Center

NCES ....................... National Center of Educational Statistics
NSSE ....................... National Survey of Student Engagement
Chapter One

Introduction and Background of the Problem

Higher education in the United States is a formidable enterprise (Thelin, 2004). According to the Federal Reserve Bank (2013), it is an established industry representing approximately 3% of the gross national product. President Obama and virtually every governor across the nation describe colleges and universities as critical to the nation and each individual state’s economic and cultural development. As a system, it includes more than 4,000 accredited institutions, 15 million students, and confers in excess of 2 million degrees annually (The White House, 2013).

In contrast to the higher education systems in Europe which developed outward from a central, government-supported university, the higher education system in the United States began, grew, and evolved in response to state and local needs, demographics, religion, and changing social contexts (Thelin, 2004). The result has been a system characterized by a variety of individual institutional goals and missions, types of degrees offered, finance and governance structures, and even curricula, course contents and instructional methodologies.

The most well-established classification system for categorizing postsecondary institutions in the United States was developed by the Carnegie Foundation for the Advancement of Teaching and has come to be known as the “Carnegie Classification”. Originally published in 1973, this classification system was designed to serve research needs. It has since been updated several times, most recently in 2010. It is the framework most often used in describing institutional diversity in the United States and is
relied upon by researchers and educational leaders to ensure appropriate comparison between and among colleges and universities (Cohen & Brawer, 2008).

The current basic classification divides institutions into six main categories including doctoral/research institutions, master’s colleges and universities, baccalaureate colleges, associate’s colleges, specialized institutions, and tribal colleges. For the purposes of this dissertation, the researcher will focus on two specific categories: the doctoral/research institution, which includes institutions that have awarded at least 20 research doctoral degrees per year; and the associate’s college, or community college, which includes institutions where all degrees are at the associate’s level, or where bachelor’s degrees account for less than 10% of all degrees (Carnegie, 2013).

The differences between doctoral/research institutions and the associate’s degree institutions are significant. The doctoral/research institution typically offers a full range of baccalaureate programs, is committed to graduate education through the doctorate, and gives a high priority to research (Thelin, 2004). In addition, Thelin (2004) describes the typical student at a doctoral/research institution as one that is academically prepared, traditional age, and residential. In direct comparison, the community college typically offers both non-credit/workforce development and credit/transfer programs culminating in certificates and two-year degrees. Thelin (2004) further explains that the typical student attending a community college is under-prepared, of non-traditional age, and commutes to campus.

In both types of institutions, the academic library is an integral component of their teaching/learning missions (Emmons & Wilkinson, 2011). In fact, it is difficult to envision any higher educational institution without a library. In many ways, it is the
physical manifestation of academic values and lifelong learning. However, because the doctoral/research institution and the community college serve such different missions and types of students, the academic library, defined by its programming, staffing levels, collections, etc., are also very different from one another. The traditional research library offers large and significant print collections, online databases, and primarily serves two complementary purposes: supporting the university’s curriculum, and supporting the research of the university faculty and students. The community college library, in contrast, provides traditional library services (e.g., collections, online databases, etc.) with an emphasis in media and instructional support for both students and faculty and, more importantly, plays an integral role in developing student information literacy skills (Navarro, 2005). Many such libraries call themselves Learning Commons to address differences in purpose and programming (Whitmire, 2002).

In the remaining sections of this chapter, the discussion will define the problem to be addressed and will continue to build an argument as to its significance. In addition, the researcher will define terms and identify both assumptions and limitations present in the study and research design.

**Statement of Problem**

The general purpose of this study is to extend research conducted first by Mark Emmons and Frances C. Wilkinson (2011) who examined the impact of academic library characteristics on student persistence. Their study exclusively focused on research universities. This researcher plans to conduct similar research on the effects of library or learning commons characteristics, but at the community college level. More precisely, she plans to examine the influences, among others, of staffing levels of...
professional/librarian staff and all other staff, the number of individual and group reference consultations, if the library/learning commons offers virtual reference support, if the institution’s mission includes information literacy, the expenditures on various library materials, the number of weekly public service hours, the gate count in a typical week, and various other library characteristics on institutional graduation rates in the associate’s degree Carnegie classification. In doing so, the researcher will address the gap in current research that does not address the impact of community college libraries, or learning commons, on institutional student success outcomes such as graduation rates.

**Purpose of the Study**

The purpose of this study is to examine the influences of community college library characteristics on institutional graduation or completion rates. The results will be an important early step in demonstrating if there is an impact of community college library characteristics on graduation rates. It will also address the significant gap in research pertaining to the community college learning commons and the unique student body it serves. Given the national and growing attention on community college learning outcomes (AACC, 2012), this research will provide a launching point for additional research on community college learning commons and the services they provide.

**Significance of the Problem**

According to Kuh & Gonyea (2003), the shift from a teaching to a learning paradigm, first introduced by Barr and Tagg (1995) and then by O’Banion (2000), is gaining importance in all categories of higher educational institutions. Furthermore, Kuh and Gonyea (2003) identified accreditation, funding formulas, and accountability standards as a few of the additional areas in which this paradigm shift has traction. The
library or learning commons as an integral component of the student experience should make a direct or indirect contribution to the learning outcomes of the institution.

In fact, this paradigm shift has resulted in research to identify different and more relevant measures of library success. The Association of Research Libraries (ARL) and the Association of College and Research Libraries (ACRL) have created measures that focus on institutional outcomes. Subsequent research (Smith, 2001 & Weiner, 2005) supported learning outcome models that tied campus vision, mission, and goals with library resources (including collections, personnel and budgets), capacity, and services.

Though these studies did bring emphasis to learning outcomes, they remained primarily focused on the library itself, not on the outcomes of the unique needs of the student body it serves. More importantly these studies did not address community colleges. The result is a lack of cohesive and comprehensive research findings that address the influences of community college libraries on their primary clients, the students. In turn, this reduces the empirical support college administrators need to refine their focus on current and relevant measures of library success.

Finally, the results from this study will inform the practice of community college administrators as they strive to provide educational environments and services that positively impact student success. Particularly as financial support from the states and tax payers dwindle and instructional costs increase, administrators are encouraged to make data-informed resource decisions; ones that directly and positively impact the success of their students and institutions.

**Definition of Terms**

To provide clarity, this study provides definitions of key terms, theories, and models.
• Academic libraries

An academic library is defined by the National Center for Educational Statistics (2013) as the library associated with a degree-granting institution of higher education in which they are a part and provide (a) an organized collection of printed and other materials or a combination of both, (b) a staff trained to provide and interpret such materials as required to meet informational, cultural, recreational, or educational needs of clientele, (c) an established schedule in which services of the staff are available to clientele, and (d) the physical facilities necessary to support such a collection, staff, and schedule.

• Information literacy

Tenets of information literacy include the ability to (a) determine the nature and extent of information needed, (b) access and use needed information effectively and efficiently, (c) evaluate information and its sources critically, and incorporate selected information into one’s knowledge base and value system, (d) use information effectively to accomplish a specific purpose, and (e) understand many of the economic, legal, and social issues surrounding the use of information (AACC, 2003).

• Learning commons

According to the American Association of Community Colleges (2003), a learning commons is a set of programs and services that provide an organized universe of knowledge to users. The learning commons continues to be a physical place as long as students need assistance to
conquer the digital or informational divide and there is a need to house and provide access to materials not available electronically.

- Librarian

According to the Association of College and Research Libraries (2013), an academic librarian provides expertise that satisfies a multifunctional role within the Academy. He/she imparts knowledge and skills in research and information literacy to students and faculty alike, is involved in research functions for his or herself or other faculty, participates in the governance of an institution, and has faculty status.

**Theoretical and Conceptual Frameworks**

This study will research the influences of community college library characteristics on institutional graduation rates. Astin’s Theory of Involvement and the I-E-O Model (1984) provide the theoretical and conceptual frameworks respectively. Astin’s theory states that the more students are involved in both the academic and social aspects of the collegiate experience, the more they will gain from their studies. Student involvement is defined by Astin (1984) as devoting significant energy to academics, spending time on campus, participating actively in student organizations and activities and interacting often with faculty. Astin found in his research that the most persuasive types of involvement are academic involvement, involvement with faculty, and involvement with student peer groups (1996).

Interestingly, Astin did not specifically address interactions or involvement with the library in his research. However, as most community college librarians are faculty,
one might apply his theory by hypothesizing that the more involved students are with their librarians, the more their student learning will increase.

Astin’s I-E-O Model (1996), Figure 1, provides the visual or conceptual representation for this study. Generally the I-E-O model provides for the comprehensive assessment of environmental impact on student outcomes, controlling for input differences. Inputs are defined as characteristics of students at the time they enter college and function as control variables. Examples include demographic information, educational background and degree aspirations. Environment factors refer to the programs, policies, faculty, peers, and educational experiences to which students are exposed. The output factors refer to student characteristics after exposure to the environment and include examples such as grade point average, retention and degree completion (Astin, 1996).

Applying Astin’s model to this study, and as further described in the methodology chapter, the researcher will control for student input characteristics such as race/ethnicity, gender, and age. Environmental input characteristics will include the between-institutional variables of degree of urbanization (e.g., city, suburban, rural), institutional size (as defined by FTE of students using instructional activity), if the community college is comprised of a single or multiple campuses, region of the country, library expenditures on various types of materials, institutional type (e.g. tribal, historically black, etc.), and whether or not the institution articulates learning outcomes or informational literacy in its mission or strategic plan. Other environmental factors will include library characteristics such as the number of librarian and professional staff, the number of other staff, the number of individual and group reference consultations, if the library offers virtual
reference consultations, the number of weekly public service hours, and the typical gate count reported. Output results will be measured using institutional graduation rates.

Figure 1. I-E-O model application indicating interrelationships between institutional-level student inputs, between-institution and library characteristics, and institutional graduation rates. Adapted from Astin (1992).

Introductory Literature Review and Background of Problem

There are very few studies that examine the relationship or effects between library characteristics and student persistence factors such as retention and graduation rates. There are even fewer that focus on the community college. Most impact studies this researcher found attempted to measure the library outcomes of the 4-year academic library with the college mission rather than with learning outcomes of its student body. Of the few relevant studies found, two studies completed by Whitmire (2001 & 2002) analyzed library factors that influenced the development of critical thinking skills in undergraduates. In her first study, she found students engaged in focused library activities reported a significant impact on their critical thinking development. In her expanded second study, she found that libraries with greater resources had a significant
impact on students’ self-reported gains in critical thinking.

Her studies on critical thinking, as well as others (Mezick, 2007; Astin, 2001; Porter, 1990; and Murtaugh, 1999), focus on measures that may only indirectly influence student retention and graduation rates. They also almost exclusively rely on data from 4-year institutions and students. Still, the correlations are encouraging, indicating that there is a relationship between library characteristics and student success outcomes.

R.R. Powell (1992) summarized evidence that student use of the library correlated with student grades. However, he based his conclusions on studies that, for the most part, did not control for student ability or institutional factors such as selectivity. His study also did not include community colleges. In contrast, a more recent study at Glendale Community College in California (2001) found that students who participated in library workshops had much higher pass rates in English and English as a Second Language.

Turning to the broader literature base for student persistence, the most comprehensive study is that by Alexander Astin (2001) where he examined how students change and develop in college and the factors that help them persist and graduate. His study found that factors such as peer group, socioeconomic status, and faculty orientation to teaching as significant to student success. He also found institutional factors such as diversity, student-faculty ratio, and living on campus had impact. Astin’s study did not include the library as a possible factor.

Researchers such as Carey (2004) and Pike, Smart, Kuh, & Hayek (2006) identified additional institutional variables with significant influence on student success, such as financial resources, type of institution and degree programs offerings. Furthermore, student characteristics such as race, socioeconomic status and gender are
often featured as primary variables in related research studies (Emmons & Wilkerson, 2011).

Lastly, there are several studies that investigate factors that influence undergraduate library use. Grimes and Charters (2000) found that women and African American and other minority undergraduates spent more time in the library, as did undergraduates with lower ACT scores and those who lived on-campus. The three library factors that influenced the time undergraduates spent in the library included using it as a place to study, using it as a place to socialize, and using it for its reference services. This study did not include community college students.

Jiao and Onwuegbuzie (1997) studied the reasons why undergraduates use the library or access its services and found that the primary reasons were to study for a test, to read current newspapers, to read their own textbooks, to use computerized indexes and online facilities, and to meet friends. Similar studies conducted by Williams (1995) and Harrell (1988) found that the most important factor in library use was program characteristics and grade point average. Both of these studies, although dated, did include community college students.

The preceding synopsis of empirical research illustrates two key problems that directly affect the theoretical knowledge base and the ability of higher education professionals to engage in intentional practice towards increasing student success outcomes. First, this researcher found no multi-institutional study of library characteristics and the effects on student persistence or graduation in the community college arena. While there have been studies conducted on library outcomes and student
persistence across institutional characteristics, there are none that contribute to greater understanding of the community college and the unique population it serves.

Second, and as mentioned previously, most research conducted has focused on the alignment of library outcomes to institutional mission, not institutional rates of student success. The result is a lack of research on how the library influences the student, and of particular interest to this study, the community college student.

**Research Questions**

The research questions to be addressed in this study include:

1. What influence, if any, do institutional-level student input variables such as the percentage of racial/ethnic groups, the percentage of female and male students, and the percentage of students under and over the age of 25, have on institutional graduation rates?

2. What influence, if any, do between-institutional variables (e.g., degree of urbanization, institutional size, single/multiple campuses, region of country, and total library expenditures) have on institutional graduation rates?

3. What influence, if any, do library or learning commons variables (e.g., number of professional staff/librarians, the number of other staff, the number of individual and group reference consults, if virtual consults are available, the number of weekly service hours, and typical weekly gate count) have on institutional graduation rates?

For the purposes of this study, graduation rate is defined as 150% of normal time to completion or 3 years for community colleges (NCES, 2013).
Methodology

For the purposes of this expanded study, both descriptive statistics and a blocked, step-wise multiple regression model were used. The researcher computed basic statistics for all variables. She first conducted basic correlations to determine significance, and then performed a step-wise multiple regression analysis using 3 blocks. She chose this methodology because it allows by design for independent variables to be added to the regression one after the other. In effect, the regression tested institutional-level student input variables first for significance against institutional graduation rates. Next, between college variables were added and then, lastly, the library variables.

These techniques allowed her to incorporate several independent variables and analyze their effects on the dependent variable relative to one another. Secondly, since this technique provides predictive power (Freedman, 1997), it provided the researcher with an instrument for predicting institutional graduation rates given different characteristics of the community college library or learning commons.

The data set to be examined was drawn from five sources conducted by the National Center for Educational Statistics. The first four sources included data from the Integrated Post-Secondary Data System (IPEDS) and the fifth or last source from the Library Statistics Program. In all cases, only associate’s degree institutions were used and any missing data was replaced with mean values.

The data provided by the Library Statistics Program is collected biennially from approximately 3,700 degree-granting post-secondary institutions. To be classified an academic library, it must provide an organized collection of print or other materials, a staff trained to provide and interpret such materials, an established schedule in which
services of the staff are available to students, faculty, and staff and physical facilities necessary to support such a collection, staff and schedule.

The most recent data set includes 3,689 U.S. academic libraries of which 1,371 are classified as Associate using the Carnegie classification system. The web-based survey was administered during fall 2011. The response rate overall was 86% and for Associate classified libraries specifically 84.5% (NCES, 2010). There were 32 independent variables taken from this data set in support of this study. Examples of variables include the number of librarian/professional staff employed, the FTE (full-time equivalent) of other staff, the annual number of individual and group reference transactions, if the institution offers virtual reference support, expenditures on various library resources, the number of weekly public service hours, and the typical weekly gate count. In addition from this data set, the researcher will used between institutional variables including, but not limited to, region of country and degree of urbanization.

The 2011 IPEDS data sets include 1,642 Associate-degree granting institutions and will provide the data to determine institutional-level student input variables of race, gender, and age and the between-college characteristics of institutional size and if the institution is a single or multiple campus college. The dependent variable of institutional graduation rates will also be provided by this dataset. The graduation rate for community colleges is defined as the number of completers within 150% of the normal time to graduation or 3 years.
Limitations

The study has a few limitations that are not under the control of the researcher and should be taken into account when interpreting the findings or on the generalization of the results:

- The sample in this study is represented by public community colleges. While this sample includes the vast majority of two-year institutions, it does not represent private community colleges or two-year institutions housed within a university system or a 4-year institution that also grants associate’s degrees.

- Data used in this study from IPEDs and the Library Statistics Program are self-reported by each institution. Because it is self-reported, there may be inaccuracies or mistakes due to the interpretation of questions, and the soundness and/or availability of institutional data at the time of the survey completion.

- There are inherent statistical and design problems with multiple regression studies. A specific area of concern in this study is the possible existence of multicollinearity or where two or more of the independent variables are highly correlated with one another (Freedman, 1997). Future studies may design for this limitation by eliminating one of the highly correlated variables.

- By definition, library or learning commons with less than $10,000 in total expenditures are not included in the sample.

Delimitations

Most community colleges by definition and practice provide non-credit or workforce development opportunities. These programs may include a wide array of innovative, high-value programs such as organizational and professional development,
career assessments and coaching, leadership, information technology, advanced engineering and manufacturing, industry credentials, and apprenticeship programs. Since these services are often part of the community college mission, the learning commons/library is called upon to also serve these programs and students. However, for the purposes of this study, the researcher is choosing to not address how the characteristics of the learning commons influence the graduation or completion rates of this unique population.

Assumptions

According to the AACC (2013), the current definition of graduation rates, 150% of time for first-time, full-time students, being used by IPEDS and other governmental agencies is incomplete and does not tell the full story of community college graduation. The regulation, established by the Department of Education, is much more aligned with traditional, residential 4-year colleges than the transient and part-time student populations served by community colleges. Yet, for the purposes of this study and in support of the data sets chosen, the researcher will assume the traditional graduation rate definition.

Summary

In summary, this chapter describes conducting a study of the influences of library characteristics such as staffing levels, and information services on institutional graduation rates in associate’s degree classified institutions. The purpose of this study is to address the research gap in empirical knowledge relating to student success outcomes and the community college library, also known as a learning commons. In a higher education environment of increasing accountability by funders and accreditation agencies, this
study provides a foundation for additional research on student success in the community college arena.

As stated earlier, this study expands on an existing study by focusing on a new and different environment. The methodology used included standard statistical analyses with a step-wise regression model in order to determine if there are any influences of library characteristics on institutional graduation rates. The analysis was conducted using secondary data from IPEDs and the Library Statistics Program, both from the National Center of Educational Statistics.

The following chapters will discuss in more depth the existing literature on library characteristics and institutional graduation rates, the descriptive statistics and step-wise multiple regression model used, and the results of the analysis. Lastly, a discussion on the implications and opportunities for future research will be addressed.
Chapter Two

Literature Review

Introduction

Community colleges have long been recognized as open-door institutions with an emphasis on providing a wide range of students with access to higher education. In recent years; however, policymakers, educators, and researchers have brought increased attention to the outcomes of community college students with particular emphasis on graduation rates (AACC, 2013). Despite numerous research studies on retention, authors generally agree that there are “no magic formulas” for retaining students through completion of their degrees and graduation (Bell, 2008). They acknowledge that the many student characteristics that do predict student dropout rates are not within institutional control (Tinto & Pusser, 2006). However, higher education institutions can control some environmental factors as suggested by research conducted by Astin (1985), Tinto (1975) and Pascarella (2005) that may be key to keeping students focused on completing a degree.

The factors that may contribute to graduation include the climate of expectations established by members of the institution, the amount of feedback provided to the student, and the educational and social involvements in and outside the classroom (Tinto and Pusser, 2006). According to Alexander Astin (1985), one of the most important factors may be the interactions students have with people including faculty, advisors, and students. In other words, students who graduate develop personal connections within their institutions (Kuh, 2008).
The purpose of this study is to examine the influences of community college library characteristics on institutional graduation rates. Since librarians are typically faculty positions within the institution, one can assert their engagement with students and, consequently, students’ use of the library may also affect graduation rates. There are few studies that examine this particular relationship and there are even fewer that focus on the community college and the unique student body it serves.

The literature review provides a comprehensive analysis of the existing research on the community college library or learning commons and its impact on institutional graduation rates (see Figure 2). The review will structure and build identifiable gaps in current research to build significance for this study.

As shown in the fishbone schematic (see Figure 2), the analysis will begin with a review of the history of both community colleges and the evolution of its library to a learning commons structure. It will include the current empirical base that demonstrates how the learning commons supports student success and institutional outcomes such as graduation rates. It will then summarize the work of library associations, such as the Association of Research and College Libraries, on documenting value and support of institutional outcomes.

The discussion will next move to research conducted on student success factors such as the paradigm shift from teaching to learning, increased focus on graduation rates, and the importance of learning outcomes. The focus of this discussion will be on the impact of library characteristics such as number of librarians, number of individual and group reference consultations, and the typical number of student visitors to the library, on student success factors.
Lastly, this chapter will document and analyze the work of Alexander Astin’s Theory of Involvement and his conceptual framework called the I-E-O Model. Generally speaking, this model provides for the comprehensive assessment of environmental impact on student outcomes while controlling for input differences (Astin, 1996). The review in this chapter will focus on evidence found in research that supports both this model and the application of environmental variables such as the library characteristics mentioned above.

![Diagram of Community Colleges in America: History and Present](image)

**Figure 2.** Fishbone schematic (also known as an Ishikawa diagram) to guide the literature analysis. Adapted from Dale, Barrie, et al. (2007). Managing Quality. 5th ed.

**Community Colleges in America: History and Present**

A true American invention, the development of community colleges evolved from the growth in demand for higher education in the twentieth century and from the increased need for trained workers (Cohen, 2008). In its earliest form, the Junior College, which provided both needs, was seen as a buffer between high school and scholarly research. One, in which, could provide and support students through the foundational courses or provide job training such as nursing. This notion was very
popular in the early 1900s where by 1919 there were over 170 junior colleges in thirty-seven of the forty-eight states and by 1930, there were 440 institutions in all but 5 states (Cohen, 2008).

Most of the growth in junior colleges came through the efforts of public universities that wanted to expand their feeder institutions. However, according to Cohen (2008) the single most important factor for access to the junior colleges was proximity. Universities were drawing the majority of their students from within a short radius not from their supported junior colleges up to several hundred miles away.

Access to higher education became a central theme when President Truman called his Commission on Higher Education to articulate the value of higher education for the country’s citizens; thus, opening the door for the development of community colleges. As federal and state funding became available, community colleges grew rapidly in densely populated areas which in turn fueled a large increase in the percentages of students beginning college (Cohen, 2008).

The functions of community colleges usually included academic transfer preparation, vocational-technical education, continuing education, developmental education and community service. These functions remain largely intact today.

The American Association of Community Colleges (AACC) defines the contemporary community college as a two-year public and post-secondary institution that provides preparation for advanced study, career and technical education, guidance, developmental education, general education and community service. The ranks of community colleges today have increased to over 1,200, which serve over 3 million students, and confer over 200,000 degrees per year (The White House, 2013).
Today’s community colleges come in many shapes and sizes. Some institutions have single campus locations and serve primarily small and local populations with technical and career programs; others are much larger, multiple campus institutions that offer broad ranges of transfer and technical programming to tens of thousands students. However, their goals remain similar: to provide equal access to educational opportunities to citizens of their service area; prepare or retrain individuals for employment or for further education; and to contribute to the lifelong learning opportunities through on- and off-campus educational programming (Cohen, 2008).

Through this evolution, though, challenges remain for community colleges. One of the primary current issues includes effectively serving an increasing population of students underprepared for college-level work. This challenge manifests itself in low retention and graduation rates.

**Accountability from external sources.** Over the past three decades, policymakers have become very concerned about finding ways to secure better performance from higher education institutions, including community colleges, whether in the form of greater access and success for less advantaged students, lower operating costs, or improved responsiveness to the needs of state and local economies (Dougherty, Hare, & Nutow, 2009).

One of the key incentives that policy analysts have argued for and some state governments have implemented is a state performance accountability system, whether in the form of requiring reports on performance outcomes or tying state funding to an institution’s performance on specific indicators such as rates of retention, graduations and job placement (Ewell & Jones, 2006). Meanwhile, the American Association of
Community Colleges (AACC) and the Association of Community College Trustees, in partnership with the College Board, have also launched an effort to develop a Voluntary Framework of Accountability for Community Colleges. Driving this effort has been a concern that the aforementioned systems, while useful, are tailored to four-year colleges and may not be wholly applicable to community colleges and the unique populations they serve.

Academic Libraries and the Learning Commons

The history of academic libraries parallels the history of higher education. The role of the library has also evolved as the priorities of institutions have evolved (Weiner, 2005). The first academic library was established when John Harvard donated approximately 300 of his books to Harvard University. Characteristic of that time, the colonial college libraries were described as small, eclectic collections of donated books. Most were theological works, as well as classics and standard textbooks in philosophy, logic and history (Weiner, 2005).

In the late nineteenth and early twentieth centuries, changes in scholarship and learning greatly affected libraries (Dain, 1990). Printing became much easier and the emphasis on publishing results of research led to a proliferation of journals and scholarly monographs and the need for primary source materials (Weiner, 2005). Library endowments became popular legacies and, in most cases, stand-alone buildings were constructed to house increasing collections. Hanson (1989) reported that by the end of the nineteenth century the typical small college library held 6,000-20,000 volumes comprised mostly of donations.
At the turn of the twentieth century, a shift occurred from emphasizing conservation and protection to increasing accessibility and encouraging students and faculty to use the materials. Collection building became competitive particularly in research universities. By World War I, most academic libraries had reference departments with a specific purpose to instruct and guide users. After World War II, federal funding became available for research and for academic libraries to increase their collections of published materials. There was an underlying assumption that library collections were a resource of value to the institution and country (Weiner, 2005).

Changes in technology also created major increases in the availability of electronic resources. Databases and shared consortia emerged as colleges and universities began to share resources. According to Weiner (2005), increased economic pressures on university administrators at this same time caused some to question the role and function of the traditional academic library.

**The community college library.** The academic library in the community college has also changed in response to internal and external influences. A community college library must provide a full range of learning resources to support transfer, career and technical programming and lifelong learning needs, although it is less concerned with developing collections that support faculty research. In addition, it must meet the needs of diverse student populations.

The term, learning resource center (LRC), is generally used to differentiate the traditional academic library from one that is meeting the unique needs of community colleges. Differences may include more direct involvement in instructional programs, increased emphasis on the use of information (information literacy), space provided for
self-paced and tutoring support services, and technology resources. In many cases, community college LRCs also provide faculty with technology support for learning objects designed to augment seat based or online classes (Smith, 1978).

The term learning commons has become more popular since the 1990s (Heitsch & Holley, 2011) as community colleges began to explore the space configurations of their libraries and learning resource centers. Many institutions today, including four-year, use space within these areas to encourage student-to-student and student-to-faculty interactions while also providing access to technology (or perhaps more importantly, electricity for student owned devices). In fact, according to ACRL, many institutions now provide less and less space for book collections or have made them less accessible by placing them on different floors within the library. The emphasis has moved to engagement with electronic resources, websites, and instructional materials.

The focus of a learning commons goes beyond helping students manage information to helping them manage their learning (Beagle, 2004). Rather than highlighting access to computers, software, and multi-media support, a learning commons emphasizes a range of programs and services to support students in their learning tasks. According to Beagle (2004), a learning commons should recognize not only the needs of the learner are paramount, but that the nature of that learning is changing, including a greater emphasis on collaborative learning pedagogies.

Some libraries have moved beyond the concept of a learning commons to provide space and tools that encourage effective group work incorporating flexible furniture and seating arrangement as well as coffee shops and other amenities to promote and encourage academic socializing (Matthews, 2012). Gayton (2008) has suggested that the
values of the traditional library (studious, contemplative, and quiet) focus on the individual as a solitary activity while the values of the learning commons focus on group activities. Although not the purpose of this literary review, Nitecki (2011) has offered a framework for the purposeful assessment of library space in order to better understand how various factors and different paths will affect the results of student achievement.

**The learning college.** The learning college concept was developed by Terry O’Banion in the 1990s on the premise that if the community college were to survive in education, it had to develop a particular focus that no other kind of institution offered. O’Banion extracted elements from various education reform theories (Navarro, 2005) for his learning-college concept’s primary tenet: “Student learning is at the center of educational process” (p.52).

Historically, community colleges emphasized teachers and teaching; however, the learning college concept changes the emphasis over to students and student learning. AACC (2013) documented that by 2010, 97% of its community college members claimed they are learning-centered. This change in emphasis also effected the community college library or learning commons (Navarro, 2005).

To institute this concept, according to Navarro (2005), libraries or learning commons in community colleges faced a significant challenge. First, many found it necessary to move beyond the concept of library instruction to helping students better use the library and its resources. This concept, as explained by Navarro (2005), is more about information literacy skill development.

Second, the learning college concept also requires libraries and librarians to determine to what extent their guidance actually helps students find information that
leads to student learning. This concept requires that the librarian become deeply involved in partnership with faculty (Navarro, 2005). Data from Navarro’s study (2005) indicate that very few community college libraries or learning commons have successfully integrated the learning college concept into their organizational practices.

**Information literacy in community colleges.** Much of the literature about community college students’ information habits focuses on what libraries and librarians can do to teach community college students information literacy (Fry, 2009). The articles discuss learning communities, bibliographic instruction, and information technology. Although these topics are important, more focus is needed on community college students themselves.

Several significant studies explore the information needs of university students, high school students and graduate students (Fry 2009). Community college students, however, differ vastly from these student populations. In general, community college students are more ethnically, culturally, and socioeconomically diverse than other types of students. As such, studies of university students cannot and should not simply be applied to community college populations.

**Library and Institutional Mission**

Institutions of higher education, including community colleges, have similar goals. They want to recruit and retain students, faculty and staff; and they want to support teaching and learning that results in high levels of student engagement and graduation rates. Some institutions also place mission emphasis on job placement, test scores, research and grant funding (Poll & Payne, 2006). As an important part of
institutions, libraries “do not exist for themselves” (p. 9, Goetsch, 2009); rather, they exist to promote institutional missions.

Because institutional missions can vary, the methods by which academic libraries contribute value vary as well. According to Roger (2009), “a library is successful if it serves the needs and priorities of its host institution, whatever those may be” (p. 46).

Oakleaf (2010), on behalf of the Association of Academic and Research Libraries, produced a comprehensive summary of the available research pertaining to the value of academic libraries. The Oakleaf Report also demonstrated potential areas of correlation between the uses of library collections and services and the impact on students including retention and graduation. She pointed out the possible correlation between libraries and faculty research and institutional reputation and prestige. As she and Matthews (2007) have noted, however, the vast majority of this research is difficult to generalize since the literature reports on the details of case studies typically focused on one group of students in one class or of several classes over one semester. Theses micro-level studies may reflect a narrow perspective and reflect a particular slice in time, which limits their generalization.

Franklin (2012), in a position article titled “Surviving to Thriving: Advancing the Institutional Mission”, found that academic research libraries can employ several approaches to advance the institutional mission. Of particular interest, she states that libraries should align their campus plan more deliberately to supporting the institution’s mission. For example, she suggests libraries reorganize their units to reflect direct support to first-year experiences, undergraduate research, information literacy, critical thinking skill development, research, scholarship, and creative activity of faculty.
There is need for further research that demonstrates the value of libraries to the institutional mission and to improved student outcomes.

Library Impact on Graduation or Retention

Evidence tying academic libraries to student graduation rates is at best scarce and nearly non-existent for community college libraries, LRCs or learning commons. To compensate, this researcher also includes a review of studies associated with retention and persistence since one might argue that graduation rates are dependent on retention and persistence.

Pierard and Graves (2007) reviewed the higher education and library literature on retention and found only a handful of studies. Their goal was to develop a framework that academic librarians could use as a guide to assist in retention efforts. Poll and Payne (2006) argue that the “library’s mission and goals must be adjusted to those of its parent institution, including retention and graduation” (p.550). Bell (2008) argued that library directors should make the case that the academic library could be valuable in boosting retention through the use of a variety of strategies such as emphasizing personal attention, focusing on building student research skills, and using perks/incentives to engage students. More recently, the Association of College Research Libraries (ACRL) called upon librarians to demonstrate the value of academic libraries by exploring all types of impact measures, including retention and graduation (Oakleaf, 2010).

Early studies found tended to examine individual institutions. In the earliest study identified, Kramer and Kramer (1969) found a significant correlation between persistence and students who checked out at least one book in their first year at California State Polytechnic College in Pomona versus those that did not check out books. They noted,
“of the students who used the library, 73.7% returned. By contrast, the fate of those freshmen who never used the library was that only 57% returned” (p.312). Theirs was part of a larger study that also found that library use correlated with higher grades (Barkey, 1965).

Only recently has research looked directly at the relationship between academic libraries and persistence across multiple institutions. Mezick (2007) studied the relationship between traditional library input and output measures of expenditures, materials, and salaries with fall-to-fall retention rates and found that there was a moderate correlation, with the strongest correlations occurring at doctoral institutions. Mezick did not control for any non-library factors other than institutional type, although her study did not include community colleges. Despite this shortcoming, her study did find intriguing results that point to input and output measures potentially related to persistence.

Emmons and Wilkinson (2011) explored the relationship between traditional library input and output measures of staff, collections, use, and services with fall-to-fall retention and six-year graduation rates. A linear regression model found that, controlling for ethnicity and socioeconomic status, a change in the ratio of library professional staff and students predicted a statistically significant positive relationship with both retention and graduation rates. Once again, this study did not include community colleges.

Other multi-institutional research has looked at the library under the broader umbrella of expenditures. Gansemer-Topf and Schuh (2006) investigated how institutional expenditures contribute to retention and graduation. They “found that there is a relationship between organizational behavior (i.e. resource allocation and institutional selectivity) and retention and graduation rates” (p.629). Among others, their “study
verified that academic support expenditures positively contributed to retention and graduation rates” (p.632). Noting that the library, along with advising and academic computing are part of academic support, they go on to state that it is difficult “to determine if the separate functions within academic support expenditures contributed to retention or graduation rates equally or if some have more influence on retention and graduation rates than others” (p. 632).

Unfortunately, most studies examining expenditures took the same approach, finding that spending on academic support services improved retention, but not separating out the various types of support services or including community colleges (Astin, 1993, Ryan, 2004). Their reluctance is understandable, as the category of academic support services spending defined by the National Center of Educational Statistics (NCES) and the Integrated Postsecondary Education Data System (IPEDS) does not separate library expenditures from other academic support areas.

In contrast, the researcher did find two expenditure studies that separated out the library from support services. Hamrick, Schuh, and Shelley (2004) developed a statistical model using multiple regression on institutional expenditures. They found that a direct relationship, second to only increasing per student expenditures on instruction, of increasing library expenditures provided a very “robust and statistically significant explanation of graduation rates (f=230.422, p<.001, R² = .343). For example, every 10% per student headcount increase in library expenditure resulted, on average, in an additional 1.77 percentage points of graduation rates” (p. 11).

At the University of Tennessee, as part of a larger study on the impact of campus facilities upon the retention of student from their first to their second year, Mallinckrodt
and Sedlacek (2009) found “that students who use the library are more likely to stay in school” (p.569). In particular, there was evidence that students who studied in the library, used the library for research, and who spent more hours in the library were significantly more likely to return for their second year. For African-American students, statistical significance was limited to studying in the library.

The existing research tying academic library impact to student persistence, retention or graduation is limited but encouraging. It demonstrates a positive relationship with library resources, services, or use of the library with increasing student success measures. While there is little research on impact, there are several studies (detailed in the next section) that address the impact of the library on individual student performance. This literature continues to not address the specific population of community college libraries and the students they serve.

**Library Impact on Academic Performance**

Most academic library impact studies focus not on persistence or graduation, but on student achievement and learning or on evaluation of programs with the intention of making programmatic improvements. The earliest empirical study found was research conducted at Monteith College (Knapp, 1966). Faculty at Montieth College were interested in learning more about the “methods of developing a more vital relationship between the library and college teaching” (p.11). With that in mind, the librarians planned courses with faculty that “required extensive and meaningful use of the library” (p.12) and found that students who participated made better use of the library and performed better in classes. They used their findings to call for the development of
instructional partnerships between librarians and instructional faculty, playing a key role in the development of library programs such as bibliography instruction.

Several studies focused on the library impact on student learning. Whitmore (1998, 2002) analyzed library factors that contribute to the development of critical thinking skills. In the first study, she found students “who engaged in more focused library activities reported a significant impact on their critical thinking development” (p.7). In her second more recent study (2002), she found that libraries with greater resources had a significant impact on students’ self-reported gains in critical thinking.

Julien and Boon (2004) conducted research on the impact of informational literacy instruction in a Canadian university. They gave pre- and post-tests on information literacy skills before and after students participated in librarian-led information literacy workshops and established that library instruction contributes positively to student overall success in school.

Other single institution studies looked at the relationship between library use and student success. Bolt (1987) compared students who failed program major competency examinations and subsequently took a library instruction course to students who successfully passed the competency exam. This study found no discernible difference on test scores, implying that the course did not impact student performance.

At Miami University, Erekson (1992) studied the impact of student effort in studying, using the library, and working with faculty had on achievement. He found that “library effort did not have a significant effect on GPA” (p. 441) and neither did studying. The only statistically significant relationship was that time with faculty positively impacted student achievement. Richland College found that students who had
completed the Certificate of Information Literacy (a five course sequence) had higher
grades and a better retention rate than students who did not (Ferguson, 2000).

De Jager (2002) correlated book borrowing with better scores on exams. Dickerson (2006) surveyed undergraduates and faculty to determine how academic libraries in Colorado impact student learning. While the student survey focused primarily on how they used the library rather on their learning, one part of the faculty survey did find that most faculty felt the library contributed to their teaching. Zhong and Alexander (2007) surveyed students who responded that access to library facilities and to technology and online resources contributed to their academic success. This was the only study found that included community college students in its population.

At Arizona State University, Churchill and Iwai (1981) examined the impact campus facilities had on retention of students with high and low grades. The library was one of nine campus facilities in a large conglomerate that included “campus housing, campus food services, recreational facilities, academic advisement, career services, financial aid, student health services, and the university counseling service” (p.356). They found that “for students with low GPAs, the use of campus facilities is correlated with continuance in school” (p.361). Unfortunately, they were interested in looking at campus facilities holistically and did not separate out the impact of the library or any other services in their analysis.

Some studies did not find positive impact or relationships. Ayres and Bennett (1983) studied institutional factors “including library facilities, financial resources, curriculum design, student body attributes, and faculty quality” and found that “no measure of library facilities is strongly related to achievement difference” (p.521). The
researchers explained further that the “absence of a strong relationship is, however, more an indictment of the aggregate measure than an indication of the unimportance of books” (p.522). Their library indicators included the number of books, number of periodicals, and annual acquisition budgets.

The ACRL regularly produces SPEC Kits which help librarians learn about current practices in research libraries, implement new practices and technologies, manage change and improve performance. In late 2010, the ACRL completed a SPEC Kit on impact measures. Based on this framework, Poll and Payne (2006) developed a survey that found “despite the urgency the library community has felt in recent years to justify its value, the responding libraries reported shockingly little work that focuses on investigating whether use of library resources correlate with the measures of success for library users” (p. 9). Using the same resource, Koltay and Li (2010) found that only 34% of the library respondents reported having conducted research on their library’s impact.

The Academic Library and Student Engagement

Several researchers have found student engagement a major factor in student success or performance and retention or graduation. Chickering and Gamson (1991) developed their Seven Principles for Good Practice in Undergraduate Education based upon 50 years of educational research. Two of the principles that promote success are contact with faculty and cooperation among students. Astin (1993) noted that involvement, especially with peers and faculty in the pursuit of education, is critical to student success.

In their exhaustive landmark review of how college affects students, Pascarella and Terenzini (2005) found that integration, involvement, and interaction improved
persistence and academic performance. In a review of literature entitled “What Matters to Student Success”, Kuh, Kinzie, Buckley, Bridge and Hayek (2006) found that, along with the characteristics students bring with them to college such as gender, race, and ethnicity, academic preparation, educational aspirations, and socioeconomic status, student engagement was the single most important factor in student success and engagement. Though these researchers use different terms, the literature reviews each found student engagement was among the most critical student success factors. 

There are only a few studies that directly connect the library to student engagement. Kuh, Boruff-Jones, and Mark (2007) reviewed the literature on student engagement and explored the conditions under which libraries can engage students. They defined engagement simply as “the more students do something, the more proficient they become” and examined the library’s role in light of two features: “the amount of time and effort students put into their studies” and “how a school deploys its resources” (p.18). They argued that libraries could promote student engagement by minimizing library anxiety, involving librarians in first year programs, and meeting with students outside of class time. Their research led them to then focus on approaches to teaching information literacy skills to first year students. 

Kuh and Gonyea (2003) used data from the College Student Experience Questionnaire (CSEQ) to analyze the relationship between academic libraries and student learning. Though they found that “on balance, library experiences do not seem to be directly related to information literacy, overall gains in college, or satisfaction with the college experience” (2003, p. 9), they went on to highlight correlations between library indicators and other measures of success that suggest that there might be indirect
relationships. For example, students who more frequently use the library reflect a studious work ethic and engage in academically challenging tasks that require higher-order thinking. They also note that although certain student background characteristics (race, major, year in school, transfer status, access to computers) affect the nature and frequency of students’ library activities, the library appears to be a positive learning environment for all students, especially members of historically underrepresented groups.

Mark and Boruff-Jones (2003) analyzed the National Survey of Student Engagement (NSSE) in order to develop a process for local academic libraries to use in analyzing and setting benchmarks for their library instruction programs. Their particular interest was to correlate survey questions from the NSSE with the ACRL Information Literacy Competency Standards for Higher Education for the purpose of librarians to assess their work.

Gratch-Lindauer (2008) reported on a project to include two experimental questions related to information literacy behaviors on the 2006 NSSE. An analysis of the results corroborated that eight of the ten questions showed moderate to high correlations between information literacy scales and NSSE questions.

Nelson-Laird and Kuh (2005) conducted a similar NSSE study with experimental questions about the use of information technology. Several of their questions asked about using technology to obtain resources for academic work, accessing the library (or web), making judgments about the quality of information, or asking a librarian questions. Overall, they found a moderate to strong “positive relationships between academic uses of information technology and engagement, particularly academic challenge, student-faculty interaction and active and collaborative learning” (p.230).
While most of these studies did not address community colleges, one study conducted by Whitmire (2002) did focus on the relationship between undergraduate background characteristics and library use. The students in the study were freshmen and sophomores and more closely parallel student characteristics found in community colleges. Whitmore found that women and African American minority undergraduates spent more time in the library; however, the time dropped significantly if the student held a part-or full-time job. Furthermore, the variables with the strongest impact on library use were student-faculty and peer interactions, writing activities, and being assigned term papers.

Lastly, Zhong and Alexander (2007) conducted a survey of 1,295 undergraduates (none from community colleges) asking students about their perspectives on how the library impacted their learning. Significantly, they found the notion that academic libraries and library initiatives were viewed by students to directly and positively impact their academic engagement and success. Students felt most engaged by libraries that promoted academic and social integration, encouraged library use and supported student-to-student and student-to-faculty connections. This group identified the library website and electronic periodicals and databases as most important over the physical print collections and placed high value on access to computer workstations. Lastly, the results indicated that of all reference factors, the level of friendliness of the staff influenced student engagement in the service.

**Persistence in Higher Education**

Whereas persistence is not studied in great depth in relation to the academic library, it is studied in great depth in higher education. Pascarella and Terenzini (1991)
reviewed “roughly 2,600 pieces of research” (p. xi) on the influence of college upon students. They devoted an entire chapter of their book to listing hundreds of studies about educational attainment, a category essentially equivalent to persistence or graduation. They wrote a follow-up with another decade of research, citing nearly as many studies in one decade as in the previous two decades combined (Pascarella & Terenzini, 2005). Once again, they devoted a whole chapter adding hundreds of studies to educational attainment.

Tinto (2006, 2007), one of the pioneers in student persistence, reviewed the history of student retention research. He noted, “40 years ago, student attrition was typically viewed through the lens of psychology. Student retention, or the lack thereof, was seen as the reflection of individual attributes, skills, and motivation” (p. 2). He then tracked the addition of the environment as an influential factor and his own work in developing a longitudinal model that emphasized the student’s integration into the environment. Much subsequent research built upon his model and his idea of integration in what he terms the “age of involvement” (p. 3) with studies focusing on the importance of involving the student in the life of the college, especially in the first year. He then described the maturing of the field of retention research with a fine-toothed focus on different types of institutions and students from different backgrounds.

Building upon the work of Pascarella and Terenzini (1991, 2005), Reason (2005) thoroughly reviewed the literature on student persistence in higher education. Using a framework he created with Terenzini (Terenzini & Reason, 2005), he examined research published in the areas of student precollege characteristics and experiences, the
organizational context, and the peer environment that includes individual student experiences in and out of class.

**Community college graduation rates.** According to Bailey, Calcagno, Jenkins, Leinbach and Kienzi (2006), one common measure of community college performance is the graduation rate for students within 150% of the time in which they would be expected to complete a degree or certificate (if they attended full-time and were ready for college-level coursework). This rate is also known as the Student Right to Know (SRK) rate and is based on an entering cohort of all first-time students who attend full-time when they initially enroll.

In the study completed by Bailey, Calcagno, Jenkins, Leinbach and Kienzi (2006) the results indicated a negative relationship between enrollment size and completion. In addition, colleges with a high share of minority students, part-time students, and women have lower graduation rates. Another significant finding among institutional characteristics is that greater instructional expenditures per FTE is related to a greater likelihood of graduation. Lastly, the state in which the college is located is significantly related to its graduation rate, suggesting that a state’s policy environment as a strong bearing on the measured performance of colleges.

In summary, these reviews of the literature demonstrate that persistence and graduation rates are a much-studied phenomenon in higher education although there are fewer related to the specific challenges faced by community colleges.

**Theoretical Framework**

Research on college students shows that the time and energy students devote to educationally purposeful activities is the single best predictor of their learning and
personal development (Astin, 1993, Kuh et al, 2007). What students do during college generally matters more to what they learn and whether they persist to graduation than who they are or even where they go to college. Furthermore, Pascarella and Terenzini (2005) reaffirmed the finding that the impact of college is determined primarily by individual student effort and involvement in the curricular and co-curricular offerings on a campus, though the total impact is also influenced by the campus itself. These findings support the premise of this researcher’s work which will examine the effects of library characteristics on student graduation rates in community colleges.

**Astin’s Theory of Involvement.** Astin (1984) defined involvement as the amount of physical and psychological energy a student devotes to his/her academic experience. This involvement can be both academic and social, though much of the research using the theory of involvement has tended to focus on extracurricular involvement (Hernandez, Hogan, Hathaway & Lowell, 1999). Astin (1984) hypothesized that the more involved the student is, the more successful he or she will be in college. He suggested that involvement is the investment of psychological and physical energy, which occurs along a continuum, with different students investing different amounts of energy. Astin (1984) added that involvement is both qualitative and quantitative, is related to learning, and can be encouraged by institutions to enhance educational effectiveness.

The concept of involvement was first formally introduced in Astin’s (1975) book, *Preventing Students from Dropping Out*, and was later presented more formally in his 1984 article. According to Astin, “The 1984 article, in its draft form was used by the National Institute of Education Study Group that produces the widely cited report,
Involvement in Learning. The Study Group embraced the involvement construct as the centerpiece of its national report on the state of higher education in the United States, which helped to popularize the concept” (p. 63).

Involvement theory (Astin, 1984, 1991) states that the more involved students are with their undergraduate experience, the higher chance they will persist towards graduation. Astin argues that while student characteristics (inputs) are useful in predicting the outcomes of students (e.g., college GPA, retention), the activities a student participates in while in college (environmental factors) are also important in shaping the outcomes of a student’s college career.

While Astin’s theory of involvement has been used to examine community college persistence, there is very limited research applying environmental factors such as library characteristics to graduation rates (output measures) using his approach. Furthermore, while he found student interaction with faculty a positive factor in graduation and persistence, he and others did not apply this conclusion to library faculty. Testing Astin’s theory on the community college student graduation rate and interaction with the library will be a significant contribution to the literature on understanding the factors that influence community college students.

I-E-O Model

Involvement theory is typically utilized in research using the Input-Environment-Output (I-E-O) Model proposed by Astin (1984). This model was conceptualized to show the effects of college on undergraduate students. According to Astin (1984), inputs refer to the characteristics of the student at the time of initial entry to the institution; environment refers to the various programs, policies, faculty, peers, and educational
experiences to which the student is exposed; and the outcomes refer to the student characteristics after exposure to the environment. Change or growth in the student during college is determined by comparing outcome characteristics with input characteristics.

Activities such as working on campus, living on campus, engaging with peers, being a member of a club, and socializing with faculty members are the types of involvement typically measured using this framework. A variety of outcome measures, including graduation, have been linked to extracurricular involvement (Pascarella & Terenzini, 2005). However, although both extracurricular and academic involvement are important, research shows that academic involvement (e.g., hours spent studying and doing homework, asking questions in class, studying with other students) has more significant effects than other types of involvement (Astin, 1993).

For the purposes of this dissertation, input characteristics will include student variables such as race, gender and age. The environmental variables will include both between institutional variables and characteristics of library or learning commons such as number of professional staff/librarians, number of group reference consults, etc.

**Summary**

In summary, this chapter provided a comprehensive synthesis and analysis of existing research on libraries and the empirical evidence of their impact on institutional mission, student information literacy, academic performance, student engagement and graduation rates. The majority of the studies discussed emphasized four-year institutions and traditional-aged students. The evidence from these studies suggest that the academic library does have an impact on student success factors but there is much to learn in terms of how best to utilize this resource to positively impact student learning.
Unfortunately, very few of these studies address the community college environment, its learning commons, and the specific population of students they serve. This vacuum in targeted research provides the significance to this study by demonstrating the gap in research relating to student success outcomes and the community college library or learning commons.

Given the national and growing attention of community college completion and graduation rates, this study will provide a launching point for additional research and an empirical basis for community college librarians and administrators to address their value and impact on institutional missions and goals.
Chapter Three

Methodology

Introduction

The purpose of this study is to determine what influence, if any, do community college library characteristics have on institutional graduation rates. In this chapter, the research design of a blocked step-wise multiple regression will be explained. In addition, the chapter will include sections on: a) the description of the survey instruments used to gather data, b) a description of the sample used for analysis, c) a description of the dependent variable and the independent variables, d) an overview of the statistical procedures conducted, and e) a discussion of the limitations and threats to the validity of the results.

The research questions to be addressed by this study are as follows:

1. What influence, if any, do institutional-level student input variables such as the percentage of different racial/ethnic groups, the percentage of female and male students, and the percentage of students under and over the age of 25, have on institutional graduation rates?

2. What influence, if any, do institutional variables (e.g., degree of urbanization, institutional size, single or multiple campuses, region of country, and total library expenditures) have on institutional graduation rates?

3. What influence, if any, do library or learning commons variables (e.g., number of professional staff/librarians, the number of other staff, the number of individual and group reference consults, if they offer virtual consultations,
the number of weekly service hours, the typical weekly gate count) have on institutional graduation rates?

For the purposes of this study, graduation rate is defined as 150% of normal time to completion or 3 years for community colleges (NCES, 2013).

**Research Design**

This study used a quantitative, non-experimental correlational research design to examine specific community college library characteristics in order to determine what influence, if any, they have on institutional graduation rates. For the purposes of this study, the SPSS software was used to provide descriptive statistics and to run a blocked form of a step-wise multiple regression analysis to examine the research questions.

The researcher began by computing basic Pearson correlational statistics for all variables in order to determine significance. She then performed a step-wise multiple regression analysis using 3 blocks. This model first tested student input variables for significance against institutional graduation rates, then between college variables, and lastly, specific library variables.

This model is appropriate for this study based on Creswell’s (2012) explanation of correlational research that indicates this methodology is used when one seeks “to relate two of more variables to see if they influence each other” (p. 338). Furthermore, Creswell explains in this type of research “the researchers do not attempt to control or manipulate the variables as in an experiment; instead they relate, using the correlation statistic, two or more” (Creswell, 2012, p. 338).

As explained in Cohen, Cohen, West and Aiken (2003), “multiple regression is a technique that enables researchers to determine a correlation between a criterion variable
and the best combination of two or more predictor variables” (p. 76). A predictor, or independent, variable, as defined by Creswell (2012) “is a variable used to make a forecast about an outcome in correlational research” (p. 341), and the criterion, or dependent, variable is “the outcome being predicted” (Creswell, 2012, p. 341).

A stepwise regression was chosen because the “purpose of stepwise regression is to reduce the set of independent variables down to the most important predictors” (Stephens, 2004, p. 175). In this type of blocked regression analysis, the most significant variable is added at each step until the best model is created. In other words, “each time a predictor is added to the equation, a removal test is made of the least useful predictor. As such, the regression equation is constantly being reassessed to determine whether any redundant predictors can be removed” (Stephens, 2004, p. 213). This technique is in alignment with the purpose of this study in determining what library characteristics, if any, influence institutional graduation rates.

In addition, Field (2009) suggested variables be set with a p-value of less than 0.05 within the SPSS software to remain included in the regression analysis, while those with a p-value of 0.10 or above be excluded. Field (2009) continued his support for stepwise regression by stating “this method takes many important methodological decisions out of the hands of the researcher. What’s more, the models derived by the computer often take advantage of random sampling variations and so decisions about which variables should be included will be based upon slight differences in their semi-partial correlation” (p. 213).

Thus, the use of a stepwise regression design allowed the researcher to incorporate several independent variables of community colleges and their learning
commons to analyze their effects on institutional graduation rates relative to one another. Secondly, since this technique provided predictive power (Freedman, 1997), it provided the researcher with an instrument for predicting student success given different characteristics of the community colleges and their learning commons.

**Survey Instruments**

The data used in this study came from the National Center for Educational Statistics (NCES), which is the primary federal entity for collecting and analyzing data related to education in the United States. The NCES organization is located within the U.S. Department of Education and the Institute of Education Services.

The Integrated Post-secondary Data System (IPEDS) is a system of interrelated surveys conducted annually that is required for institutions to be applicants for federal student financial aid programs (NCES 2013). According to the NCES website (2013), more than 7,500 institutions complete IPEDS surveys each year, including research institutions, state colleges and universities, private religious and liberal arts colleges, for-profit institutions, community and technical colleges, and non-degree granting institutions. The data gathering was authorized by the Higher Education Act of 1965 to include data on enrollments, program completions, graduation rates, faculty and staff, finances, institutional prices, and student financial aid.

This study used data from 5 specific surveys found within IPEDS. The first four IPEDS surveys included the provisional release data from the Enrollment Fall 2012A survey which provided gender, the Enrollment Fall 2012B survey which provided age and degree of urbanization variables, the Institutional Characteristics survey which provided several of the between-institution variables such as region of the country and
institutional size, and the Graduation Rate 2011 Survey which provided institutional graduation rates.

The last data source used was called the 2012 Academic Libraries Survey (ALS), which is part of the Library Statistics Program also found within IPEDS. NCES began the nation-wide library statistics program in 1989, and it now includes the Academic Libraries Survey (identified for purposes of this research study) and the School Library Media Center Survey. The Academic Libraries Survey collects data biennially from about 3,700 degree-granting post-secondary institutions in order to provide an overview of academic libraries nationwide (NCES, 2013).

For the purposes of the ALS, an academic library is the library associated with a degree-granting institution of higher education and must meet the following criteria: a) total expenditures that exceed $10,000, b) an organized collection of printed or other materials or a combination thereof, c) a staff trained to provide and interpret such materials as required to meet the informational, cultural, recreational, or educational needs of clientele, d) an established schedule in which services of the staff are available to clientele, and e) the physical facilities necessary to support such a collection, staff, and schedule (NCES, 2013).

According to NCES (2013), the survey universe from 2012 was comprised of all two- and four-year degree granting postsecondary institutions with a library. The survey file contains final data on 3,177 of the 3,996 academic libraries in the United States, representing an 86.1% response rate. Specific to this study, the universe was comprised of 1,326 associate-degree institutions with 1,120 participating for an 84.5% response rate. The data was collected over the Internet via a web-based reporting system. The web
application included a user guide and tutorial that explained its features and operation, the survey instrument, and the edit check tool. The reporting period for the 2012 survey is defined as any 12-month period starting between June 1 and September 30, 2011 that corresponds with the institution’s fiscal year.

**Non-response bias.** NCES is directed by the Office of Management and Budget to evaluate nonresponse bias if a survey’s unit response rate falls below 80% (Graham 2006). The Academic Library Survey for 2012 did have a unit response rate above 85%, but experienced numerous item response rates of less than 80%; therefore based on NCES statistical standards, a nonresponse bias study was required.

The purpose of the nonresponse bias study was to identify areas of potential nonresponse bias and to make recommendations for mitigating the bias. Because the Academic Library Survey is a census (i.e., units have equal weights of one), any nonresponse is an indicator of bias. In the 2012 survey, four cells were consistently below the 80% including private institutions, FTE less than 1,000, and specialized and not-classified Carnegie classifications. Of these 4 cells, only the FTE less than 1,000 may affect this study on libraries at associate-degree institutions.

**Dependent and Independent Variables**

This section will discuss the dependent and independent variables selected for this study. The variables are displayed in Figure 3.

**Dependent variable.** The dependent variable, institutional graduation rates, is reported in the IPEDS data. It is defined as the number of students entering the institution as full-time, first-time, degree/certificate-seeking undergraduate students in a particular year cohort, by race/ethnicity and gender; the number completing their program
within 150% of normal time (IPEDS, 2013). In the case of associate-degree institutions, 150% of normal time is 3 years.

While a few studies such as Pierard and Graves (2007), Bell (2008), and Mezick (2007), determined a relationship between retention and persistence with library characteristics, evidence tying academic libraries to student graduation rates is scarce and nearly non-existent for community college libraries or learning commons. Emmons and Wilkerson (2011) explored the relationship between traditional library input and output measures of staff, collections, use, and services with fall-to-fall retention and six-year graduation rates. They used a linear regression and found, controlling for ethnicity and socioeconomic status, a change in the ratio of library professional staff and students predicted a statistically significant positive relationship with both retention and graduation rates. The fact this study did not include community colleges is the primary basis for this study.

**Independent variables.** Both the literature and the Emmons and Wilkerson study (2011) provided the basis for the inclusion of forty-one independent variables for this study. The variables were entered into the regression analysis using a three-block model seen in Figure 3.

Astin’s (1993) I-E-O conceptual model informs the blocks of the step-wise regression analysis and the variables within each block. As stated in Astin & Sax (1998), “the I-E-O model was designed to address the basic methodological problem with all non-experimental studies in the social sciences, namely the nonrandom assignments of people (inputs) to programs (environments)” (p. 252).
Using the I-E-O model, it is important to control for student input characteristics before examining the effects of the environmental factors on the dependent variable, because variability in outcomes “may simply represent difference in the characteristics of students” (Astin & Sax, 1998, p. 252). The same logic is expanded to the between institutional characteristics since the dataset included various community colleges.

While figure 3 provides a visual display of the conceptual model for this study including the various blocks, tables 1-3 list the specific variables and their respective codes from IPEDS and the Academic Library Statistics surveys. The input variables were entered into the analysis first, then the two environmental blocks (between-institutional variables and library characteristics), to explore their influence, if any, on the output variable.

Figure 3. Conceptual I-E-O model with dependent and independent variables.

The input block of student characteristics included institutional-level figures of race/ethnicity, gender, and age. IPEDS (2013) defines race/ethnicity as the group to which individuals belong, identify with, or belong in the eyes of the community. The category does not denote scientific definitions or anthropological origins. Definitions of gender and age are self-evident. Race and gender figures are found in annual IPEDS
data and were represented in the 2012 data sets retrieved for this study. Age, however, is collected by NCES in odd-years requiring the data to be pulled from 2011.

The codes from the IPEDS survey that denote each input characteristic are found in Table 1. In some cases the variables needed to be dummy coded before entering into the regression analysis.

Table 1

**Block One: Input Variables**

<table>
<thead>
<tr>
<th>Variable Code/Dummy Code if needed</th>
<th>Variable Description</th>
<th>Variable Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>EFAGE 2</td>
<td>Under 25 years of age</td>
<td>Fall Enrollment 2011-12B IPEDS data</td>
</tr>
<tr>
<td>PCTFEMALE</td>
<td>Female</td>
<td>Fall Enrollment 2012-13A IPEDS data</td>
</tr>
<tr>
<td>PCTMIN1</td>
<td>Black, Non-Hispanic, American Indian/Alaskan</td>
<td>Academic Library Survey 2012 data</td>
</tr>
<tr>
<td>PCTMIN2</td>
<td>Asian/Pacific Islander, Hispanic</td>
<td></td>
</tr>
</tbody>
</table>

The environment block of between institution characteristics included eight variables representing various ways institutions vary from one to another. Table 2 denotes the descriptions and primary codes/dummy codes from the ALS Survey 2012 or IPEDS 2012-13.

Table 2

**Block #Two: Environmental Between-Institution Variables**

<table>
<thead>
<tr>
<th>Variable Codes</th>
<th>Variable Description</th>
<th>Variable Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCALE</td>
<td>Degree of urbanization based on school address.</td>
<td>Fall Enrollment 2012-13B IPEDS data</td>
</tr>
<tr>
<td>Variable</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>DUMMY_CITY</td>
<td>Population 100,000 or higher</td>
<td></td>
</tr>
<tr>
<td>DUMMY_SUBURB</td>
<td>Outside primary city boundaries</td>
<td></td>
</tr>
<tr>
<td>DUMMY_TOWN</td>
<td>Outside urban cluster by at least 10 miles</td>
<td></td>
</tr>
<tr>
<td>DUMMY_RURAL</td>
<td>Outside urban cluster by more than 10 miles</td>
<td></td>
</tr>
<tr>
<td>INSTSIZE</td>
<td>Size of institution based on headcount of students enrolled for credit</td>
<td></td>
</tr>
<tr>
<td>DUMMY_UNDER 4999</td>
<td>Institutions with 0-4999 students</td>
<td></td>
</tr>
<tr>
<td>DUMMY_UNDER 9999</td>
<td>Institutions with 5000-9999 students</td>
<td></td>
</tr>
<tr>
<td>DUMMY_UNDER 19999</td>
<td>Institutions with 10000-19999 students</td>
<td></td>
</tr>
<tr>
<td>DUMMY_OVER 20000</td>
<td>Institutions with 20000 or more students</td>
<td></td>
</tr>
<tr>
<td>CCBASIC</td>
<td>Single/Multiple Campus(es)</td>
<td></td>
</tr>
<tr>
<td>DUMMY_SINGLE</td>
<td>Institutions with one campus/site</td>
<td></td>
</tr>
<tr>
<td>OBEREG</td>
<td>Region of country by code</td>
<td></td>
</tr>
<tr>
<td>DUMMY_NE-Region</td>
<td>Institutions in the New England region</td>
<td></td>
</tr>
<tr>
<td>DUMMY_MW-Region</td>
<td>Institutions in the Midwest region</td>
<td></td>
</tr>
<tr>
<td>DUMMY_GL-Region</td>
<td>Institutions in the Great Lakes region</td>
<td></td>
</tr>
<tr>
<td>DUMMY_PL-Region</td>
<td>Institutions in the Plains region</td>
<td></td>
</tr>
<tr>
<td>DUMMY_SE-Region</td>
<td>Institutions in the Southeast region</td>
<td></td>
</tr>
<tr>
<td>DUMMY_SW-Region</td>
<td>Institutions in the Southwest region</td>
<td></td>
</tr>
<tr>
<td>DUMMY_FW-Region</td>
<td>Institutions in the Far West region</td>
<td></td>
</tr>
<tr>
<td>EXTOT</td>
<td>Total library expenditures</td>
<td></td>
</tr>
<tr>
<td>INSTTYPE</td>
<td>Institutional type</td>
<td></td>
</tr>
<tr>
<td>DUMMY_HBCU_YES</td>
<td>Historically black college or university</td>
<td></td>
</tr>
<tr>
<td>DUMMY_TRIBAL_YES</td>
<td>Tribal institution</td>
<td></td>
</tr>
</tbody>
</table>
Student learning outcomes are articulated in mission/strategic plan.

There is no information literacy outcome.

The second environment block in the analysis was for the addition of library characteristics. As Table 3 indicates, there are 30 variables. Once again, the variable name, dummy code if necessary, the description, and the data source are provided.

Table 3

<table>
<thead>
<tr>
<th>Variable Code</th>
<th>Variable Description</th>
<th>Variable Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>STLIBPRO</td>
<td>Number of librarian and other professional staff</td>
<td>Academic Library Survey 2012 data</td>
</tr>
<tr>
<td>STOTH</td>
<td>Number of other staff (not student assistants)</td>
<td></td>
</tr>
<tr>
<td>TOTSERATT</td>
<td>Total number of in-person reference transactions, attention at presentations, and in-person consultations</td>
<td></td>
</tr>
<tr>
<td>SUPPVIRTYN</td>
<td>Library supports virtual consultations</td>
<td></td>
</tr>
<tr>
<td>DUMMY_SUPPVIRT-NO</td>
<td>Library does not support virtual consultations</td>
<td></td>
</tr>
<tr>
<td>HOURS</td>
<td>Number of weekly service hours</td>
<td></td>
</tr>
<tr>
<td>GATECT</td>
<td>Typical weekly gate count</td>
<td></td>
</tr>
<tr>
<td>LIBREFYN</td>
<td>Reference service by email</td>
<td></td>
</tr>
<tr>
<td>Variable</td>
<td>Description</td>
<td>Note</td>
</tr>
<tr>
<td>----------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>DUMMY_LIBREF-NO</td>
<td>Library does not provide reference through email</td>
<td>Academic Library Survey 2012 data</td>
</tr>
<tr>
<td>TECHYN</td>
<td>Library provides technology to assist disabilities</td>
<td></td>
</tr>
<tr>
<td>DUMMY_TECH-NO</td>
<td>Library does not provide technology to assist disabilities</td>
<td></td>
</tr>
<tr>
<td>EMAILREFYN</td>
<td>Library utilized email reference</td>
<td></td>
</tr>
<tr>
<td>DUMMY_EMAILREF-NO</td>
<td>Library does not provide email reference</td>
<td></td>
</tr>
<tr>
<td>COMSERYN</td>
<td>Library utilizes chat for reference services</td>
<td></td>
</tr>
<tr>
<td>DUMMY_COMSER-NO</td>
<td>Library does not use chat for reference services</td>
<td></td>
</tr>
<tr>
<td>INSTMESYN</td>
<td>Library utilizes instant messaging for reference services</td>
<td></td>
</tr>
<tr>
<td>DUMMY_INSTMES-NO</td>
<td>Library does not use instant messaging for reference services</td>
<td></td>
</tr>
<tr>
<td>SORTMESYN</td>
<td>Library utilized text messaging for reference service</td>
<td></td>
</tr>
<tr>
<td>DUMMY_SORTMES-NO</td>
<td>Library does not use text messaging for reference service</td>
<td></td>
</tr>
<tr>
<td>SUPPVIRTYN</td>
<td>Library supports virtual reference service</td>
<td></td>
</tr>
<tr>
<td>DUMMY_SUPPVIRT-NO</td>
<td>Library does not support virtual reference service</td>
<td></td>
</tr>
<tr>
<td>STLIBS</td>
<td>Number of professional librarians</td>
<td></td>
</tr>
<tr>
<td>STOTHPRO</td>
<td>Number of professional staff (not librarians)</td>
<td></td>
</tr>
<tr>
<td>STASST</td>
<td>Number of student assistants</td>
<td></td>
</tr>
<tr>
<td>STTOT</td>
<td>Total FTE staff</td>
<td></td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
<td>Source</td>
</tr>
<tr>
<td>---------</td>
<td>--------------------------------------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>EXBKS</td>
<td>Expenditures for books</td>
<td>Academic Library Survey 2012 data</td>
</tr>
<tr>
<td>EXELBKS</td>
<td>Expenditures for electronic books</td>
<td></td>
</tr>
<tr>
<td>EXAUD</td>
<td>Expenditures for audiovisual materials</td>
<td></td>
</tr>
<tr>
<td>EXCUSER</td>
<td>Expenditures for current serials</td>
<td></td>
</tr>
<tr>
<td>EXELSER</td>
<td>Expenditures for electronic resources</td>
<td></td>
</tr>
<tr>
<td>EXDEL</td>
<td>Expenditures for document delivery/interlibrary loan</td>
<td></td>
</tr>
<tr>
<td>EXPRES</td>
<td>Expenditures for preservation</td>
<td></td>
</tr>
<tr>
<td>EXOTHIR</td>
<td>Expenditures for other categories</td>
<td></td>
</tr>
<tr>
<td>EXCOMP</td>
<td>Expenditures for computer hardware</td>
<td></td>
</tr>
<tr>
<td>EXBIB</td>
<td>Expenditures for bibliographic utilities</td>
<td></td>
</tr>
<tr>
<td>CRGEN</td>
<td>Number of general circulation transactions</td>
<td></td>
</tr>
<tr>
<td>CRRSV</td>
<td>Number of reserved circulation transactions</td>
<td></td>
</tr>
<tr>
<td>PRESEN</td>
<td>Number of presentations by librarians</td>
<td></td>
</tr>
<tr>
<td>ATTEND</td>
<td>Total attendance at presentations</td>
<td></td>
</tr>
</tbody>
</table>

The output block will represent the dependent variable of institutional graduation rates as defined by IPEDs (see Table 4).
Table 4

Output of Institutional Graduation Rates

<table>
<thead>
<tr>
<th>Variable Code</th>
<th>Variable Description</th>
<th>Variable Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>GR</td>
<td>Graduation rate as a percentage of first-time, full-time students in 150% of time</td>
<td>Graduation Rates 2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IPEDs data</td>
</tr>
</tbody>
</table>

Data Analysis Procedures

The following sections describe the data analysis procedures used in this study. A discussion of steps taken to access, clean and prepare the data is provided, followed by a description of the assumptions and the statistical methods used in this study.

Data access and preparation. The 2012 IPEDS and 2012 ALS survey data are publicly available on the NCES website. The data was downloaded to the researcher’s computer in Excel file formats.

The researcher reviewed the data to ensure readability and that the variables were coded for regression analysis. The data was cleaned by NCES prior to release to identify valid responses and imputation was used when possible to replace missing data with valid response data.

In order to combine data from the five different surveys, the researcher began by sorting all databases by the Carnegie classification for associates’ degree institutions. Since this group also included private two-year institutions and only public two-year institutions were desired, the researcher also cut the data by sector which resulted in 1,237 institutions from the IPEDS surveys and 838 from the Academic Library Survey.
The researcher then used the unique institutional identification codes provided by NCES to combine all datasets. Any institution that was missing relevant data from the Academic Library Survey was removed (200 institutions). This action resulted in a final sample of 638 public, two-year institutions with both complete IPEDS and Academic Library Survey data. This sample represents 53% of the original universe of all two-year associates’ degree institutions.

**Assumptions.** In order to make conclusions based on the results of this study, certain assumptions must be tested and demonstrated to be true (Field, 2009). One important assumption is that there is a linear relationship between the independent and dependent variables. The researcher conducted a Pearson correlation to ensure that predictive independent variables were correlated with the dependent variable. If any of the independent variables were found to be not significantly related to the dependent variable, they will be reviewed to determine if they should remain in the study, or be eliminated.

Another assumption that was tested is that there should be no multicollinearity or singularity, meaning that no two independent variables are too correlated, or redundant, of one another. If this is the case, Tabacknick and Fidell (2001) suggest eliminating one of two variables using correlations above .90. This instruction was used and any strong correlations found were reviewed to determine if they should remain in the study.

**Limitations of the Study**

Every study is faced with limitations or restrictions. This section will identify and discuss the limitations specific to this study.
**Threats to internal validity.** Internal validity, according to Cohen, Cohen, West and Aiken (2003) refers to the ability to determine cause and effect relationships within a research study. As a result, causation will be difficult to determine because independent variables cannot be randomly assigned. Because this researcher used a blocked form of multiple regression, she selected variables and placed them in blocks based on groupings intended to reflect the I-E-0 model developed by Astin (1993). However, the research findings may have been due to other factors such as reverse causation, circular causation, or from the effects of other variables not considered in this analysis.

An additional threat to the internal validity is the accuracy and completeness of the data provided by IPEDS and the ALS. As with any survey-based research, respondents could misinterpret questions or omit information which may skew results. As mentioned previously, the ALS data did have some items identified for non-response bias.

Lastly, due to the collection cycles for both IPEDS and the ALS survey, the researcher was forced to use different annual surveys for some information. For example, most of the IPEDS data came from the 2012-13 collection period but the researcher needed to use 2011-12 data to gather age data.

**Threats to external validity.** External validity refers to the generalizability of the research findings to other populations in other settings and over time (Cohen, Cohen, West, & Aiken, 2003). According to these authors, one of the best ways to ensure external validity is to draw a representative sample using random selection and achieving high response rates. In the case of this study, the data was pulled from national data sets.
with greater than 80% response rates, which will increase the ability to generalize the findings to other populations.

Another threat to external validity in this study is the use of secondary data. While using secondary data can be beneficial in several ways, it can also impose several limitations (Smith, 2008). For example, the reason the secondary data was collected is usually different than subsequent research studies. In the case of this study, the data was first collected by NCES for governmental reporting purposes, not to specifically determine if library characteristics influence graduation rates at community colleges. In addition, secondary data may be full of errors, although IPEDS and ALS have internal correction mechanisms to guide the survey respondent if answers fall outside identified parameters. Lastly, since the data is secondary, the researcher was not able to develop specific survey items pertinent to the research questions.

Summary

Chapter three provided an overview of the purpose of the proposed study and the methods that were used to explore the research questions. The research design and the specific research techniques were discussed. The IPEDS and ALS surveys were explained, including non-response bias found in the ALS survey. The variable section included descriptions of the independent and dependent variables used in the regression analysis. Finally, data analysis procedures and limitations were discussed. The results of the regression will be examined in the following chapter.
Chapter Four

Results

Introduction

Previous studies of the influences library characteristics may have on institutional graduation rates have primarily focused on four-year institutions. This dissertation is the first known study to examine what influence, if any, library characteristics have on institutional graduation rates at the community college level or two-year, public associates degree institutions.

Based on the research design, a total of 41 independent variables were used in the analysis process to determine if any predicted graduation rates, the dependent variable. The variables were organized into three blocks, including (a) student input measures, such as age, gender, and race/ethnicity, (b) between-institutional characteristics, such as region of country, single or multiple campuses, and institutional size, and (c) library characteristics, such as including number of librarians, professional staff, and other staff, the typical hours open and gate count per week, and total reference service provided face-to-face, by email, text, chat and instant messaging.

This chapter first reiterates the research questions below. It then presents and discusses relevant descriptive statistics of the sample used in this study. Lastly, it discusses the regression model used and the results achieved.

The research questions are as follows:

1. What influence, if any, do institutional-level student input variables, such as percentage of different racial/ethnic groups, percentage of female and male
students, and the percentage of students under or over the age of 25, have on institutional graduation rates?

2. What influence, if any, do between-institutional variables have on institutional graduation rates?

3. What influence, if any, do library or learning commons variables have on institutional graduation rates?

**Description and Characteristics of the Sample and Population**

The data used for this study was provided by NCES, the primary federal entity for collecting and analyzing data related to education in the United States. Data was pulled from five publicly available IPED surveys. The researcher used the unique institutional identification codes provided by NCES to combine all datasets. Any institution that was missing relevant data was removed. This action resulted in a final sample of 638 public, two-year institutions with complete data. This sample represents 53% of the original universe of all two-year associates’ degree institutions.

**Institutional Characteristics.** Analyzing the data from the sample at the institutional level provides some insight. This section will review the basic demographics found, including student characteristics and institutional characteristics. As mentioned above, the sample includes 638 public, two-year institutions.

Within the sample institutions, 44% of the students were male and 56% of the students were female. The majority of students were over 25 years of age (59%). White, Caucasian students represented the majority of the sample (65%). Other races found in the sample include Black, Non-Hispanic (14%), American Indian/Alaskan Native (2%), Asian/Pacific Islander (4%), and Hispanic (15%).
The majority of the institutions represented were institutions with 1,000-4,999 students (n=253 or 39.7%). Institutions with 5,000-9,999 students represented the next largest segment (n=186 or 29.2%). Very small institutions, those with less than 1,000 students, represented a very small portion of the sample (n=17 or 2.8%), as did the very large institutions with over 20,000 students (n=55 or 8.4%). Nearly two-thirds of the sample represented single campus institutions (n=423 or 66.4%).

The location of the sample institutions represent all IPEDS categories including city, suburb, town, and rural. The majority of institutions were in cities with populations over 100,000 (n=216 or 33.9%). A close second were those institutions found in rural areas, or more than 10 miles from an urban cluster. There were 202 institutions in this category representing 31.7% of the sample. The remaining institutions fell almost equally between suburb and town locations.

Table 5 depicts the regions of the country represented in the sample. All regions were represented, although the New England and Southwest regions may be underrepresented, and the sample may be skewed to the Southeast and Far West.

The percentages of tribal or historically black institutions were very small within the sample used. There was only one institution that represented tribal institutions (<1% of sample) and 10 (1.6% of sample) representing historically black institutions.

In summary, based on the descriptive statistics described above, the average institution included for analysis reported a higher percentage of white, female students with an average age over 25 years. In addition, the majority of institutions represented in the sample are found in the southeast, in large cities (populations of at least 100,000), have single campuses and a student body of 1,000-4,999.
Table 5

Regions of Country Represented in Sample (N=638)

<table>
<thead>
<tr>
<th>Region of Country with State Abbreviations*</th>
<th>Number in Sample</th>
<th>Percentage in Sample</th>
<th>Percentage in Universe</th>
</tr>
</thead>
<tbody>
<tr>
<td>New England (CT, ME, MA, NH, RI, VT)</td>
<td>30</td>
<td>4.7%</td>
<td>5.9%</td>
</tr>
<tr>
<td>Mideast (DE, DC, MD, NJ, NY, PA)</td>
<td>66</td>
<td>10.4%</td>
<td>15.4%</td>
</tr>
<tr>
<td>Great Lakes (IL, IN, MI, OH, WI)</td>
<td>76</td>
<td>11.9%</td>
<td>15%</td>
</tr>
<tr>
<td>Plains (IA, KS, MN, MO, NE, ND, SD)</td>
<td>46</td>
<td>7.2%</td>
<td>10%</td>
</tr>
<tr>
<td>Southeast (AL, AR, FL, GA, KY, LA, MS, NC, SC,TN,VA, WV)</td>
<td>169</td>
<td>26.4%</td>
<td>24.8%</td>
</tr>
<tr>
<td>Southwest (AZ, NM, OK, TX)</td>
<td>80</td>
<td>12.6%</td>
<td>9.2%</td>
</tr>
<tr>
<td>Rocky Mountain (CO, ID, MT, UT, WY)</td>
<td>28</td>
<td>4.4%</td>
<td>4%</td>
</tr>
<tr>
<td>Far West (AK, CA, HI, NV, OR, WA)</td>
<td>143</td>
<td>22.4%</td>
<td>14%</td>
</tr>
</tbody>
</table>

*Note: Categories identified from IPEDS data.

Statistical Results

This section provides the results of the Pearson correlation and stepwise regression.

**Two-tailed Pearson correlation.** The results of the two-tailed Pearson correlation are shown in Table 6 and indicate that 10 of the 41 independent variables were significantly correlated with the dependent variable of institutional graduation rates. The first five variables, including percentage of students under the age of 25, expenditures for electronic serials, number of general circulation transactions, number of presentations made by librarians, and the total attendance at presentations, were all significant at the $p>.05$ level. The remaining five variables, including number of staff
(non-professionals), expenditures on books, current serials, and other information resources, and the total library expenditures, were all significantly correlated with institutional graduation rates at the $p>.01$ level. The remaining 31 variables were removed from the regression equation because there was no significant correlation found with the dependent variable.

The researcher examined the two-tailed Pearson correlations to determine if multicollinearity was a factor and found the two variables of PRESENT (number of presentations by librarians) and ATTEND (total attendance at presentations) were closely related with a correlation of .927. Based on research conducted by Tabachnick and Fidell (2001), the researcher removed the PRESENT variable from the final regression equation.

**Regression Analysis.** Once the major assumptions were tested, a 3-block stepwise multiple regression analysis was performed to determine if any of the remaining predictor variables had an influence on institutional graduation rates. A total of nine independent variables were included in the final regression. The results of the analysis are displayed in Table 7. The first column of the table indicates the name of the variable that proved a predictive influence on institutional graduation rates. The second column indicates from which block the variable entered during the stepwise regression analysis. The third column, Zero r, indicates the correlation between that variable and the institutional graduation rate. The fourth column, step β weight, indicates the weight in which that variable entered in the model. The fifth column indicates the β weight for that variable in the final model. Lastly, in the sixth column is an $F$ value. The $F$ value represents a ratio of explained variance to unexplained variance (Cohen, et al 2003).
Table 6

*Significant Correlations of Independent Variables*

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Two-Tailed Pearson Correlation</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>EFBAGE2 (percentage of students under age 25)</td>
<td>.082</td>
<td>p&gt;.05</td>
</tr>
<tr>
<td>EXELSER (expenditures on electronic serials)</td>
<td>.098</td>
<td>p&gt;.05</td>
</tr>
<tr>
<td>CRGEN (number of general circulation transactions)</td>
<td>.082</td>
<td>p&gt;.05</td>
</tr>
<tr>
<td>PRESENT (number of presentations provided by librarians)</td>
<td>.080</td>
<td>p&gt;.05</td>
</tr>
<tr>
<td>ATTEND (total attendance at presentations)</td>
<td>.093</td>
<td>p&gt;.05</td>
</tr>
<tr>
<td>STOTH (number of non-professional staff)</td>
<td>.104</td>
<td>p&gt;.01</td>
</tr>
<tr>
<td>EXTOT (total library expenditures)</td>
<td>.111</td>
<td>p&gt;.01</td>
</tr>
<tr>
<td>EXBKS (expenditures on books)</td>
<td>.118</td>
<td>p&gt;.01</td>
</tr>
<tr>
<td>EXCUSER (expenditures on current serials)</td>
<td>.110</td>
<td>p&gt;.01</td>
</tr>
<tr>
<td>EXOTHIR (expenditures on other information resources)</td>
<td>.127</td>
<td>p&gt;.01</td>
</tr>
</tbody>
</table>

*Note.* Multicollinearity to be discussed more fully in chapter 5.
The stepwise regression analysis produced three models where a new independent variable entered as significant each time. Two variables indicated significant beta (β) weights in the last model, including expenditures on other information resources and expenditures on current serials.

Table 7

**Significant Predictors of Institutional Graduation Rates**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Block</th>
<th>Zero r</th>
<th>Step β</th>
<th>B</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>EFBAGE2</td>
<td>Block 1: Student</td>
<td>.082*</td>
<td>.082*</td>
<td>-.015</td>
<td>4.257*</td>
</tr>
<tr>
<td>(percentage of students under the age of 25)</td>
<td>Characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXOTHIR</td>
<td>Block 3: Library</td>
<td>.127**</td>
<td>.116***</td>
<td>.130***</td>
<td>6.285**</td>
</tr>
<tr>
<td>(expenditures on other information resources)</td>
<td>Characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXCUSER</td>
<td>Block 3: Library</td>
<td>.110**</td>
<td>.119*</td>
<td>.119*</td>
<td>6.155***</td>
</tr>
<tr>
<td>(expenditures on current serials)</td>
<td>Characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Sample size n=638, R²=.028, Adjusted R²=.024; *p<.05, **p<.01, ***p<.001

The adjusted R² for the final model is .024, indicating that the three significant variables explained approximately 2.4% of the variance in institutional graduation rates. In addition, the R² indicates a small effect size, or in other words, a low level of magnitude on the dependent variable.

**Discussion of Results**

The following section discusses the results of the three block stepwise multiple regression analysis by each research question.
Student input characteristics. The first research question addressed if the input characteristics of students including age, gender and race influenced institutional graduation rates. The percentage of students under the age of 25 was the only predictor variable found with a significant correlation to institutional graduation rates and, therefore, used in the stepwise blocked regression. At the beginning of the model, the variable of students under the age of 25 had a positive correlation with the dependent variable of $r(636) = .082, p<.05$ level. In the final model, the variable of students under the age of 25 was a negative predictor ($\beta = -.015$) and no longer significant at a $p < .05$ level.

Between-institution characteristics. The second research question of this study asked if between-institutional characteristics had any influence on institutional graduation rates. The variables first considered included institutional size, single or multiple campuses, region of country, degree of urbanization, type of institution, total library expenditures, and if the college’s mission articulated student learning outcomes or informational literacy. Total library expenditures was the only between-institutional variable that significantly correlated with the dependent variable at $r(636) = .111, p<.01$. The other variables were not used in the stepwise regression model. In the final model, total library expenditures was no longer a significant predictor of institutional graduation rates.

Library Characteristics. The third research question of this study was what library characteristics, if any, influence institutional graduation rates. Originally 30 variables were identified from the Academic Library Survey. After applying a two-tailed Pearson correlations test, eight variables emerged as significantly correlating with institutional graduation rates, including the total number of other staff, expenditures on
books, current serials, electronic serials, and other information resources, and number of
general circulation transactions and the number of presentations provided by librarians
and the number of attendees. Checking for multicollinearity resulted in the researcher’s
decision to exclude the variable of number of presentations.

In the final model, two variables emerged as significant predictors of institutional
graduation rates. The two variables were total expenditures on other information
resources (β =.130, p<.001) and expenditures on current serials (β =.119, p<.05).

Summary

This chapter provided an overview of the statistical analyses that were conducted
in order to answer the research questions of this study. The results of the blocked
stepwise regression analysis, based on the sample of two-year public associates’ degree
institutions, were discussed by each research question.

The data resulted in 2 of the original 41 independent variables having significant
influence on the dependent variable. The 2 variables included total expenditures for other
information resources (β =.130, p<.001) and total expenditures for current serials (β
=.119, p<.05). The final model explained 2.4% of the variation in institutional
graduation rates.

The implications of these findings deserve further discussion with particular
attention to the advancement of research and theoretical knowledge, policy development
and professional practice on the impact of the library on increasing institutional
graduation rates. These implications will be discussed in the next chapter.
Chapter Five

Discussion, Recommendations, and Conclusions

Introduction

Chapter Four presented the results of the analyses that were conducted in attempt to find answers to the three research questions of this study. Chapter Five provides an overview of the study, including the purpose and methodology, and then examines the findings in detail by research question. Implications for policy and practice are also addressed, followed by recommendations for future research. A final summary of the study concludes this chapter.

Overview of Study

The purpose of this study was to extend research conducted first by Mark Emmons and Frances Wilkinson (2011), who examined the impact of academic library characteristics on student persistence. Their study exclusively focused on research universities. This study, in contrast, examined the influences of library or learning commons characteristics on the institutional graduation rates of community colleges. More specifically, this study examined several characteristics of community college libraries or learning commons, such as staffing levels of professional librarians and other staff, the number of individual and group consultations, library expenditures on various library materials, and access and use of virtual services. In doing so, this study addressed the current gap in research that addresses the community college library and its impact on institutional graduation rates.

The library or learning commons, as an integral component of the student experience, should make a direct or indirect contribution to the outcomes of the
Recognizing this challenge, the ARL and ACRL have created measures that focus on institutional outcomes. Subsequent research by Smith (2001) and Weiner (2005) supported learning outcome models that tied campus vision, mission, and goals with library resources (including collections, personnel, and budgets), capacity, and services. But because these studies and resources remained focused on the library itself, not the outcomes or the unique needs of the student body, this researcher chose to focus this study on institutional graduation rates within the community college arena.

**Theoretical and Conceptual Frameworks.** Astin’s Theory of Involvement and the I-E-O Model (1984) provided the theoretical and conceptual frameworks respectively. Astin’s theory states that the more students are involved in both the academic and social aspects of the collegiate experience, the more they will gain from their studies. Interestingly, Astin did not specifically address interactions or involvement with the library in his research. However, this researcher felt that since most community college librarians are faculty, one might apply his theory by hypothesizing that the more involved students are with their librarians and library resources, the more their student learning will increase.

Astin’s I-E-O Model (1996), Figure 4, provided the visual or conceptual framework for this study. Applying this model to this study, the researcher controlled for student input characteristics, such as race/ethnicity, gender, and age. The environmental input characteristics included between-institutional variables, such as degree of urbanization, institutional size, region of the country, and library expenditures on various types of materials. Other environmental factors included the specific library characteristics. Examples of library characteristics include number of professional
librarians and other staff, the number of individual and group consultations, weekly gate counts, and the number of virtual consultations using various mediums, such as text messaging and email.

Figure 4. I-E-O model application indicating interrelationships between institutional-level student inputs, between-institution and library characteristics, and institutional graduation rates. Adapted from Astin (1992).

Research Questions and Data Set. The research questions this study addressed included:

1. What influence, if any, do institutional-level student input variables such as percentages of different racial/ethnic groups, percentages of female and male students, and percentages of students under or over age 25, have on institutional graduation rates?

2. What influence, if any, do between institutional variables have on institutional graduation rates?

3. What influence, if any do library or learning commons variables have on institutional graduation rates?
It was determined that existing data from five sources conducted by the National Center of Educational Statistics (NCES) could be used to answer the questions above. The first four sources included data from separate IPEDS data sets. The fifth source was provided by the Library Statistics Program. In all cases, only associate’s degree institutions were used. The 2011 and 2012 IPEDS data sets included 1,642 institutions, and provided several of the independent variables, such as student and between-institution characteristics. The IPEDS data also included the dependent variable of institutional graduation rates. The data provided by the 2012 Library Statistics Program included 1,371 associate’s degree academic libraries. This data set provided the independent variables that categorized libraries or learning commons.

**Methodology.** For the purposes of this study, both descriptive statistics and a blocked, stepwise multiple regression model were used. The researcher computed basic statistics for all variables, including two-tailed Pearson correlations to determine significance. Of the 41 independent variables, 10 were significantly correlated with the dependent variable. The first five variables, including the percentage of students under and over the age of 25, expenditures for electronic serials, number of general circulation transaction, number of presentations made by librarians, and the total attendance at presentations correlated significantly with the dependent variable at the $p<.05$ level. The remaining five variables, including number of staff (non-professionals), expenditures on books, current serials, and other information resources, and the total library expenditures, were also significantly correlated with institutional graduation rates, but at the $p \leq .01$ level. Because the remaining 31 variables did not significantly correlate with the dependent variable, they were removed from the regression model.
A 3-block stepwise multiple regression analysis was then performed to determine if any of the remaining predictor variables had an influence on institutional graduation rates. Two of the variables (expenditures on other information resources and expenditures on serials) proved to be significant influences on institutional graduation rates. The adjusted $R^2$ for the final model was .024, meaning that the 2 variables mentioned above explained approximately 2.4% of the variance in graduation rates.

**Discussion of the Findings**

The first research question addressed the input characteristics of students, including age, gender, and race. The percentage of students under the age of 25 was the only institutional-level student predictor variable found with a significant correlation to institutional graduation rates and, therefore, used in the stepwise blocked multiple regression. At the beginning of the model, the variable of the percentage of students under the age of 25 had a positive correlation with the dependent variable. In the final model, the variable became a negative predictor and was no longer significant.

It is important to reiterate that graduation rates, as defined by IPEDS, is based on the fall entering cohort of first-time, full-time students that graduate with an associate’s degree or certificate in 150% of normal time, or three years. Because this cohort represents a small percentage of community college students, this measurement may not be a true predictor of student success or completion for community colleges. The majority of community college students are older, non-traditional and attend part-time (AACC, 2013). The researcher used IPEDS graduation rate since this was the variable available, but future researchers should explore different graduation definitions by
incorporating new and trial measures, such as those developed by the Voluntary Framework of Accountability (AACC, 2014).

Based on the Pearson correlation results, the percentage of students under the age of 25 had a positive correlation with graduation rates. On first examination, this makes sense. Younger students may be more likely to attend full-time and, therefore, be able to complete their degree within the 150% of time. However, as the regression model advanced, this variable became a negative predictor (and no longer significant). Since most community college students attend part-time to balance other responsibilities, younger students are more likely to withdraw or stop in and out of school, delaying their graduation date beyond the 3 years tracked by IPEDS.

In addition, the analyses of the sample found that it represented the national community college student profile (AACC, 2014) of age and gender but did not of race. AACC (2014) states that the national profile of Black, Non-Hispanic, public, two-year institutions represent 34%. The sample used in this study only had a representation of 14%. This is explained by the representation of regions of the country found in the sample and may not have been a significant predictor in the regression model due to underrepresentation. More importantly, an analysis of the sample against the IPEDS population indicated it closely represented the population. Age, gender and race all aligned within 1-3 quality points except for the percentage of Hispanic students. This race/ethnicity was represented by 15% in the sample, where in the population, Hispanics represent only 10.8%.

The second research question asked if between-institutional characteristics had any influence on institutional graduation rates. The variables first considered included
institutional size, single or multiple campus(es), region of country, degree of urbanization, type of institution, total library expenditures, and if the college’s mission articulated student learning outcomes or information literacy. The only variable that significantly correlated with the dependent variable in this block was total library expenditures. In the final block, the variable, total library expenditures, was no longer a predictor of institutional graduation rates.

Total library expenditures, as a variable from the Academic Library Survey, included all expenses, including staff and professional salaries. While a correlational relationship does not suggest cause and effect, if a library incurs more expenses by providing more services to students and faculty, it is likely to positively influence student success in courses and, thus, the institutional graduation rate. However, since this variable did not prove significant in the final regression model, it calls into question the value of increasing library expenditures.

Lastly, the sample characteristics of between-institutional variables represented the universe of public, two-year community colleges well, with the exception of a few characteristics, including region of the country, type of institution and location. While the percentages and number within the sample of size of the institution and single/multiple campus characteristics mirrored statistics from AACC (2014), the sample had a disproportionate number of institutions from the Southeast and Far West, a very low representation of tribal or historically black institutions, and may have been skewed to large city or rural locations. The comparison of the sample against IPEDS population found similar results noting that once again the sample may have had underrepresentation
of tribal and historically black institutions. Future research should consider these variables and their influence on institutional graduation or other success factors.

In the final and third question, the study examined if specific library characteristics had any influence on institutional graduation rates. Originally, 30 variables were identified from the Academic Library Survey for examination. After applying the two-tailed Pearson correlation test, only eight variables emerged as significantly correlating with the dependent variable. These variables included total number of other staff, expenditures on books, current serials, electronic serials, and other information resources, the number of general circulation transactions, the number of presentations provide by librarians, and the number of attendees. Due to multicollinearity found between the number of presentations and the number of attendees, the researcher decided to exclude the variable indicating the number of presentations.

In the final model, two variables from this block emerged as significant predictors of institutional graduation rates. The two variables were total expenditures on other information resources, and expenditures on current serials. The Academic Library Survey defines current serials as ongoing subscription commitments. Serials may include periodicals, newspapers, annuals (reports, yearbooks, etc.), memoirs, proceedings and transactions of societies. The survey defines other information resources as expenses not covered in other categories, such as cartographic materials, manuscripts, copyright fees, and fees for database searches such as DIALOG, and Lexis-Nexis (ALS, 2014). While these materials also exist in 4-year, research libraries, it is asserted that these materials are used more frequently by community college students and their faculty, making them more influential than resources such as professional journals. It is also possible that
community college students tend to access resource materials via database search engines and, since these materials are available through electronic means, they are accessible without physically entering the library or learning commons.

In summary, the data analysis resulted in two of the original 41 independent variables having a significant predictive influence on the dependent variable. The two variables included the total expenditures for other information resources, and total expenditures for current serials. The final model explained 2.4% of the variation in institutional graduation rates.

These results add to the current research base and provide the first direct examination of library or learning commons characteristics and their influence on institutional graduation rates. As community colleges continue to explore effective ways to positively impact completion and graduation rates, this information will be relevant in decisions affecting budgetary support for libraries and in the library’s organizational structure or deployment of resources.

**Implications for Practice and Theory**

The purposes of conducting research are to advance current theory or influence the development of new theory while also impacting practice in the field. The following section will address these areas.

**Implications for theory.** The theoretical framework that supported this study was Astin’s theory of involvement (1984). His theory states that the more students are involved in both the academic and social aspects of the college experience the more they gain from their studies. He defines involvement as devoting significant energy to academics, time on campus, and interacting with faculty. Using this theory, one might
assume the more involved students are, the more success they have in their studies and, thus, graduate at a higher rate, which positively influences the institution graduation rate.

The findings from this research study indicate that entering the library, attending presentations by librarians, or interacting with them through virtual or personal consultations does not influence community college student graduation rates, even though librarians are considered faculty at most institutions. Furthermore, the number of times students enter the library or learning commons, assumedly to study or use resources, also does not influence graduation rates.

However, this study did find that the library expenditures on current serials and other information sources did positively impact graduation rates. This result indicates that the more students used or interacted with these types of resources, the more successful they were in their studies, resulting in graduation within the IPEDS three year time period. Using serials and other sources such as databases is a type of involvement with academic resources and advocates for increased time on studies both of which support Astin’s theory of involvement.

Lastly, the findings from this study support that the percentage of younger students (age 25 and under) negatively influences an institution’s graduation rate. Based on Astin’s theory of involvement, if these students became more involved they would be more successful and graduate. However, because community college students typically have unique factors that impact their ability to become fully involved in their studies, such as the need to work at least part-time, under-preparedness for college-level work, and have multiple family obligations, future researchers should examine other theoretical models that are based on the community college student.
Another implication of this study is the need for an expanded student outcomes model that includes interactions with the library and other college services. This model should not rely solely on the number of volumes or expenditures on information resources on institutional level student outcomes (e.g. graduation rates), but should expand to include the quality of student interactions with these services. Furthermore, this model should look to include direct measures of student learning, such as student learning outcomes or assessment measures.

According to Astin (1993), interactions with faculty and other students are a couple of the most significant contributors to student persistence. Future research should examine the interactions students have with librarians. What can students tell us about these interactions and how do these interactions make them more likely to remain in school and graduate? What do student-to-student interactions look like in the library? What programming designed by librarians or the availability of library resources might impact student-to-student or student-to-faculty interactions?

**Implications for practice.** This study provides several implications for practice at the institutional level. First, using the IPEDS definition for institutional-level graduation rates may not be the best benchmark for community colleges. Given the high level of accountability required by the accreditors, and federal and state governments, community colleges do, however, need to find an appropriate measure for student success and completion that their missions support.

Community colleges are responding to this challenge in several ways. The AACC is supporting a new set of measures defined by the Voluntary Framework of Accountability (VFA). This framework, developed through a nationally funded project,
is designed to develop a set of sector-appropriate measures to determine how well community colleges are serving their students. Measures include an analysis of cohorts of students (typically those that entered in 2006) and what percentages moved successfully through developmental education in one year, or what percentage moved through their first college-level English or mathematics course within one year.

While this framework is new and is currently being piloted by many community colleges, institutions will need to further explore the impact of services, such as library or career centers, on their measures. Other institutional surveys such as the Community College Survey of Student Engagement (CCSSE) and the Noel Levitz Survey of Student Satisfaction may also provide additional information to practitioners, as they may include information on the quality of interactions students have with the library or library services.

It is incumbent on community college administrators and library or learning commons directors to plan now for a future that impacts these measures. Directors need to understand and appreciate that the library or learning commons is only part of a larger community college system, yet it is their responsibility to continuously scan the larger system and identify ways their areas can specifically impact outcome measures.

Secondly, the results of this study support expenditures for serials and other information resources held in the library or learning commons as a significant predictor of graduation rates. While budgets are being decreased across institutional departments, higher education administrators should think twice about decreasing library support in these areas. Since other library or learning commons characteristics did not prove to be significant predictors, there would be other areas to consider for decreased funding.
Areas not found to be significant include expenditures on books, periodicals, and technology.

Community colleges are comprehensive higher education environments committed to providing a full array of educational programs. Support services, such as the library or learning commons, should offer students the resources and services needed to succeed. Among these students is a growing number who learn by distributed learning (AACC, 2014) which, by definition, includes those who take advantage of distance learning methodologies, some in remote locations, and some without ever coming to campus.

Libraries or learning commons should provide access to organized online library resources, and plan to service distance learners and remote users with the same level of access and customer service afforded on-ground users. Directors and librarians should explore new paradigms, identify benchmarks, seek partnerships, invest in technology, and design technology infrastructure, and train and develop instructional faculty and staff to provide support to existing and growing virtual needs. The results of this study support this additional attention and resources to information and serials.

Thirdly, community college faculty, including librarians, need to consider how to adapt practices to promote student involvement with the library and/or its resources. Librarians have a unique and varied teaching role. In addition to teaching traditional credit courses, they also provide students with one-on-one instruction at the reference desk and collaborate with other faculty to teach discipline-based research methods. Clearly, librarians see their role as supporting student success. While current methods may be helpful to individual students, community college faculty, including librarians,
need to establish and assess their practices to impact institutional-level student enrollment, retention and graduation rates. To this end, librarians should integrate library services and resources with high-impact educational strategies (Kuh, 2008) such as first-year seminars and experiences, learning communities, writing intensive courses, collaborative assignments and projects, and undergraduate research.

One way to do so would be to assess the impact of course-integrated instruction. In this approach, librarians partnering with instructional faculty, teach students to access, evaluate, critically analyze information to successfully complete course assignments. The challenge, of course, is to move this practice past individual and one-on-one faculty relationships to systemic and integrated practice across the curriculum. Future researchers should investigate and explore the relationships between librarian-enhanced practices and student learning or completion and graduation rates.

**Areas of future research.** While this study is an important early step in demonstrating that characteristics of community college libraries do influence institutional graduation rates, it raises many questions that future research might address. Why do expenditures for serials and other resources impact graduation? How do serials and other resources impact student learning? What percentage increase in expenditures would predict an increase in graduation rates? Is there an optimal level of resources?

Indeed, future researchers should extend beyond traditional assessment measures of libraries (such as circulation and gate counts) to how libraries and learning commons support institutional missions and goals for completion and graduation. National surveys that focus on community colleges, such as CCSSE, should incorporate more questions
that address how students engage with the library and librarians in support of greater learning and success.

In contrast, future researchers should incorporate more relevant measures of institutional graduation rates. As the debate continues at the national level to identify better measures of success for community colleges, researchers might incorporate the measures defined by the Voluntary Framework of Accountability. In this framework, institutions track their success (beyond graduation rates) to the number of full- and part-time students that complete developmental education and milestones such as completion of the general education core. Other measures such as successful transfer to a four-year institution are just as relevant and may be influenced by library characteristics as well. Future researchers would be served to pay close attention to the national debate and incorporate institutional success measures that community colleges see as relevant.

As community colleges strive to provide a quality education to thousands of students that results in higher graduation and completion rates, practitioners need more information on the impact and influences of the students’ full learning experiences, particularly from areas proven, such in this study, to positively impact graduation rates. Scholarly research, both qualitative and quantitative, would help fill the gaps in research that currently exist.

Future researchers should also consider other theoretical and conceptual frameworks that focus on expenditures versus involvement. The results of this study found no involvement factors. While this could also be a function of the data used, it is more likely that a change in theoretical framework would lead to different conclusions. Future researchers should apply theoretical frameworks from higher education finance
such as expenditure theories and its application to maximum social balance and satisfaction of users (students and faculty).

As seen in figure 5, the original literature review diagram has been expanded to identify the possible research topics and directions discussed throughout this chapter. The research and current literature base should be expanded to include deeper examination of community college students and how they interact with the library, and how the library effects community college student outcomes, such as persistence and graduation. Furthermore, new measures that more accurately identify the impact of the library and its librarians on institutional goals need to be explored and identified.

The area, based on previous research, which shows the most promise is to explore ways librarians can enhance their pedagogical practices, such as embedding librarians in instructional classes, and measuring its impact on student learning. Lastly, extending the research findings of this study, future researchers should explore the impact of specific library expenditures to determine if there is a specific formula to guide spending on library resources.

Figure 5. A fishbone diagram demonstrating opportunities for additional research topics based off of current study conclusions.
Conclusions

This study makes contributions to the limited body of research, particularly at the community college level, on the topic of the library’s influence on graduation rates and student success. The results presented included a small, but significant predictive power (2.4%) of two library or learning commons characteristics on institutional graduation rates. The characteristics found to be influential included total expenditures on information resources, and total expenditures on current serials.

Astin’s theory of involvement (1993) and his I-E-O model helped shape this study into a practical piece of work that can assist an institution in assessing the library’s impact on institutional graduation rates. It also provides an environment rich with the need for additional research, both in and out of the community college arena, leading to greater understanding of how academic libraries influence institutional and student level outcomes. Most notably, future researchers should explore expenditure theories and models that may lend additional insight into the findings.

While the academic library or learning commons may be perceived by most students and faculty as an integral component of the college or university, this study found that it had a small impact on institutional outcomes, such as graduation rates. Due to the heightened scrutiny on community colleges by accreditors and funders, it is imperative that institutions focus efforts on areas that have significant impact on outcome measures. Libraries and their faculty need to further explore ways they can measure the impact of their resources and services, while finding new ways to integrate with practices that have significant and positive impacts.
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