

ABSTRACT

Robert Timothy Wright. THE EFFECT OF SELECTED INSTITUTION-LEVEL COMMUNITY COLLEGE TRAITS ON THE ACADEMIC PERFORMANCE OF TRANSFEREES AT UNIVERSITIES (Under the Direction of Dr. David Siegel). Department of Educational Leadership, July, 2010.

This study used correlation to examine the effect of 18 institution- or service area-level community college traits on the North Carolina Community College System's (NCCCS) Performance Measure E, renamed Performance Standard 3 (PME/PS3). One of eight measures included in the NCCCS performance funding system, PME/PS3 is the percentage of an NCCCS college's transferees who achieve a grade point average of 2.0 or higher during their first two semesters at a University of North Carolina constituent university. The 18 traits correlated with PME/PS3 were derived from existing literature on factors affecting individual transferees and from speculation voiced by community college personnel. The traits include academic, demographic, economic, and other categories of data.

Only two of the 18 traits were found to have correlations with PME/PS3 at the 0.05 or stronger level of statistical significance: the economic condition of a community college's service area, represented by median household income; and market penetration, represented by the percent of a community college's service area population it enrolled. Both of these effects were relatively weak, having a Pearson's r of 0.134* and -0.159**, respectively.

In sum, this research suggests that (a) the institution- and service area-level traits examined in this study appear not to exert a strong influence on transferee success at universities; (b) further research should be conducted toward discovering the determinants of that success; and (c) perhaps PME/PS3 is an inappropriate measure of NCCCS colleges' success at preparing their students for transfer to universities.

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THE EFFECT OF SELECTED INSTITUTION-LEVEL COMMUNITY COLLEGE TRAITS
ON THE ACADEMIC PERFORMANCE OF TRANSFEREES AT UNIVERSITIES

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THE EFFECT OF SELECTED INSTITUTION-LEVEL COMMUNITY COLLEGE TRAITS
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CHAPTER 1: INTRODUCTION TO THE STUDY

The factors influencing how community college transferees perform academically at a university are critical to know for a number of reasons. Certainly it is of interest to university officials to discover how its practices, policies, and conditions can be adapted to improve its transferees' performance (Townsend, 1993; Townsend & Wilson, 2006). Another set of useful knowledge includes a variety of demographic markers that describe individual students and predict to some degree how they will fare (Baldwin, 1994; Castaneda, 2000; Quany, Dixon, & Ridley, 1999). Both of those areas of inquiry have been and are being explored, as the studies cited attest. Relatively neglected, however, is the potential influence of institution-level characteristics of the community college of origin, and of its service area, even though many of those colleges are held responsible for their transferees' performance through one or another form of performance funding. Whether, or to what degree, several of those institution-level and service-area-level characteristics influence community college transferees' academic performance at a university is the question this study aims to address.

This introductory chapter begins an explanation of the study's rationale by discussing the nationwide conditions that have prompted this research. Toward that end, it will elucidate the current disposition of its object system, the North Carolina Community College System (NCCCS), especially the NCCCS performance funding policy and the component of that policy that measures transferee performance. As discussed at length below under "Limitations of the Study," the NCCCS is of sufficient size, scope, and variety to make it a strongly representative example of community college performance funding in action, and how a number of institution- and service-area-level variables might influence a particular student outcome used as a

performance measure. An even closer examination of how NCCCS colleges are faring versus performance benchmarks will clarify the problem and substantiate its operational significance. The study's overarching research question and its variables to be studied, with rationales for each, then follow. The chapter concludes with a discussion of the study's limitations and key terms used.

Rationale for and Background of the Study

This study is intended as one step toward addressing a historically recent and somewhat problematic dynamic that has arisen at the nexus of three academic phenomena:

- (a) the century-long stagnation of university-student graduation rates at a little over 50% (Tinto, 1982), including the immediate past generation (ACT, 2009)
- (b) the rise in community college transferees to universities as a percentage of all baccalaureate recipients to the current level of almost 50% (McPhee, 2006);
- (c) the spread of carrot-and-stick performance funding as states struggle to improve the performance of the colleges they fund (Burke & Minassians, 2002).

At the center of that nexus are accountability measures for community college transferee success at universities, whether that success is defined as retention, baccalaureate attainment, or, as is the case in North Carolina, transferee grade point average (Burke & Minassians, 2002).

Because community colleges are measured *as institutions*, this study examines whether certain institution- and service-area-level variables of community colleges appear to influence the academic success of their transferees at university. While the question itself may derive ultimately from concern for student success, the individual community college is rewarded or punished according to a numerically defined measure of that success deriving from the

performance funding system in place. Thus the rationale for this study arises not only directly from a general concern for student success, but also indirectly from that concern as it subsumes the rationale for the rise of performance funding nationwide and in the NCCCS specifically—as an artifact of the national and state moods—and as it recognizes the precious financial resources at stake in the measurements imposed by the NCCCS as an exemplar system.

The origin and development of the whole of the NCCCS performance funding system will be examined in Chapter 2 as a component of the literature review. For the purpose of introduction, it is sufficient to explain that this study focuses on a single performance measure required by that system, called Performance Measure E (PME) in the prior version of the NCCCS performance funding rules and Performance Standard 3 (PS3) in the subsequent, current version of those rules. The data years analyzed by this study will span both versions. Under both, that measure is the percentage of an NCCCS college's transferees who achieve grade point averages of 2.0 or higher during their first two semesters at University of North Carolina (UNC) universities. The standard to be met—i.e., to receive performance funds—is that a community college's transferees must achieve the 2.0 at the same or higher percentage rate than UNC's native students for the given semesters. NCCCS transferees to UNC qualify to be counted for the measure if they transfer at least 24 semester hours of NCCCS credit to UNC. Consider the following: During the 2004-2005 academic year, 4,278 NCCCS students who had the previous year earned at least 24 credit hours transferred to one of the 16 UNC universities (NCCCS, 2006a). Because of PME/PS3, their academic performance at university in fall 2004 and spring 2005 would directly and solely determine the disbursement to—or withholding from—their two-year alma maters of 0.33% of the \$934,646,618 of NCCCS 2005-2006 expenditures, or

approximately \$3.1 million (NCCCS, 2006b), and would contribute to their community colleges' opportunity to share in another \$7.1 million of unexpended funds for achieving the "superior" rating (Lancaster, 2006). However, transferees from 37 of the 58 community colleges failed to meet the 2.0 GPA standard upon transfer (NCCCS, 2006b).

Statement of the Problem and Its Significance

The proportion 37 failures to 21 successes simply illustrates a problem that, pondered from either a social or a financial perspective, is the same: Community college transferees to university tend not to succeed as often as their native classmates, especially in their first semester or year of transfer (Diaz, 1992; Glass & Harrington, 2002; Hills, 1965). While not all studies confirm Hills's (1965) seminal meta-analysis of "transfer shock," or the lowering of community college transferees' GPAs at university (Cejda, Kaylor, & Rewey, 1998; Johnson, 2005; Townsend & Barnes, 2001), in North Carolina the phenomenon seems beyond dispute. Glass and Harrington's study of community college transferees at a large North Carolina university revealed a first-semester GPA drop of 0.44. Perhaps more telling are NCCCS statistics; Table 1 shows how successfully NCCCS colleges met the PME/PS3 measure in recent years.

If "transfer shock" indeed exists in other states, then it is a sizeable problem. In 1999-2000, essentially half of all baccalaureate recipients in the United States had attended a community college, and 44% had followed the traditional route, attending the two-year institution first, then transferring to the four-year institution (McPhee, 2006). So how well community college transferees perform at four-year colleges, and more to the point, why some succeed while others fail, is a question of substance for the students themselves, for the

Table 1

NCCCS Colleges (of 58 Total) Achieving PME/PS3 Benchmark

Measurement year ^a	No. of colleges	% of colleges
1999-2000	17	29
2000-2001	23	40
2001-2002	8	14
2002-2003	23	40
2003-2004	18	31
2004-2005	21	36
2005-2006	29	50

Note. From data annually reported in *Critical Success Factors (CSF)* of 2000-2007, by NCCCS.

^aMeasurement Year = year of students' performance, not reporting year.

universities tasked with educating and graduating them, and—as explained above—even for the cash-starved community colleges they have already left.

Over the years, that question has been answered to some extent at the level of factors affecting individual students, as will be discussed below in the literature review. Considerably less research, however, has been conducted toward identifying factors that affect individual community colleges at the institutional level or that inhere in their service areas—the level at which the colleges are measured toward awarding or withholding accountability funding that would in turn be plowed back into helping individual transferees succeed.

Answers to questions about those institution- and service-area-level factors could be beneficial in three quite practical ways. First, they could direct individual community colleges' energies and resources away from focus on malleable “structural” or inherent factors that do not make a difference in transferee outcomes, and toward factors that do. Second, it is not uncommon for faculty and administrators to hold the opinion that various institution- and service-area-level inequities do present insuperable obstacles to their transferees' success relative to those of other colleges (T. Gould, past president of NCCCS College Transfer Program Association, personal communication, April 16, 2008). Thus faculty and administrators may lack motivation to search out policies, procedures, and methods that could, in fact, help their transferees to succeed. And third, if a factor like local socioeconomic condition—or other possibilities, discussed below—does tilt the ground uphill for some colleges but downhill for others, then perhaps the current one-size-fits-all performance standard should be altered or elasticized to allow for the differing strength of that factor's effect on students transferring from different community colleges.

Research Question and Factors to Be Studied

Therefore, the single research question this study will seek to answer is whether any of 18 institution- and service-area-level factors affect the academic performance of a given NCCCS college's transferees at UNC universities. Thirteen of those factors were chosen because they, in some form or another, appear in existing literature that explores factors affecting individual students' academic success at university; two are commonly discussed as possible factors by veteran community college personnel; the remaining three factors are unique to the present study.

The operational form of the independent variables used as proxies for the 18 factors, the rationales for using the factors, and the 18 null hypotheses to be tested appear in the third chapter, "Methodology." The factors themselves, expressed as general concepts, follow:

Dependent variable: PME/PS3 score, or the yearly percentage of a given NCCCS college's transferees who achieved a GPA of 2.0 or higher during their first two semesters at a UNC university.

Factor #1: Completion of a community college transfer degree before transferring, versus transferring hours without a degree.

Factor #2: The absolute size of a college transfer program.

Factor #3: The size of a college transfer program relative to all other curriculum programs at its college.

Factor #4: The academic rigor of a college transfer program.

Factor #5: The level of graduate degree held by community college instructors, the doctorate versus the master's.

Factor #6: The degree of female representation in the community college faculty.

Factor #7: The degree of minority representation in the community college faculty.

Factor #8: A community college's commitment to distance learning.

Factor #9: The amount spent by the community college per student for instruction.

Factor #10: The amount spent by the community college per student for the library and instructional support.

Factor #11: The amount spent by the community college per student for Student Services.

Factor #12: The amount spent by the community college per student for all other institutional costs, excepting operation/maintenance and continuing education.

Factor #13: The economic conditions prevailing in a community college's service area.

Factor #14: The rural or urban nature of a community college's service area.

Factor #15: The growth rate of a community college's service area population throughout the years studied.

Factor #16: The "market penetration" of a community college into its service area.

Factor #17: The academic strength of the university students among whom a community college's transferees compete, as measured by their average high school class rank.

Factor #18: The academic strength of the university students among whom a community college's transferees compete, as measured by their average Scholastic Aptitude Test scores.

Limitations of the Study

The most obvious limitation of this study is that it is restricted to the North Carolina Community College System and the University of North Carolina system. However, given the extremity of conditions across the state, and the size and distribution of each of its two higher

education systems, the results of this study should be as generalizable to other states as a study of any single state could be. For example, NCCCS colleges exist in Robeson County, with a 2004 median household income (MHI) of \$27,241, and also in Wake County, with a 2004 MHI of more than double that figure at \$57,846 (Economic Research Service, 2007). NCCCS students reside in the Charlotte metropolitan statistical area, with a 2007 population of 1.65 million (U.S. Census Bureau, 2008b), and also in Tyrrell County, with a 2007 population of 4,121 (Economic Research Service, 2008). Variety characterizes the UNC universities as well. They range in size from North Carolina State University, with a fall 2006 enrollment of 31,130, to Elizabeth City State University, with an enrollment in the same semester of 2,681 (UNC, 2007). Just as pronounced is the difference in student preparedness: 76.2% of 2006 freshman at UNC-Chapel Hill had graduated in the top 10% of their high school classes, while 3% of North Carolina Central University's 2006 freshman had done so (UNC, 2007). Thus, the remarkably broad range and variety of North Carolina contexts—at the level of the student, of the community college, and of the university—support the assertion that the ongoing NCCCS/UNC dynamic provides an especially representative laboratory for community college-to-university transfer studies.

Some limitations do, however, derive from constraints on the data itself. To protect student privacy, NCCCS does not report institution-specific data when the number of students is small (10 or fewer), because the performance of an individual student might be identifiable. Further, NCCCS data is not always “pure.” For example, percentages reported by a community college for PME/PS3 can include transferees' GPAs at private colleges. Only a minority of NCCCS colleges include that data, but when they do, it can be difficult to separate from data that

includes UNC universities alone. In most instances the data is recoverable; in a few others, not, as will be explained in chapter 3, “Methodology.”

Finally, this study examines relationships over recent years between PME/PS3 and 18 institution-level factors that could be rationally suspected to influence it. But factors arise from one unique set of contexts and disappear into a different set, strengthening and weakening in influence along the way. It is unlikely that this study has identified all relevant factors influencing PME/PS3 over the years studied, and it is equally unlikely that those factors will persist permanently or influence uniformly.

Key Terms

The following terms are used throughout this study. Unless expressly stated otherwise, they adhere to the definitions given below.

Academic strength: The collective academic preparedness level of an identified group of students as manifested in their performance for grades.

Accountability funding: Any funding awarded or withheld based on a college’s performance as expressed through measurable indicators.

Individual-level factors: Factors measurable at the level of the individual student, such as gender, ethnicity, socioeconomic status, age, etc.

Institution-level factors: Factors measurable at the level of the individual college, such as student population, number of graduates, socioeconomic status of the college’s region, etc.

Native student: A non-transfer student at university.

Performance funding: Funding for a college or university that is tied to specific, measured performance.

Performance measure: A numerical indicator of the “success” of a college, for example, the percentage of its graduates who are employed within one year of graduation, or the percentage of a freshman class who graduate within five years.

Performance Measure E: For the NCCCS accountability system in effect from 1999 through 2007, the percentage of a community college’s transferees who achieved GPAs of 2.0 or higher during their first two semesters at UNC universities. Beginning in 2007-2008, this measure was renamed *Performance Standard 3*.

Performance standard: The benchmark level of a performance measure that must be achieved in order for a college to earn accountability funding credit for having met it. For example, the Performance Standard for Performance Measure E required a community college’s transferees to achieve GPAs of 2.0 or higher during their first two semesters at a rate equal to or higher than their native-sophomore and -junior UNC classmates.

Service-area-level factors: Factors measurable at the level of a college’s official service area, such as population or median household income.

Transfer shock: The term coined by Hills (1965) that refers to the tendency of two-year college transferees at four-year colleges to experience an initial drop in GPA.

Summary

One of the NCCCS performance funding measures requires that a community college’s transferees achieve GPAs of 2.0 or higher at the same rate as their native-sophomore and –junior UNC classmates. But given the significant institution- and service-area-level differences both among the 58 NCCCS colleges and among the 16 UNC universities to which they transfer, and the resultant possibility that those differences may put a given community college at a decided

advantage or disadvantage, it may be that holding all NCCCS colleges to a single numerical benchmark imposes, perpetuates, and even exacerbates systemic inequity. Conversely, if it can be shown that institution- and service-area-level factors do not influence a community college's ability to achieve this performance measure, then perhaps those NCCCS educators who do believe the measure to be inequitable will be more motivated to seek solutions to poor transferee performance instead of assuming the problem of transfer shock to be predetermined, and thus insoluble.

This study proceeds next to a review of relevant literature concerning factors influencing the success of community college transferees to universities. A third chapter is devoted to the methodology employed to analyze data and to determine whether statistically significant relationships exist between the dependent and independent variables. A fourth chapter presents the results of the statistical analysis, and a final chapter discusses and interprets those results.

CHAPTER 2: REVIEW OF LITERATURE

The independent variable with which institution- and service-area-level dependent variables will be correlated in this study—the attainment of the 2.0 GPA by a community college’s transferees, as reported for NCCCS performance funding purposes—suggests that three distinct sets of literature be reviewed in order to provide the reader a fully contextualized grounding from which to view the study and its findings. One is the origins, growth, and scope of higher education performance funding, specifically as it has come to exist in the NCCCS/UNC system; another is the literature of theoretical frameworks that inform and contextualize retention; and the third is the literature that explores factors influencing transferee success. While the direct relevance to this study of performance funding literature and of transferee literature should be clear, the relevance of retention literature is perhaps not; therefore, a brief explanation of the relevance of retention literature will introduce that section of this chapter.

The Literature of Performance Funding

The origins and development of performance funding are fairly clear. Burke and Minassians (2002) see the movement arising first in the early 1980s as a response to the “organized anarchy” (p. 6) of the 1960s and 1970s. That “organized anarchy” in higher education had existed in most states under funding determined by legislative formulas. In 1984, for example, 36 states appropriated funds for their public colleges and universities according to formulas, which included individually fundable categories such as instruction, public service, and plant operations; units of measurement such as square footage, head count, and credit hours; and differentials such as academic discipline, year of student, and type of college (McKeown, 1996).

Interestingly, formula funding had developed largely in Southern states as a response to Federal directives intended to address pre-civil rights-era inequities (McKeown, 1996). Just as that formula funding system was a response to social change and a new matrix of values that legislators and institutions were tasked to operationalize, so performance funding has its roots in the extramural world as well. In broad terms, the 1980s brought to bear on higher education the converging pressures of political conservatism, the results-oriented business model, and economic decline, all of which collectively reached a sort of trigger point in the recession of the early 1990s (Burke & Associates, 2002; Christal, 1998; McKeown, 1996). Despite the apparent transparency and accessibility to public understanding afforded by formula funding, some legislators felt that they had been “poking money through a hole in the fence” (Schmidt, 1999). And whereas the pre-1990s performance funding movement had expressed itself as “accounting for expenditures,” by the 1990-1991 recession it had evolved into “accounting for results” (Burke & Minassians, p. 5). State legislator Sandra Kauffman’s summation of the motivations behind a report by her state’s Business and Education Partnership—the name itself is telling—could have been offered by her colleagues in a number of states: “The business community made it clear what their expectations were for postsecondary education in Missouri and that they just weren’t being met” (Trombley, 2001).

Essentially, conservative legislators in difficult economic times began applying the principles of commercial business to higher education (Burke & Associates, 2002). Their reasoning derived from the fact that public colleges were supported largely from public funds—in the case of North Carolina community colleges in 2006-2007, for example, at the rate of about 69% of their total budgets (NCCCS, 2007b). Further, these legislators sought ideologically to

effect a “paradigm shift wherein colleges are to meet states’ needs rather than the state meeting the colleges’ needs” (Mize, 1999, p. 3).

The final two actuators of the performance funding movement developed most clearly in the mid 1990s. Following the recession, with state budgets simultaneously constrained by falling revenues and depleted by increased public need, in academic year 1992-1993 colleges experienced the first occurrence since data has been collected of state appropriations declining from those of the previous year (Burke & Minassians, 2002). Following close upon the heels of this shockwave were the full-blown arrival and workforce integration of expensive information technology (Burke & Minassians, 2002) and its concomitant necessity for workers to compete successfully in a “global economy.” The tide of accountability was still rising around community colleges at the turn of the millennium. From 2000 to 2003 the number of states applying specified performance indicators to community college systems rose from 17 to 23, and the number of indicators in use rose from 13 to 17 (Beas & Zarkesh, 2003).

In summary, plentiful funds, traditional workforce needs, and relatively liberal governance in the 1960s and 1970s gave way in the 1980s and 1990s to reduced funds, the high-tech workforce revolution, and relatively conservative governance. A tacit consequence of the liberal-to-conservative political shift, and under-discussed in the literature, is the ideological question of whether higher education’s primary purpose is to transmit culture, as cultural conservatives asserted (Bloom, A., 1987; Bloom, H., 1994; Cheney, 1989; Hirsch, 1987), or rather to fuel the economic engine with technically competent workers, as the fiscally conservative assessment legislation asserted on its face (U.S. Department of Education, 2006).

Clearly the latter answer is now ascendant, and its chosen mechanism for translating ideology into reality has turned out to be performance funding.

Types of Accountability Systems, and Indicators Used

First, in the interest of unambiguous terminology, it should be noted that accountability systems in higher education have been categorized by Burke and Minassians (2002) into three types: performance reporting, performance budgeting, and performance funding. Performance reporting is exactly what the name suggests: Colleges must report publicly the degree to which they have met a set of measures. The theory is that institutional competitiveness, or perhaps mere embarrassment, will motivate colleges to perform better if they must publicize outcomes. Performance budgeting, occupying a middle ground, inserts measured outcomes into legislators' funding deliberations, but only as one piece of information among many to be considered. Performance funding—perhaps the most impactful of the three, and the type used by NCCCS—makes a specified amount or percentage of funding directly contingent on a college's meeting a specified number of specified measures.

However, there appears to be no consensus on which measures to apply, nor how many, nor at what standard. Zarkesh and Beas (2004) report that in 2003, 23 states were applying some combination of 16 different performance indicators to their community colleges. Table 2 shows the 13 indicators used by three or more states. The most common indicator was graduation rate, used by 12 states; performance after transfer, the particular object of the present study, was used by six.

Benefits of Performance Funding

Despite the breadth of indicators applied and a decade or so of available data, the benefits

Table 2

Community College Performance Indicators Used by Three or More States in 2003

Performance Indicator	No. of States
Graduation rate	12
Transfer rate	11
Employment rate	10
Certificate/licensure pass rate	10
Retention/persistence rate	10
Degree completion/conferred	8
Performance after transfer	6
Faculty instruction workload	5
Employer feedback	4
Service area	4
Partnership with industry	3
Class size	3
Continuing education	3

Note. Adapted from “UCLA Community College Review: Performance Indicators and Performance-Based Funding in Community Colleges,” (Zarkesh & Beas, 2004, p. 75).

of performance funding for community colleges are, as so far reported in the literature, at best only partial and putative. Individual studies of the success of higher education performance funding in Tennessee (Bogue, 2002), Florida (Wright, Dallet, & Copa, 2002), Ohio (Moden & Williford, 2002), and South Carolina (Burke, 2002) all failed to find clear-cut overall improvement indisputably attributable to those states' performance funding systems. As Dougherty and Hong (2005) put it, "accountability systems have had moderate impact on the behavior of community colleges [and] the ultimate impact on student outcomes is still unclear" (p. 2). Zarkesh and Beas (2004) echo the sentiment: "the benefits of performance indicators and performance-based funding in community colleges are still being examined and debated." Many on-the-ground administrators join that opinion. Harbour and Nagy (2005) cite the assessment of the chief instructional officer at an anonymous North Carolina community college who, while granting the importance of accountability measures, insists concisely that "there are still too many unknowns" (p. 457).

If any benefit exists beyond dispute, it may be simply that accountability nudges colleges toward some kind and degree of self-examination (Community College League of California, 1999; Dougherty & Hong, 2005; Harbour & Nagy, 2005; Zarkesh & Beas, 2004; Zumeta, 2007). Harbour and Nagy found that in response to NCCCS's accountability system, three of the four community colleges they studied had made changes in programs and staffing toward improving their performance on some measures. On the other hand, accountability measures can perhaps produce the opposite of self-examination—in this case, the belief in results automatically attained: One community college dean asserted flatly that "If performance is measured, performance improves" (Harbour & Nagy, 2005, p. 454).

Problems with Performance Funding

The problems attributable to performance funding, though several, tend to fall into two major categories. The first is well characterized by Burke and Minassians (2002), who are speaking historically but might as well be describing the situation today: “Although assessment spread widely to colleges . . . its effects rarely ran deep” (p. 8). The second category, equally troublesome, encompasses the widespread feeling among community college administrators and faculty “that there is no real linkage between state performance measures and classroom activities” (Harbour & Nagy, 2005, p. 459).

Where performance funding fails to modify institutional behavior, it may sometimes be that the amount of money involved is judged insignificant by college administrators (Serban, 1998). In the nine states studied by Dougherty and Hong (2005)—California, Florida, Illinois, New Mexico, New York, North Carolina, Texas, Virginia, and Washington—performance-contingent dollars accounted for as little as 1% and no more than 6% of community colleges’ budgets. Overall, such funds comprise roughly 2% to 3% of total higher education state appropriations (Mize, 1999). Moreover, performance funding tends only to reward, not to punish. In North Carolina, for example, funds are granted for high performance, but not reverted from a college’s base budget for poor performance (North Carolina General Statutes, 1999 amend. & 2007 amend.). Thus, accountability measures can be, and often are, simply ignored in real behavioral terms, instigating no substantial institutional change. One community college president, when asked what effect recent performance reports might have on his college, paused for thought and replied, “Any effect would be infinitesimal” (Harbour & Nagy, 2005, p. 452).

Specific charges abound as well. Mize (1999) lists 15 “disadvantages or difficulties,” including “Properly addressing the complexities of measuring quality, particularly in student learning”; “Punishing poor or urban institutions”; “Creating excessive costs for data collection and analysis”; “Producing budget instability and uncertainty”; “The tendency to stress efficiency over quality”; and “Distortions . . . created through the motivation of explicit financial rewards,” to name a few (pp. 4-5). Zarkesh and Beas (2004) add that measuring graduation rates, the most common indicator in their study, fails to “reflect the value of a community college due to the many two-year college students who take classes for reasons other than simply to attain a degree” (p. 63). Zumeta (2007) wonders if “bludgeoning the current denizens of [higher education] with narrowly conceived efficiency mandates” is an “attractive” tactic (p. 13). And the administrators interviewed in Harbour and Nagy’s (2005) case studies of NCCCS colleges characterize that state’s performance measures as “pretend” rather than “real” (p. 455); find certain measures “totally unrealistic” for colleges in low-socioeconomic districts (p. 457); and view “measures regarding student performance and employer satisfaction” as “matters [the college] had little control over” (p. 457).

NCCCS Performance Funding

The NCCCS development of performance funding began in 1989 when the North Carolina General Assembly mandated a “Critical Success Factors Report” (NCCCS, 2006a, p. 1). Although this report was not tied to funding, it is worth noting that the timing of the legislation coincides with the nationwide history of the movement, as outlined above. Pressures peculiar to North Carolina that motivated accountability legislation may have included the sheer size of the system and its concomitant share of State appropriations. North Carolina’s 58 public

community colleges make it the third largest system in the United States by number of individual institutions, trailing only California's 111 and Texas's 66 (American Association of Community Colleges, 2009). As, however, the 11th most populous state (U.S. Census Bureau, 2000c) and 12th in gross state product in 1998 (U.S. Bureau of Economic Analysis, 2007), North Carolina's system is relatively outsized and, in a neutral sense, proportionally burdensome. Total state expenditures on NCCCS for fiscal year 1998-1999, the year immediately before the legislation under discussion, amounted to almost \$760 million (NCCCS, 2000).

Whatever motive or motives informed its decision, in 1996 the General Assembly directed the State Board of Community Colleges to hire an external consultant for the express purpose of conducting a thorough analysis of the NCCCS funding formula (Harbor, 2002). As the consultant's reports began to become available, the General Assembly turned once again to the issue of NCCCS funding, in 1998 ordering the State Board to partner a second time with an external consultant, toward conducting a study of options for a performance funding plan (Harbor, 2002). Finally, in July 1999, legislators passed §115D-31.3, "Performance budgeting," which, adjusted in degree rather than in kind, still holds today (Harbor, 2002; North Carolina General Statutes, 1999 amend. & 2007 amend.).

The issue continued to evolve: The adjustment occurred in July 2007 when the North Carolina General Assembly approved Session Law 2007-230, House Bill 642, which purports to amend the NCCCS accountability system laid out in §115D-31.3 and which took effect beginning with the 2007-2008 academic year (North Carolina General Statutes, 2007 amend.). NCCCS associate vice president for planning, accountability, research & evaluation Keith Brown explained to the State Board that he expected the plan to result in a 50% reduction in the

number of colleges earning the “superior” rating. “This will not be a drop in college performance,” he stated, “but an indication that we have raised the bar” (NCCCS, 2007a). The release omitted to provide reasons for the recommended modifications.

The prior system established 12 performance measures; the first five were required, and community colleges could choose a sixth from among the remaining seven. For each of the six measures met, a college could carry forward into the next fiscal year 0.33% of its former year’s budget, or up to 2% total. Further, colleges that earned a “superior” rating by meeting at least five of the six measures then shared equally in any NCCCS funds left unexpended. Under the plan that took effect in 2007-2008, the 12 performance measures are reduced to eight, colleges are allowed to carry forward only 0.25% of the previous year’s budget for each measure met, and the highest rating is reserved for colleges meeting all eight measures. Thus, under both systems, a college could earn carry-forward privileges of up to 2% of its budget.

Insofar as the new plan was intended to reduce the number of colleges earning the highest rating, it appears to have over-achieved: NCCCS *Critical Success Factors (CSF)* reports for 2002 through 2006 (see Table 3) show that under the final years of the original system, an average of about 33 of NCCCS’s 58 colleges earned the superior rating, while *CSF* reports for 2008 and 2009 show that under the first two years of the new system only seven and 11, respectively, earned the newly termed but equivalent “exceptional” rating.

To contextualize the amount of funds involved, consider a recent year’s example. Approximately \$7.1 million of NCCCS’s unexpended 2005/2006 funds was divided among 36 eligible (“superior”-achieving) colleges, or \$197,222 per college (Lancaster, 2006). In that year Sampson Community College’s budget was approximately \$10.1 million (NCCCS 2006c); thus,

Table 3

Standards Met and Superior Ratings Achieved in NCCCS 2001/2002 to 2007/2008

System	Year	No. Colleges Achieving Superior/Exceptional Rating
Prior System	2001/2002	31
	2002/2003	36
	2003/2004	37
	2004/2005	36
	2005/2006	38
Current System	2006/2007	7
	2007/2008	11

Note. From 2003-2009 *Critical Success Factors*, by North Carolina Community College System.

if it had achieved all six measures, it could have carried forward \$202,000 (2%) of its budget and earned an almost equal amount for superior performance, for a total of \$399,222. That amount could have funded perhaps five full-time, nine-month, curriculum instructional positions for a year (Sampson Community College vice president of finance Virginia Lucas, personal communication, September 3, 2009). Teaching 20 students in each of six three-credit-hour courses in each of two semesters, those five instructors would have generated 112.5 full-time equivalencies (FTE) (NCCCS 2008b) which, at that year's rate of \$4231.97 per curriculum FTE (NCCCS, 2009), could potentially have earned Sampson C.C. \$476,096 in future budget dollars to add to its potential \$399,222 in directly awarded performance funds, for a total of \$875,318. Thus one can see that under ideal circumstances the performance funding system of NCCCS can significantly augment a college's budget. In the case cited, it would have been possible for Sampson Community College to have leveraged success at all six performance measures into a windfall equaling about 8.7% (\$875,318 of \$10.1 million) of its budget for that year.

To conclude this review of performance funding literature: Higher education performance funding may indeed suffer significant imperfections and resolute detractors. Still, it exists, and continues for now to determine the allocation of some portion of resources to a considerable segment of the higher education landscape. Despite the opinion of the NCCCS college president quoted by Harbour and Nagy (2005), who claimed that the effect of performance reports on his or her college would be "infinitesimal," a long-view understanding of the latent potential of performance funding in the NCCCS system might suggest that its effect should be more keenly felt and, as the present study intends, that its component parts be thoroughly examined and analyzed.

The Literature of College Retention

Relevance to this Study of Retention Literature

A number of researchers and theorists, over several decades (e.g., Astin, 1971; Bean, 1990; Hagedorn, 2005; Tinto, 1975, 1987), have remarked on the inconsistency of retention definitions. As Hagedorn asserts, the definition of retention for measurement purposes continues to be “complicated, confusing, and context-dependent” (p. 89). Perhaps it is because of this confusion that educational researchers have commonly employed the simple dichotomy of retention versus drop-out (Hagedorn, 2005), meaning that for all practical purposes this understanding of retention equates it with persisting to graduation. Another definition of retention is applied by the National Center for Education Statistics, whereby enrollment in a student’s first and second consecutive fall semesters is the measure.

Neither of these definitions of retention fits the NCCCS PME/PS3 statistic exactly, because it (a) measures transferees in their junior years or earlier, before graduation; (b) includes students enrolled in either possible combination of consecutive semesters, whether fall-spring or spring-fall; and (c) uses GPA as its target datum rather than the fact of enrollment. However, retention theories may nevertheless usefully inform this study, because the PME/PS3’s 2.0 GPA requirement is identical to the cumulative GPA that all 16 UNC universities require for the baccalaureate degree. Further, every UNC university defines “good academic standing” via a series of incremental benchmarks that demand a cumulative GPA increasingly nearer to 2.0 as a student accumulates more credit hours. In view of these parallels between the PM3/PME statistic and the concept of retention, an overview of retention theories is included because it may provide

valuable and effective context for this study, while an in-depth recounting of retention literature would be unnecessary and perhaps even misleading.

Table 4 exhibits good-standing benchmarks for all 16 UNC universities. The average number of accumulated hours at which a student must maintain a cumulative 2.0 GPA is 76 (omitting those universities without incremental definitions), or at about the level of a first-semester junior. Considering instead only the five UNC universities that accepted a majority (62%) of NCCCS transferees in Fall 2007 (UNC, 2008b)—East Carolina University, University of North Carolina-Charlotte, University of North Carolina-Wilmington, University of North Carolina-Greensboro, and Appalachian State University—the average point at which a student must have a 2.0 GPA is even more stringent, at 60 accumulated hours, or about the level of a second-semester sophomore.

In the 2005-2006 academic year, 39 % of NCCCS students who transferred to UNC universities did so as juniors, with at least 64 credit hours; the other 61% transferred between 24 and 63 credit hours, or approximately as sophomores (NCCCS, 2008). Taking two semesters of minimum (12) full-time credit hours, at the end of the NCCCS measurement year the two groups would have been bound by academic good-standing definitions for, respectively, 48-87 hours and 88+ hours. Referring once more to Table 4, it is clear that the UNC good-standing GPA requirements for each group would have been at or very near the NCCCS 2.0 GPA performance-measure requirement, rendering the students' success at retention (broadly defined) and success at the performance measure approximately equivalent. Toward contextualizing this study's primary research question, it therefore seems useful to review the major theories posited to explain retention.

Table 4

GPA Required for Good Academic Standing at UNC Universities, by Credit Hours

University	Hrs. GPA	Hrs. GPA	Hrs. GPA	Hrs. GPA	Hrs. GPA
ASU	16-30 – 1.75	31-45 – 1.9	46+ - 2.00		
ECU	01-29 – 1.6	30-59 – 1.8	60-74 – 1.9	75+ - 2.00	
ECSU	24-47 – 1.45	48-71 – 1.6	72-95 – 1.75	96+ - 2.00	
FSU	01-29 – 1.5	30-59 – 1.8	60+ - 2.0		
NCAT	24-35 – 1.5	36-47 – 1.6	48-59 – 1.8	60-71 – 1.9	72+ - 2.0
NCCU	19-39 – 1.3	40-69 – 1.5	70-96 – 1.7	97-123 – 1.9	123+ - 2.0
NCSA	(Vary by school [of Dance, etc.]; higher standards than other UNC colleges)				
NCSU	01-59 – 1.8	60+ - 2.0			
UNC-A	00-23 – 1.0	24-44 – 1.5	45-74 – 1.75	75+ - 2.0	
UNC-CH	(2.0 GPA required plus X hours of credit per Y number of semesters)				
UNC-C	(Suspension ensues after two consecutive semesters of GPA <2.0)				
UNC-G	00-29 – 1.75	30+ - 2.0			
UNC-P	1-29 – 1.5	30-59 – 1.75	60-89 – 1.875	90+ - 2.0	
UNC-W	1-26 – 1.5	27-58 – 1.75	59-88 – 1.9	89+ - 2.0	
WCU	(When GPA <2.0, student must achieve cumulative 2.0 or term 2.3+ GPA)				
WSSU	00-18 – 1.5	19-39 – 1.7	40-69 – 1.8	70-96 – 1.9	97+ - 2.0

Note. From most recent UNC catalogs available as of fall semester 2008; see References.

Theories of Retention

From the founding of Harvard College and the College of William and Mary in the seventeenth century (Thelin, 2004) through the revolutions in American higher education catalyzed by the Morrill Land-Grant Acts of the second half of the nineteenth century and the approximately contemporaneous adoption of the German university model (Thelin), retention was not enough of a concern to have produced a significant literature (Berger & Lyon, 2005). It was only the convergence of three new realities in the early twentieth century that created an environment in which “student mortality” (McNeely, 1937) would become a concern worthy of study: the growing importance of the baccalaureate degree, the increase in number of students, and the proliferation of colleges and universities. The importance of the baccalaureate made retention necessary for students, the increase in student numbers meant greater diversity in student preparedness and background, and the proliferation of institutions made it possible to observe differences in retention rates from one school to another (Berger & Lyon).

The first such substantial study was McNeeley’s (1937) *College Student Mortality*, which explored many of the facets of retention still researched today, including dropout rates, points of dropout, time to degree, demographic descriptors of dropouts, and reasons for dropping out. However, any momentum McNeeley’s research might have created for retention study was precluded and obviated by the intervention of World War II. Unsurprisingly, college enrollment dropped precipitously during the early 1940s, with male students attending at roughly only two-thirds their pre-war level (Folger, 1967).

Postwar economic, cultural, and technological factors would create conditions that reinvigorated retention studies. The Servicemen’s Readjustment Act of 1944—better known as

the G.I. Bill—provided funds for returning servicemen’s vocational training or college attendance. In the midst of the U.S.-Soviet space race and Cold War, the National Defense Education Act of 1958 created funding for the promotion of math, science, and technology at all levels of education. The Higher Education Act of 1965 greatly expanded the potential pool of college students through the offering of scholarships and low-interest loans. Finally, over the three decades from 1945 to 1975, the U.S. population increased from roughly 140 million to 216 million, or by about 54 percent (U.S. Census Bureau, 2000b). To meet the burgeoning demand for college and university degrees, the number of institutions grew in almost precisely the same proportion over that thirty-year period, from 1,768 to 2,747, or by about 55% (Cohen, 1998). Thus, the reconvergence of the increasing importance of a college degree, the strong growth in student populations, and a proliferation of colleges and universities necessitated a return to the question of why students fail to finish an undergraduate degree, and how to help them to succeed. It seems relevant to note that these were the same decades during which the number of public two-year colleges almost tripled, from 328 in 1947-48 to 1030 in 1977-78 (Cohen & Brawer, 2008).

Thus the stage was set on which retention would become a significant concern and, consequently, a subject of scholarly inquiry and theory-making. There is of course neither a single document inarguably identifiable as the first to posit a retention theory, nor indeed unassailable consensus on where assumptions end and—insofar as assumptions imply theory—where theory begins. However, one such early publication was Summerskill’s (1962) “Dropouts from college,” included in Sanford’s (ed.) suggestively titled anthology *The American College: A Psychological and Social Interpretation of the Higher Learning*. Summerskill’s synthesis of the

results of 35 studies conducted over the previous half-century led him to determine that students' internal attributes played a major role in retention. As Berger and Lyon (2005) point out, Summerskill's was one of a number of foundational retention studies "conducted through the psychological lens" (p. 17), i.e., focusing on student personality traits rather than on student demographics or patterns of dropout.

Remaining within the social science perspective but changing disciplinary point of view from the psychological to the sociological, Spady (1971) theorized that student dropout was a function of "a complex social process that includes family and previous educational background, academic potential, normative congruence, friendship support, intellectual development, grade performance, social integration, satisfaction, and institutional commitment" (p. 38). His quantitative analysis of 683 University of Chicago students in the mid-1960s led him to modify that theory only by noting that male students responded more strongly to academic achievement than did female students: For both genders, successful integration into the social life of the university environment was a potent determining factor of retention.

Contemporaneous with Spady, another sociological explanation of retention issued from Kamens's (1971) analysis of factors affecting the eventual retention of 1665 students who were freshman at 99 American colleges during academic year 1962-1963. Observing that larger colleges tended to have higher retention rates than smaller ones, Kamen (1971) theorized that size grants a college "superior status-allocating capacity" (p. 270). As a college's "structural linkages to occupational and economic groups" differ, so differs a college's "charter," or capacity to bestow status on its graduates (Kamen, 1971, p. 270). Hence students tend to persist at higher rates at large colleges than they do at small colleges because, presumably, students are

cognizant of the proportionally greater advantage to be had from a large-college degree and thus are more motivated to graduate. This theory would seem to presage Berger's (2000) application to retention of Bordieu's (1973) social and cultural reproduction theory; Berger's work is discussed at the end of this section on retention theory.

No theory of college student retention has received so much attention as Tinto's (1975, 1993). As Braxton and Hirschy (2005) would characterize it, Tinto's interactionist theory has achieved "paradigmatic status" (p. 61). That status is not restricted to the field of retention research; Baird (2000) necessarily alludes to the ascendance of retention as an institutional concern and as a focus of scholarship when he states that Tinto's theory "is one of the most studied in the field of higher education, and it may be one of the most studied in social science" (p. 62).

In Tinto's model, students matriculate already equipped with or burdened by precollege academic experiences, family traits, and individual traits. Precollege academic experiences include such things as degree of scholastic achievement in secondary school and the characteristics of the secondary school itself. Family traits include parents' educational attainment, parental pressure, and socioeconomic status. Individual traits are demographic markers like race and gender, and also include innate ability.

These existing traits influence the student's academic integration and social integration into the university. Academic integration depends on two distinct processes: One is a function of student success as measured by his or her grades, while the other is a function of whether the student's intellectual maturation brings the student into accord with or rather into conflict with the intellectual atmosphere of the university. Social integration depends on the student's success

at interacting productively with faculty, administration, and peers, and at joining in extracurricular activities.

Tinto theorized that the student's degree of success in integrating with the university both academically and socially determines the student's commitment to remaining at the university and to attaining a degree. Simply put, greater integration along these two vectors equals greater probability of retention and consequently of graduation.

A theory rivaling Tinto's in importance, and also dating originally from the 1970s, is Astin's (1977, 1997) theory of student involvement. After extensive quantitative analysis of student information from databases that were national in scope, Astin proposed—not unlike Tinto—that students' involvement in both the academic and social life of the university contributed to their retention. What distinguishes Astin's theory from Tinto's is, primarily, Astin's emphasis on the *effort* expended by students toward academic and social integration rather than on, as Tinto emphasizes, students' *success* at such integration. In Astin's model, it is students' personal investment of time and energy in the university and in their academic work there that make them resistant to attrition. Also like Tinto (1993), Astin (1997) has continued to modify and refine his theory of student involvement well into the last decade of the millennium.

Moving beyond the 1970s, Bean (1980) identified Price (1977) as the origin of Bean's theory that analogizes student dropout at a college to employee turnover in an organization. Where Price studied "pay" as an organizational variable that dampens employee turnover, Bean substituted a number of college-related variables, such as GPA, institutional quality, a student's perceived personal development, and the degree's practical value. Bean theorized that these and other "organizational determinants" (p. 159) have the capacity to influence student satisfaction,

which in turn influences retention. Although institutional commitment was the single strongest impetus toward retention for both genders, Bean found, like Spady (1971), that men and women students tended to drop out for different reasons: Men might leave because of low GPA or dissatisfaction with routine, even while feeling satisfied with being a student at the institution; but women dropouts tended to doubt the usefulness of a degree and were not satisfied with being a student at the institution. It is worth pointing out that the 907 students in Bean's 1977 sample were all full-time, unmarried, non-Chicano and non-Puerto Rican Caucasian, freshmen U.S. citizens under 22 years old. How such homogeneity influenced Bean's results, and how relevant those results are in American higher education today, would seem to be legitimate and important questions. A few years later, in a study of nontraditional students, Bean and Metzner (1985) found that different gender, age, and ethnic groups are likely to leave college for different reasons.

Kuh's (1980, 1982, 2003) student engagement approach employs qualitative inquiry to gauge institutional quality by focusing on students' interactions with each other and with institution personnel both inside and outside the classroom. In Kuh's view, students' own opinions of institutional quality and, more important, students' engagement in classroom and other activities are the appropriate data to be collected (Kuh, 1982), because quality cannot be directly measured by "resources and reputation" but instead only by students "development in various cognitive, affective, and psychomotor areas," a perspective that "emphasizes the interaction of student and institutional variables" (Kuh, 1980, p. 47).

Toward collecting such data on a usefully large scale, Kuh was instrumental (NSSE, 2010b) in launching in 1999 the National Survey of Student Engagement (NSSE), an annually

administered instrument that gathers “information from hundreds of four-year colleges and universities nationwide about student participation in programs and activities that institutions provide for their learning and personal development” (NSSE, 2010a). Data gathered through NSSE are quantitatively analyzed to produce, among other statistical measurements, scores on each of five benchmarks: Level of Academic Challenge, Active and Collaborative Learning, Supportive Campus Environment, Enriching Educational Experiences, and Student-Faculty Interaction (Kuh, 2003). One finding especially relevant to this study is that transfer students score lower on all of the benchmarks except Level of Academic Challenge; Kuh (2003) attributes this phenomenon to what he calls “transfer tremor” (p. 29), essentially a qualitative equivalent to Hills’s (1965) “transfer shock”. Further, Kuh (2003) found no significant differences between two-year and four-year transferees in engagement, and notes that transferees performed as well as native students at “few” four-year institutions (p. 30).

Speaking directly to the link between student engagement and retention—in their terminology, “persistence”—Laird, Chen, and Kuh (2008) found that institutions with higher persistence rates were both more academically challenging than average, and simultaneously more supportive of student engagement. These institutions placed more emphasis on social and collaborative learning, and instructors in lower-division courses emphasized “intellectual skills, practical skills, and individual and social responsibility” (p. 93). Kuh (2002) summarizes institutional characteristics and practices that promote persistence in five “shibboleths” (p. 27): clear institutional philosophy, values, and expectations; valuing and celebration of community; frequent interaction among students and institution personnel; early inculcation of culture and expectations; and recognition of and engagement with student subcultures.

More recently, Berger's (2000) adapting of Bourdieu's (1973) theory of social reproduction to college retention appeared after a generation of significant postmodernist/poststructuralist presence in educational research (Denzin & Lincoln, 2005). Bourdieu conceived of a "habitus," or a "system of dispositions" sustained by "the tendency of structures to reproduce themselves by producing agents endowed with the system of predispositions which is capable of engendering practices adapted to the structures and thereby contributing to the reproduction of the structures" (Bourdieu, 1973, p. 190). In higher education, this principle results in organizational and social reproduction of the "cultural capital" that a college possesses: the "informal interpersonal skills, habits, manners, linguistics, educational credentials, and lifestyle preferences" (Berger, 2000, p. 97) that characterize the college's students. Students with higher levels of cultural capital are more likely to choose, fit into, and persist within the academic, social, and organizational systems of colleges with similarly high levels of cultural capital, while students with lower levels of cultural capital are more likely to do likewise at colleges with similarly low levels of cultural capital. However, students with higher levels of cultural capital will persist more successfully overall than students with lower levels of cultural capital, and colleges with higher levels of cultural capital will have higher retention rates overall than colleges with lower levels of cultural capital (Berger, 2000).

Researchers and theorists following Tinto—including Tinto (1987; 1993) himself—have questioned, revised, and extended his original theory. Two recent lines of that continuing development are noteworthy with respect to the present study. Organizational theory has been applied to universities (Berger & Millem, 2000), one result of which is the assertion that a number of institution-level characteristics influence student retention—including organizational

culture, symbolism, and political environment—and also that the students a university attracts in turn influence those characteristics of the university. Particularly germane to the second point is the observation (Rendon, Jalomo, & Nora, 2000) that many retention studies were conducted in times and institutions where male and/or European American students predominated, so that current theories are less confidently applicable to universities with diverse or majority-minority student populations. That observation is directly relevant to this study, because five of the 16 UNC universities are Historically Black Colleges and Universities (HBCU)—Elizabeth City State University, Fayetteville State University, North Carolina Agricultural & Technical State University, North Carolina Central University, and Winston-Salem State University—and University of North Carolina-Pembroke, founded as a school for Native Americans, retains today within its majority-minority student body a Native American enrollment of approximately 18% (UNC, 2008a).

Finally, Braxton, Hirschy, and McLendon (2004) addressed the increasingly important issue of retention at commuter colleges. Following up on the failure of Tinto's original model to match patterns of commuter student departure, Braxton et al. (2004) proposed a new model for retention at commuter colleges that involves student entry characteristics, the student's external environment and the internal campus environment, the student's academic integration into the college, and institutional commitment. As commuter students are more likely than residential students to be older, have families, and work, the student's external environment includes such factors as financial support, work obligations, and family obligations. The internal environment consists of student traits such as high motivation (a positive influence) and parents' college attendance (a negative influence), and also embraces such college traits as institutional integrity,

affordability, and the promotion of various forms of learning communities. All these factors, along with initial and continuing institutional commitment, influence the student's likelihood to remain enrolled.

To sum up: Although not retention research per se, the present study is usefully contextualized by a review of retention theories because the 2.0 GPA required by PME/PS3 roughly matches the good-academic-standing requirements of most UNC universities. Those theories, arising from rapid mid-twentieth-century growth in number of students and number of institutions, have invoked both psychological and sociological, both personal and institutional factors to explain why students fail to achieve the baccalaureate degree. Though Tinto's and Astin's theories perhaps enjoy the greatest status, no single theory is acclaimed as complete and satisfactory. It will be particularly interesting, going forward, to see how existing retention theories will change, and what entirely new theories will come into being, as theorists respond to the revolutionary changes higher education is now undergoing because of accelerating technological innovation, an unsure economic landscape, and shifting national values.

Literature of Transfer Success

By far most studies researching transferee success focus on individual students rather than on their community colleges of origin (Bailey, Calcagno, Jenkins, Kienzl, & Leinbach, 2005; Baldwin, 1994; Castaneda, 2000; Hagedorn, Moon, Cyphers, Maxwell, & Lester, 2006; Quany et al., 1999). When studies do investigate institution- or service-area-level factors, they tend to use as a standard simply the accomplishing of transfer, or even of eventual baccalaureate attainment, rather than measurable academic performance at university (e.g., Bailey et al., 2005). Only three studies were found that offer empirical data about institution-level community college

effects on transferees' success at university (Bailey et al.; Hill, 2004; Townsend & Wilson, 2006). Studies that address GPA at all tend to examine average GPAs of transferees in relation to individual demographic traits (Castaneda; Maryland Higher Education Commission, 2004), and only one study (Hill) was discovered that uses the NCCCS measure of percentage of transferees who achieved a 2.0 GPA or greater during the fall and spring semesters immediately following transfer. Another type of study worth noting, though outside the immediate concern of this analysis, is that which appraises university practices toward students after transfer (e.g., Townsend, 1993).

Since no substantial body of literature exists that closely matches the research questions addressed herein, this review will proceed in a foundational order. It will begin by surveying studies that continue Hills' (1965) examination of "transfer shock," or GPA drop of transferees, which first established the phenomenon and coined the term itself. Next it will examine studies that explore the influence on transferee success of individual demographic and other measurable factors, such as age, gender, SES, and hours transferred. The review will continue by looking at the scant research on institution- and service-area-level community college factors that affect transferees' future academic performance, including an extended analysis of Hill's (2004) correlation study of NCCCS performance measures, including PME/PS3. Finally, it will end with a summary of existing literature and make clear its implications for this study.

Studies of GPA and "Transfer Shock"

Confirmation that community and two-year college students indeed suffer a drop in GPA after transferring to university was first established by Hills (1965), who coined the term "transfer shock." Many studies and tabulations of raw data have been published since, varying in

size and focus from, for example, one targeting a dozen students in a single program (Townsend & McNerny, 1993) to yearly reports of all—tens of thousands—of Florida Community College System (FCCS) students' GPAs in all majors at all Florida public universities (FCCS, 2001).

Studies of transfer shock in the 1970s and 1980s tended to confirm Hills's findings. Nolan and Hall (1974) found a GPA drop of 0.5; Doucette and Teeter (1985) reported a drop of 0.3; Pounds and Anderson's (1989) summary of University System of Georgia transferees reported a much smaller 0.08 drop; and Melteson and Lucas (1990), following only students at William Harper Rainey College, repeated Nolan and Hall's finding of a 0.5 drop. Diaz (1992), in a Hills-like meta-analysis of over 122,000 students in studies from 1927 through 1990, found that while 70% of transferees experience GPA drop, 67% eventually recover from it. Likewise, Carlan and Byxbe (2000), in a study of community college transferees at a large, Southern university from 1989-1990 through 1991-1992, found a GPA drop of .3 for the first semester, but no statistically significant difference from native students by the time both groups graduated.

More recent studies, however, have produced mixed results. In a small study limited to a single academic program, Townsend, Carr, and Scholes (2003) found no significant difference in the GPAs of 12 community college transferees and native students in the University of Missouri-Columbia teacher education program. Neither did Johnson (2005) discover significant differences between the GPAs of community college transferees and native students majoring in natural resources or sciences at a mid-size West Coast university. More compelling is Janicki's (2002) study of 833 Tidewater Community College (TCC) transferees to Virginia public universities in fall 1999 and fall 2000, which found no clear pattern of GPA drop for TCC students.

Three transfer-shock studies of particular relevance to this analysis are those of Boswell (1992), which examined the performance of transferees to three UNC universities from 1988 to 1990; Glass and Harrington (2002), which concerns NCCCS transferees to North Carolina State University in the late 1990s; and a 2001 report from the large Florida Community College System detailing how its transferees performed at Florida public universities from 1996 to 1998. Boswell's study found that although community college transferees at university experienced initial transfer shock, on whole they performed as well as native students. Further, Boswell found no GPA differences in student performance explainable by age, gender, or academic major. Glass and Harrington, studying the GPAs of a randomly chosen 100 NCSU native juniors and 100 NCCCS transferees, found that NCCCS students' average GPA was 0.3 lower than that of native juniors after fall semester. The NCCCS cohort's GPAs recovered somewhat during the following spring semester, and by the time the two groups received their baccalaureate degrees, no significant difference in GPA existed.

It should be noted that in both of these North Carolina studies, the transferees/subjects attended NCCCS colleges before the 1997-1998 academic year, when the NCCCS in cooperation with UNC adopted the Comprehensive Articulation Agreement (CAA). The CAA

- (a) provided for a semester-based rather than quarter-based academic calendar;
- (b) established a Common Course Library, with standard course descriptions, credit hours, contact hours, prerequisites, titles and numbering for all NCCCS colleges;
- (c) standardized associate degree requirements;
- (d) standardized admission status for NCCCS transferees to UNC (UNC & NCCCS, 1996).

Thus, insofar as the CAA introduced extensive and fundamental changes into the NCCCS/UNC transfer process, the academic fortunes of pre-CAA transferees to UNC may have limited use for practitioners aiming to improve the performance of more recent transferees.

The Florida study reported average data for more than 70,000 community college transferees per year over summer, fall, and winter terms. Its figures show that FCCS transferees to Florida public universities over the fall semesters of 1996, 1997, and 1998 performed slightly differently according to whether they had earned an associate in arts degree, earned an associate in science degree, or transferred credit hours but not an associate degree. Students with associate in arts degrees averaged GPAs 0.04 lower than native juniors; those with associate in science degrees, 0.3 higher; and students transferring hours but not degree, 0.1 lower (FCCS, 2001).

Demographic and Other Measurable Predictors of Individual Student Performance

Studies in this category, the most numerous in the literature, report correlations between student transfer rates or baccalaureate achievement rates and a host of predictive variables. Common factors analyzed for correlation include age, community college GPA, ethnicity, hours earned before transfer, socioeconomic status, and several others.

Community college GPA appears to have been reported most often as the single best predictor of transferees' success. Both Baldwin (1994) and Townsend and McNerny (1993) cite GPA at the community college as the strongest predictor of student performance at university. Two large studies which concur in that finding are Castaneda's (2000) tracking of all students entering a Texas public two-year college in 1990, and the Maryland Higher Education Commission's (2004) analysis of ten-year trends, beginning in 1991-1992, of

all community college transfer students in Maryland public universities. Hoyt (1999) found GPA strongly predictive for same-subject courses.

Another set of strong predictors is ethnicity and socioeconomic status, which appear to be related insofar as lower SES is known to correlate with lower university GPA (Wright & Bean, 2005), and median household incomes (MHI) of some minority groups are significantly lower than those of European Americans. The most recent census found African American MHI to be 66% of, Latino American 75% of, and Native American 72% of European American MHI (U.S. Census Bureau, 2000b). Thus Castaneda (2000) and Bailey et al., (2005) found that African American students trail European American transferees in eventual baccalaureate attainment. Eddy, Christie, and Rao, (2006) also established SES as a strong factor affecting successful transfer; it should be noted, however, that although Eddy's is a large study, based on almost 500 students, it is also an old study, having used data collected in the early and mid-1980s. Relatively fewer studies address the university performance of Latino American and Asian American transferees, and native- versus second-language problems make those results more problematic to interpret with confidence. Of note, Walpole, Chambers, and Goss (2009) look at intersections of race, class, and gender in evaluating the persistence of African-American women.

Age is a particularly interesting factor in transferee success; according to the American Association of Community Colleges (2007), the average age of today's community college student nationwide is 29, and the same age holds for NCCCS students in 2005-2006 (NCCCS, 2007a). Both Castaneda (2000) and Quany et al. (1999) found that younger, "traditional" transferees attained baccalaureates at a statistically significant higher rate than non-traditional students. However, Hagedorn et al., (2006) saw "little to no difference" (p. 238) according to age

for persistence and retention—admittedly, a different measure—of 5000 students enrolled in the Los Angeles Community College District in spring 2001.

The last potentially predictive factor for individual students covered in this review, hours completed before transfer, is especially important to the current analysis because the NCCCS performance measure for transferees is reported in two cohorts: students transferring with the associate degree, and students transferring at least 24 transfer credit hours but without the associate degree (although the cohorts are combined for the purpose of achieving or failing to achieve the standard). Both Castaneda (2000) and Quanty et al. (1999) found that more hours transferred correlated with greater success at university. Baldwin (1994) concurs, but restricts hours transferred to those earned in “critical” courses (p. 126). However, Carlan and Byxbe (2000) found no predictive value for transferee GPA in either the attainment of the associate degree or in the number of hours transferred.

Institution-Level Factors

The research on institution-level factors affecting the success of community college transferees has focused largely on characteristics and behaviors of the receiving universities (e.g., Townsend, 1993). Only three studies were found that addressed the community college as an individual institution, and how it might influence the university success of its transferees. Bailey et al. (2005) combined community college graduation rates from the National Center for Education Statistics, institutional traits from the Integrated Postsecondary Data System, and individual student data from the National Education Longitudinal Study of 1988 so that, controlling for student characteristics, they could examine the effects of institutional factors on the probability that students would either graduate from community college or transfer to

university. They found that students graduate at a higher rate from smaller community colleges. Further, and interestingly for the larger question of whether institution-level performance measures are appropriate at all, they found that “individual student characteristics appear to be more important determinants of graduation and retention than the institutional variables” (p. iv). (Whether factors affecting graduation and transfer—their dependent variables—affect academic performance—my dependent variable—in a similar manner is unknown.) Townsend and Wilson (2006), in a qualitative study limited to a few students who had transferred to a single university, reported that transferees themselves thought disparity between the size of the community college and the size of the receiving university had a negative effect on their four-year success.

Hill’s (2004) Study

The third institution-level study, Hill’s (2004) dissertation, deserves extended analysis because in addressing one of its hypotheses it appears at first glance to duplicate my study in some respects. Hill (2004) characterizes her study as having “reviewed the research methodology and interpreted the findings for North Carolina’s fifty-eight community colleges with respect to the core performances measures” (p. 2). One hypothesis she tests toward accomplishing those goals is that “There is no relationship between the performance of college transfer students and pertinent institutional and student characteristics” (Hill, 2004, p. 170). Hill’s dependent variable is a single year’s PME/PS3 statistic, as reported in *Critical Success Factors 2002*, for students who left an NCCCS college in 1998-1999 and transferred to a UNC universities within two years. She uses the following independent variables, all based on data from the single academic year 2000-2001:

- (a) “FTE earned by college credit or curriculum programs” (Hill, 2004, p. 230).
- (b) “FTE earned through students enrolled in terminal, technical or vocational programs” (Hill, 2004, p. 230).
- (c) “FTE earned through students enrolled as special students, dually enrolled, Huskins, etc.” (Hill, 2004, p. 231).
- (d) “Average faculty salary per month (multiplied x 12 to get a yearly figure” (Hill, 2004, p. 231).
- (e) “The percent of full-time instructional staff employed to teach curriculum classes at a community college” (Hill, 2004, p. 231).
- (f) “Percent of college credit instructional staff whose highest degree is less than a bachelor’s degree” (Hill, 2004, p. 231).
- (g) “Percent of college credit instructional staff whose highest degree is a bachelor’s degree” (Hill, 2004, p. 231).
- (h) “Percent of college credit instructional staff whose highest degree is a master’s degree” (Hill, 2004, p. 231).
- (i) “Percent of college credit instructional staff whose highest degree is a doctoral degree” (Hill, 2004, p. 231).
- (j) “Percent of college credit instructional staff whose highest degree is an education specialist certificate” (Hill, 2004, p. 231).
- (k) “Average class size for college credit programs” (Hill, 2004, p. 231).
- (l) “Average age of students enrolled in college credit classes” (Hill, 2004, p. 231).

(m) “Percent of students enrolled in college credit classes that are non-caucasian [*sic*]” (Hill, 2004, p. 231).

(n) “Percent of female students enrolled in college credit classes” (Hill, 2004, p. 231).

Hill found two statistically significant relationships with her dependent variable: faculty salaries and percent of female students, both negatively correlated. However, the entire picture was complicated by 26 instances of collinearity among independent variables. Faculty salary showed a statistically significant correlation with average class size and with the percentage of doctorate-holding instructors, and the percentage of female students showed a statistically significant correlation with the percentage of minority students and with the average age of students. Hill did not further analyze her data to control for these collinearities; thus, it is not clear to what degree faculty salaries and percent of female students as isolated factors influenced the dependent variable.

Further, Hill’s independent variable “percent of female students” describes the female proportion of all curriculum students, not just the female proportion of college transfer students. Since some programs are either heavily female or heavily male, and since not all colleges offer all programs, the proportion of female curriculum students may not accurately reflect the proportion of female college transfer students. Table 5 shows gender proportions in the Associate of Arts program alongside examples of several programs heavily populated by one or the other gender.

There are other, perhaps more problematic, concerns with Hill’s (2004) study as well. Though she employs a single year’s data for the dependent variable and a (different) single year’s data for the independent variables, she concedes that “many aspects of college

Table 5

Comparison of Gender Proportions in Selected NCCCS Programs

Program	No. Colleges	% Male	% Female
Associate in Arts	58	41	59
Associate Degree Nursing	28	8	92
General Occupational Technology	32	15	85
Automotive Systems Technology	25	96	4

Note. Adapted from “Number of Students Enrolled by Program, Race, Sex, and Five-Year Unduplicated Headcount.” NCCCS 1999-2000 Annual Statistical Report (ASR).

performance are longitudinal in nature since they are affected by factors occurring over a period of time” (p. 13). Hill (2004) goes on to assert, ostensibly toward mitigating the former concession, that “variables such as credentials for instructional staff, course requirements/descriptions, facilities, *et al.* remain fairly stable” (p. 14). No data are presented to support this assertion; moreover, the internal logic of the argument built upon it invites scrutiny.

First, concerning whether the PME/PS3 score reflects an “aspect of college performance” that is, indeed, “longitudinal in nature,” it is perhaps useful to assess the year-to-year variation in PME/PS3 scores. This is important because if there is no significant variation in the PME/PS3 score—the dependent variable—and no significant variation in the independent variable, then they may be related. If there is significant variation in both, then they may be related. However, if there is significant variation in one, but not in the other, then they cannot be related. Using Hill’s measurement year (NCCCS, 2002), and comparing it with both the year preceding and the year following, it is possible to look at 99 year-to-year differences between any single college’s PME/PS3 scores (some data is missing). Of those 99 one-year differences, 24 were 10 percentage points or greater, and 11 of the 24 were 15 points or greater. Stepping back to look at the differences over the three-year span, 27 colleges posted scores with a range of greater than 10 percentage points; 17 of the 27 had a range of greater than 15 points; and six of the 27 had a range of greater than 20 points. Of the 47 colleges that reported PME/PS3 data for all three years, 26 (55%) had a range of greater than 10 percentage points, while only 21 (45%) had a range of 10 points or less (NCCCS, 2001, 2002, 2003). With such pronounced year-to-year variation in the scores of a majority of the colleges’ transferees, it seems debatable whether using

any single year's data by which to judge the influence of purportedly stable factors is likely to produce unambiguous results.

Second, Hill's argument leaves open questions whether her mitigating assertion is true or false: If institutional characteristics do "remain fairly stable," then they cannot cause the established swings in PME/PS3 scores; if they do not remain stable, then it would seem strongly preferable to use data from synchronized years for dependent and independent variables whenever possible. However, as already pointed out, Hill uses PME/PS3 scores for NCCCS students who were measured at UNC universities during the 1999-2000 academic year, and attempts to correlate it with NCCCS data from the 2000-2001 academic year—i.e., the NCCCS independent variable data describes community colleges two years *after* the measured students left them.

Finally, Hill's PME/PS3 data derives from students who left community college during the 1998-1999 academic year. Since 1997-1998 was the NCCCS's first year under the semester system and the CAA, then Hill's students who transferred with two-year degrees were products of the first two years of that new system; if they took more than two years to earn the associate degree, then they were products of the pre-CAA system as well. Perhaps a new study is required to paint a fair picture of forces operating on transferees who are products of a now decade-old, more fully realized articulation dynamic.

Therefore, although Hill's study is a valuable addition to the growing body of literature that attempts to understand community college transferees' differential performance at university, it leaves enough questions unanswered, or partially answered, that it does not obviate my study. It is essentially a one-year's study of the very beginning of the CAA era, employing

data from asynchronous years to investigate a relatively large number of independent variables. My study will analyze synchronous-year data over five recent years toward determining the effect on transfer performance of a larger, differently constituted set of independent variables that inhere at the institution and service-area level only.

Perhaps the major concepts to be gathered from the existing literature of transferee success are that individual student characteristics are assumed—but hardly proven—to influence the community college transferee’s university prospects more strongly than do institutional characteristics, and that individual student performance at their community colleges appears to be, as one might imagine, the best predictor of a student’s academic success at university. However, since so little research has focused on institution- and service-area-level factors at the community colleges of origin, it may be premature to regard as well-established the impact of any factors whatsoever.

Further, the demographic factor of socioeconomic status may be particularly relevant insofar as *community* colleges tend to serve student populations that can be distinctly different from one another, depending upon local demographic make-up. Also, to the extent that the “transfer shock” drop in GPA at universities appears to be a widespread phenomenon, especially during the transferee’s first semester, then the NCCCS standard that uses only the transferee’s first two semesters at university is perhaps not an accurate, sufficiently comprehensive way to determine a community college’s performance in readying students for transfer.

CHAPTER 3: METHODOLOGY

Research Problem

Nearly half of all baccalaureate recipients in the United States attend a community college before transferring to universities (McPhee, 2006). The preponderance of evidence suggests that during their first couple of semesters at universities, those transferees are likely to experience some degree of “transfer shock,” or a reduction in the GPA they enjoyed at community college. Further, when state governments choose to motivate community colleges via performance funding, and when a common accountability measure targets the success of transferees to universities, then the identification of variables influencing that success becomes crucial not only to students, but to the larger society as well through its potential impact on the effectiveness and fiscal soundness of the institutions.

As established in this study’s literature review, numerous studies over several decades have examined how various demographic traits inhering in the individual might influence the community college transferee’s academic success. Common definitions of “academic success” in those studies have included retention, baccalaureate attainment, and university GPA. A smaller but still significant set of studies has explored how the universities themselves aid or impede the community college transferee’s success. Yet very few studies have attempted to identify the influence on transferees of the community colleges of origin as institutions, the level at which they are measured for performance funding. Moreover, no institution- and service-area-level study that I have found focuses on transferees’ first-year GPA by examining a statewide student population over multiple years.

Research Design

This study was designed to determine if any of 18 institution- or service-area-level independent variables appear to affect the academic performance of students from North Carolina's 58 community colleges who transfer to UNC universities. Performance in this study is defined for each college as the percentage of its transferees who achieved GPAs of at least 2.0 during their first two semesters at UNC. The five UNC academic years 2002-2003 through 2006-2007, the years when the transferees' performance at UNC were measured, were chosen because (a) at the time this study was conducted, they were the most recent five years for which data for all variables were available; (b) no comparable study discovered during the literature review used multi-year data, although the dependent and other variables change from year to year; and (c) the relatively large sample size afforded by five years of data from 58 community colleges should yield results more trustworthy than one year's data, or data from a single or few community colleges only.

For independent variables reported as yearly changing values, such as FTE counts or high school class ranks, five years of independent variable data were correlated year-for-year with five years of dependent variable data. For independent variables usable only as single values for the entire five-year period, such as estimated service-area populations or median household incomes of service areas, then a value was chosen that lies as near the midpoint of the five years as possible. Years of measure for yearly changing independent variables derived from community colleges were chosen to match transferees' final year at community college, except for SAT and class-rank averages of native UNC students. These data were processed for UNC students who were sophomores during the community college transferees' measurement year.

The sophomore year was selected because according to hours transferred, the plurality of transferees appear to arrive at UNC as sophomores rather than as freshmen or juniors. Lists of independent variables and null hypotheses follow. The rationale and procedure for collecting each independent variable is detailed in this chapters' section headed "Data Collection Procedures for Independent Variables."

Description of Independent Variables

Independent Variable #1: Completion of a community college transfer degree before transferring, versus transferring hours without a degree.

Independent Variable #2: The absolute size of a college transfer program.

Independent Variable #3: The size of a college transfer program relative to all other curriculum programs at its college.

Independent Variable #4: The academic rigor of a college transfer program.

Independent Variable #5: The level of graduate degree held by community college instructors, the doctorate versus the master's.

Independent Variable #6: The degree of female representation in the community college faculty.

Independent Variable #7: The degree of minority representation in the community college faculty.

Independent Variable #8: A community college's commitment to distance learning.

Independent Variable #9: The amount spent by the community college per student for instruction.

Independent Variable #10: The amount spent by the community college per student for the library and instructional support.

Independent Variable #11: The amount spent by the community college per student for Student Services.

Independent Variable #12: The amount spent by the community college per student for all other institutional costs, excepting operation/maintenance and continuing education.

Independent Variable #13: The socioeconomic conditions prevailing in a community college's service area.

Independent Variable #14: The rural or urban nature of a community college's service area.

Independent Variable #15: The growth rate of a community college's service area throughout the years studied.

Independent Variable #16: The "market penetration" of a community college into its service area.

Independent Variable #17: The academic strength of the university students among whom a community college's PME/PS3-eligible transferees compete, as measured by their average high school class rank.

Independent Variable #18: The academic strength of the university students among whom a community college's PME/PS3-eligible transferees compete, as measured by their average Scholastic Aptitude Test scores.

Null Hypotheses

The following hypotheses, stated in the null, were tested toward answering the research question:

1. There is no statistically significant difference in the PME/PS3 performance of NCCCS transferees to UNC according to the percentage of a community college's transferees who completed the Associate of Arts (AA) or Associate of Science (AS) degree before transferring.
2. There is no statistically significant difference in the PME/PS3 performance of NCCCS transferees to UNC according to the number of FTE generated by a community college's AA and AS majors.
3. There is no statistically significant difference in the PME/PS3 performance of NCCCS transferees to UNC according to a community college's college transfer (CT) FTE as a percentage of all curriculum FTE.
4. There is no statistically significant difference in the PME/PS3 performance of NCCCS transferees to UNC according to the number of a community college's transferees expressed as a percentage of its total college transfer (CT) FTE.
5. There is no statistically significant difference in the PME/PS3 performance of NCCCS transferees to UNC according to the percentage of a community college's curriculum instructors who hold doctoral degrees.
6. There is no statistically significant difference in the PME/PS3 performance of NCCCS transferees to UNC according to the percentage of female instructors at a community college.

7. There is no statistically significant difference in the PME/PS3 performance of NCCCS transferees to UNC according to the percentage of minority instructors at a community college.
8. There is no statistically significant difference in the PME/PS3 performance of NCCCS transferees to UNC according to the percentage of a community college's FTE earned via distance instruction.
9. There is no statistically significant difference in the PME/PS3 performance of NCCCS transferees to UNC according to a community college's dollar cost per FTE for Institutional Support.
10. There is no statistically significant difference in the PME/PS3 performance of NCCCS transferees to UNC according to a community college's dollar cost per FTE for Curriculum Instruction.
11. There is no statistically significant difference in the PME/PS3 performance of NCCCS transferees to UNC according to a community college's dollar cost per FTE for Academic Support.
12. There is no statistically significant difference in the PME/PS3 performance of NCCCS transferees to UNC according to a community college's dollar cost per FTE for Student Support.
13. There is no statistically significant difference in the PME/PS3 performance of NCCCS transferees to UNC according to the median household income of a community college's service area.
14. There is no statistically significant difference in the PME/PS3 performance of

NCCCS transferees to UNC according to the average Rural-Urban Continuum Code score of a community college's service area.

15. There is no statistically significant difference in the PME/PS3 performance of NCCCS transferees to UNC according to the percentage gain or loss of population in a community college's service area from 2000 to 2007.
16. There is no statistically significant difference in the PME/PS3 performance of NCCCS transferees to UNC according to the percentage of the adult population in a community college's service-area that is enrolled in curriculum programs.
17. There is no statistically significant difference in the PME/PS3 performance of NCCCS transferees to UNC according to the average high school class rank of the native university students among whom a community college's transferees compete.
18. There is no statistically significant difference in the PME/PS3 performance of NCCCS transferees to UNC according to the average Scholastic Aptitude Test (SAT) score of the native university students among whom a community college's transferees compete.

Population of the Study, and Data Collection Procedures for the Dependent Variable

The population of the dependent variable includes essentially all NCCCS students with at least 24 transferrable credit hours from the AA and AS curricula whose first two semesters at UNC universities coincided with one of the five academic years from 2002-2003 through 2006-2007. NCCCS reports those scores in two cohorts, transferees with the associate degree, and transferees with at least 24 credit hours but no degree, although the PME/PS3 score is calculated

from the two cohorts combined. That PME/PS3 data were gathered largely from NCCCS *Critical Success Factors (CSF)* reports 2004 through 2008, which in sum report data from the university GPAs of 21,634 community college transferees.

Several caveats apply, however. In order to protect students' privacy, NCCCS does not report such data when the number of transferees from a single community college is fewer than 10. Further, for some smaller community colleges in some reporting years, three-year-average data is reported instead of one-year data. Finally, community colleges are allowed to include data on students who transferred to private universities as well as data gathered from the 16 UNC universities. This last complication is problematic because (a) public and private colleges and universities are quite different in some ways, and (b) two of this study's independent variables will use data from UNC universities alone. All instances of these irregularities in the data are marked and identifiable in the *CSF* reports.

Of 290 potential cases (58 community colleges times five years), there appear to be 22 instances in which the 2.0 GPA average of a community college's transferees to UNC universities was either not reported in *CSF* due to small cell size, or was reported as a three-year average. Additionally, community colleges included private-university transferees in their data in another 50 instances. To address these gaps and inconsistencies in the dependent variable data, this study when possible and productive arrived at "pure" dependent variable data by piecing it together from UNC's annual *Transfer Student Performance Reports (TSP)* (UNC, 2008c).

For example, NCCCS's 2008 *CSF* asterisks Mitchell Community College's PME/PS3 data, indicating that among the 56 transferees included in its PME/PS3 calculation were not only students who transferred to UNC universities, but also students who transferred to private

colleges. Referring to UNC's *TSP* report for Mitchell CC, however, it is possible to discern that 18 of those 56 transferred associate degrees to UNC universities, and that 88.9%, or 16, of the 18 achieved a GPA of 2.0 or greater during their first two semesters. Further, 22 of those 56 transferred 24 or more hours without the associate degree, and 77.3% of them, or 17, achieved 2.0 GPAs. Thus one can calculate that Mitchell CC's PME/PS3 score for the purpose of this study's dependent variable value would be $16 + 17$ of $18 + 22$, or 33 of 40, which equals 82.5%, rather than *2008 CSF*'s reported PME/PS3 score for Mitchell CC of 86%, which includes 16 transferees to private colleges.

Another example: *2008 CSF* italicizes Roanoke-Chowan Community College's data, indicating that it is cumulative for the past three years. Over those three years, *2008 CSF* reports, 12 students had transferred to UNC universities with either an associate degree or 24 or more credit hours, and 92% of them had maintained a 2.0 GPA for their first two semesters. However, using UNC's annual *TSP* reports for those three years makes it possible to calculate Roanoke-Chowan's PME/PS3 score for each year, as shown in Table 6.

In order to perform that calculation, it is in one instance necessary to make a deduction from *TSP* internal data, as follows: A transferee population omitted from PME/PS3 score calculations by NCCCS is those students coded General Education, a two-year degree that does not require college transfer courses; only students coded AA and AS comprise the PME/PS3 population. However, *TSP* reports include some data that combine the associate degree transferees with the General Education degree transferees.

For 2006-2007, the percentage of Roanoke Chowan CC transferees with a 2.0 GPA is not reported in *TSP* for the 24+ hours cohort from associate degree transferees alone, because the

Table 6

Performance Data for Roanoke-Chowan CC Transferees to UNC, from TSP Reports

Measurement Year	Credit Hour Status	# Students w/2.0 GPA	% Students w/2.0 GPA	Calculated PME/PS3 Score
2004-05	Assoc. degree	0		
	24+Hours	4	100%	
	Total	4		100%
2005-06	Assoc. degree	2	100%	
	24+Hours	3	66.7%	
	Total	5		80%
2006-07	Assoc. degree	3	100%	
	24+Hours	2	100%	
	Total	5		100%

Note. Adapted from University of North Carolina (2008c). *Transfer student performance reports* [Data files]. Available from <http://www.northcarolina.edu/ira/ir/analytics/tsp.htm>.

number is so small. However, *TSP* does report that 100% of associate degree and General Education degree transferees combined achieved the 2.0 GPA. Thus, it is possible to deduce that 100% of associate degree transferees in the 24+ hour cohort achieved the 2.0 GPA, and then to calculate the Roanoke Chowan CC's PME/PS3 score for that individual year, even though it is unreported by NCCCS as a discrete statistic.

Thus, when data used for the dependent variable is not published by NCCCS in *CSF* reports, or is mixed with private-university data, then it was calculated by gathering data from UNC *TSP* reports, sometimes through the additional application of elementary logic and mathematics. When in any instances no method allowed identification of a single year's PME/PS3 score for transferees at UNC universities only, then that score was omitted.

Data Collection Procedures for Independent Variables

Data collection procedures for the dependent variable have already been described above, in "Population of the Study." Collection procedures for data that were used for the 18 independent variables are described below.

Independent Variable #1

Variable. The percentage of transferees who completed the AA or AS (college transfer) degrees before transferring.

Rationale. A review of the literature shows that completion/noncompletion of the associate degree is an independent variable used to predict individual student success (Baldwin, 1994; Beckenstein, 1992; Carlan & Byxbe, 2002; Castaneda, 2000; Eddy et al., 2006; FCCS, 2001; Hill, 2004; Janicki, 2002; Townsend & Barnes, 2001).

Collection procedure. The *CSF* tables that report PME/PS3 scores include seven pieces

of data in all for each NCCCS college; from left to right they are (a) total FTE of the college, (b) number of the college's transferees with 24 or more credit hours but no degree, (c) percent of those 24+ hour transferees who achieved a 2.0 GPA at universities, (d) number of transferees with the associate degree, (e) percent of those associate degree transferees who achieved a 2.0 GPA at universities, (f) total number of transferees, and (g) the PME/PS3 score, or percent of all transferees who achieved 2.0 GPA at universities (see Figure 1). This independent variable was calculated by dividing (d) number of transferees with the associate degree, by (f) total number of transferees. When either of those values was unreported, it was derived when possible using basic algebra or gathered from the appropriate *TSP* reports, as described above for the dependent variable. For example, the 2008 *CSF* displays Beaufort County Community College's PME/PS3 data (along with the 57 other colleges) as shown in Figure 1.

Note that the number of associate degree recipients is unreported, because it is fewer than 10. To derive the number of associate degree recipients, it is a simple matter of solving for Y in the equation $17 + Y = 25$, or $Y = 8$. Thus in this instance independent variable #1 is $8/25$, or 32%. When *CSF* data for a college is adulterated by inclusion of transferees to private universities, then "pure" data could sometimes be gathered from UNC's *TSP* reports, as described above for the dependent variable.

Independent Variable # 2

Variable. The size of a community college's curriculum programs as represented by curriculum full-time equivalencies (FTE).

Rationale. A review of the literature shows that the size of a community college is an independent variable used to predict individual student success (Bailey et al., 2005; Castaneda,

PERCENT OF 2005-06
COLLEGE TRANSFER STUDENTS WITH A
GPA OF ≥ 2.0 AFTER TWO SEMESTERS AT A UNC INSTITUTION

INSTITUTION	TOTAL FTE	24 or More Semester Hours		Associate Degree Recipient		Total	
		Number	Percent ≥ 2.0	Number	Percent ≥ 2.0	Number	Percent ≥ 2.0
Beaufort County CC	1,709	17	77%	**	**	25	80%
System Total	198,759	2,707	81%	1,728	89%	4,435	84%

Note.

*Includes data from private colleges and universities.

**Number too small to report.

Italics means number of students in three years.

Figure 1. Facsimile of PME/PS# data as reported in *Critical Success Factors 2008*. Adapted from NCCCS. (2008, p. 21).

2000; Townsend & Wilson, 2006). Further, curriculum FTE is a more accurate measure than total FTE, since total FTE includes continuing education students, who generally do not take academic courses.

Collection procedure. Curriculum FTE figures were obtained from “Curriculum Two Semester Annualized FTE” in *NCCCS Annual Statistical Reports* for the appropriate years.

Independent Variable #3

Variable. College transfer (CT) FTE as a percentage of curriculum FTE.

Rationale. A review of the literature shows that this is an independent variable used to predict institution-level transfer success (Hill, 2004). The assumption is that the relative size of the college transfer program itself at a given community college may impact its preparation of students.

Collection procedure. The percentage was calculated from data available in “Curriculum Two Semester Annualized FTE” and in “FTE by Curriculum Program Area,” both from *NCCCS Annual Statistical Reports* for the appropriate years.

Independent Variable #4

Variable. The number of transferees as a percentage of college transfer (CT) FTE.

Rationale. Transferees’ GPA at community colleges has been used as an independent variable in a number of studies focusing on transferee success at universities (Baldwin, 1994; Carlan & Byxbe, 2000; Castaneda, 2000; Cejda et al., 1998; Eddy et al., 2006). However, the academic rigor of a community college’s college transfer program is difficult to measure because GPA at the community college or at the receiving university can be a function of institutional culture, or of student preparedness, or of a combination (Goldman & Hewitt, 1975; Sabot &

Wakeman-Linn, 1991; Strenta & Elliot, 1987). However, the ratio of transferees to college transfer FTE (the size of the college transfer program) is a picture of the proportion of students who successfully navigate the academic challenges of a given community college's program. Admittedly, it is perhaps neither a pure nor a perfect measure, but it is difficult to imagine how else the academic rigor of a college transfer program might be quantified.

Collection procedure. The number of transferees from each community college to UNC universities was taken mainly from the same yearly *CSF* reports table wherein are reported PME/PS3 scores, namely, "Percent Of [year] College Transfer Students with a GPA of ≥ 2.0 After Two Semesters at a UNC Institution." In cases where transferees to private universities are included in the reported total, or where the number of transferees reported is a three-year total, or where the number is unreported because it is fewer than 10, then the number was gathered and/or deduced when possible from UNC's annual *TSP* reports, as explained above concerning PME/PS3 values under "Population of the Study, and Data Collection Procedures for the Dependent Variable."

The number of college transfer FTE for each community college was gathered from "FTE by Curriculum Program Area" in NCCCS *Annual Statistical Reports*. These data were confirmed via personal communication with Keith Brown, NCCCS associate vice president for research and performance management, as reflecting FTE generated solely by college transfer majors rather than as FTE generated by college transfer classes—for example, freshman composition—which are taken by students from non-college transfer curricula as well.

Thus it accurately reflects the “size” of a community college’s college transfer program from which its transferees to UNC arise.

Independent Variable #5

Variable. The percentage of a community college’s instructors who hold doctoral degrees.

Rationale. A review of the literature shows that this is an independent variable used in at least one instance to predict institution-level transfer success (Hill, 2004). The assumption is that doctorate-holding instructors might teach in a manner more similar to university professors than do masters-holding instructors, thus more effectively acculturating community college students for the baccalaureate academic experience.

Collection procedure. The percentage was calculated from data available in “Full Time Curriculum/Extension Faculty Only, 9 Months or More, Highest Degree Earned” from *NCCCS Annual Statistical Reports* for the appropriate years.

Independent Variable #6

Variable. Percentage of female community college faculty.

Rationale. Gender of students is a variable used by a number of researchers to predict the academic success of transferees (Boswell, 1992; Carlan & Byxbe, 2000; Castaneda, 2000; Cohn, Cohn, Balch, & Bradley, 2004; Eddy et al., 2006; Hill, 2004; Kocher & Pascarella, 1990). Gender of college instructors and/or administrators as role models for women students has been studied as well (Canes & Rosen, 1995; Hoffman & Oreopoulos, 2009; Neumark & Gardecki, 1998; Rothstein, 1995). In the spirit of the latter set of studies, variable #6 is intended to discover

whether the percentage of female faculty at a community college affects female transferee performance.

Collection procedure. The number of female faculty and number of total faculty for each community college is reported yearly in “Full-Time Curriculum/Continuing Education Faculty by Race And Sex” in *NCCCS Annual Statistical Reports*. To derive the variable, the number of total female faculty was divided by the number of total faculty.

Independent Variable #7

Variable. Percentage of minority community college faculty.

Rationale. Minority status of students is a variable used by a number of researchers to predict the academic success of transferees (Bailey et al., 2005; Castaneda, 2000; Hagedorn et al., 2006; Kocher & Pascarella, 1990; Maryland Higher Education Commission, 2004). Ethnicity of college instructors and/or administrators as role models for minority students has been studied as well (Karunanayake & Nauta, 2004; Zirkel, 2002). Identical in concept to Variable #6, Variable #7 intends to discover if the percentage of a community college’s minority faculty has any effect on its total transferee cohort’s academic performance at universities by improving the performance of the community college’s minority transferee cohort.

Collection procedure. This data was collected from the same sources as variable #6, and derived through the same mathematical procedure.

Independent Variable #8

Variable. Percentage of FTE earned from classes delivered via distance-learning technologies.

Rationale. For the 2002-2003 academic year 10,111 FTE, or 7.1%, of a total 141,967

FTE, were earned system wide from distance-learning classes (NCCCS, 2005). By 2006-2007, that figure had jumped to 63,090 FTE, or 24.1%, earned from distance-learning classes of 149,509 total FTE (NCCCS, 2007c). Variable #8 intends to discover if a college's commitment to distance-learning technologies has any impact on its transferees' academic performance at universities.

Collection procedure. The number of curriculum FTE earned by each college via several categorized delivery methods is reported in "Curriculum FTE by Instructional Method" in the NCCCS *Annual Statistical Report*. For each college, the sum of all FTE earned from distance-learning categories was divided by the total FTE earned from all delivery methods listed to produce variable #8.

Independent Variable #9

Variable. Curriculum Instruction cost per FTE.

Rationale. Cost per FTE is a rough measure of the efficiency of a community college's use of resources; it has been a statistic of concern for community colleges for more than three decades (e.g., Illinois Community College Board, 2005; Toler, 1977). However, a more granular way to approach the question may be to divide that one rough measure into its four relevant constituent parts as NCCCS reports them: Curriculum Instruction, Academic Support, Student Support, and Institutional Support (leaving aside the less relevant categories Continuing Education, and Operations and Maintenance). Variable #9, Curriculum Instruction, includes funds expended for salaries of curriculum instructors (V. Lucas, vice president of finance, Sampson Community College, personal communication, January 8, 2009).

Collection procedure. Yearly average cost per FTE for several categories of college

expenditures, among them “Curriculum Instruction,” is available in the annual *Matter of Facts* reports in a table titled “Average Cost per FTE Analysis.”

Independent Variable #10

Variable. Academic Support cost per FTE.

Rationale. Identical to that of Variable #9. Academic Support costs include secretarial support and supplies for academic units and for the library (V. Lucas, vice president of finance, Sampson Community College, personal communication, January 8, 2009).

Collection procedure. Identical to that of Variable #9.

Independent Variable #11

Variable. Student Support cost per FTE.

Rationale. Identical to that of Variable #9. Student Support costs include salaries and supplies for Student Services, which unit typically encompasses admissions, counseling, financial aid, the registrar’s office, and student affairs, and to some degree campus security (V. Lucas, vice president of finance, Sampson Community College, personal communication, January 8, 2009).

Collection procedure. Identical to that of Variable #9.

Independent Variable #12

Variable. Institutional Support cost per FTE.

Rationale. Identical to that of Variable #9. Institutional Support costs include salaries and supplies not covered under the previous categories, such as the president’s office, the personnel office, the planning office, the resource development office, and to some degree

security (V. Lucas, vice president of finance, Sampson Community College, personal communication, January 8, 2009).

Collection procedure. Identical to that of Variable #9.

Independent Variable #13

Variable. The socioeconomic status (SES) of a community college's service area, as represented by its 2005 estimated median household income (MHI).

Rationale. A review of the literature shows that socioeconomic status is an independent variable used to predict individual student success (Bailey et al., 2005; Eddy et al., 2006).

Collection procedure. Estimated 2005 MHI by county is reported by the Small Area Income and Poverty Estimates (SAIPE) section of the U.S. Census Bureau (2008a). Average MHI for community colleges with service areas encompassing multiple counties was calculated in the same manner as average RUC value for Independent Variable #14, below,

Independent Variable #14

Variable. Average Rural-Urban Continuum Code (RUC) value of a college's service area.

Rationale. As established in "Introduction to the Study," NCCCS colleges serve areas that differ widely in the rural or urban characters of their populations (Economic Research Service, 2008; U.S. Census Bureau, 2008b). Presumably those differences manifest themselves in various types of resources available and in culture generally, in addition to the sheer numerical differences of population densities.

Collection procedure. The 2003 RUC value for each county is available online from the Economic Research Service unit of the U.S. Department of Agriculture (Economic Research

Service, 2008). County population estimates for July 1, 2005, are reported by the U.S. Census Bureau (2006). The service area of each community college is defined by the NCCCS in its yearly *A Matter of Facts* reports. All service areas remained stable for the five years covered by this research. Where a community college's service area overlaps another's such that it is impossible to determine distinct populations, then that college's service area is defined as its home county. This is the case in only three instances: Halifax Community College, Martin Community College, and Roanoke-Chowan Community College.

Each county is assigned an RUC value ranging from one to nine, wherein one denotes most urban and nine denotes most rural (Economic Research Service, 2004). The percentage that each county in a community college's service represented of its total service-area population was determined using the July 1, 2005, population estimates. That percentage was then multiplied by the RUC value of the county, and the resultant products for all counties in the college's service area were then summed to achieve the variable.

For example, Caldwell Community College's service area comprises Caldwell County, with a 2005 population of 79,334, or 65.1% of its service area population, and an RUC value of two; and Watauga County, with a population of 42,434, or 34.8% of its service area population, and an RUC value of six. Thus its variable #12 value is $(65.1\% \times 2) + (34.8\% \times 6) = 1.3 + 2.1 =$ an average RUC value of 3.3.

Independent Variable #15

Variable. Percent population increase of a college's service area 2000-2007.

Rationale. NCCCS colleges are funded based on the prior year's FTE or on a rolling average of the previous three fiscal years' FTE, whichever is greater, rather than on

contemporaneous or projected enrollment (NCCCS, 2007a, p. 48). Thus it seems reasonable to posit that significant population growth in a college's service area could render its resources insufficient to meet a given year's significant enrollment increase. If such growth were to persist over a number of years, then a student's entire learning experience at a community college could be hampered by shortages of college resources in instructors, technology, and any number of budget categories.

Collection procedure. County-by-county populations for 2000 and estimates for 2007 are available from the Economic Research Service (2008). Variable #15 values were derived by determining the total 2000 population of a college's service area, and dividing that figure into the total estimated 2007 population of its service area; the percent over or under 100% represents the percentage change.

Independent Variable #16

Variable. Percentage of a college's service area population enrolled in curriculum programs.

Rationale. This statistic is to some extent a measure of a college's "market penetration" into its service area. Presumably colleges vary in how well they market themselves to their service area populations and in how successfully they find means, e.g., in the form of financial or transportation assistance, to bring students into the college. This statistic may speak as well to the degree of competition for students from nearby colleges and universities. Wake Technical Community College, for example, coexists in Wake County with Meredith College, Peace College, North Carolina State University, Shaw University, and St. Augustine's College (Wake County, North Carolina, 2009). Halifax Community College, on the other hand, has no other

colleges or universities in its service area (Halifax County, North Carolina, 2008).

Collection procedure. This data is reported annually for each community college in NCCCS *Critical Success Factors* reports in a table titled “Percent of Adult Population in Service Area Enrolled.”

Independent Variable #17

Variable. The academic strength of UNC native students against whom a community college’s transferees compete during the measurement year, as represented by the average high school class rank of UNC native students who are sophomores during the measurement year. The transferees from a given community college in a given year attend a unique combination of UNC universities in unique percentages. Thus the average academic strength of university students with whom a given community college’s transferees compete in a given year is a function of (a) the percentage of its transferees that the community college sends to each university, and (b) the academic strength of native students at each university.

Rationale. A community college’s transferees tend to transfer to a number of UNC universities, and in unique and yearly changing proportions. However, UNC universities differ markedly in the stringency of admissions. Thus, to the extent that GPA is a measure of relative performance *within* a university (via curving, for example), then a given community college’s transferees may be competing for grades with higher-performing students than do those of a community college in another part of the state. This factor is commonly speculated on by NCCCS faculty (T. Gould, past president of NCCCS College Transfer Program Association, personal communication, April 16, 2008).

Further, and contrary to NCCCS faculty opinion as reported, several studies (Astin, 1982,

1993; Astin & Oseguera, 2005) have found that the more selective the institution, the greater its incidence of degree completion. In fact, Astin and Oseguera found the effect on degree completion of institutional selectivity to be slightly stronger than the effect of high school grades. They speculate that this may be because more-selective institutions have more resources, and because the student peer groups are more academically prepared and come from higher socioeconomic backgrounds.

Collection procedure. In its annual *Statistical Abstract of Higher Education in North Carolina*, UNC reports the number of each NCCCS community college's transferees to each UNC university in "Undergraduate Transfer Students from Two-Year Colleges to Senior Colleges and Universities in North Carolina by Institution." In "High School Class Rank of Entering Freshmen in the University of North Carolina" the same source reports the percentage of entering UNC freshman at each UNC university who graduated in each high school class-rank quintile.

To illustrate how Variable #17 was derived, first, Table 7 displays the number of transferees to UNC universities from Sampson Community College and from South Piedmont Community College for Fall 2004. Then Table 8 displays the percent distribution of high school class-rank quintiles for freshman entering those UNC universities in Fall 2003. The reason for the one-year difference in data is that in 2005, those 2004 freshman were the sophomores with whom a plurality of Sampson Community College's and South Piedmont Community College's transferees competed.

Table 9 illustrates how data from Tables 7 and 8 are combined to derive Variable #17: By assigning a value to each quintile, it was possible to obtain an average high school class-rank

Table 7

Number and Percentage of Transferees from Sampson CC and S. Piedmont CC to UNC

Universities, Fall 2004

University	Sampson No. (%)	S. Piedmont No. (%)
ECU	2(7.1)	0
FSU	8(28.6)	1(12.5)
NCSU	4(14.3)	0
UNC-C	1(3.6)	5(62.5)
UNC-P	2(7.1)	1(12.5)
UNC-W	11(39.3)	0
WCU	0	1(12.5)
Total	28(100)	8(100)

Note. Adapted from University of North Carolina (2005). "Undergraduate transfer students from two-year colleges to senior colleges and universities in North Carolina by institution, fall 2004." *Statistical Abstract of Higher Education in North Carolina 2004-2005*.

Table 8

Percent Distribution of Freshman Entering Selected UNC Universities in Fall 2003, by High School Class-Rank Quintile

University	Top fifth	2 nd fifth	3 rd fifth	4 th fifth	Bottom fifth	Average percentile ^a
ECU	35	37	23	5	0	70.4
FSU	15	24	29	21	11	52.2
NCSU	71	25	3	1	0	83.2
UNC-C	36	42	19	3	0	72.2
UNC-P	25	24	25	20	6	58.4
UNC-W	52	37	9	2	0	77.8
WCU	21	30	30	18	1	60.4

Note. Adapted/derived from University of North Carolina (2004). "High school class rank of entering freshmen in the University of North Carolina, fall 2003." *Statistical Abstract of Higher Education in North Carolina 2003-2004*.

^a Average percentiles derived by using .9 for Top Fifth, .7 for 2nd Fifth, .5 for 3rd Fifth, .3 for 4th Fifth, and .1 for Bottom Fifth.

Table 9

Illustration of Method for Combining Data to Derive Variable #17

	University	% Comm. coll.'s trans. entering, 2004		Avg. HS class rank of freshman, 2003		
Sampson	ECU	7.1	x	70.4	=	5.0
	FSU	28.6	x	52.2	=	14.9
	NCSU	14.3	x	83.2	=	11.9
	UNC-C	3.6	x	72.2	=	2.6
	UNC-P	7.1	x	58.4	=	4.1
	UNC-W	39.3	x	77.8	=	30.6
					Total = Variable #17	=
S. Piedmont	FSU	12.5	x	52.2	=	6.5
	UNC-C	62.5	x	72.2	=	45.1
	UNC-P	12.5	x	58.4	=	7.3
	WCU	12.5	x	60.4	=	7.5
					Total = Variable #17	=

percentile for each university's freshman class. Lacking more-precise data, this study used the middle decile of each quintile. Thus the average high school class-rank value for ECU's entering freshman for Fall 2003 (see Table 9) is $(35\% \times 90\%) + (37\% \times 70\%) + (23\% \times 50\%) + (5\% \times 30\%) + (0\% \times 10\%) = 31.5\% + 25.9\% + 11.5\% + 1.5\% + 0\% = 70.4\%$, or an average high school class-rank of 70.4 percentile. One need then only to multiply the percentages of a community college's transferees to each university by each university's average high school class-rank percentile, and sum those figures, to derive an average high school class-rank percentile of UNC students with whom a community college's transferees competed in a given year.

Independent Variable #18

Variable. The academic strength of UNC native students against whom a community college's transferees compete during the measurement year, as represented by the average Scholastic Aptitude Test (SAT) scores of UNC native students who are juniors during the measurement year.

Rationale. Identical to that of Variable #17.

Collection procedure. This variable was derived in exactly the same fashion as variable #6, average high school class rank, except that the average SAT scores of freshman entering UNC universities is reported as a precise number that is usable without further processing, rather than as quintiles requiring the assignment of approximate values. Average SAT scores are reported annually in *Statistical Abstract of Higher Education in North Carolina's "Averages and Quartiles of Recentered SAT Scores of Entering Freshmen in the University of North Carolina."*

Data Analysis

The data analysis begins with central-tendency statistics of the independent variable values for each year. A correlation matrix employs Pearson's r to assess the relationship between factors. After a statistical description of transferee success, it was my intention to perform a regression analysis to measure the relative influence of each independent variable on transferee success. However, regression analysis proved inappropriate, as explained in Chapter 4, "Findings."

This study intended to discover which independent variables appear to impact transferee success, in which direction, and to what extent. Frankfort-Nachmias and Leon-Guerrero (2006) state that bivariate regression analysis is the proper method by which to economically express the relationship between two interval-ratio variables. Thus, via SPSS 17.0 software, the dependent variable underwent bivariate regression analysis with all 18 independent variables to determine if any statistically significant relationships exist. Null hypotheses were rejected only when $p \leq .05$.

Summary

This research explores whether institution-level and service-area-level variables appear to significantly impact the academic performance of a community college's transferee cohort at university. Toward that end, 18 such variables were chosen for inclusion in the study, ranging from county demographic descriptors to community college expenditures to university admission selectivity. Five recent academic years were targeted for data collection to ensure contemporary relevance, to give depth of perspective, and to encompass as large a population as practicably useful. The data used was taken from college, university, state, and federal sources, and sometimes further processed to obtain "cleaner," more-precise, and/or more-relevant

information. Data for yearly changing independent variables were selected such that they match the transferees' final year at community college, and single-point data were chosen from a year near the midpoint of the five-year period. The study's intention is to provide additional perspective on factors contributing to community college transferee success.

CHAPTER 4: FINDINGS

This study was designed to determine whether any of 18 independent variables that inhere at the level of a community college as an institution or of its service area predict the academic success of a community college's transferees at universities. Success is defined for those colleges—and for this study—by the NCCCS's yearly reported PME/PS3 statistic, or the percent of a given community college's transferees who achieve a GPA of 2.0 or higher during their first academic year at a UNC university. These are the variables evaluated; in parentheses are abbreviations that will be used in tables:

Dependent Variable (PME/PS3): percent of an NCCCS college's transferees earning a 2.0 GPA at UNC universities.

Independent Variable #1 (%AssocDeg): percent of an NCCCS college's transferees with the associate's degree.

Independent Variable #2(#CurrFTE): number of an NCCCS college's curriculum full-time equivalencies.

Independent Variable #3 (CT%CurrFTE): an NCCCS college's CT FTE as a percent of its curriculum FTE.

Independent Variable #4 (#Tran/CT-FTE): number of an NCCCS college's transferees divided by its CT FTE.

Independent Variable #5 (%InstrDoc): percent of an NCCCS college's instructors with the doctorate.

Independent Variable #6 (%InstrFem): percent of an NCCCS college's female instructors.

Independent Variable #7 (%InstrMin): percent of an NCCCS college's minority instructors.

Independent Variable #8 (%FTE-DL): percent of an NCCCS college's FTE from distance learning.

Independent Variable #9 (\$FTE-CurrInstr): an NCCCS college's cost per FTE for curriculum instruction.

Independent Variable #10 (\$FTE-AcadSpt): an NCCCS college's cost per FTE for academic support.

Independent Variable #11 (\$FTE-StdSpt): an NCCCS college's cost per FTE for student support.

Independent Variable #12 (\$FTE-InstiSpt): an NCCCS college's cost per FTE for institutional support.

Independent Variable #13 (MHI-SrvArea): median household income (MHI) of an NCCCS college's service area in 2005.

Independent Variable #14 (RUC-SrvArea): Rural-Urban Continuum Code (RUC) of an NCCCS college's service area in 200.

Independent Variable #15 (%PopChg): percent population change from 2000 to 2007 of an NCCCS college's service area.

Independent Variable #16 (%PopEnrld): percent of an NCCCS college's service area population enrolled.

Independent Variable #17 (HSCR-UNCsoph): average high school class rank of sophomores at UNC universities attended by an NCCCS college's transferees.

Independent Variable #18 (SAT-UNCsoph): average Scholastic Aptitude Test (SAT) scores of sophomores at UNC universities attended by an NCCCS college's transferees. These particular 18 independent variables were chosen because they are identified in the existing literature on transferee success and/or because community college personnel have commonly cited them as possible differentiators of the PME/PS3 score among NCCCS colleges.

This chapter presents the findings of the study. It will begin with descriptive statistics for the dependent variable and the 18 independent variables (see Table 10). Figures 2 through 20 display histograms of the distribution of each variable. A correlation matrix (see Tables 11, 12, and 13) and table of notable correlation values (see Table 14) follow. The chapter ends with a brief explanation of why regression analysis turned out to be inappropriate for this set of variables.

Descriptive Statistics

Dependent Variable: PME/PS3 - A histogram showing the distribution of the dependent variable is displayed in Figure 2. The range extends down to 43.8 because of outliers, but the scores are grouped between 60 and 100, with a plurality in the 80s. The mean and median lie in the 80s as well, at 83.58 and 84.6, respectively.

Independent Variable #1: %AssocDeg - A histogram showing the distribution of Independent Variable #1 is displayed in Figure 3. Note that the upper limit of the range for Independent Variable 1 is only 76.2, meaning that no NCCCS college in any measurement year transferred more than about three-fourths of its students to UNC universities with the associate's degree in hand. The slightly platykurtic distribution peaks at approximately 30%, with a mean of 34.99% and median of 34.01%.

Table 10

Mean and Standard Deviation for Dependent Variable and All Independent Variables

Variable	<i>M</i>	<i>SD</i>
PME/PS3	83.58	7.52
%AssocDeg	34.99	14.78
#CurrFTE	2617.39	1856.29
CT%CurrFTE	26.71	10.52
#Tran/CT-FTE	12.09	9.73
%InstrDoc	10.94	6.57
%InstrFem	55.57	6.64
%InstrMin	12.6	9.87
%FTE-DL	9.62	7.73
\$FTE-CurrInstr	2791.86	305.54
\$FTE-AcadSpt	455.18	98.41
\$FTE-Stdtspt	316.97	58.79
\$FTE-InstiSpt	800.15	221.27
MHI-SrvArea	37748.9	5868.6
RUC-SrvArea	3.83	1.84
%PopChg	8.17	9.24
%PopEnrld	14.7	3.93
HSCR-UNCsoph	67.73	4.02
SAT-UNCsoph	1043.86	45.43

Note. *N* = 268 for all variables.

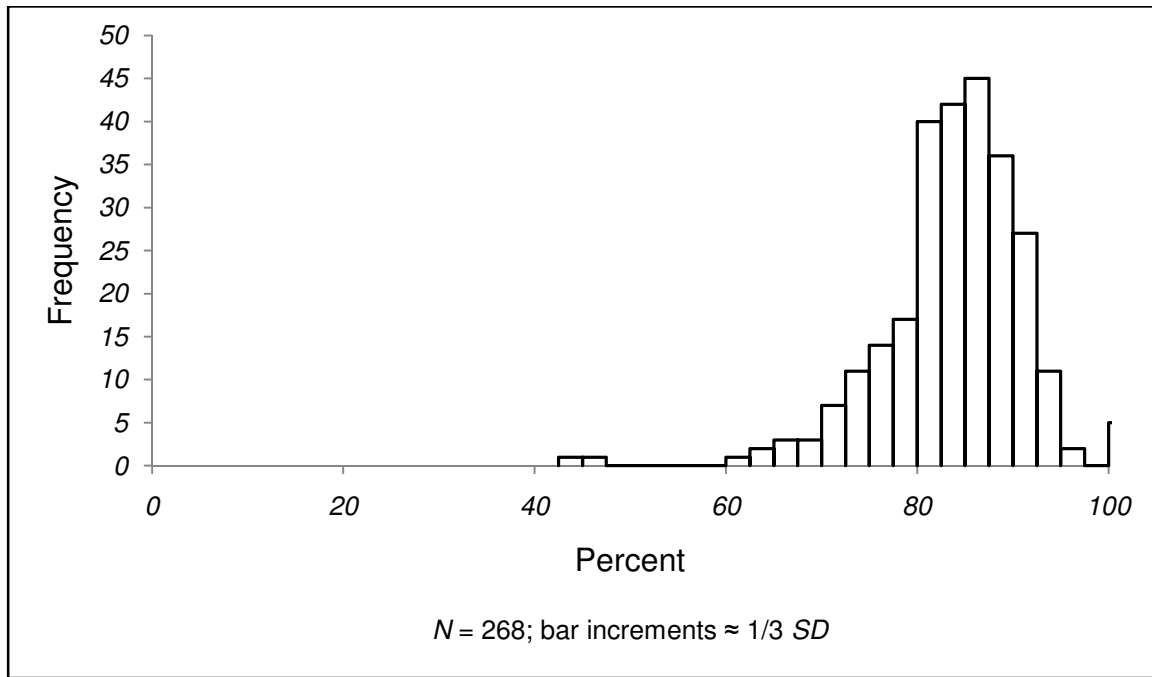


Figure 2. Distribution of dependent variable: Percent of transferees with ≥ 2.0 GPA.

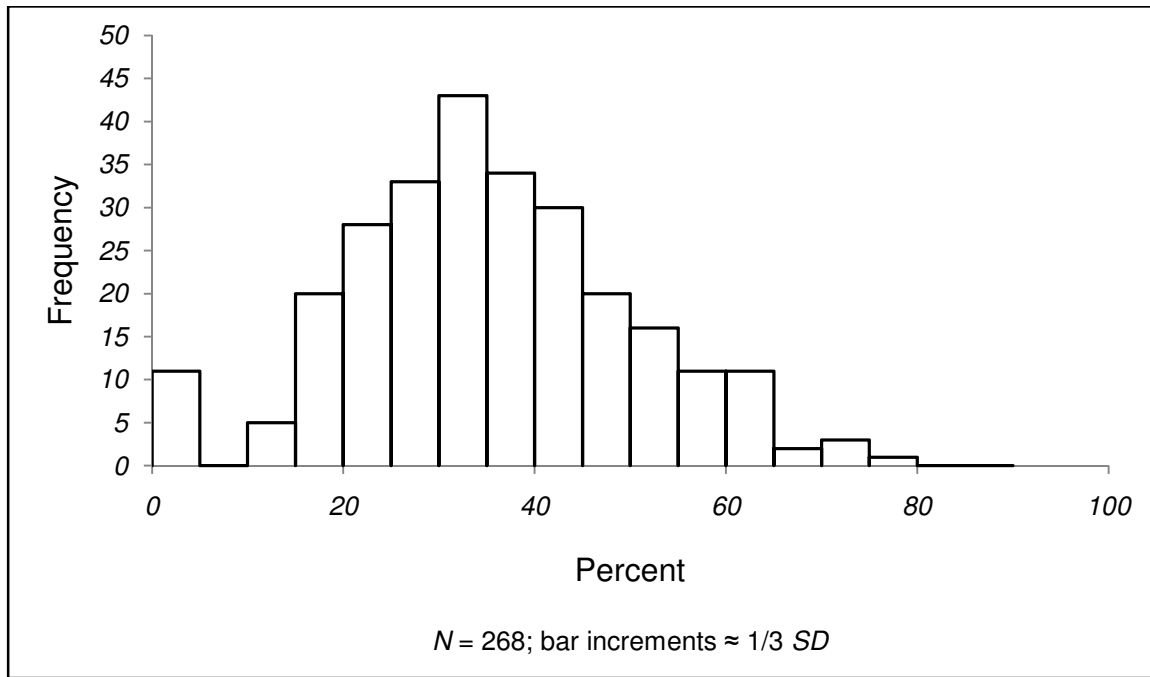


Figure 3. Distribution of independent variable #1: Percent of transferees with associate's degree.

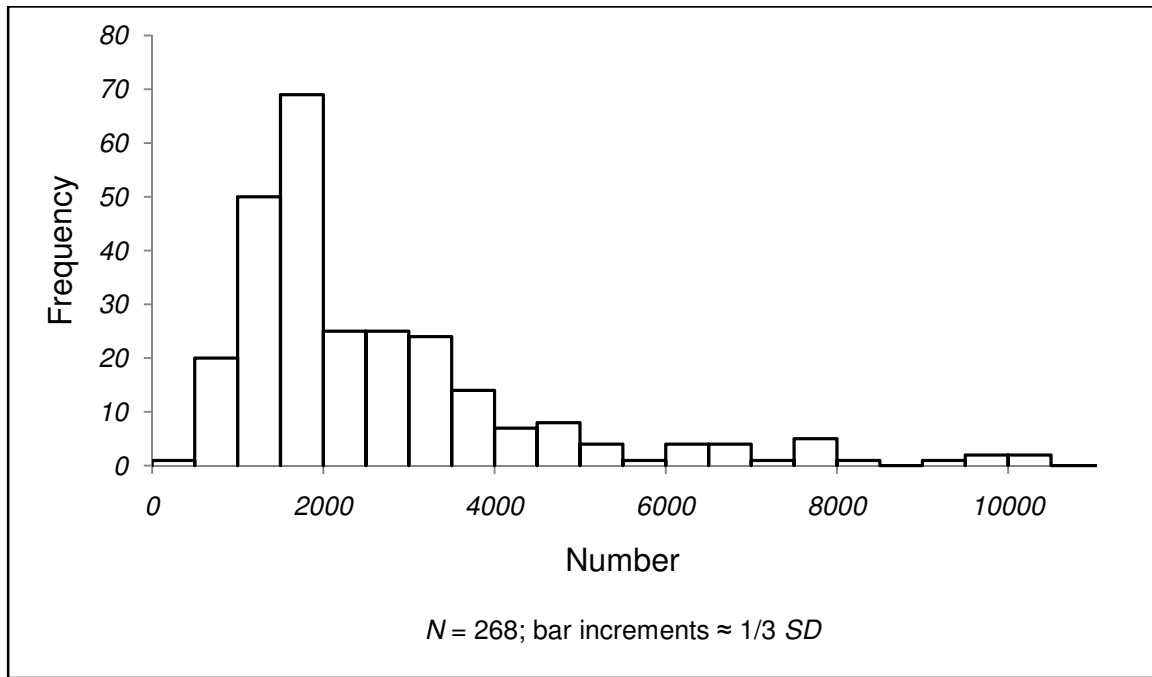


Figure 4. Distribution of independent variable #2: Number of curriculum FTE.

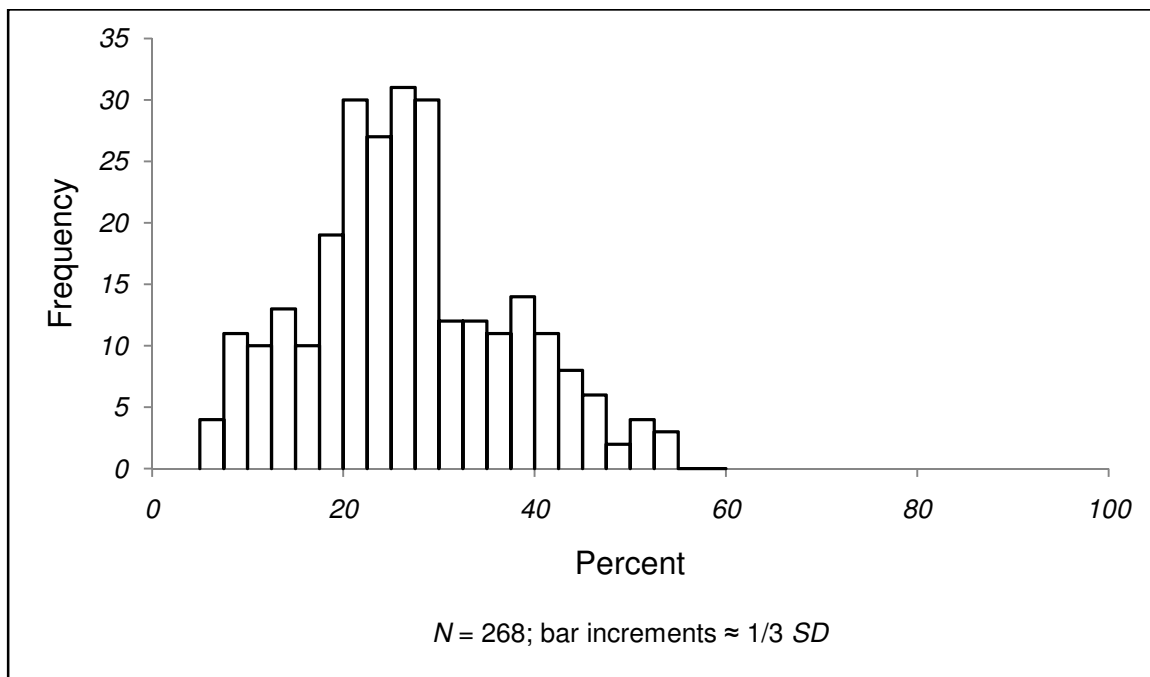


Figure 5. Distribution of independent variable #3: College transfer FTE as a percent of curriculum FTE.

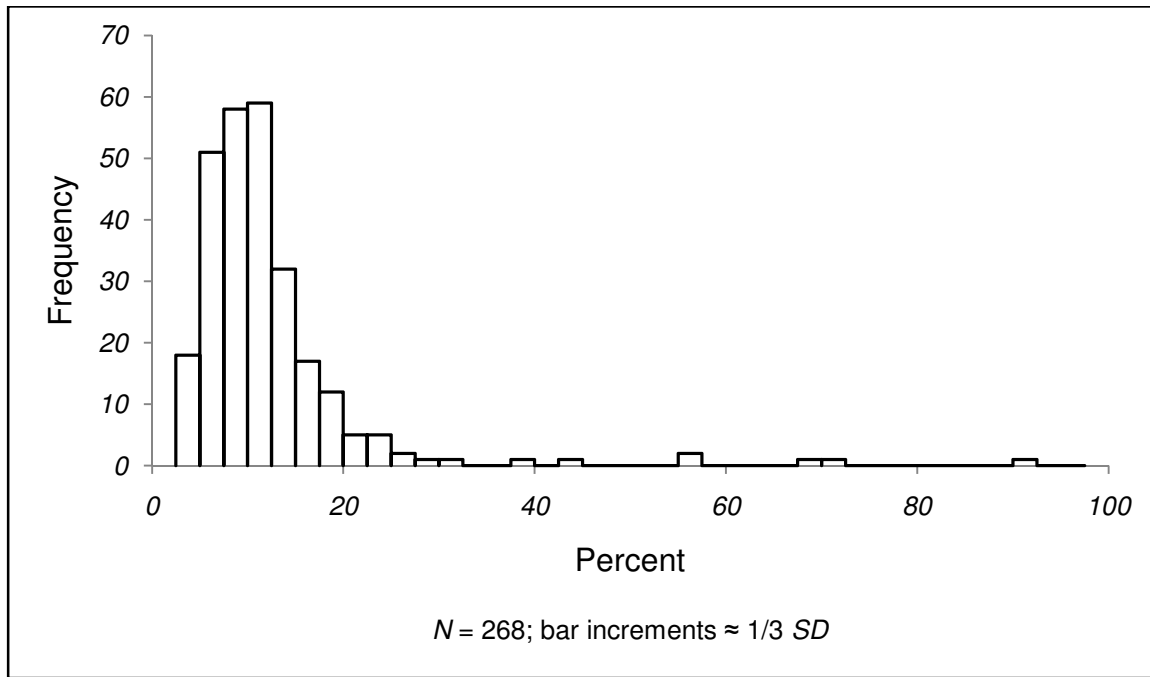


Figure 6. Distribution of independent variable #4: Number of transferees divided by college transfer FTE (= percent).

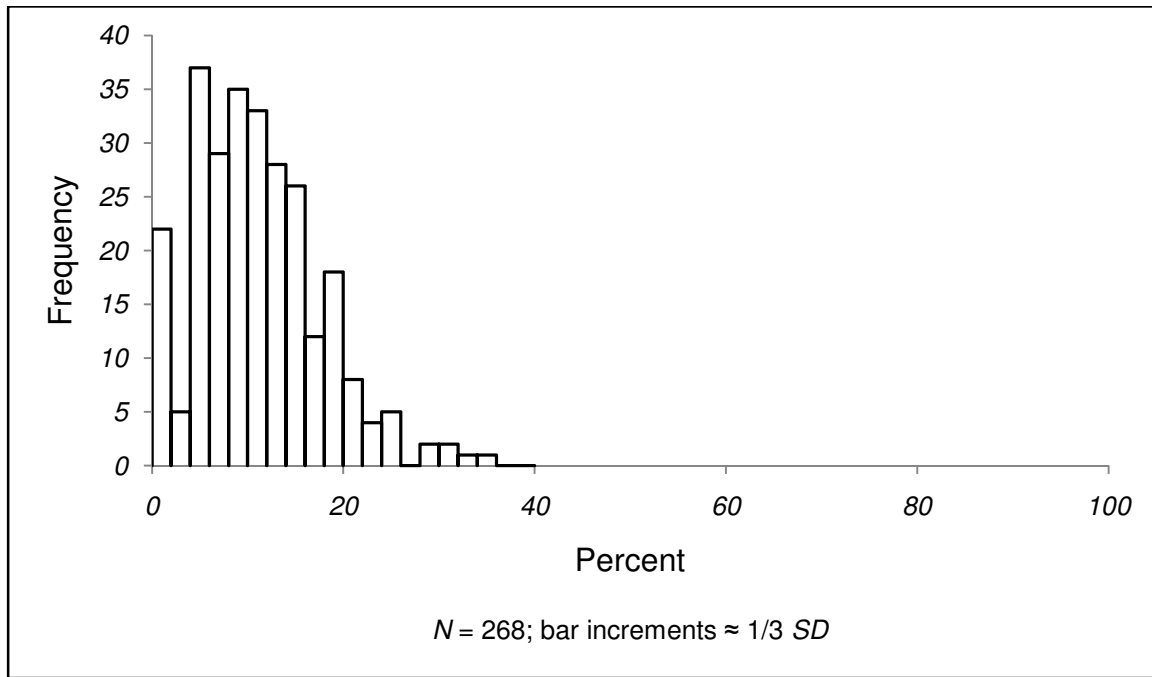


Figure 7. Distribution of independent variable #5: Percent of instructors with doctorate.

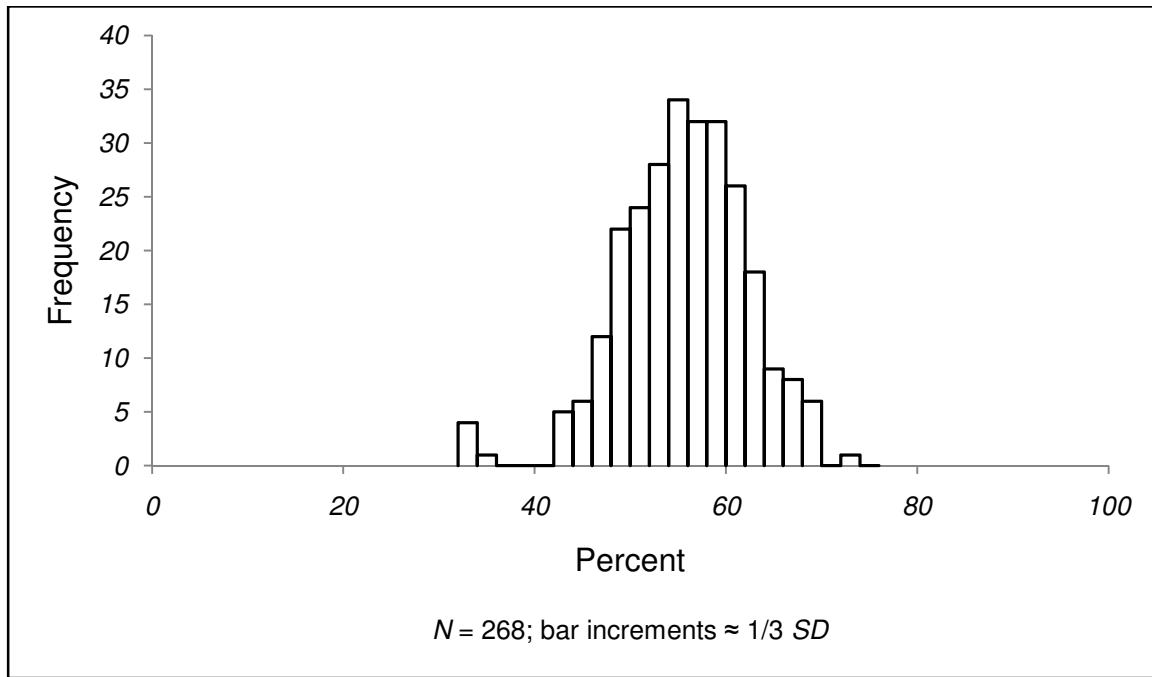


Figure 8. Distribution of independent variable #6: Percent of female instructors.

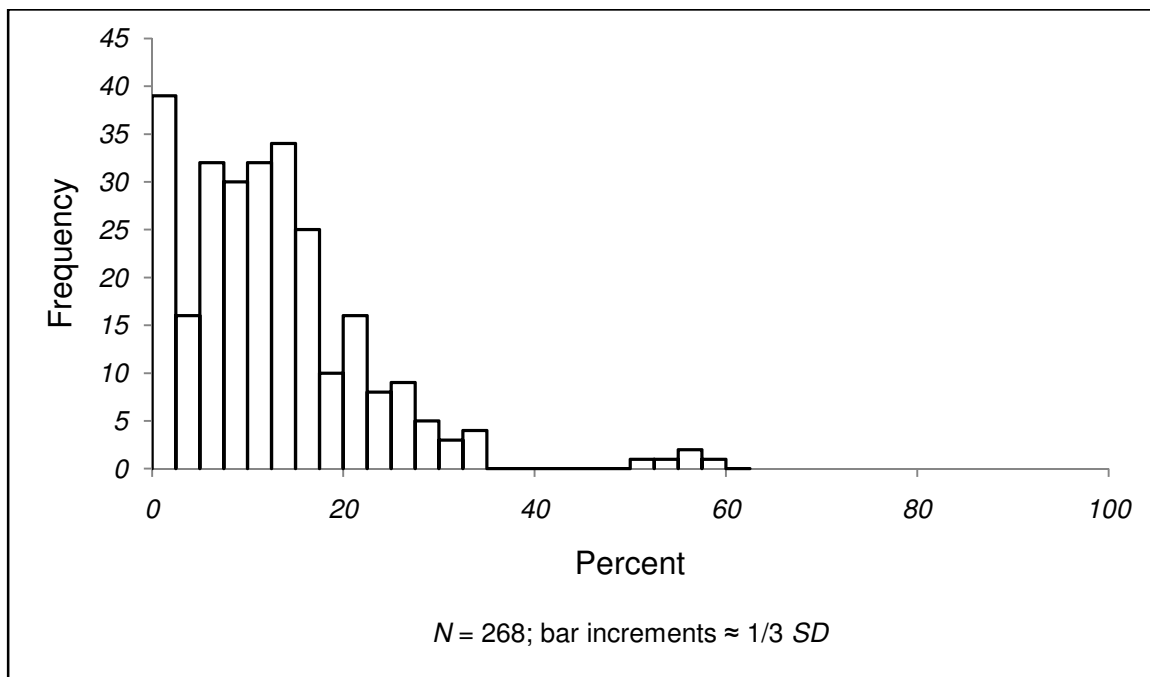


Figure 9. Distribution of independent variable #7: Percent of minority instructors.

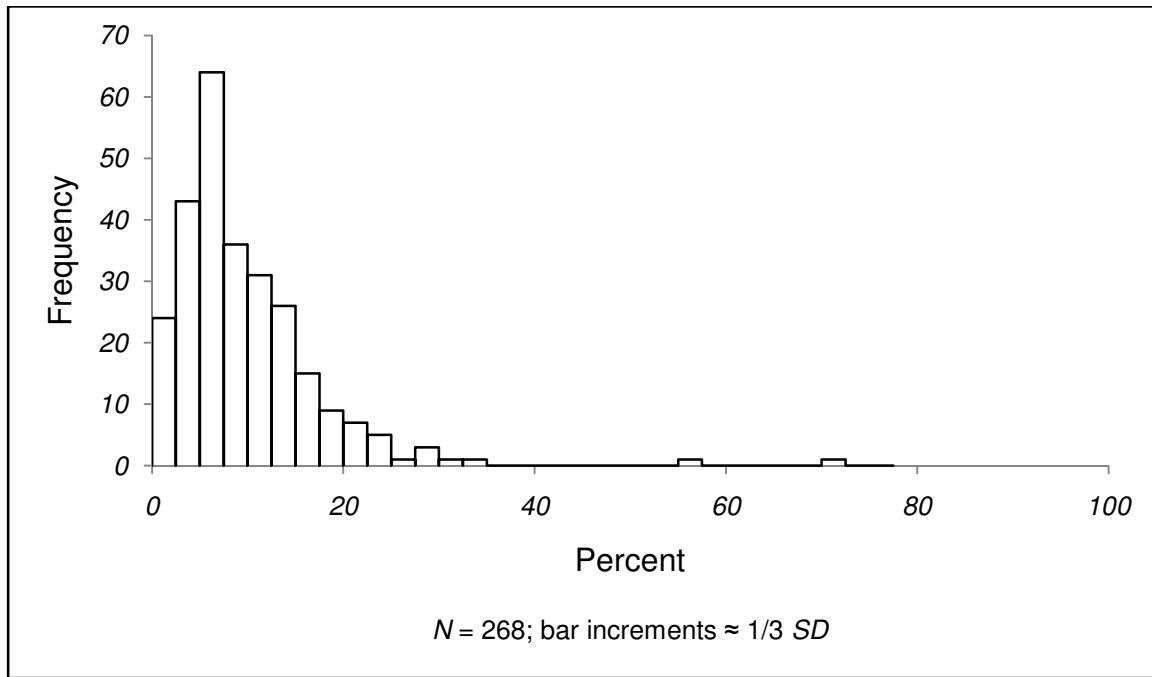


Figure 10. Distribution of independent variable #8: Percent of FTE from distance learning.

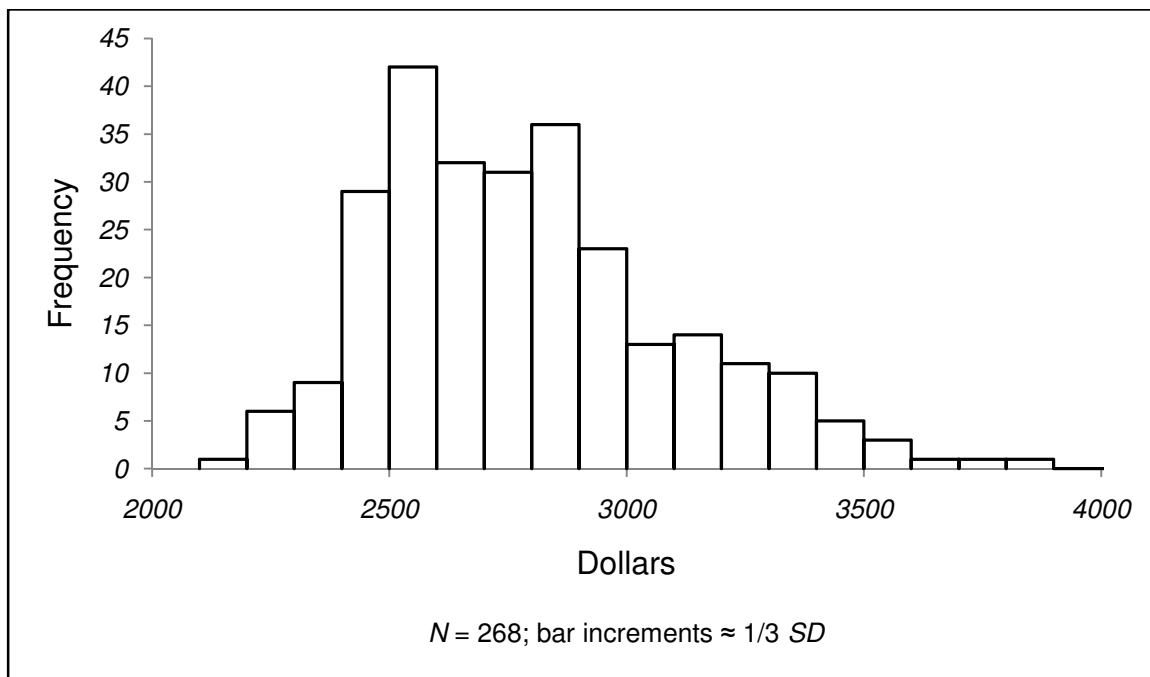


Figure 11. Distribution of independent variable #9: Cost per FTE for curriculum instruction.

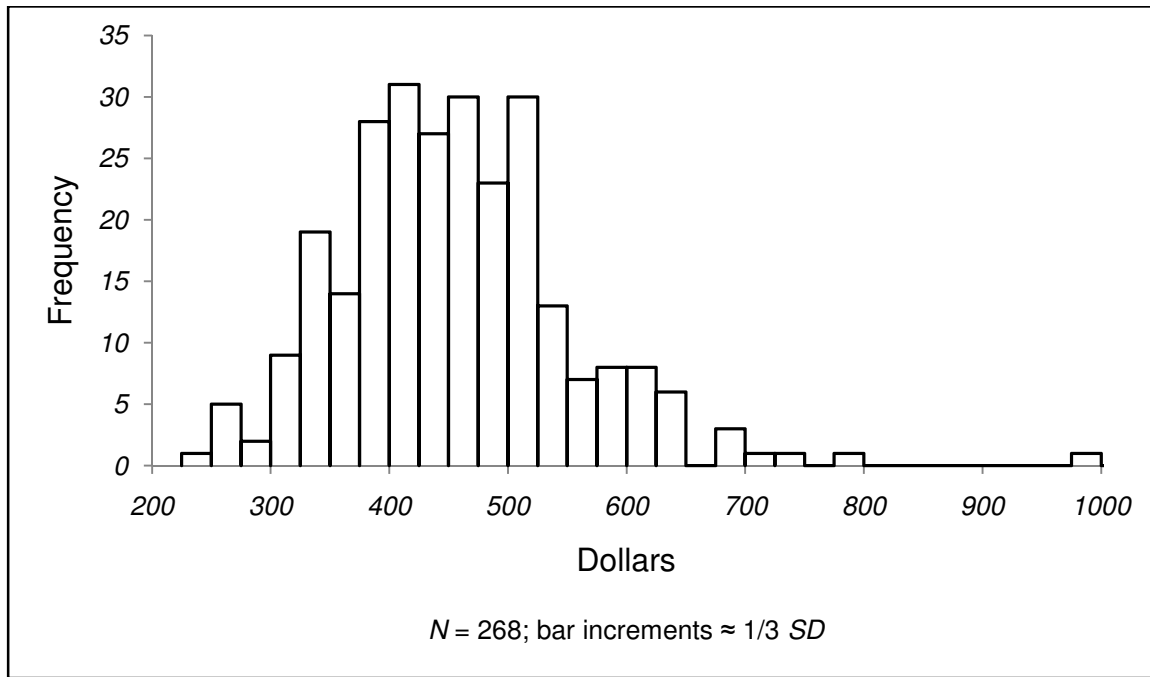


Figure 12. Distribution of independent variable #10: Cost per FTE for academic support.

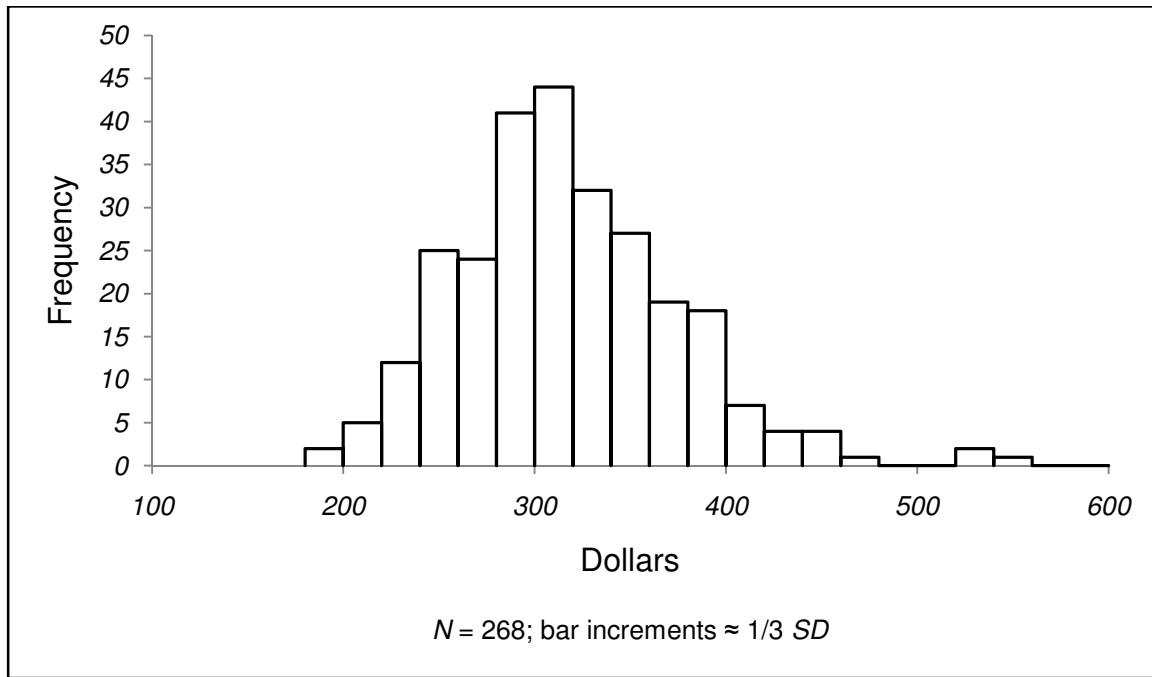


Figure 13. Distribution of independent variable #11: Cost per FTE for student support.

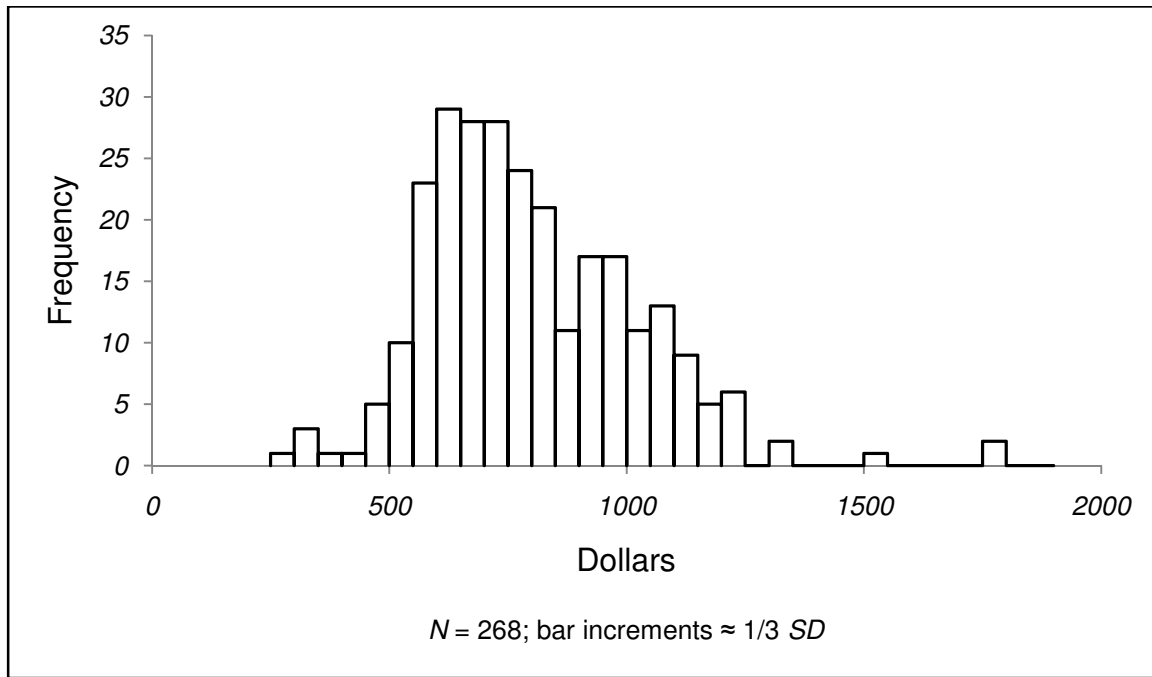


Figure 14. Distribution of independent variable 12: Cost per FTE for institutional support.

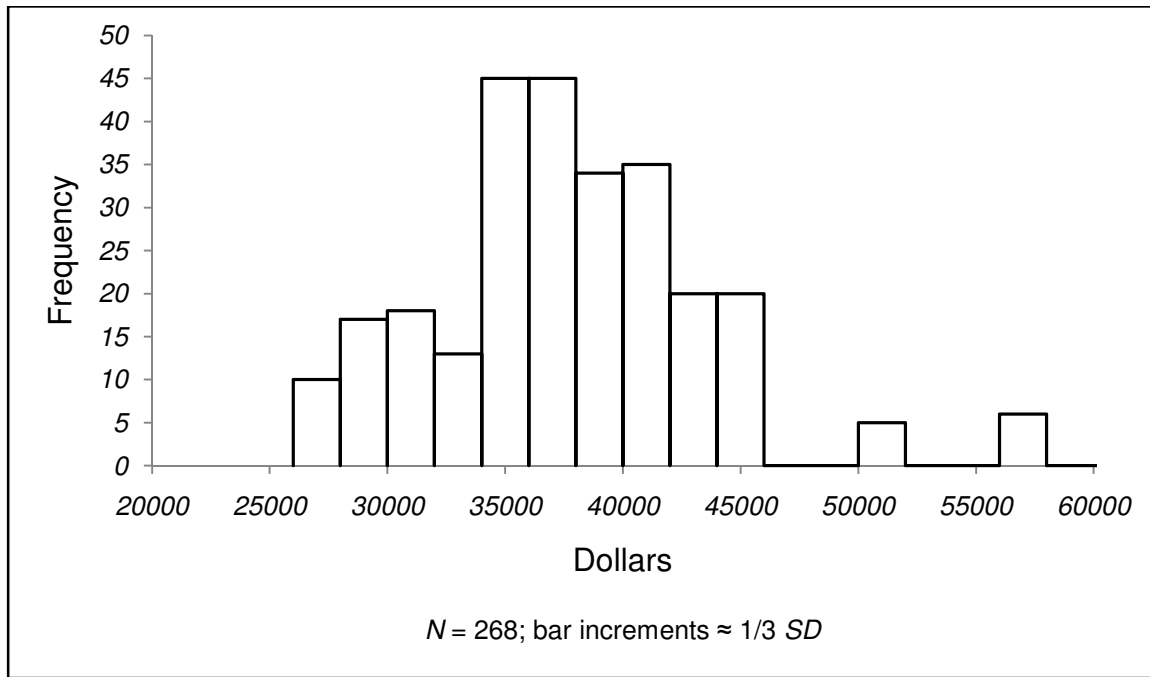


Figure 15. Distribution of independent variable 13: Median household income of service area in 2005.

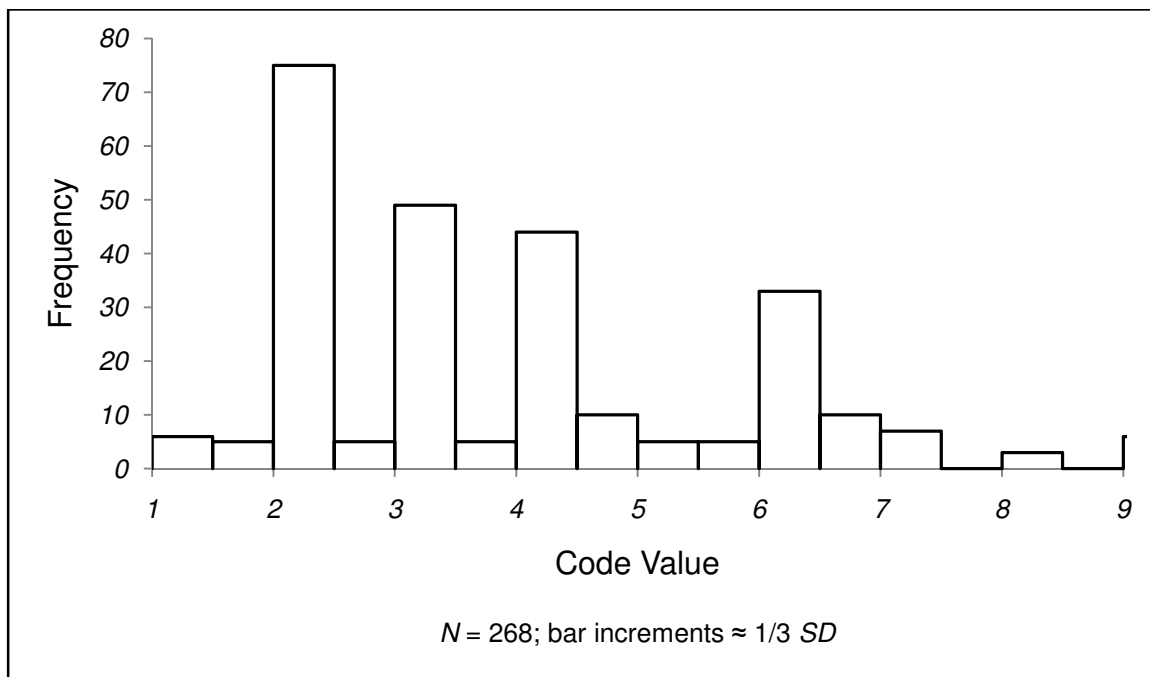


Figure 16. Distribution of independent variable 14: Rural-Urban continuum code of service area in 2003.

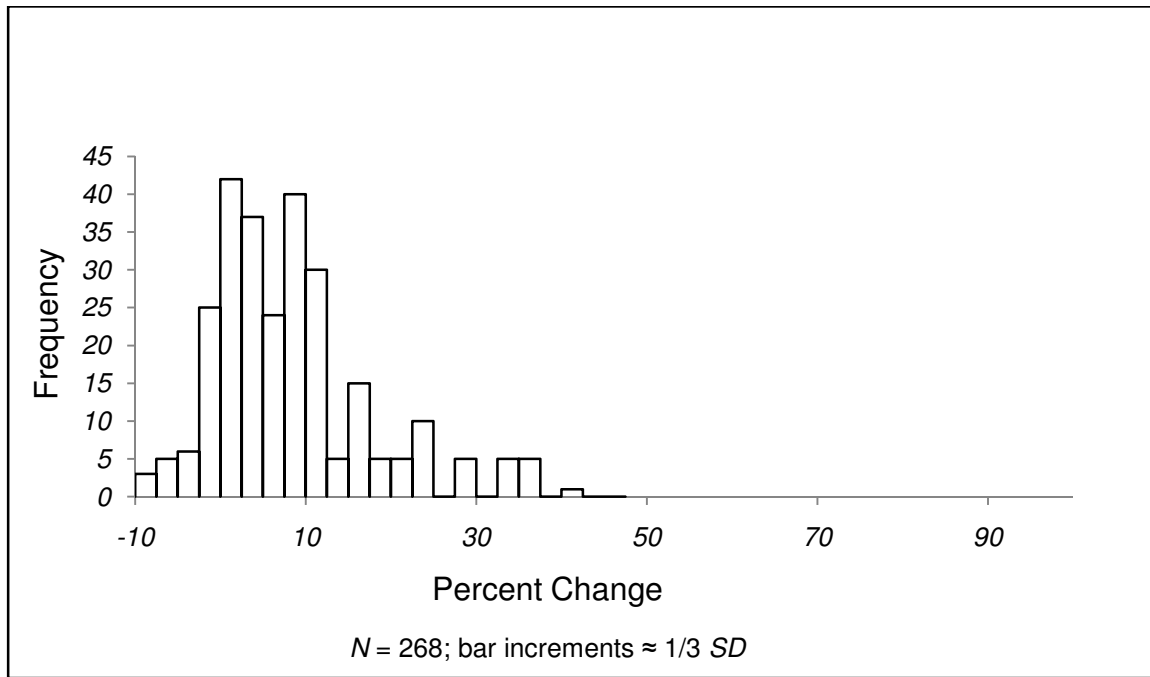


Figure 17. Distribution of independent variable 15: Percent population change of service area from 2000 to 2007.

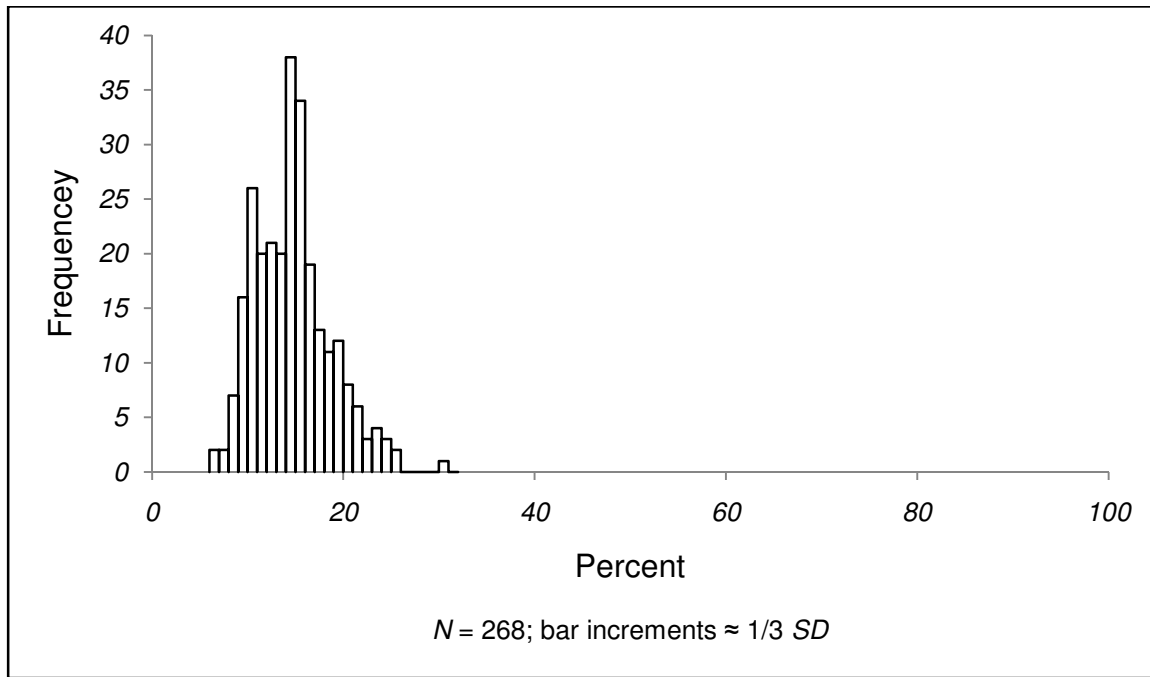


Figure 18. Distribution of independent variable 16: Percent of service area population enrolled.

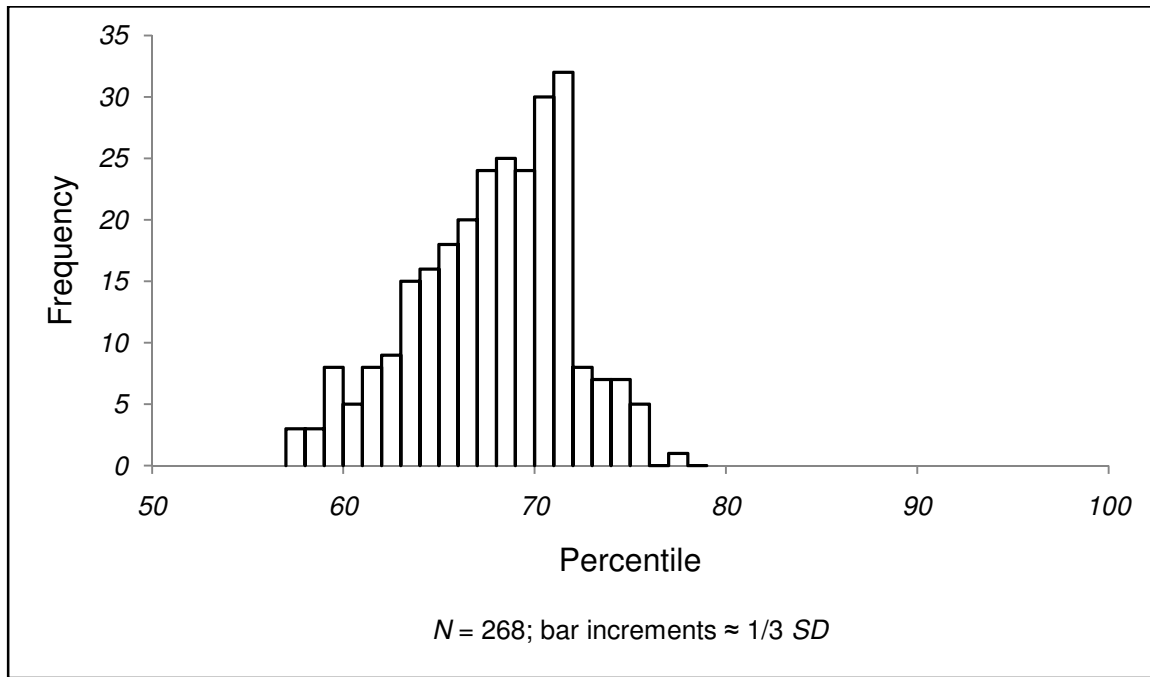


Figure 19. Distribution of independent variable 17: Average high school class rank of sophomores at UNC universities attended by transferees (in percentiles).

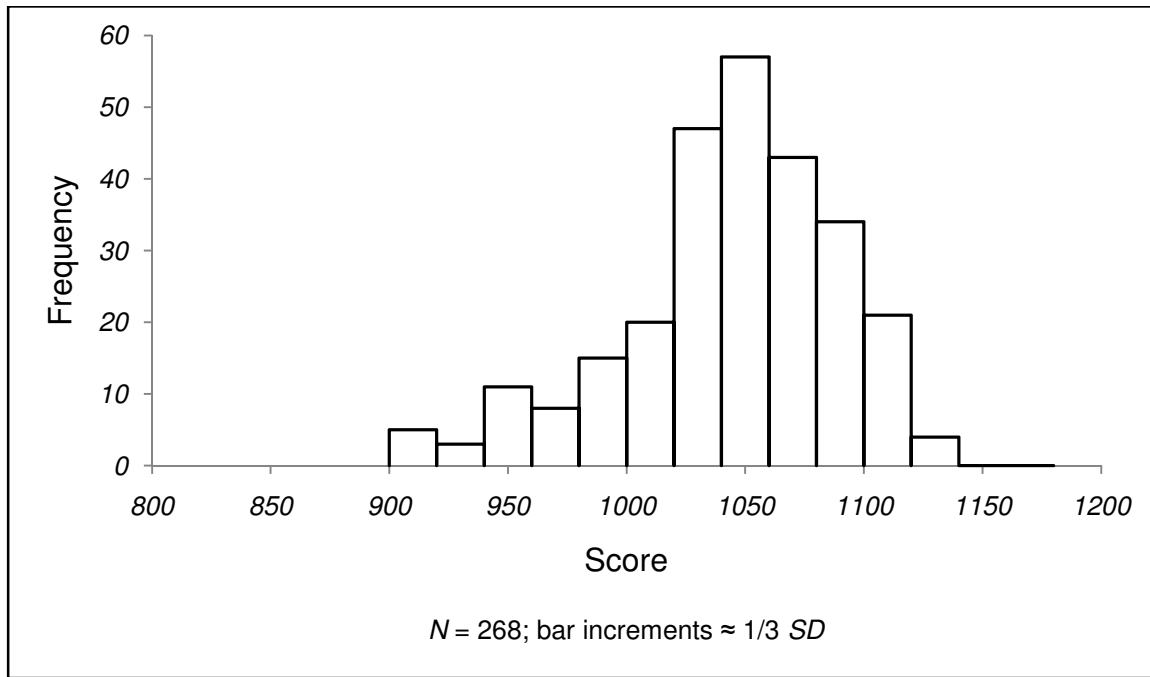


Figure 20. Distribution of independent variable 18: Average SAT scores of sophomores at UNC universities attended by transferees.

Independent Variable #2: #CurrFTE - A histogram showing the distribution of Independent Variable #2 is displayed in Figure 4. Of note is that although the range extends from 301 to 10352 curriculum FTE, the majority of Figure 3. Distribution of Independent Variable #1: Percent of transferees with associate's degree. Cases lie between 1000 and 4000, indicating that most NCCCS colleges are relatively small, with a few much larger colleges pulling the distribution in a long tail toward the higher range.

Independent Variable #3: CT%CurrFTE - A histogram showing the distribution of Independent Variable #3 is displayed in Figure 5. No college's CT FTE exceeded 55% of its curriculum FTE during the measured years. A plurality of colleges' values for this variable lie between 20% and 30%.

Independent Variable #4: #Tran/CT-FTE - A histogram showing the distribution of Independent Variable #4 is displayed in Figure 6. This variable displayed the greatest range of all variables expressed as percents. Its distribution is also the most leptokurtic of all the variables in this study, at 27.9, and the most skewed, at 4.59. Most values lay between five and 25, with outliers extending up to 92.

Independent Variable #5: %InstrDoc - A histogram showing the distribution of Independent Variable #5 is displayed in Figure 7. Its values are strongly bunched between zero and 25%, with an upper range of 34.37%, expressing that no community college during the measured years had a majority of instructors with the doctorate degree.

Independent Variable #6: %InstrFem - A histogram showing the distribution of Independent Variable #6 is displayed in Figure 8. The distribution of this variable reflects the slight majority of female faculty overall in the NCCCS. The effect of the female instructor

majority is fairly uniform, with few outliers falling beyond two standard deviations ($2 \times 6.64 = 13.28$) from the mean of 55.57%.

Independent Variable #7: %InstrMin - A histogram showing the distribution of Independent Variable #7 is displayed in Figure 9. Most values for this variable were less than 25%, with a few outliers beyond 40%. Although mode is not reported in Table 11, it is perhaps notable that the mode for this variable was zero.

Independent Variable #8: %FTE-DL - A histogram showing the distribution of Independent Variable #8 is displayed in Figure 10. Scores within two standard deviations of the mean of 9.74% fall between zero and 25%. The range extends upward past 40% only because of a few extreme outliers.

Independent Variable #9: \$FTE-CurrInstr - A histogram showing the distribution of Independent Variable #9 is displayed in Figure 11. Although the bulk of the values are grouped between approximately \$1800 and \$3000, the range is perhaps notable insofar as more uniformity might be expected in a common fiscal outlay, whereas this variable has a maximum more than 175% of the minimum.

Independent Variable #10: \$FTE-AcadSpt - A histogram showing the distribution of Independent Variable #10 is displayed in Figure 12. The majority of values for this variable are grouped between \$300 and \$650 around the mean of \$455.18, although outliers extend beyond two standard deviations toward the upper range of \$994.24. This is the least kurtotic of all distributions in the study, at 3.15.

Table 11

Pearson Correlation Matrix for Dependent Variable and Independent Variables 1 through 4

	PME/PS3	%AssocDeg	#CurrFTE	CT%CurrFTE	#Tran/CT-FTE
PME/PS3	1.00				
%AssocDeg	-0.051	1.00			
#CurrFTE	0.081	-0.081	1.00		
CT%CurrFTE	0.025	0.130*	0.285**	1.00	
#Tran/CT-FTE	-0.003	0.011	0.002	-0.405**	1.00
%InstrDoc	0.069	0.088	0.221**	0.254**	0.096
%InstrFem	-0.009	-0.164**	-0.012	0.084	-0.095
%InstrMin	0.034	-0.219**	0.079	0.085	-0.252**
%FTE-DL	-0.055	0.125*	0.266**	0.131*	-0.084
\$FTE-CurrInstr	-0.085	0.242**	-0.321**	0.055	-0.54
\$FTE-AcadSpt	-0.023	0.003	-0.107	-0.016	0.057
\$FTE-StdSpt	-0.005	0.013	-0.147*	0.106	-0.115
\$FTE-InstiSpt	-0.062	0.175**	-0.607**	-0.142*	-0.80
MHI-SrvArea	0.134*	0.032	0.638**	0.210**	0.036
RUC-SrvArea	-0.075	0.065	-0.581**	-0.154*	0.051
%PopChg	0.089	0.136*	0.428**	0.194**	0.030
%PopEnrld	-0.159**	0.037	-0.302**	-0.052	0.027
HSCR-UNCsoph	-0.049	0.002	0.164**	0.112	0.179**

Table 11 (*continued*)

SAT-UNCsoph	-0.060	0.135*	0.096	0.038	0.167**
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Note.

^a $N = 268$ for every variable.

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

Independent Variable #11: \$FTE-StdSpt - A histogram showing the distribution of Independent Variable #11 is displayed in Figure 13. As with Independent Variable 10, a few outliers extend beyond two standard deviations toward the upper range of \$549.15.

Independent Variable #12: \$FTE-InstiSpt - A histogram showing the distribution of Independent Variable #12 is displayed in Figure 14. Values for this variable begin rather sharply at approximately \$600 and then descend with notable uniformity toward approximately \$1300. As with the other three cost-per variables, outliers tend to extend toward the upper limit of the range rather than toward the lower limit.

Independent Variable #13: MHI-SrvArea - A histogram showing the distribution of Independent Variable #13 is displayed in Figure 15. The histogram clearly illustrates the diversity of economic conditions prevailing among North Carolina's 100 counties, as explained in the review of literature. Although the mean MHI is \$37,748.90, a substantial block of service areas have MHIs of less than \$35,000, while outliers occur above \$50,000.

Independent Variable #14: RUC-SrvArea - A histogram showing the distribution of Independent Variable #14 is displayed in Figure 16. This variable produces the least normal-looking distribution, with alternating high and low values. The reason for this phenomenon is that the RUC is expressed as a natural number from one (most rural) to nine (most urban) for counties; hence the relatively high frequencies at two, three, four and six. However, as explained previously, a number of NCCCS colleges' service areas contain multiple counties. The average RUC for these colleges is (usually) a value that falls between two natural numbers; hence the low-frequency values between, for example, two, three and four. The predominance of values in

the lower half of the scale reflects the rural conditions still prevailing across much of North Carolina.

Independent Variable #15: %PopChg - A histogram showing the distribution of Independent Variable #15 is displayed in Figure 17. This is the study's only variable with negative values, indicating that population declined in some service areas over those years by as much as -7.6%. A plurality of service area populations grew from a minimal percent up to approximately 12%, but a tail of higher-percent increases extends all the way up to 40.8%, again reflecting the diverse economic and sociological conditions that exist in the state.

Independent Variable #16: %PopEnrld - A histogram showing the distribution of Independent Variable 16 is displayed in Figure 18. The relatively small standard deviation of 3.93 is reflected in the histogram, as a plurality of the values are clearly bunched between approximately 10% and 17% around the mean of 14.7%. However, a uniformly diminishing tail of higher values does extend from approximately 17% up to beyond 25%.

Independent Variable #17: HSCR-UNCsoph - A histogram showing the distribution of Independent Variable 17 is displayed in Figure 19. As explained in this study's chapter on methodology, this variable represents the average high school class rank of students that a given NCCCS college's transferees competed with, based on the average class rank of sophomores at each university and the percent of the community college's transferees who attended each university. The distribution rises rather uniformly from its minimum value of 57.78% to approximately 73%, then falls off sharply before continuing to its maximum of 77.02%. Values are well grouped within two standard deviations ($2 \times 4.02 = 8.08$) around the mean of 67.73%.

Independent Variable #18: SAT-UNCsoph - A histogram showing the distribution of

Independent Variable 18 is displayed in Figure 20. This variable was derived in the same manner as Independent Variable 17, except that SAT scores were used as the measure of university selectivity instead of high school class rank. Like Independent Variable 17, this variable's distribution exhibits a small, negative skewness, with lower values building up from the minimum of 909.13 to a substantial grouping between approximately 1025 and 1125 around the mean of 1043.86, then falling rather sharply toward the maximum of 1125.46.

Correlations

A correlation matrix displaying Pearson's r among the dependent variable and all 18 independent variables is divided into three tables (for readability) and exhibited in Tables 11, 12, 13, and 14. The purpose of correlation analysis is to determine whether relationships exist between the independent variables and the dependent variable, percent of transferees with ≥ 2.0 GPA. The matrix format also allows for an analysis as to whether there are associations among the independent variables.

Although the purpose of this study was to determine the independent variables' correlation with the dependent variable, it may prove useful to point out notable correlations between selected independent variables as well. Table 15 displays all statistically significant correlations greater than 0.3 between independent variables.

Summary of Findings

Null hypotheses are not rejected for 16 of the 18 independent variables. Null hypotheses are rejected for Independent Variable #13, median household income of service area, and for Independent Variable #16, percent of service area population enrolled. Independent Variable #13 has a Pearson's r of 0.134 at the $p < .05$ level of significance. Independent Variable #16 has a

Table 12

Pearson Correlation Matrix for Independent Variables 5 through 9

	%InstrDoc	%InstrFem	%InstrMin	%FTE-DL	\$FTE-CurrInstr
%InstrDoc	1.00				
%InstrFem	-0.132*	1.00			
%InstrMin	-0.213**	0.384**	1.00		
%FTE-DL	0.037	-0.048	-0.094	1.00	
\$FTE-CurrInstr	-0.069	-0.035	-0.111	0.250**	1.00
\$FTE-AcadSpt	0.087	0.015	-0.145*	0.185**	0.264**
\$FTE-Stdtspt	-0.226**	0.212**	0.261**	0.143**	0.423**
\$FTE-InstiSpt	-0.092	-0.190**	-0.120*	0.077	0.532**
MHI-SrvArea	0.229**	-0.087	-0.160**	0.144*	-0.191**
RUC-SrvArea	-0.155*	-0.030	-0.076	-0.060	0.234**
%PopChg	0.183**	-0.058	-0.033	0.042	-0.145**
%PopEnrld	-0.201**	0.074	-0.112	-0.077	0.140*
HSCR-UNCsoph	0.067	0.004	-0.396**	-0.118	-0.130*
SAT-UNCsoph	0.163**	-0.108	-0.539**	-0.059	0.042

Note.^a*N* = 268 for every variable.**p* < .05. ***p* < .01.

Table 13

Pearson Correlation Matrix for Independent Variables 10 through 14

	\$FTE- AcadSpt	\$FTE- StdSpt	\$FTE- InstiSpt	MHI- SrvArea	RUCSrvArea
\$FTE-AcadSpt	1.00				
\$FTE-StdSpt	0.130*	1.00			
\$FTE-InstiSpt	0.107	0.339**	1.00		
MHI-SrvArea	0.012	-0.082	-0.439**	1.00	
RUC-SrvArea	0.060	0.233**	0.573**	-0.540**	1.00
%PopChg	0.032	-0.046	-.0213**	0.756**	-0.401**
%PopEnrld	0.108	-0.018	0.136*	-0.477**	0.284**
HSCR- UNCsoph	0.099	-0.147*	-0.207**	0.434**	-0.263**
SAT-UNCsoph	0.159**	-0.151*	-0.044	0.365**	-0.184**

Note.^a*N* = 268 for every variable.**p* < .05. ***p* < .01.

Table 14

Pearson Correlation Matrix for Independent Variables 15 through 18

	%PopChg	%PopEnrld	HSCR-UNCsoph	SAT-UNCsoph
%PopChg	1.00			
%PopEnrld	-0.476**	1.00		
HSCR-UNCsoph	0.371**	0.002	1.00	
SAT-UNCsoph	0.297	0.076	0.876**	1.00

Note.

^a $N = 268$ for every variable.

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

Table 15

Statistically Significant Pearson Correlations >0.3 Between Independent Variables

Pearson's <i>r</i>	Description of Variables
0.876**	HSCR-UNCsoph & SAT-UNCsoph
0.756**	MHI-SrvArea & %PopChg
0.638**	#CurrFTE & MHI-SrvArea
-0.607**	#CurrFTE & \$FTE-InstiSpt
-0.581**	#CurrFTE & RUC-SrvArea
0.573**	\$FTE-InstiSpt & RUC-SrvArea
0.540**	MHI-SrvArea & RUC-SrvArea
-0.539**	%InstrMin & SAT-UNCsoph
0.532**	\$FTE-CurrInstr & \$FTE-InstiSpt
-0.477**	MHI-SrvArea & %PopEnrld
-0.476**	%PopChg & %PopEnrld
-0.439**	\$FTE-InstiSpt & MHI
0.434**	MHI-SrvArea & HSCR-UNCsoph
0.428**	#CurrFTE & %PopChg
-0.405**	CT%CurrFTE & #Tran/CT-FTE
-0.401**	RUC-SrvArea & %PopChg
-0.396**	%InstrMin & HSCR-UNCsoph
0.384**	% InstrFem & %InstrMin
0.371**	% PopChg & HSCR-UNCsoph

Table 15 (continued)

0.365**	MHI-SrvArea & SAT-UNCsoph
0.339**	\$FTE-Stdtspt & \$FTE-Instispt
-0.321**	#CurrFTE & \$FTE-CurrInstr
0.302**	#CurrFTE & %PopChg

Note. ** $p < .01$.

Pearson's r of -0.159 at the $p < .01$ level of significance. Note, however, that the strength of these associations is weak; therefore, it was determined that regression analysis would not be appropriate, because this set of variables is insufficient to modularly predict the dependent variable, percent of transferees with ≥ 2.0 GPA. Implications of these findings are explored in Chapter 5, "Conclusion and Recommendations."

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

This study's aim was to determine whether any of 18 independent variables that inhere at the level of a community college as an institution or of its service area exert a statistically significant influence on the dependent variable, the North Carolina Community College System's (NCCCS) Performance Measure E, renamed Performance Standard 3 (PME/PS3). This final chapter begins with a synopsis of the study's origins and context, then reports and discusses its findings, proceeds to possible implications of those findings, and concludes with suggestions for further research. The conclusions reached in this study are limited to the NCCCS, although they may apply to other community college systems as well.

The Study's Origin and Context

In 1997 the North Carolina Community College System (NCCCS) launched a performance funding system that measures the success of its 58 member institutions by several statistics, among them PME/PS3, which is the annual percentage of a community college's qualifying transferees who achieve a 2.0 or greater GPA during their first two semesters at a University of North Carolina (UNC) university. Qualifying transferees are those who transfer 24 or more credit hours. The benchmark requires that a community college's entire cohort of transferees achieve the 2.0 GPA at a percentage rate at least equivalent to the UNC system's native-student average for that year.

Success or failure at PME/PS3 in a given year can mean an eventual difference in revenues of more than 8% of a college's budget, amounting to several hundred thousand dollars (see explanation in the section headed "NCCCS Performance Funding" in Chapter 2, "Review of the Literature"). However, over the five years of this study, UNC academic years 2002-2003

through 2006-2007, an average of only 39% of NCCCS colleges achieved the benchmark (*Critical Success Factors 2005-2009*).

The literature of community college transferee success is not especially helpful in illuminating this problem, because it focuses predominately on selected traits of individual students rather than on the community colleges they transfer from or the universities they transfer to, and in quantitative studies commonly utilizes the accomplishment of transfer itself as the dependent variable (Bailey et al., 2005; Baldwin, 1994; Castaneda, 2000; Hagedorn et al., 2006; Quany et al., 1999). Likewise, studies of post-transfer GPA tend to employ individual demographic, rather than institutional, traits as independent variables (Castaneda, 2000; Maryland Higher Education Commission, 2004). Another substantial group of studies has attempted with mixed results to confirm Hills's (1965) "transfer shock," or initial drop in GPA of two-year to four-year transferees. Hence, this study attempted to address a gap in the literature by exploring community college institution-level factors that might influence the NCCCS PME/PS3 score.

Summary of Findings

Null hypotheses were rejected for median household income (MHI) of service area and for percent of service area population enrolled. Both variables had low levels of significant correlation with the dependent variable: MHI of service area had a Pearson's r of 0.134 at the $p < .05$ level of significance, and percent of service area population enrolled had a Pearson's r of -0.159 at the $p < .01$ level of significance. None of the remaining 16 independent variables had a level of significance of $p < .05$ or stronger. The correlation results for all 18 independent variables will be examined next, in the section labeled "Discussion."

Discussion

It is perhaps not surprising that MHI of service area showed significant correlation with the performance of community college transferees at universities, because the literature corroborates that socioeconomic status of students is a factor in their performance at universities (Eddy et al., 2006; Wright & Bean, 2005). Further, since percent of service area enrolled shows a -0.477^{**} correlation with MHI of service area, it is not surprising that percent of service area enrolled also showed significant correlation with the dependent variable. However, it is interesting that MHI of service area had stronger correlations than -0.477^{**} with number of curriculum FTE, at 0.638^{**} ; with average Rural-Urban Continuum code of service area, at -0.540^{**} ; and with percent population increase of service area 2000-2007, at 0.756^{**} . Yet none of these variables had significant correlation with the dependent variable, and none of them even had nonsignificant correlations of greater than 0.089 with the dependent variable. One can only conclude that some hidden factor(s) was differentiating among these variables' effect on the dependent variable.

It is possible that percent of service area enrolled was negatively correlated with MHI of service area because lower MHI, or less wealth, suggests (a) a rural service area with fewer competitor colleges and universities that potential students can opt for, and (b) less-wealthy potential students who might choose the less expensive local community college over the more expensive university. However, it is more difficult to account for why percent of service area enrolled, considered by itself, showed a significant negative correlation with the dependent variable, no matter how small the effect. One might argue that higher percentage of service area population enrolled could translate eventually into higher percentage of potential transferees

becoming actual transferees, which in turn might mean that a higher percentage of less prepared students transferred, bringing down a community college's PME/PS3 score. Yet, if this factor—a college transfer program's degree of difficulty, or "internal selectivity," so to speak—were at work, then one would expect that number of transferees divided by college transfer FTE would produce a correlation with the dependent variable somewhat stronger than the nonsignificant and extremely weak -0.003 Pearson's r that it did produce. In sum for percent of service area enrolled, it is unclear why it showed correlation with the dependent variable while some other independent variables did not.

Also of particular interest is that neither average high school class rank of UNC sophomores nor average SAT score of UNC sophomores showed substantial or significant correlation with the dependent variable. According to Thomas Gould, past president of NCCCS College Transfer Program Association (personal communication, April 16, 2008), it is a commonly voiced assumption among NCCCS faculty that the more-selective (on average) the universities attended by a given community college's transferees, the greater that college's disadvantage on the PME/PS3. The opposite outcome was found by Astin (1982, 1993) and Astin and Oseguera (2005). Their studies suggest that students graduate at higher rates from more-selective institutions, and further, that the effect of university selectivity is even stronger than the effect of high school grades. However, if university selectivity's positive effect on native-student graduation extends to community college transferees' PME/PS3 scores, that effect did not manifest itself in this study. Pearson's r for average high school class rank of UNC sophomores was only -0.049 , and for average SAT score of UNC sophomores only -0.060 , neither of them significant at $p < .05$. It may be that the factors influencing native students'

choice of more- or less-selective universities are not the same factors at work in influencing community college transferees' university choices. Clearly this is an area for further study.

Another notable outcome is the failure of percent of transferees with the associate's degree to show correlation with the dependent variable, at nonsignificant -0.051 . Castaneda (2000) and Quany et al. (1999) both found that more hours transferred correlated with greater success at universities. However, Baldwin's (1994) study found that effect only when hours transferred were in "critical" courses (p. 126), and Carlan and Byxbe (2000) found no effect at all in either attainment of the associate degree or in number of hours transferred.

It was somewhat less unexpected that number of curriculum FTE turned out to have no discernable effect on the performance of a community college's transferee cohort at universities, showing a Pearson's r of only nonsignificant 0.081 . Bailey et al.'s (2005) finding that students graduate at a higher rate from small community colleges might be extrapolated to imply that transferees from smaller community colleges would perform better academically at universities. On the other hand, the transferees in Townsend and Wilson's (2006) study thought the disparity in size between the smaller community colleges they left and the larger university they transferred to had a negative effect on their university success. This study's lack of a significant finding for community college size as a factor in transferee performance could be interpreted to corroborate the mixed findings reported in the literature.

Findings for the other 12 independent variables, none significantly correlated with the dependent variable, are perhaps less noteworthy than the six already discussed but do present a number of questions and possibilities that might be fruitfully examined. College transfer (CT) FTE as a percentage of curriculum FTE was a variable used by Hill (2004), whose single-year

study corroborated this study by finding no statistically significant correlation between that variable and PME/PS3. In this study CT FTE as a percentage of curriculum FTE was, however, found to have a Pearson's r of -0.405 at $p < .01$ with number of transferees divided by CT FTE, a variable intended to represent the academic rigor of a college transfer program. In other words, as the size of a college transfer program rose relative to its institution's other academic programs, so did the percentage of that college transfer program's students who successfully transferred to universities. Why this should be is unclear.

Percent of instructors with the doctorate degree was also used by Hill (2004) as an independent variable, and as in this study, Hill found it to have no significant correlation with PME/PS3. This study found it to have no significant correlations greater than a Pearson's r of 0.3 with any of the study's other independent variables, either.

Exploring how students are influenced by administrators and instructors as role models, researchers have examined the impact of female instructors (Canes & Rosen, 1995; Hoffman & Oreopoulos, 2009; Neumark & Gardecki, 1998; Rothstein, 1995) and of minority instructors (Karunanayake & Nauta, 2004; Zirkel, 2002). This study found neither to correlate with PME/PS3 score. However, percent of female instructors and percent of minority instructors did have a Pearson's r of 0.384 with each other at the $p < .01$ level of significance, perhaps reflecting certain community colleges' conscious concern with or cultural habit of staff diversity. Further, percent of minority instructors had a Pearson's r of -0.539 with average SAT of UNC sophomores at the $p < .01$ level. This negative correlation likely reflects a number of community colleges that serve high-percentage-minority communities, and that therefore have high

percentages of minority staff and high percentages of transferees who attend colleges with more disadvantaged, lower-SAT-scoring native students.

Percent of FTE from distance learning classes was thought to be an interesting and potentially important independent variable for this study because of the sharp increase over the past decade or so in percentage of NCCCS courses offered via a distance learning format (see “Independent variable #8” in this study’s “Methodology” section). However, it produced no statistically significant correlation with PME/PS3 scores, nor did it produce any significant correlation above a Pearson’s r of 0.3 with any other independent variables. Whether the degree of a community college’s commitment to distance learning will become an influential factor for transferees in the future remains to be determined.

The next four independent variables were cost per FTE for the four major NCCCS spending categories that might be relevant to transferee performance: curriculum instruction, academic support, student support, and institutional support (omitting continuing education, and operations and maintenance). Number of curriculum FTE showed statistically significant negative correlation with cost per FTE for curriculum instruction, at -0.321, and with cost per FTE for institutional support, at -0.607, both at the $p < .01$ level. This is probably because, as Johnson (1999) points out, smaller community colleges may not reap the benefits of economy of scale. Curriculum instruction costs are likely higher per FTE at smaller colleges because some courses must be offered even when only partially full, meaning that an instructor produces fewer FTE. Institutional support costs are likely higher per FTE because even small colleges must have a president and full complement of senior administrative staff.

The economy-of-scale principle may also explain the cost per FTE for institutional support's correlations both with Rural-Urban Continuum Code (RUC), at 0.573, and with median household income (MHI), at -0.439, both at the $p < .01$ level. High RUC means more-rural (Economic Research Service, 2004), which in turn means a smaller community college and less economy of scale. Similarly, number of curriculum FTE had a significant 0.638 correlation with MHI, suggesting that low-population service areas were poorer; therefore, smaller colleges' high-cost institutional support correlated with MHI.

MHI, besides correlating with PME/PS3 score, number of curriculum FTE, and cost per FTE for institutional support, also had significant correlations with percent population change of service area 2000-2007, at 0.756; with RUC, at 0.540; with percent of service area enrolled, at -0.477; with average UNC sophomore high school class rank, at 0.434; and with average UNC sophomore SAT score, at 0.365. It seems reasonable to assume that these correlations have to do with the relative wealth and resources benefitting community colleges and their students in more-urban areas. The urban service areas also experienced greater growth: RUC and percent population change of service area had a -0.401 correlation significant at the $p < .01$ level.

Perhaps the least surprising correlations found were MHI with percent of service area enrolled, at -0.477, and UNC average high school class rank with UNC average SAT, the highest of all at 0.876, both at $p < .01$. As discussed previously, community colleges in low-wealth areas tended to enroll a greater portion of their local populations in part because, probably, of few competitor colleges nearby. SAT score and high school class rank obviously are expected to track each other.

Overall, so many factors may play a role in determining why a community college's transferees achieve a 2.0 GPA at universities, and the dynamic of transferee success may be so complex and changeable with time, that no single factor or even small cluster of factors can consistently show substantial correlation with transferee academic outcomes over a period as long as five years. Alternatively, it may be that factors affecting individual students produce the strongest effect on outcomes, but that the range of those factors present in a cohort of transferees cancels that effect when measured at the level of the institution.

Implications

Five major implications are suggested by the results of this study. The first is that NCCCS personnel should look elsewhere than local economic conditions, or the size of their community college, or which universities their transferees attend to answer the question of why their college succeeds or fails on the PME/PS3 score. Even though service area MHI showed significant correlation, the effect was quite small, while community college size, university selectivity, and all of the other variables analyzed had Pearson correlations that were not only nonsignificant but also weaker than +/- 0.1.

A second implication is that, if community college-level factors do not strongly influence transferee success, then that influence must lie either in the individual transferees themselves or in the universities they transfer to. For NCCCS, for its constituent colleges, and for college personnel, this means implementing and enabling policies and practices that allow focus on the potential transferee student as an individual. Such focus suggests in turn relatively low student-to-instructor classroom ratios and/or student services programs that promote dynamic personal engagement between college personnel and potential transferees.

A third implication is that universities might do more toward improving transferee performance. It seems probable that many transferees indeed experience “transfer shock” either in GPA (Carlan & Byxbe, 2000; Diaz, 1992; Doucette & Teeter, 1985; Glass & Harrington, 2002; Hills, 1965; Meltson & Lucas, 1990; Nolan & Hall, 1974; Pounds & Anderson, 1989) or in substantial psychosocial distress, or both. Universities might concentrate that help particularly in the first year of transfer, while transferees are acclimating to the university environment. Universities might also reach out more to cooperate and coordinate with the community colleges that are now producing almost half their eventual bachelor degree graduates (McPhee, 2006).

A fourth implication is that perhaps the PME/PS3 should not measure a transferee’s first two semesters at a university, or at least not the first two semesters only. If transfer shock is a real and consistent phenomenon, then that is exactly the wrong period to measure. Graduation with the baccalaureate degree might be the best PME/PS3 measure, since the baccalaureate itself is the goal of transferees and of the community colleges who prepare them, not two interim semesters.

A fifth and final implication, a combination and extension of reasoning based on the implications already explained, is that perhaps there should be no PME/PS3 at all, or at least such a measure should not impact potential funding. If, as the bulk of the literature suggests, transfer shock may put community college transferees to universities at an initial disadvantage to native university students in GPA, then a measure requiring transferees to perform as well as native students is unrealistic until the causes of that problem are solved. Further, only two of the 18 institution-level variables examined in this study were found to influence transferee performance, and that influence was relatively weak: service area MHI and percent of service

area enrolled. Of those two, service area MHI is not manipulable by the community college, and it seems an unsound practice, even an unfair one, to make any potential performance funding dependent on a factor not manipulable by the community college. Percent of service area enrolled is perhaps to some degree manipulable by the community college, but the correlation was negative, i.e., the smaller the percent of its service area a community college enrolled, the better it performed on PME/PS3. To gain a relatively small improvement in its PME/PS3 score, does a community college want to serve a *smaller* percent of its service area?

To synthesize the implications of this study, community college practitioners need a more substantial body of research, and one more singularly aimed at their transferee problem, on which to build a set of practices that will prepare transferees to perform successfully at universities. At present, simply too little research provides clear guidance to support any significant resource-draining, institution-level change toward improving transferee performance. Further, because a body of research does suggest the strong possibility that transfer shock handicaps community college-to-university transferees, but a dearth of actionable research leaves community colleges not knowing how to improve their transferees' performance, then any funding mechanism based on that performance is both unwise and unfair.

Recommendations for Further Research

First, any promising institution- or service-area-level factors overlooked by this study—whatever they may be—should be researched to continue the important inquiry into how community colleges can help their potential transferees, and in what way those community colleges should be judged on their efforts. In particular, more-granular inquiries should explore (a) the effects that a community college service area's economy exerts on its transferees; (b) the

mechanisms by which the percent of service area population enrolled might negatively impact a community college's ability to prepare its transferees; and (c), the dynamic among area economic condition, percent of service area enrolled, and transferee performance at universities, and how any negative relationships can be mitigated.

Second, it seems feasible that any of the variables explored in this study might well exert a substantial influence on transferee performance *at a particular community college, and/or in a given year*, even though a particular variable did not produce strong, significant Pearson correlations for all colleges over five years. For example, certainly a sudden, severe economic downturn locally, such as that brought on by plant closings, might inhibit the success of a college's transferees by stressing their home-based financial resources, uprooting their social networks, and generally eroding the strength of their support systems. Or, for another example, a college's decision to temporarily increase instructors' loads (i.e., decrease funds for instructional support) in response to state funding fluctuations could negatively impact the academic preparation of one or more classes of transferees. Therefore, individual community colleges should be encouraged, and enabled with support, to monitor and analyze their own institutional data relative to the university success of their transferees so that they are equipped to respond effectively when a trend of transferee failure becomes apparent. Such data tracking might even be mandated systemwide, made uniform, and disseminated annually so that community colleges could compare results, recognize trends, and learn to analyze their own practices in ways that they had neither thought of nor been equipped to do before.

Third, if the current PME/PS3 measure continues to be used, then it should be determined whether it is an accurate proxy measure for eventual baccalaureate attainment, since the bachelor

degree is the primary goal. As shown in this study, the average NCCCS-to-UNC transferee enters the university as a sophomore, where his or her academic performance is measured for the following two semesters. However, transfer shock may put NCCCS transferees at a decided disadvantage to UNC native students, especially during the transferee's first year. Perhaps even more to the point, sophomore- or junior-year performance is only a single snapshot taken during a transfer student's academic journey, and arguably an inappropriate one. The transferee's destination is not, after all, a sophomore- or junior-year GPA benchmark, but baccalaureate attainment.

Fourth, PME/PS3 might be changed from the rather simplistic binary metric of whether or not transferees maintain 2.0 GPAs. Average GPA of a community college's transferee cohort is obviously a more specific measure, and perhaps more useful on that account alone. There is a substantial difference in university performance between a cohort who attains an average GPA of 2.0 and one who attains an average GPA of, say, 3.0 or more. It could be argued that asking NCCCS colleges to produce transferee cohorts who must meet only the minimum "good standing" is less motivational than asking those colleges to compare their cohorts' actual GPAs.

From this study, then, we know that an array of community college- and service area-level factors have either very little influence or none at all on how those college's transferees perform in their first two semesters at universities, at least insofar as that performance is measured by PME/PS3. However, we still need to understand why some individual transferees succeed while others do not, and why one community college's transferee cohort performs better over time than another's. The answers to those questions will not only help community colleges

more effectively prepare their transferees to succeed at universities, but also, when performance funds are at stake, those answers will aid community colleges in supporting the citizens of their service areas via basic skills instruction, vocational training, professional certification, and all the myriad services community colleges are called upon to provide.

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APPENDIX: INSTITUTIONAL REVIEW BOARD APPROVAL LETTER



December 11, 2009

Tim Wright, EdD Candidate
LEED Department, College of Education
81 Spring Branch Drive
Four Oaks, NC 27524

RE: **Exempt Certification for UMCIRB #: 09-0872**
Funding Source: unfunded

Title of Research: The Effect of Selected Institution- and Service-Area-Level Community College Traits on the Academic Performance of Transferees at University

Dear Mr. Wright:

On December 3, 2009, the University & Medical Center Institutional Review Board (UMCIRB) determined that your research meets ECU requirements and federal exemption criterion #4 which includes collection or study of existing data, documents, or records.

It is your responsibility to ensure that this research is conducted in the manner reported in your Internal Processing Form and Protocol, as well as being consistent with the ethical principles of the Belmont Report and your profession.

This research study does not require any additional interaction with the UMCIRB unless there are proposed changes to this study. Any change, prior to implementing that change, must be submitted to the UMCIRB for review and approval. The UMCIRB will determine if the change impacts the eligibility of the research for exempt status. If more substantive review is required, you will be notified within five business days.

The UMCIRB Office will hold your exemption application for a period of five years from the date of this letter. If you wish to continue this protocol beyond this period, you will need to submit an Exemption Certification Request at least 30 days before the end of the five year period.

Sincerely,

Chairperson, University & Medical Center Institutional Review Board

pc: Norma Epley, Director
David Siegel, Faculty Mentor