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The effectiveness of developmental education at Forsyth Technical Community College, Winston-Salem, North Carolina

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THE EFFECTIVENESS OF DEVELOPMENTAL EDUCATION AT FORSYTH TECHNICAL COMMUNITY COLLEGE, WINSTON-SALEM, NORTH CAROLINA

by

Charles Richard King

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APPROVAL PAGE

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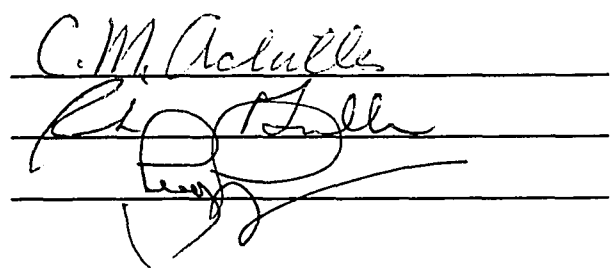
Committee Members 

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The purpose of this study was to gain information about the effectiveness of the developmental program at Forsyth Technical Community College (FTCC). Specifically, this study compared the academic success of students placed in developmental programs before entering a curriculum with the success of those curriculum students who did not require developmental courses. Academic success was measured by grade point average (GPA) at the end of four quarters in the curriculum. In addition, this study included a questionnaire designed to measure the students' perception of the developmental program, an analysis of demographic variables of developmental students, a comparison of entrance examination scores and grade point averages, and an analysis of attrition rates.

Data were collected on 376 students who were enrolled in curriculum programs during the 1990-91 academic year. The data collected on each student included cumulative grade point average, age, race, sex, employment status, day or evening enrollment, financial aid status, perception of the developmental program, attrition rates, and entrance examination scores. Five research questions were developed to determine the effectiveness of the developmental program at

FTCC. The student data were analyzed using descriptive statistics, chi square, analysis of variance, and multiple regression.

Based on the analysis of the research questions it was determined that the developmental program at FTCC is effective in preparing developmental students for success in the curriculum. The cumulative GPA was essentially the same for those students who completed developmental studies prior to entering a curriculum and those curriculum students not requiring developmental studies. The perception among developmental students of the developmental program was positive. The data used for this study indicated that the demographic variables had no impact on the developmental students' GPA. Sections of the entrance examination related to success in the curriculum. Finally, the attrition rate of the developmental students was not significantly different from those students not requiring developmental studies prior to entering their curriculum. These findings support the contention that FTCC is effective in preparing developmental students to achieve success in their curriculum.

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To my mother, Evelyn, my love and gratitude for her support and for teaching me the value of education. This dissertation is dedicated to the memory of my father, Charles Robinson King, and to my mother.

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CHAPTER I

INTRODUCTION

American postsecondary institutions have been confronted by the problem of responding to increasing numbers of students unprepared to handle college-level courses (Roueche, 1984). Recently conducted research has shown that approximately one-third of all entering college freshmen need remediation in reading, writing, and mathematics (Plisko & Stern, 1985). Although there has been much focus on the causes of this phenomenon, there has also been very little improvement, if any, in the depth and breadth of this national problem (Morante, 1989). Further, there is evidence to support the conclusion that successful completion of high school courses or receipt of a high school diploma does not necessarily mean proficiency in basic skills (New Jersey Basic Skills Council, 1989). Someday this might be reversed, but there is currently no end in sight. Indeed, since college admissions committees are likely to continue to admit students who do not complete or perform successfully in high school, there is likely to be a continued need for developmental education emphasis in those institutions of higher education that those students attend.

Faculty at two-year and four-year colleges and universities across America continue to attempt to cope with

the learning deficiencies brought to them by students, who for myriad reasons are not prepared to navigate college-level work successfully. Hence, many of the approximately 3,000 institutions of higher education in the United States have some type of remedial or developmental education services. Educators at prestigious Stanford University established a learning assistance center, a remedial program for bright but underachieving students. Begun in 1972, it serves more than 50 percent of Stanford's freshmen each year (Henry, 1986).

Educators at two-year colleges took an early lead in development of courses and programs for students with academic deficiencies (Grant & Hoehner, 1978). The open door policy of the community colleges has provided an opportunity to pursue higher education for "millions of people who had previously found the doors of selective universities closed" (Access, 1987). A commitment to nonselective admissions is not enough to ensure success to all students who enter the community colleges. Therefore, to prepare students for success, it is imperative that their entry-level skills and abilities be determined (Sims, 1989). Students identified as having deficiencies can then be channeled into and perhaps benefit from developmental programs. Yet, the success of these programs is not known in a generalizable or universal sense. Tens of millions of dollars are expended annually for delivery

of developmental and remedial programs with unclear definitions for such services and even more ambiguous criteria for evaluation (Resnick, 1980).

STATEMENT OF THE PROBLEM

The open-door policies which typify many of the community colleges in this country can be seen as having both positive and negative aspects. From the positive point of view, for the first time a college education is available for many who were previously not able to attend college. Many of these students are economically and socially disadvantaged and they are ill-prepared for college-level work. As more colleges have adopted open-door policies and more students have entered, it has become clear that developmental programs must be available if these students are to achieve success.

Developmental programs, resource centers, and learning centers have been designed with the intent of helping under-prepared students meet college requirements. The Pretechnical program, which began in 1972 at Forsyth Technical Community College (FTCC), located in Winston-Salem, North Carolina, exists to provide students with an opportunity to build academic skills and acquire the background which should facilitate success in their chosen curriculum. This program is similar to most of the developmental programs in the other 57 colleges of the North Carolina Community College System (Sims, 1989). Students applying to FTCC for an associate

degree curriculum must take the Assessment and Placement Test (APT). The results of this test determine whether the applicant is placed directly into the curriculum or placed in the Pretechnical program. Admission to different curriculums requires different placement scores. For example, a reading score of 52 is required for the Associate Degree Nursing curriculum whereas a score of 45 is required for Business Administration.

Students placed in the Pretechnical program at the time of their admission must take reading comprehension, developmental English, and/or developmental mathematics. After completing the required developmental courses, students may enter the curriculum of their choice by either retaking the APT and attaining the required scores or by receiving the recommendation of the Pretechnical department. The admission requirements of the particular department determine whether a retest on the APT is necessary for admission. The success of the Pretechnical program has not been determined. Therefore, a study is needed to determine whether students, after completing required developmental coursework, are as academically successful in their curriculum as are students not required to take developmental coursework.

PURPOSE OF THE STUDY

The purpose of this study was to gain information about the effectiveness of the developmental (Pretechnical) program

at Forsyth Technical Community College. Specifically, this study compares the academic success of students placed in developmental programs before entering a curriculum with the success of those curriculum students who did not require developmental courses. Academic success is measured by grade point average (GPA) at the end of four quarters in the curriculum. In addition, this study includes a questionnaire designed to measure the students' perception of the developmental program, an analysis of demographic variables of developmental students, a comparison of posttest APT scores and grade point averages, and an analysis of attrition rates.

RESEARCH QUESTIONS

1. Is there a significant difference among the grade point average (GPA) means of three groups of students: 1- those placed directly into their curriculum, 2- those placed into their curriculum after developmental studies based on the APT posttest, and 3- those placed into their curriculum after developmental studies based on departmental recommendation?
2. What is the perception among developmental students of the effectiveness of the developmental program?
3. Are there individual demographic characteristics (age, race, sex, employment status, day or evening enrollment, financial aid status) of developmental students that relate to success in curriculum, as measured by GPA?

4. How well does the entrance exam (APT) predict success in the curriculums, as measured by GPA?
5. Are the attrition rates different, after entering the curriculum, for those students who completed developmental studies and those who did not require developmental studies?

DEFINITION OF TERMS

1. Academic success

Academic success is defined as achieving a GPA of 2.00 or better at the end of two quarters in a curriculum. A student who does not have a 2.00 at the end of two quarters is either placed on academic probation or withdrawn from the curriculum.

2. Curriculum

A prescribed set of courses that leads to an associate degree or vocational diploma.

3. Developmental student

Developmental students are those students who have shown marked deficiency in reading, English, and/or mathematics as measured by the Assessment and Placement Test (APT). The deficiencies are measured by scores on the APT required for admission to the student's chosen curriculum.

4. Grade Point Average (GPA)

The grade point average is the ratio of quality points to credit hours attempted. The quality points are assigned as

follows: A - 4 points, B - 3 points, C - 2 points, D - 1 point, and F - 0 points.

5. Pretechnical Program

The Pretechnical program is the developmental program at Forsyth Technical Community College. This program includes a series of courses in preparation, remediation, and guidance for students who do not meet the specific APT requirements of their chosen curriculum.

LIMITATIONS

1. The cost effectiveness of the developmental program was not determined due to lack of available information.
2. This study did not assess the relationship between instructor qualifications and student success because of the random nature of teacher assignments.
3. The results of this study may not be generalizable outside Forsyth Technical Community College or possibly outside the North Carolina Community College System. Without further research, the results of this study may be applicable only to those North Carolina Community Colleges that require entrance examinations for admission to curriculum programs.
4. The non-experimental nature of this study and the low validity of the Assessment and Placement Test (APT) suggest that any conclusions or generalizations be applied with caution.

SIGNIFICANCE OF THE STUDY

The results of this study may provide significant information on the effectiveness of developmental programs at FTCC. The results may help admissions staffs and administrators to understand the factors that contribute to the success of students who start their academic programs in developmental studies. Administrative and instructional staffs may be able to use this information when designing and implementing changes in the developmental studies program. Hopefully, this information may be used as a decision-base if it becomes necessary to provide support for the cessation, continuation or expansion of the developmental program. Insights gained from this study may also be used by the community college counseling staffs when supporting and advising developmental students.

ORGANIZATION OF THE STUDY

The basic organization plan for the remainder of this study is as follows:

Chapter Two. This chapter consists of a review of the literature, a brief history of the North Carolina Community College System, a history of Forsyth Technical Community College, and the results of relevant studies of developmental programs and students.

Chapter Three. This chapter addresses the methods of gathering and analyzing data. Included is the pertinent

information about the study design, population, sample, test instrument, data collection, and methods of analysis.

Chapter Four. This chapter contains the study data and an account of the results of the data analysis. The information is presented with tables, figures, charts, and a discussion of the findings.

Chapter Five. This final chapter contains a summary of the findings, presents conclusions based upon those findings, a discussion of the results, and recommendations for further research.

CHAPTER II

REVIEW OF LITERATURE

The purpose of this study was to gain information about the effectiveness of the developmental (Pretechnical) program at Forsyth Technical Community College. The admission of underprepared students has been a continuing problem for American higher education; the problem is not new. As early as 1852, the problem of students poorly prepared for college was addressed by personnel at the University of Michigan (Mickler and Chapel, 1989). In 1862, leaders at Iowa State College established a remedial program for its students who had deficiencies in reading, writing, and mathematics. The problem was acknowledged at Harvard, Yale, Princeton, and Colombia Universities around the turn of the century when entering students were unable to perform at the basic skills level required by institutional admission standards (Maxwell, 1979). In his inaugural address as president of Harvard College in 1869, Charles William Eliot stated, "The American college is obligated to supplement the American school. Whatever elementary instruction the schools fail to give, the college must supply" (Eliot, 1869). Cross (1976) traced the roots of developmental education back to a pre-college mathematics course offered at Wellesley College in 1894.

Bridging the academic preparation gap has been a constant in the history of American higher education and the controversy surrounding it is an American educational tradition (Brier, 1984).

After the Civil War, the demand for an improved calibre of entering students as well as improvement in American higher education increased in intensity. The nineteenth century college growth movement greatly expanded the meaning of institutional and student diversity. At the beginning of the nineteenth century, church-related colleges for men served as the sole model of American higher education. By the last quarter of the century, institutional types included scientific and technical institutions, state colleges, colleges for women and for blacks, and coeducational institutions (Brier, 1984). New and developing institutions brought what Cross (1976) eventually referred to as "new students" -- students with developmental educational needs -- into higher education. Faced with underprepared applicants and a strong need for enrollment, nineteenth century colleges, like many of the twentieth century descendents, admitted students whether they were prepared or not. Developmental education, then, became an essential ingredient in higher education.

The recent proliferation of remedial programs can be traced to the 1960s and early 1970s when many students from economic and ethnic groups, traditionally under-represented in

higher education, began to enroll in ever increasing numbers (Rounds and Anderson, 1985). Since then, developmental education programs have increased steadily in number and scope. As a result, the faculty at many schools hastily developed remedial programs, many of which proved to be ineffectual. Roueche and Snow (1977) reported that very few students progressed beyond the remedial courses. They stated, "In those few colleges where evaluation data (on remedial programs) were available, the program results were disastrous."

Not until the 1970s were programs redesigned by subject-matter specialists and specially trained faculty were assigned to teach students needing remedial instruction (Mickler and Chapel, 1989). Concurrently, such instructional innovations as individualized, self-paced, master, and programmed learning, as well as new technologies, were employed to increase the effectiveness of these programs (Rounds and Anderson, 1985).

The prevailing attitude about remediation also has undergone a change since the early 1960s. Then it was not at all uncommon to find faculty and administrators who sincerely believed that students had the "right to fail" and, as adults, were given the option of enrolling in remedial courses or regular courses. Rounds and Anderson (1985) point out that mandatory remediation was uncommon until recently. Currently, a growing number of institutions requires pre-enrollment

assessment and mandatory placement of students to avoid the pitfalls of failure (Mickler and Chapel, 1989). If students are assigned to remedial courses, they are required to complete them successfully before being allowed to enroll in college-level courses.

In a rapidly changing world, the demands for education have resulted in thousands of highly motivated high school graduates, high school dropouts, adults, or recent immigrants, who lack adequate skills for academic success, being admitted to collegiate-level institutions each year. A 1983 national survey of colleges, reported by Lederman, Ribaudo, and Ryzewic (1985), found that 85% of those instructors responding perceived that incoming freshmen were poorly prepared. A substantial percentage of freshmen that year required assistance in the basic skills with 28% deficient in reading, 31% deficient in writing, and 32% deficient in mathematics. Should these students be failed summarily or do college faculty have an obligation to provide appropriate services to assure them of a reasonable chance for success?

By providing opportunities for success "against all odds" while maintaining academic integrity, developmental programs can assist students with limited educational skills in overcoming their deficiencies. In keeping with the democratic ideals of education, faculty at colleges at all levels should provide the remediation needed to allow all individuals every chance to realize their full potential. The student who

graduates in spite of difficulties, having perservered and met with success, is more likely to be a supportive alumnus, make a greater contribution to his/her community, and have a more positive long-term impact on society than those who did not graduate (Mickler and Chapel, 1989).

THE COMMUNITY COLLEGE

The community college emerged as a major force in higher education after World War II. The demands for higher education in the 1950s and 1960s worked to the advantage of the community colleges, for many four-year colleges and universities were literally bursting at the seams (Vaughn, 1983). If America was to fulfill the dream of universal higher education, some means were needed for serving the large numbers -- particularly the academically underdeveloped members of society. That there is a need for developmental education programs to serve a vast number of American students who have been ill-served by their prior educational experiences seems obvious. The improvement of social and economic conditions within the nation is a likely outcome of improved literacy and employment opportunities. Whether community colleges are the logical place for these programs may provoke some disagreement, but as long as an open admissions policy remains part of the community college's mission, and as long as the community's priorities can direct the institution's priorities, then these colleges, as Cohen

and Brawer (1982) point out, have the responsibility to teach their students the skills required for them to succeed.

Vaughn (1983) has identified three key assumptions that underlie most community college developmental education programs.

> The first is that the increasing population of inadequately prepared students who come to the nation's community college is educable -- that is, that under appropriate conditions, such students can be prepared to learn well in college or vocational and technical curricula. The second assumption is that these appropriate conditions can be provided in an efficient manner with the resources available to community colleges. The third assumption is that the community college is the most appropriate place to provide the developmental education experience.

According to Donovan (1985), personnel in community colleges now realize that they are not likely to be relieved of the responsibility for developmental education in the foreseeable future. He identifies three reasons that dominate the thinking of college personnel:

> First, there is little evidence indicating that the tightening of high school standards will greatly affect the number of recent high school graduates underprepared for college-level work. Second, as the number of recent high school graduates declines, it is increasingly unlikely that many colleges facing enrollment shortfalls will deny admission to underprepared students. Finally, with the dramatic increase in the number of minority students in the 1970s, there will be substantial pressure not to retreat from postsecondary education's new and belated diversity.

Zoglin (1982) called the community college the "institution of last resort" for many underprepared developmental students, and concluded that "No matter how

unpopular the remedial function may become, we must keep it," and it is one job of the community college faculty to deal with underprepared students.

NORTH CAROLINA COMMUNITY COLLEGE SYSTEM

In the years following World War II, North Carolina began a rapid shift to accommodate both an agricultural and an industrial economy. With that change came an awareness that a different kind of education was needed in the state. People who did not desire a four-year baccalaureate education nevertheless had the need for more than a high school diploma (North Carolina Community College Fact Book, 1990). In 1950, the State Superintendent of Public Instruction authorized a study of the need for a system of tax-supported community colleges. The resulting report, by Alan S. Hurlburt, of Duke University, was published in 1952. It proposed a plan for development of state-supported community colleges. In 1957, the General Assembly adopted the first Community College Act and provided funding for community colleges (Wiggs, 1989).

In May 1963, the General Assembly, in line with the Carlyle Commission report, enacted into law G.S. 115A (later changed to 115D), that provided for the establishment of a Department of Community Colleges under the State Board of Education. At that point there were 20 industrial education centers, 6 community colleges, and 5 extension units (North Carolina Community College System Fact Book, 1990).

By 1966, there were 43 institutions with 28, 250 full-time equivalent (FTE) enrollments. In 1969, there were 54 institutions with 59,329 FTEs. The system had grown very rapidly, exceeding ten percent annually nearly every year until the late 1970s. In 1974-75, growth reached the 33 percent mark (Wiggs, 1989). The system continues to grow in enrollment nearly every year, but by much more modest margins. The number of institutions has not increased since Brunswick Community College became the 58th in 1978. Enrollment in 1989 was approximately 660,000 students by unduplicated headcount.

The mission of the system has been defined in the North Carolina General Statues (115D):

> ...the establishment, organization, and administration of a system of educational institutions throughout the state offering courses of instruction in one or more of the general areas of two-year college parallel, technical, vocational, and adult education programs...

The law further states that:

> The major purpose of each and every institution operating under the provisions of this Chapter shall be and shall continue to be the offering of vocational and technical education and training, and of basic, high school level, academic education needed in order to profit from vocational and technical education, for students who are high school graduates or who are beyond the compulsory age limit of the public school system and who have left the public schools.

The statutory mission statement serves to keep the system focused on vocational and technical education. It also specifically mandates provision of basic academic education for adults through the high school level. These programs --

vocational and technical education, and basic academic education for adults -- have priority status because of their specific place in the statutory mission statement. The mission directs the system to serve adults who have left the public schools and are beyond compulsory school age. This definition provides the background for development of policies governing the institutions' programs in developmental or remedial education.

FORSYTH TECHNICAL COMMUNITY COLLEGE

Forsyth Technical Community College (FTCC) can trace its beginning to early adult and high school vocational courses available in Winston-Salem, North Carolina. In 1958, a Chamber of Commerce Study Committee recommended that an Industrial Education Center be built to provide the trade and technical training needed by local industry. A bond issue provided the money to start construction of two buildings late in 1959, and the first adult classes were begun in October of 1960. In 1963, a third building was constructed and new technical programs were added. That same year the North Carolina Legislature passed the Community College Act, creating a statewide system of community colleges, technical institutes, and industrial education centers (Wiggs, 1989). In January, 1964, the name of the school was changed to Forsyth Technical Institute. The operation of the school was transferred from the Winston-Salem/Forsyth County Schools to

a local board of trustees. In July, 1985, Forsyth Technical Institute became Forsyth Technical College, and in December 1987, it became Forsyth Technical Community College (FTCC General Catalog, 1989-91).

The FTCC Employee Handbook (1991-92) lists the stated purposes of the college as:

1. Effective teaching and academic support services for adults.
2. Opportunities for adults who need to master education skills.
3. Vocational education and training for adults who are preparing to enter skilled trades.
4. Technical education and training for adults wishing to enter occupations in business, industry, and health services.
5. Technical, vocational, and self-improvement courses for adults.
6. Education for adults who wish to further their schooling at four-year institutions.
7. Employee training and retraining for business and industry in response to changing economic conditions.

Forsyth Technical Community College is an open-door institution which offers adults the opportunities for learning which leads to gainful employment and effective community membership (FTCC General College Catalog, 1989-91). the "open-door" policy does not mean that there are no restrictions on admission to specific programs. It does mean that these restrictions are flexible enough to allow students opportunities to improve their educational status. A student will be given opportunities to eliminate deficiencies through remedial/developmental work. The students may remain in a program as long as they make satisfactory progress. When

students are able to meet the specific admission requirements for a given curriculum, they may be enrolled in that curriculum.

Institutional data provided by the Office of Student Development Services reveal the following facts about FTCC:

--- The campus is located in Winston-Salem, N.C. on 38.34 acres with 13 buildings.
--- The enrollment fall quarter, 1990, was 4,923 curriculum students and 6,000+ continuing education students.
--- The annual budget for the 1990-91 school year was $18,856,769 of which $9,810,000 was payroll for 200+ full-time and 300+ part-time employees.
--- The graduation ceremony is held twice a year; at the end of the spring quarter and the end of summer quarter. Seven hundred and three (703) students graduated in 1991.
--- An analysis of student withdrawal data for 1989-90 shows that the mean "drop-out" rate was 35% across the 47 curricula. The range was from 14.3% for Radiologic Technology to 89.5% for Mechanical Drafting and Design Engineering Technology.

Relevant Studies

A search of the relevant studies revealed a large number that have been conducted to evaluate the effectiveness of developmental programs in elementary school through the university level. Some studies are concerned with only one subject area, e.g., math; while others are more comprehensive and investigate the whole developmental program. The present study falls into the second category. Although some were able to link success in remedial programs with achievement in subsequent courses, most researchers tend to relate success in

remedial programs to retention (Deegan, Tillery, & Associates, 1985). Lavin, Alba, and Silberstein (1981) note that in the giant multicompany CUNY effort, success in remediation could only be linked with subsequent persistence in college. Cohen (Cohen & Brauer, 1982) reports that the only conclusive effect of remedial programs is the tendency to lower the student dropout rate. The present study differs from previous investigations in that multiple measures of effectiveness were utilized.

In a study of remedial arithmetic scores in three California community colleges, Randall (1972) evaluated the effectiveness of required remedial arithmetic courses in terms of improving skills and attitudes. Although he did not compare the remedial students with a control group, he did find significant improvement in skills and he also found that attitudes about math were more improved by the traditional lecture than by a programmed text.

An earlier study by Clark (1967) was conducted at Virginia State College. He investigated (1) the relationship between entering non-remedial students' placement test results and their academic performances in initial college math courses; (2) the academic performances of those students who had completed the remedial math course and who then enrolled in initial college math courses compared with the academic performance of non-remedial students in these intial math courses; and (3) the relationship between remedial students'

math weaknesses and remedial math course content. His findings indicated that the remedial courses were somewhat effective in preparing math-deficient students to compete successfully with non-remedial students in two of three initial college math courses.

When English courses are examined, the same kind of comparisons and evaluations have been made. For example, Baker (1982) compared college freshmen achievement in remedial English courses and in freshmen composition courses and found that significant gains were made by remedial students. He also found that these gains, as measured by a writing sub-test, were not significantly different from those made by students in the regular freshmen classes.

Some researchers concluded that the developmental program was unsuccessful. At Harrisburg Area Community College, Basonic (1982) analyzed the academic performance and persistence of developmental students. Overall, the students were not successful in the developmental courses. These students had a pattern of low GPAs, suspensions, failing grades, and repeated courses. Basonic did not attempt to evaluate the program to find the reasons for the failures.

Generally, the developmental programs show some degree of success. Snowden (1972), at Western Michigan University, confirmed that the GPA of the developmental group was significantly higher than that of two non-developmental groups

and that the developmental group maintained academic persistence equal to that of the control group.

Mann (1988) reviewed the evaluation of 11 developmental programs in community colleges across the United States from 1979 to 1987. She found very few commonalities among evaluations. Most of the evaluations focused on some aspect of academic performance as a result of the developmental activity or how well students were retained rather than lost through attrition.

Of more significance to this study is one conducted at four North Carolina Community Colleges (Sims, 1989). Her purpose was to attempt to discern the relationship between the admission/placement test scores of developmental students in English, reading comprehension, and mathematics in the community college and the developmental students' final overall GPA at graduation. A linear regression analysis was used to determine the relationship between the admissions/placement test scores and the final overall GPA at graduation. The analysis showed no significant relationship between developmental courses in reading comprehension, English, and mathematics and the developmental students' final overall GPA at graduation. The data did show that generally, the higher the admission/placement test scores the higher the final overall GPA.

SUMMARY

Mounting concern over the perceived decline in student aptitude coupled with increasing interest in assessment of student learning outcomes have forced many institutions to reexamine the effectiveness of their academic programs. Nowhere is this more apparent than in the remedial programs and services offered by community colleges (Alfred and Lum, 1988). Much has been written about remedial programs in community colleges, but a paucity of information is available with respect to long-term student achievement following remedial or developmental instruction. The most widely quoted research studies have been those completed by Cross (1971; 1976) and Astin (1975; 1977; 1982). Cross found that developmental students served by the community colleges exhibit major differences from traditional students on characteristics such as academic achievement in secondary school; family socioeconomic background; self-esteem; willingness to take chances; and prior educational achievement in the family. Other studies have suggested that only a small percentage of students entering the community college with marginal reading, writing, and mathematics skills -- those who could profit most from developmental studies -- actually enrolled in the developmental courses when given the choice (Maxwell, 1980; Friedlander, 1981). This research has been deficient in the examination of multiple effects of selected student and institutional variables on academic achievement.

Successful completion of college-level courses following enrollment in developmental programs is considered to be an important educational issue (Alfred and Lum, 1988). As such, it has commanded the attention of researchers, teachers, and administrators who are trying to measure the effectiveness of developmental programs. Part of the difficulty in evaluating the effectiveness of developmental programs is that this issue, like many others, is complex and multifaceted. Each variable used to examine the effectiveness of developmental studies -- student demographics, grade point averages, students' perceptions of the developmental program, and entrance examination scores -- requires attention.

Because developmental program effectiveness in community colleges has been a long-standing problem, there is considerable research literature on this topic. The earlier literature, although useful in exploring the depth and significance of the problem, in general has suffered from several shortcomings. First, many developmental programs and the courses that comprise them may have been hastily and poorly designed. They often lack clear goals and objectives, or possess inadequate procedures for data collection (Rounds and Anderson, 1985). Second, research on developmental programs has been largely correlational in nature and has been able to show only bivariate relationships between academic achievement and a host of antecedents. Third, in a postsecondary context, heretofore marked by limited interest

in student assessment, college faculty and staff have lacked incentive for empirical research on student outcomes (Alfred and Lum, 1988). Gordon (1970) as early as 1970 reported that developmental programs had generated little valid evaluation findings. This trend continues and too little has been done since the infancy of these programs to ensure their continued success and viability (Henry, 1986).

The present study has moved beyond earlier efforts, building on their strengths. The present research compared the academic success of students placed in developmental programs before entering a curriculum with the success of those curriculum student who did not require developmental courses. In addition, students' perceptions of the developmental program were measured, demographic variables of developmental students were examined, entrance examination test scores and grade point averages of developmental students were compared, and an analysis of attrition rates was conducted.

The problem of student achievement beyond developmental education is unlikely to go away. Thorndike (1942) noted that "if a thing exists, it can be measured." The basic assumption, then, for all responsible for these programs, should be that the programs do exist, and their impact can be measured.

CHAPTER III

METHODOLOGY

The general purpose of this study was to gain information about the effectiveness of the developmental program at Forsyth Technical Community College (FTCC). FTCC, one of 58 colleges in the North Carolina Community College System, is located in the north-central region of North Carolina. The investigator sought to determine whether students, after completing required developmental coursework, were as successful in their curriculums as were students not required to take developmental coursework.

One specific purpose of the study was to compare the academic success, as measured by grade point average (GPA), of students placed in developmental programs before entering a curriculum with the success of those curriculum students who did not require developmental courses. A second purpose was to measure the students' perceptions of the developmental program. Additional purposes included an analysis of selected demographic variables of developmental students, a comparison of posttest Assessment and Placement Test (APT) scores and grade point averages, and an analysis of attrition rates.

This chapter describes the research design, study sample, instruments, data collection, research questions, procedure, and data analysis.

RESEARCH DESIGN

This study employed a post-hoc descriptive design. The study may also be classified as institutional research or a field study since the data were collected from one institution.

Data were examined on the following selected variables to address the five research questions:

(1) Grade point averages (GPAs) of three groups of students

(2) Demographic factors: age, race, sex, employment status, day or evening enrollment, financial aid status, and attrition rates

(3) Developmental students' perceptions of the developmental program

(4) Entrance examination scores as measured by the Assessment and Placement Test (APT)

STUDY SAMPLE

The study sample consisted of three groups of students who entered curriculum programs at FTCC in the 1990 fall quarter. The first group was a random sample of 188 students

from the 2,030 who were admitted directly into a curriculum without being required to enroll in developmental studies. A second and a third group included all 188 students who were admitted into a curriculum program after completing developmental studies. The second group included the 143 students admitted on the basis of the APT retest. The third group included the 45 students admitted without the requirement of an APT retest and were admitted based on departmental recommendation.

INSTRUMENT

The test instrument used to determine placement in a curriculum or in developmental studies was the Assessment and Placement Test (APT). The APT was developed and was administered by Educational Testing Service for the College Board (APT Manual, 1985). The APT consists of five separate tests (results are reported as standard scores; mean = 50, standard deviation = 10) as described below:

Reading - the 25-minute Reading test contains 35, four-choice questions based on reading passages. Questions measure the students' comprehension of both main ideas and specific details and their ability to make inferences and extract the meaning of vocabulary in context.

Writing - The 25-minute Writing test contains 40, four-choice questions designed to measure a student's ability to do the kind of writing usually required of students in college.

The items require the student to recognize errors in grammar, usage, choice of words, and idioms.

Computation - The Computation test takes 20 minutes and consists of 35, four-choice questions. It is concerned primarily with basic arithmetic operations on whole numbers, fractions, decimals, and percents.

Applied Arithmetic - the Applied Arithmetic test takes 20 minutes and contains 25, four-choice questions. All of them involve ability to solve problems relating to percentages, proportions, rates, averages, and the interpretation of data involving graphs and charts.

Elementary Algebra - The Algebra test takes 20 minutes and consists of 35 quantitative comparison questions dealing with topics found in most first-year algebra courses. Primary emphasis is on operations with real numbers and with algebraic expressions, and the solution of linear equations.

The reliability estimates (KR-20) of the APT as reported in the APT manual (1985) are:

Reading-	.90	Algebra-	.84
Writing-	.83	Applied Arithmetic-	.85
Computation-	.88		

The validity is reported as "correlations obtained from validity studies for students in English and Mathematics classes" which include the following:

Course	Predictor	Median	Highest	Lowest
English[1]	Reading	.28	.51	-.01
	Writing	.32	.55	.03
Math[2]	Mathematics	.43	.55	.06

[1]Criterion is grade in English course. This summary is based on 64 validity studies, each of which had at least 100 students.

[2]Criterion is grade in mathematics course. This summary is based on 29 validity studies, each of which had at least 100 students.

The validity is further explained in the APT manual (1985):

> Of the several types of validity, content validity and predictive validity are considered most pertinent to the subject of this manual.
>
> English and mathematics faculty members assisted in developing the tests and establishing their content validity. They identified the skills they believed were necessary for success in English and mathematics courses as taught in post-secondary institutions with an open admissions policy, and they approved all the questions used in the tests. The questions they selected for use had to meet their standards of appropriateness as to the academic background of students in these institutions. The mathematics backgrounds of entering freshmen are particularly diverse at these institutions; consequently, these tests were designed to cover a wide range of preparation.
>
> The predictive validity of the placement tests has been studied fairly extensively, although the number of mathematics courses for which data are available is not large. Because entering freshmen vary widely in their mathematics preparation, most colleges offer a variety of entry-level mathematics courses (college English departments, however, typically offer only a few basic English courses).
>
> The predictive validity correlations for the Assessment and Placement tests show that performance on the tests is positively related to performance in English and mathematics courses. These correlations are between test scores students

> earned during the year prior to beginning college work and grades earned at the end of the first semester or second semester.
>
> The criterion data needed for validity studies were obtained only from colleges that elected to provide them during the 1975-76, 1976-77, and 1977-78 APT Program years. Because the validity studies were conducted only at regular APT institutions, the results cannot be generalized to a nationwide population in a true statistical sense. However, the validities are consistent with those obtained throughout the history of APT.

Students applying for admission to FTCC must take four of the five tests. All applicants take the Reading, Writing, and Computation tests. The fourth test is either Applied Arithmetic or Elementary Algebra. The admission requirements of the particular curriculum determine whether the fourth test is Applied Arithmetic or Elementary Algebra.

QUESTIONNAIRE

A questionnaire developed by the investigator to measure the perception among developmental students of the effectiveness of the developmental program included a total of four questions (See Appendix A). The questionnnaire was employed to elicit the students' perceptions of the developmental (Pretechnical) program.

At the inception of the questionnaire's development, ten faculty/staff and ten students were invited to participate by responding to a list of possible questions in relation to the appropriate research question. They were requested to make suggestions and comments they felt might be relevant to the research question. The group provided valuable suggestions

useful in the development of the questionnaire. The students, however, offered no suggestions for revising the instrument.

Several drafts circulated to the same group for review led to subsequent revisions. Information contained in the questionnaire was divided into two groups. The first section asked if the student had taken developmental courses. This served as a "back-up" to insure that only students who had been identified as former developmental students answered the questionnaire. The second section contained three questions that pertained to the student's perception of the effectiveness of the developmental program.

Instructions for the first section requested the student to answer yes or no and then to continue if the answer was yes. The second section contained instructions that requested the student to use the following four-point response set: Poor was rated 1, Fair was rated 2, Good was rated 3, and Excellent was rated 4.

The questionnaire was initially given to a pilot group of 15 second-year students. All participants in the pilot study returned the questionnaire. No revisions were necessary based upon feedback from the pilot group. The amount of time reported to complete the questionnaire ranged from three to eight minutes. None of the students in the pilot group were involved in the subsequent study.

DATA COLLECTION

Data were collected from two primary sources. One source was the students' records located on FTCC's Prime computer. The Prime computer generated a list of all students entering a curriculum in the 1990 fall quarter. This list also indicated which students had been in developmental studies prior to entering the curriculum. A second source of data was provided by the questionnaires which were completed and returned to the investigator. Prior approval to use the Prime computer and to develop and use the questionnaire was obtained from the Dean of Student Services (See Appendix B). A spreadsheet was developed to record the data from the Prime computer and from the questionnaire (See Appendix C).

PROCEDURE

The list of students entering a curriculum program in the fall quarter 1990 was obtained from the Prime computer. The list indicated which students had previously attended the developmental program. An equal number of non-developmental students (n=188) was obtained by using a table of random numbers. The list of students requiring developmental studies was then divided according to admission type. One group (n=143) was admitted with a retest of the APT and the other group (n=45) was admitted with faculty recommendations. A spreadsheet was used to record data for the three groups as

they were obtained from the Prime computer or the questionnaire.

The questionnaire was given to the 188 students selected for the study during the last two weeks of the 1991 summer quarter. The questionnaire was given to the students during or immediately after their classes by the investigator and collected immediately. A master listing of the subjects was maintained. This list contained the codes of each subject's questionnaire and was used to identify the returned questionnaires. No names appeared on the questionnaire to insure the subjects' confidentiality. Sixty-seven students selected for this study were not in attendance during the last two weeks of the quarter. They were mailed a questionnaire with cover letter and a self-addressed stamped envelope. Telephone calls were also made to these students to encourage their response.

DATA ANALYSIS

Data were analyzed using the SAS software package from the Academic Computer Center at the University of North Carolina at Greensboro. The specific statistical analyses used to answer each of the research questions were as follows:

1- Is there a significant difference among the grade point average (GPA) means of the three groups of students: 1- those placed directly into their curriculum, 2- those placed into their curriculum after developmental studies based on the

APT posttest, and 3- those placed into their curriculum after developmental studies with departmental recommendation?

An analysis of variance (ANOVA) was used to determine whether there was a significant difference among the means of the three groups. The GPAs were obtained after the students had been in their curriculum for four quarters.

2- What is the perception among developmental students of the effectiveness of the developmental program?

This research question was analyzed using descriptive statistics and frequency distributions.

3- Are there individual demographic characteristics (age, race, sex, employment status, day or evening enrollment, and financial aid status) of developmental students which relate to success in curriculum, as measured by GPA?

4- How well does the entrance exam (APT) predict success in the curriculums, as measured by GPA?

Both questions #3 and #4 were analyzed with a multiple regression model. The dependent variable for both questions #3 and #4 was GPA. Independent variables were APT, age, race, sex, employment status, day or evening enrollment, and financial aid status.

5- Are the attrition rates different, after entering the curriculum, for those students who completed developmental studies and those who did not require developmental studies?

Only two categories of reasons for a withdrawal were considered for this question of the study: academic reasons

and other reasons. A Chi square test was utilized to determine whether the attrition rates were significantly different.

SUMMARY

This chapter outlined the methodology used for the study. The research design was a post-hoc descriptive design. The study examined three groups of students that entered curriculum programs in the fall quarter, 1990. The first group consisted of students (n=188) who did not require developmental studies prior to curriculum entry. The second group (n=143) required developmental studies and students were admitted to their curriculum on the basis of the APT posttest. The third group (n=45) also required developmental studies and students then were admitted to their curriculum on the basis of departmental recommendation.

Several variables associated with student demographics, grade point average, APT scores, and student perceptions of the developmental program were examined in an attempt to address the five research questions. Data were collected from two primary sources - FTCC's Prime computer and a questionnaire that was developed by the investigator. The questionnaire was tested on a pilot group of 15 second-year students. None of the students in the pilot study were included in the subsequent study.

Statistical techniques for analyzing the data included an ANOVA, Chi square, multiple regression, descriptive statistics, and frequency distributions. A probability level of .05 was used to determine whether differences were significant.

CHAPTER IV

ANALYSIS OF DATA

The purpose of this study was to gain information about the effectiveness of the developmental program at Forsyth Technical Community College (FTCC). Data were collected on 376 students entering a curriculum program in the 1990 fall quarter. Answers were sought for five research questions:

1. Is there a significant difference among the grade point average (GPA) means of the three groups of students: 1- those placed directly into their curriculum, 2- those placed into their curriculum based on the APT posttest and after completing developmental studies, and 3- those placed into their curriculum based on departmental recommendation after completing developmental studies?
2. What is the perception among developmental students of the effectiveness of the developmental program?
3. Are there individual demographic characteristics (age, race, sex, employment status, day or evening enrollment, and financial aid status) of developmental students which relate to success in curriculum, as measured by GPA?
4. How well does the entrance examination (APT) predict success in the curriculums, as measured by GPA?

5. Are the attrition rates different, after entering the curriculum, for those students who completed developmental studies and those who did not require developmental studies?

Information was obtained from two primary sources. The student records located on FTCC's Prime computer served as one source of information, and responses to a questionnaire designed by the investigator represented a second source of data. Data were analyzed using the SAS software package at the University of North Carolina at Greensboro. This chapter consists of an analysis of the data collected for each research question.

Research Question #1

The first investigation of the study was to determine whether students, after completing required developmental course-work, were as successful in their curriculum as were students not required to take developmental course-work. To examine this question, the following research question was formulated:

> Is there a significant difference among the grade point average (GPA) means of the three groups of students: 1- those placed directly into their curriculum, 2- those placed into their curriculum based on the APT posttest after completing developmental studies, and 3- those placed into their curriculum based on departmental recommendation after completing developmental studies?

Table 1 shows the GPA data for the three groups. GPAs were available for 140 (74.5%) of the 188 students in group

one, 93 (65.0%) of the 143 students in group two, and 28 (62.2%) of the 45 students in group three. Those students for whom GPAs were not available withdrew prior to the end of the fourth quarter.

Table 1. Grade Point Average Means, Standard Deviations, Mininum GPA, and Maximum GPA of Participating Students.

Group	GPA Mean	Standard Deviation	GPA Minimum	GPA Maximum
One[a]	2.76	0.51	1.85	4.00
Two[b]	2.60	0.39	1.86	3.43
Three[c]	2.66	0.45	1.95	3.65

[a]Admitted without requirement for developmental studies
[b]Developmental studies required; admission based on APT retest
[c]Developmental studies required; admission based on departmental recommendation

As shown in Table 1, the highest mean GPA was earned by Group One. The mean GPA was higher for Group Three than for Group Two. An analysis of variance (ANOVA) was used to determine whether there was a significant difference among the means of the three groups. A probability level of .05 was used to determine whether differences were significant. The results of the ANOVA indicate that there were statistically significant differences among some or all three of the mean

GPAs. The F-ratio associated with the ANOVA was 3.39 with 2,258 degrees of freedom and p = .04. The SAS software provided a Tukey test for multiple comparisons of mean GPAs. The Tukey Test of Multiple Comparisons revealed that the significant difference (alpha = .05) was between groups one and two. No significant differences were observed between groups one and three or between groups two and three.

Overall, the findings indicated a significant difference in mean GPA between Group One (admitted without requirement for developmental studies) and Group Two (admitted based on APT retest after completing required developmental studies). Students in Group One did not differ significantly from students in Group Three (admitted based on departmental recommendation after completing required developmental studies). Similarly, there was no significant difference in mean GPA between Groups Two and Three. The admission requirements of the individual curriculums determine whether a retest of the APT is necessary for admission.

Research Question #2

The second problem addressed by this study was to measure the students' perception of the developmental program. To examine this problem, the following research question was formulated:

> What is the perception among developmental students of the effectiveness of the developmental program?

A three-item questionnaire was used to obtain information for analysis. Chapter three contains a description of the questionnaire and the procedures used to gather the information. Of the 188 developmental students asked to complete the questionnaire (143 students in group two and 45 students in group three), 121 remained enrolled at FTCC at the end of the four quarters and 67 had withdrawn. The response rate for those students remaining enrolled was 121 out of 121 for a 100% return rate. The response rate for withdrawn students was 43 out of 67 for a 64.18% return rate. The total response rate was 164 out of 188 for a total return rate of 87.23%. Question number one asked if the student had taken developmental courses. This insured that only students who had been indentified as former developmental students answered the questionnaire.

Table 2 shows a summary of the responses to the second question:

		POOR	FAIR	GOOD	EXCELLENT
(2)	The preparation provided by the pretech courses was	1	2	3	4

Table 2. Summary of Responses to Question #Two

Response	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Excellent	20	12.2	164	100.0
Good	89	54.3	144	87.8
Fair	51	31.1	55	33.5
Poor	4	2.4	4	2.4

Table 3 shows a summary of the responses to the third question:

		POOR	FAIR	GOOD	EXCELLENT
(3)	The teaching in the pre-tech program was	1	2	3	4

Table 3. Summary of Responses to Question #Three

Response	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Excellent	35	21.3	164	99.9
Good	75	45.7	129	78.6
Fair	44	26.8	54	32.9
Poor	10	6.1	10	6.1

Table #4 shows a summary of the responses to the fourth question:

		POOR	FAIR	GOOD	EXCELLENT
(4)	Overall, the quality of the pretech program was	1	2	3	4

Table 4. Summary of Responses to Question #Four

Response	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Excellent	25	15.2	164	99.9
Good	86	52.4	139	84.7
Fair	48	29.3	53	32.3
Poor	5	3.0	5	3.0

Overall, the findings indicated that the students' perception of the developmental program (called the Pretech program at FTCC) was positive. The modal response to all three questions was "GOOD." In addition, the percentage of response was higher for "EXCELLENT" than for "POOR" for the three questions (12.2 vs. 2.4; 21.3 vs. 6.1; and 15.2 vs. 3.0 respectively).

Research Question #3

The third problem addressed by this study was an analysis of demographic variables of developmental students. To examine this problem, the following research question was formulated:

> Are there individual demographic characteristics (age, race, sex, employment status, day or evening

enrollment, and financial aid status) of developmental students which relate to success in the curriculum, as measured by GPA?

Table #5 shows the demographics of the identified independent variables by group:

Table 5. Demographics

Independent Variable	Group One[a]	Group Two[b]	Group Three[c]
Age (mean)	29.2	28.1	27.7
Race (% white)	77.7	76.2	75.6
Sex (% female)	56.9	57.3	55.6
Employment status (mode)	Part-time	Part-time	Part-time
Day or evening enrollment (% day)	68.1	67.8	66.7
Financial aid status (% yes)	42.0	41.3	48.9

[a]Admitted without requirement for developmental studies
[b]Developmental studies required; admission based on APT retest
[c]Developmental studies required; admission based on departmental recommendation

The results of the regression analysis indicated that only 2.24% of the variation in GPA can be explained by the independent variables chosen for this study (r^2 = 0.0287;

adjusted $r^2 = 0.0224$). The independent variables and their probabilities are listed below:

Independent Variable	Probability
Age	0.20
Race	0.94
Sex	0.15
Employment status	0.86
Day or evening enrollment	0.66
Financial aid status	0.83

Overall, the findings indicated that the identified individual demographic characteristics do not relate to success in the curriculum.

Research Question #4

The fourth problem addressed by this study was a comparison of APT scores and grade point averages. To examine this problem, the following research question was formulated:

> How well does the entrance examination (APT) predict success in the curriculums, as measured by GPA?

Students applying for admission to FTCC must take 4 of the 5 tests of the APT. All applicants take the Reading, Writing, and Computation tests. The fourth test is either the Applied Arithmetic or the Elementary Algebra test. The admission requirements of the particular curriculum determine whether the fourth test is Applied Arithmetic or Elementary Algebra. Therefore, two regression analyses were required to answer research question #4. The first regression analysis

considered those students who were required to take the Reading, Writing, Computation, and Applied Arithmetic tests. The second analysis considered those students who were required to take the Reading, Writing, Computation, and Elementary Algebra tests. In both analyses, the group that was admitted to the curriculum based on departmental recommendation after completing the required developmental studies (Group #Three) was not included.

Table 6 shows the test results for Group One:

Table 6. APT Results of Group One

Variable	N	Mean	Deviation	Minimum	Maximum
Reading	188	54.45	5.59	44	72
English	188	54.86	5.28	42	70
Computation	188	54.37	5.70	44	68
Applied Aritmetic	91	51.92	4.74	44	68
Algebra	96	55.06	5.44	46	70

Table 7 shows the test results for Group Two:

Table 7. APT Results of Group Two

Variable	N	Mean	Deviation	Minimum	Maximum
Reading	143	53.31	4.51	42	64
English	143	53.48	3.99	42	64
Computation	143	53.27	4.05	46	64
Applied Arithmetic	74	51.82	3.57	44	64
Algebra	69	53.54	3.67	47	62

The results of the regression analysis for the students who were required to take the Reading, Writing, Computation, and Applied Arithmetic tests indicated that 73.14% of the variation in GPA can be explained by the independent variables ($r^2 = 0.7428$; adjusted $r^2 = 0.7314$). The independent variables and their probabilities are listed below:

Independent Variable	Probability
Reading	.00
Writing	.05
Computation	.01
Applied Arithmetic	.61

The results of the regression analysis for the students who were required to take the Reading, Writing, Computation,

and Elementary Algebra tests indicated 59.10% of the variation in GPA can be explained by the independent variables ($r^2 = 0.6030$; adjusted $r^2 = 0.5910$). The independent variables and their probabilities are listed below:

Independent Variable	Probability
Reading	.00
Writing	.02
Computation	.89
Elementary Algebra	.01

Overall, the findings indicated that the APT does predict success in the curriculums, as measured by GPA. For those students who take the Applied Arithmetic test, along with Reading, Writing, and Computation, the results indicated that the Reading and Computation tests can predict success. For those students who took the Elementary Algebra test, along with Reading, Writing, and Computation, the results indicated that the Reading, Writing, and Algebra test can predict success.

Research Question #5

The last problem addressed by this study was an analysis of attrition rates. To examine this problem, the following research question was formulated:

> Are the attrition rates different, after entering the curriculum, for those students who completed developmental studies than for those who did not require developmental studies?

The student records showed that 115 students had withdrawn prior to the end of the fourth quarter. An additional 12 students did not return for the fifth quarter and were considered withdrawals for purposes of this study. Table 8 shows a summary of the withdrawals by group and reason. Due to a lack of available information only two types of reasons are listed for withdrawals: academic reasons and non-academic reasons.

The results of the Chi square analysis ($x^2 = 1.46$ with 2 degrees of freedom; $p = 0.48$) indicated that the attrition rates were essentially similar for those students who completed developmental studies and those students who did not require developmental studies.

Table 8. Summary of Withdrawals by Group and Reason

Reason for Withdrawal	Regular Students	Developmental Students
Did Not Withdraw	130	119
Withdrew/ Academic	36	42
Withdrew/ Non-Academic	22	27

Summary

This chapter analyzed data to gain information about the effectiveness of the developmental program at Forsyth Technical Community College. Data were collected from student records and from a questionnaire developed by the investigator. The data then were examined in response to five research questions. An ANOVA, regression analyses, Chi square, and descriptive statistics were used to analyze the data. All data were examined at the .05 level of significance.

The first research question was concerned with determining whether GPAs were significantly different for students who had been required to take developmental studies and those students who did not require developmental studies. The ANOVA indicated that a significant difference in mean GPA did exist between those students who did not require developmental studies and those students admitted on the basis of APT retest after completing developmental studies. Those students who did not require developmental studies had the highest mean GPA. However, there was no significant difference in mean GPA between those students who did not require developmental studies and those students admitted on the basis of departmental recommendations after completing developmental studies.

The second research question was concerned with the students' perception of the developmental program. The data revealed that the students' perception of the developmental program was positive.

The third research question addressed an analysis of selected demographic variables to determine whether any related to success in the curriculum, as measured by GPA. A regression analysis indicated that the selected variables did not relate to success in the curriculum.

The fourth research question was concerned with a comparison of entrance examination (APT) scores and GPAs after four quarters enrollment in a curriculum. The regression analysis revealed that sections of the test can predict success in the curriculum.

The last research question was concerned with an analysis of attrition rates. A Chi square analysis indicated that there was no significant difference in withdrawal rates between students who had been required to take developmental studies and those who had not been required to complete developmental studies prior to curriculum entry.

In response to the question of the effectiveness of the developmental program at Forsyth Technical Community College the data showed:

1. Students who completed developmental studies before entering a curriculum did as well as students who did not require developmental studies when

admission was based on departmental recommendation. However, those who did not require developmental studies did significantly better than those who completed developmental studies and who were admitted on the basis of the APT retest.

2. The perception among developmental students of the preparation they received in developmental studies was positive.
3. The demographic variables selected for this study appears to have had no impact on the developmental students' GPA.
4. Sections of the entrance examination (APT) can predict success in the curriculum.
5. Withdrawal rates were not significantly different between developmental students and those not requiring developmental studies.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter presents the summary of the study, conclusions, and recommendations for further study.

SUMMARY

The developmental program at Forsyth Technical Community College (FTCC) exists to provide students with an opportunity to build academic skills and to acquire the background which should facilitate success in their curriculum. Students applying to FTCC must take the Assessment and Placement Test (APT). The results of this test determine whether the applicant is placed directly into the curriculum or placed in the developmental program. The purpose of this study was to gain information about the effectiveness of the developmental program at FTCC.

The study sample consisted of a random sample of 188 students who were admitted directly into a curriculum without being required to enroll in developmental studies and the 188 students who were admitted into a curriculum after completing developmental studies. The 188 students that required developmental studies were further divided into two groups

based on whether admission into the curriculum was determined by APT retest or by departmental recommendation.

Data were collected from two primary sources. One source was the students' records located on FTCC's Prime computer. A second source of data was provided by the responses to the questionnaire developed by the investigator. Data were examined on the following selected variables:

1. Grade point averages of three groups of students.
2. Demographic factors: age, race, sex, employment status, day or evening enrollment, financial aid status, and attrition rates.
3. Developmental students' perceptions of the developmental program.
4. Entrance examination scores as measured by the Assessment and Placement Test.

Five research questions were developed to determine the effectiveness of the developmental program at FTCC. Analysis of the data produced the following findings:

1. A statistically significant difference was found between the mean GPA of those students admitted without a requirement for developmental studies and the mean GPA of those students whose admission was based on APT retest scores after completing developmental studies. Although the difference

between the mean GPAs was statistically significant, this result lacks practical importance considering the means were 2.76, 2.60, and 2.66 respectively. Students whose admission was based on departmental recommendation after completing required developmental studies without retaking the APT did not differ significantly from the other groups.

2. The findings indicated that the perception among developmental students of the developmental program was positive. The modal response to questions regarding the effectiveness of the developmental program was "good."
3. The findings indicated that individual demographic characteristics did not relate to success in the curriculum, as measured by GPA.
4. The findings indicated that the APT did predict success in the curriculums, as measured by the GPA. For those students who entered curriculums requiring the Reading, Writing, Computation, and Applied Arithmetic tests, the results indicated that the Reading and Computation tests did predict success. For those students entering curriculums that required the Reading, Writing, Computation, and Elementary Algebra tests, the results indicated

that the Reading, Writing, and Algebra tests did predict success.

5. The findings indicated that the attrition rates were not significantly different between those students who completed developmental studies and those students who did not require developmental studies prior to entering a curriculum.

CONCLUSIONS

The findings suggest that the developmental program at Forsyth Technical Community College is effective in preparing developmental students for success in the curriculum. The perception among developmental students of the developmental program was positive. The data used for this study indicated that the demographic variables had no impact on the developmental students' GPA. Sections of the entrance examination (APT) predicted success in the curriculum. Finally, the attrition rate was not significantly different between the developmental students who completed the developmental program and those not requiring developmental studies prior to entering their curriculum. These findings support the contention that FTCC is effective in preparing developmental students to achieve success in their curriculum.

RECOMMENDATIONS FOR FURTHER STUDY

Based on the results of this study, the following recommendations are made for further study:

1. This study should be replicated throughout the North Carolina Community College System. The present study was a study of one college rather than a comparative study of many colleges. For this reason, the results may not have external validity; that is, the results are not necessarily extendible to other community colleges. The study should be expanded to include graduation rates and "follow-up" information.

2. It is recommended that studies be conducted which investigate the relationship between instructor qualifications and developmental students' success in the curriculum. These studies should also include the effect on the developmental student of the random nature of teacher assignments in developmental programs.

3. It is further recommended that future studies of developmental programs and/or students address the type and difficulty of different curriculums, the amount of time spent in developmental studies, and the interaction of classroom and teacher effect.

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APPENDIX A

QUESTIONNAIRE OF DEVELOPMENTAL STUDENTS' PERCEPTION OF DEVELOPMENTAL PROGRAM

FORSYTH TECHNICAL COMMUNITY COLLEGE
PROGRAM EVALUATION
PRETECHNICAL (DEVELOPMENTAL) PROGRAM

Selected students are being asked to complete this questionnaire as part of a research project to evaluate the effectiveness of the pretech (developmental) program. Your answers will be kept completely anonymous and confidential; no name will be attached to any response. Code numbers are used for follow-up purposes only.

(1) Did you take any pretech courses prior to entering your program of study?

_____ YES _____ NO

If you answered **YES**, please continue!

Thinking about your current program of study, please rate the following.

	POOR	FAIR	GOOD	EXCELLENT
(2) The preparation provided by the pretech courses was	1	2	3	4
(3) The teaching in the pre-tech program was	1	2	3	4
(4) Overall, the quality of the pretech program was	1	2	3	4

Thank you for your assistance. If you would like to add any comments, please write them on the back of this page.

_____
CODE

APPENDIX B

LETTER OF PERMISSION TO CONDUCT RESEARCH

Forsyth Technical Community College
2100 Silas Creek Parkway Winston-Salem, NC 27103 Telephone (919) 723-0371
Dr. Bob H. Greene, President

To: Dr. Susan Phelps
From: Charles R. King
Subj: Permission to Conduct Research
Date: July 1, 1991

I request permission to use data of Forsyth Technical Community College students for research to be used in writing my doctoral dissertation at the University of North Carolina at Greensboro.

My dissertation topic is an investigation of the effectiveness of developmental education at FTCC. This will be accomplished by comparing the fourth quarter cumulative GPA of students who had developmental courses with those who did not. Student data will be obtained from the records of those students who entered the fall quarter, 1990. A short questionnaire will be sent to a random sample of students that had developmental courses.

No personally identifiable information will be released. Student I.D. numbers will be used only to "match" data.

Thank you for your consideration in this request.

Charles R King
Charles R. King

Approved _____, PhD
Susan Phelps, PhD

APPENDIX C

RAW DATA SPREADSHEET

OBS	GRP	ID	R	E	C	AA	AG	WD	AGE	RACE	SEX	ES	DN	FAID	GPA	Q1	Q2	Q3
1	2	2001	52	54	50	.	54	0	31	1	2	3	1	1	3.015	4	3	3
2	2	2002	48	46	52	50	.	0	26	1	1	2	1	2	2.150	3	2	3
3	2	2003	56	54	58	.	60	0	28	1	1	3	1	2	3.400	4	3	4
4	2	2004	52	52	50	.	50	0	19	2	2	3	2	2	2.180	3	3	3
5	2	2005	64	62	60	.	58	2	43	1	2	3	1	2	.	4	3	4
6	2	2006	60	60	63	.	58	0	26	1	1	2	2	2	2.900	3	2	3
7	2	2007	48	50	52	50	.	1	28	2	2	4	1	1	.	.	.	.
8	2	2008	52	54	50	49	.	0	19	1	2	4	1	1	2.205	3	3	3
9	2	2009	52	52	54	50	.	0	21	1	2	3	1	2	2.310	3	4	3
10	2	2010	56	56	54	.	56	0	27	1	1	2	2	2	2.475	3	2	3
11	2	2011	58	56	58	.	49	2	30	2	2	4	1	1	.	.	.	.
12	2	2012	47	50	50	52	.	1	38	2	2	3	1	2	.	2	3	2
13	2	2013	64	62	62	60	.	0	23	1	1	3	2	2	3.250	3	3	3
14	2	2014	60	62	64	58	.	0	27	1	1	2	1	1	3.160	3	4	4
15	2	2015	52	54	52	49	.	1	32	2	1	4	1	1	.	2	1	2
16	2	2016	48	50	50	52	.	0	19	1	2	3	2	2	1.960	2	3	2
17	2	2017	52	52	50	.	50	0	25	1	2	2	2	2	2.155	2	2	2
18	2	2018	48	49	49	48	.	1	28	1	2	3	1	1	.	3	3	3
19	2	2019	60	60	62	.	56	0	31	1	1	3	2	2	2.950	3	3	3
20	2	2020	58	54	50	.	48	2	30	1	1	3	1	2	.	3	4	4
21	2	2021	54	56	50	50	.	0	25	1	1	3	2	2	2.550	3	4	3
22	2	2022	50	52	54	52	.	2	29	2	2	4	1	1	.	3	3	3
23	2	2023	52	54	54	.	54	0	19	1	1	3	1	1	2.390	3	2	3
24	2	2024	56	56	62	50	.	0	26	1	1	3	1	2	2.650	3	3	3
25	2	2025	48	50	47	50	.	1	33	2	2	4	1	1	.	2	3	2
26	2	2026	49	48	49	49	.	1	39	1	1	3	1	2	.	3	3	2
27	2	2027	58	56	52	.	54	0	28	1	1	3	1	2	2.680	3	3	3
28	2	2028	52	54	50	.	49	2	46	1	2	3	1	1	.	.	.	.
29	2	2029	50	52	52	48	.	0	27	1	2	4	1	1	2.450	3	2	3
30	2	2030	42	52	54	.	56	0	19	1	2	3	2	2	2.500	3	3	3
31	2	2031	56	56	48	44	.	0	31	2	2	4	1	1	2.850	4	3	4
32	2	2032	58	54	56	50	.	0	24	1	2	3	1	2	2.900	3	3	3
33	2	2033	48	50	52	48	.	2	40	1	2	3	2	2	.	.	.	.
34	2	2034	52	52	48	.	49	1	19	2	1	3	1	2	.	3	2	2
35	2	2035	52	54	56	.	47	1	30	2	2	4	1	1	.	2	3	2
36	2	2036	54	53	54	.	54	0	28	1	1	4	1	1	2.540	3	3	3
37	2	2037	48	49	50	49	.	1	34	1	1	2	2	2	.	.	.	.
38	2	2038	60	60	62	.	49	0	24	1	2	3	1	2	3.140	3	4	3
39	2	2039	64	58	56	60	.	0	29	1	2	4	1	1	3.250	4	4	4
40	2	2040	52	50	50	52	.	2	42	1	1	3	1	2	2.150	.	.	.
41	2	2041	58	50	48	49	.	0	18	1	2	3	2	2	2.460	3	3	3
42	2	2042	49	52	46	50	.	1	25	2	2	4	1	1	.	.	.	.
43	2	2043	52	49	52	.	54	0	21	1	2	4	1	1	2.485	3	2	3
44	2	2044	54	52	58	.	49	0	22	1	2	2	2	2	2.440	2	2	3
45	2	2045	56	52	50	.	54	0	36	2	1	3	2	2	2.750	3	3	3
46	2	2046	52	52	49	.	47	1	51	1	2	4	1	1	.	.	.	.
47	2	2047	46	49	50	52	.	0	27	1	2	3	2	2	2.010	2	3	2
48	2	2048	48	50	52	54	.	1	24	2	2	4	1	1	.	2	2	2
49	2	2049	56	54	52	60	.	0	21	1	2	3	1	2	2.650	3	4	3
50	2	2050	52	54	54	.	54	2	29	1	1	2	2	2	.	3	3	2
51	2	2051	60	58	56	.	56	0	22	1	1	4	1	1	3.150	4	3	4
52	2	2052	54	56	50	57	.	0	23	1	2	3	1	2	2.470	3	3	3
53	2	2053	56	54	52	50	.	0	34	2	2	3	1	1	2.600	3	3	4
54	2	2054	48	50	48	49	.	1	19	1	1	2	2	2	.	.	.	.
55	2	2055	42	42	49	44	.	0	28	1	2	3	1	1	1.980	2	3	2
56	2	2056	53	52	50	.	49	0	23	1	1	3	1	1	2.380	2	1	2

OBS	GRP	ID	R	E	C	AA	AG	WD	AGE	RACE	SEX	ES	DN	FAID	GPA	Q1	Q2	Q3
57	2	2057	54	54	56	.	54	0	32	1	2	2	2	2	2.460	3	3	3
58	2	2058	50	46	48	50	.	1	39	2	1	3	1	2	.	2	1	2
59	2	2059	52	50	50	.	49	0	27	1	1	4	1	1	2.245	3	3	3
60	2	2060	58	52	54	.	58	2	22	1	1	3	2	2	.	2	2	2
61	2	2061	52	52	49	54	.	0	21	1	2	4	1	1	2.210	3	2	3
62	2	2062	54	52	50	49	.	0	33	1	1	3	1	2	2.510	3	4	3
63	2	2063	49	50	54	52	.	1	41	2	2	3	1	2	.	.	.	.
64	2	2064	52	56	52	.	54	2	26	2	2	4	1	1	2.340	3	3	3
65	2	2065	60	61	58	.	56	0	28	1	1	3	2	2	3.125	4	4	4
66	2	2066	56	58	56	52	.	2	24	1	1	2	2	2	.	2	3	2
67	2	2067	58	56	52	.	49	0	19	1	1	3	1	2	3.010	3	4	3
68	2	2068	48	49	52	.	50	1	29	2	2	4	1	1	.	2	2	2
69	2	2069	52	50	54	50	.	0	22	1	1	3	1	1	2.000	2	3	2
70	2	2070	52	52	48	52	.	1	36	1	1	3	2	2	.	1	2	1
71	2	2071	62	60	58	.	54	0	27	1	2	4	1	2	2.420	3	3	3
72	2	2072	56	58	60	.	56	0	43	1	2	3	1	2	3.425	4	4	4
73	2	2073	52	56	62	64	.	0	51	1	2	2	2	2	2.940	4	3	4
74	2	2074	58	60	56	.	56	2	27	2	2	4	1	1	.	3	3	3
75	2	2075	54	52	50	56	.	0	32	1	1	3	2	2	2.560	3	4	3
76	2	2076	52	52	54	.	50	0	35	1	1	4	1	2	2.280	3	2	3
77	2	2077	48	50	52	54	.	1	25	1	1	2	2	2	.	2	1	2
78	2	2078	46	48	49	52	.	1	38	2	2	4	1	1	.	.	.	.
79	2	2079	54	52	52	.	52	0	21	1	1	3	1	1	2.560	3	3	3
80	2	2080	50	48	49	50	.	1	28	1	2	4	1	1	.	2	2	2
81	2	2081	61	60	62	.	58	0	26	1	1	2	2	2	3.240	4	4	4
82	2	2082	56	54	56	54	.	0	29	1	2	4	1	1	2.720	3	3	3
83	2	2083	52	54	54	.	50	2	30	2	2	4	1	1	.	3	2	3
84	2	2084	52	56	58	.	60	0	20	1	1	3	1	2	2.450	2	3	3
85	2	2085	50	52	50	52	.	2	19	1	2	3	1	1	.	3	3	3
86	2	2086	58	60	56	.	52	0	27	1	2	2	2	2	3.000	4	4	4
87	2	2087	60	62	60	.	56	0	28	1	1	3	2	2	3.125	4	3	4
88	2	2088	52	54	56	.	52	0	32	1	2	4	1	1	2.290	3	3	3
89	2	2089	49	50	52	52	.	1	30	2	2	3	1	2	.	1	2	2
90	2	2090	50	52	54	50	.	0	19	1	1	3	2	2	2.100	2	3	2
91	2	2091	54	52	48	50	.	0	32	1	2	3	1	1	2.400	3	3	3
92	2	2092	60	62	58	.	54	0	19	1	1	3	2	2	3.125	4	4	4
93	2	2093	52	50	52	49	.	0	27	1	2	3	1	1	2.415	3	4	3
94	2	2094	54	54	50	.	52	0	29	2	2	4	1	1	2.580	3	2	3
95	2	2095	48	50	60	58	.	1	33	1	2	2	2	2	.	.	.	.
96	2	2096	46	50	52	54	.	1	47	1	1	3	1	1	.	2	2	2
97	2	2097	52	54	50	.	50	0	28	1	2	2	2	2	2.310	3	3	3
98	2	2098	58	60	56	.	52	0	19	2	2	4	1	1	2.840	3	4	3
99	2	2099	50	48	48	50	.	2	22	2	1	2	2	2	.	.	.	.
100	2	2100	61	60	56	.	60	0	26	1	1	3	1	2	3.260	4	4	4
101	2	2101	62	64	60	.	54	0	25	1	2	3	1	1	3.350	3	4	3
102	2	2102	54	50	50	.	50	0	35	2	2	4	1	1	2.600	2	3	2
103	2	2103	56	58	54	56	.	0	32	1	2	3	2	2	2.790	3	3	3
104	2	2104	48	50	56	50	.	1	21	2	1	3	1	2	.	2	1	2
105	2	2105	49	50	50	52	.	1	23	1	2	4	1	1	.	2	2	2
106	2	2106	56	52	48	49	.	0	18	1	1	3	2	2	1.985	2	3	2
107	2	2107	52	54	56	.	50	2	36	2	2	3	1	1	.	.	.	.
108	2	2108	52	48	49	51	.	0	40	1	1	2	2	2	2.010	2	2	2
109	2	2109	56	53	50	52	.	0	52	1	2	3	1	2	2.440	3	3	3
110	2	2110	54	52	54	.	54	0	26	1	2	3	2	2	2.560	3	4	3
111	2	2111	48	50	50	54	.	1	24	1	2	4	1	2	.	2	3	2
112	2	2112	62	60	58	.	60	0	19	1	1	3	1	1	1.860	2	4	2

OBS	GRP	ID	R	E	C	AA	AG	WD	AGE	RACE	SEX	ES	DN	FAID	GPA	Q1	Q2	Q3
113	2	2113	58	54	59	.	56	2	30	1	1	3	1	2	.	.	.	.
114	2	2114	56	52	54	.	54	0	34	2	2	4	1	1	2.425	3	3	3
115	2	2115	52	52	50	52	.	0	43	1	2	2	1	2	2.300	3	2	3
116	2	2116	53	56	60	.	52	0	22	1	1	3	1	2	2.410	2	2	2
117	2	2117	54	58	56	.	56	0	19	1	2	2	2	2	2.650	3	4	3
118	2	2118	52	50	50	49	.	1	28	1	2	3	1	2	.	2	1	2
119	2	2119	48	49	52	54	.	1	19	1	1	2	2	2	.	2	2	2
120	2	2120	56	58	56	.	49	0	30	1	2	3	1	1	2.800	3	4	2
121	2	2121	58	54	50	.	60	0	28	1	2	4	1	2	3.160	3	4	3
122	2	2122	52	52	49	.	54	0	32	1	1	3	1	1	2.450	3	3	3
123	2	2123	60	58	56	.	52	0	19	1	1	3	2	2	3.280	4	4	4
124	2	2124	48	50	52	50	.	1	28	1	2	3	1	2	.	.	.	.
125	2	2125	49	52	50	54	.	0	21	2	2	4	1	1	2.120	2	3	2
126	2	2126	54	56	60	.	62	0	29	1	2	3	1	2	2.510	2	3	3
127	2	2127	50	52	49	51	.	1	42	1	2	3	2	2	.	2	1	2
128	2	2128	46	48	49	52	.	2	28	1	1	2	2	2	.	2	3	3
129	2	2129	52	50	54	50	.	0	24	2	2	4	1	1	2.340	3	3	3
130	2	2130	52	54	56	58	.	0	18	1	1	2	2	2	2.245	3	2	3
131	2	2131	58	56	58	.	54	2	36	1	1	3	1	1	.	3	3	3
132	2	2132	54	56	54	52	.	0	25	2	2	4	1	1	2.560	3	2	3
133	2	2133	60	60	58	.	60	0	20	1	1	3	1	1	3.300	3	3	4
134	2	2134	52	54	50	50	.	0	26	1	2	3	1	2	2.380	2	2	2
135	2	2135	54	52	54	.	54	0	29	1	2	4	1	1	2.530	3	2	3
136	2	2136	48	50	52	49	.	1	19	1	1	2	2	2	.	.	.	.
137	2	2137	52	54	54	.	49	0	20	2	2	4	1	1	2.655	3	3	3
138	2	2138	58	59	56	.	56	0	40	2	1	3	1	1	3.010	3	4	3
139	2	2139	46	49	48	49	.	1	32	1	1	2	2	2	.	.	.	.
140	2	2140	49	51	50	54	.	0	24	1	2	4	1	2	1.905	2	1	2
141	2	2141	54	52	56	.	56	0	21	1	2	3	1	2	2.520	2	3	3
142	2	2142	52	52	52	58	.	2	28	1	1	3	2	2	.	3	4	3
143	2	2143	56	58	54	.	54	0	26	1	2	3	1	1	2.780	3	3	3
144	1	1001	58	54	50	.	60	0	27	1	2	4	1	2	3.146	.	.	.
145	1	1002	52	52	54	.	50	2	21	2	2	3	1	2	2.475	.	.	.
146	1	1003	60	54	62	64	.	0	32	1	1	3	1	2	3.435	.	.	.
147	1	1004	48	48	52	.	50	0	28	1	1	2	2	2	2.860	.	.	.
148	1	1005	58	60	62	62	.	0	39	1	2	4	1	1	3.645	.	.	.
149	1	1006	54	58	60	60	.	0	34	1	2	4	1	1	2.980	.	.	.
150	1	1007	50	54	49	.	52	0	26	2	1	3	2	2	3.060	.	.	.
151	1	1008	44	46	50	48	.	1	25	1	2	3	2	2	.	.	.	.
152	1	1009	54	54	58	.	56	0	41	1	2	2	1	1	3.185	.	.	.
153	1	1010	60	58	54	56	.	2	19	1	2	2	1	1	.	.	.	.
154	1	1011	49	52	60	.	56	0	24	1	1	3	2	2	2.880	.	.	.
155	1	1012	62	64	58	.	54	0	28	2	2	2	1	1	3.250	.	.	.
156	1	1013	51	52	48	50	.	2	42	1	1	3	2	2	2.015	.	.	.
157	1	1014	56	54	50	.	52	0	28	2	2	4	1	1	2.920	.	.	.
158	1	1015	61	60	56	.	54	0	31	1	1	4	1	2	3.640	.	.	.
159	1	1016	48	49	52	52	.	1	26	2	1	3	2	2	1.945	.	.	.
160	1	1017	56	56	48	49	.	0	52	1	2	4	1	2	2.860	.	.	.
161	1	1018	46	49	52	52	.	0	36	1	1	3	2	2	2.115	.	.	.
162	1	1019	56	52	60	.	62	0	47	1	2	3	1	1	3.430	.	.	.
163	1	1020	50	52	48	48	.	2	19	1	2	3	1	2	2.650	.	.	.
164	1	1021	64	64	53	.	58	0	24	2	1	4	2	1	3.345	.	.	.
165	1	1022	48	50	46	.	49	1	30	1	2	3	1	2	.	.	.	.
166	1	1023	46	48	48	.	46	0	21	2	1	4	2	1	1.940	.	.	.
167	1	1024	56	58	54	.	60	0	22	1	2	4	1	2	2.635	.	.	.
168	1	1025	60	62	64	68	.	0	28	1	1	3	1	1	3.018	.	.	.

OBS	GRP	ID	R	E	C	AA	AG	WD	AGE	RACE	SEX	ES	DN	FAID	GPA	Q1	Q2	Q3
169	1	1026	60	54	60	58	.	0	30	1	1	2	1	1	3.240	.	.	.
170	1	1027	54	54	59	.	56	0	49	1	2	3	2	2	3.110	.	.	.
171	1	1028	56	58	50	50	.	0	26	1	2	4	1	1	3.245	.	.	.
172	1	1029	50	50	49	.	50	1	18	2	1	4	2	2	.	.	.	.
173	1	1030	61	64	60	.	64	0	28	1	2	3	1	2	3.420	.	.	.
174	1	1031	64	64	56	.	54	0	24	1	2	4	1	2	3.215	.	.	.
175	1	1032	50	52	54	56	.	0	32	2	2	3	2	2	2.650	.	.	.
176	1	1033	66	68	70	.	64	0	27	1	1	3	1	2	3.850	.	.	.
177	1	1034	72	70	66	68	.	0	38	1	1	2	2	2	4.000	.	.	.
178	1	1035	48	50	50	48	.	1	22	2	1	3	1	1	1.870	.	.	.
179	1	1036	52	54	54	.	54	0	30	1	1	3	1	1	2.755	.	.	.
180	1	1037	56	58	52	.	50	2	39	2	2	4	1	1	.	.	.	.
181	1	1038	45	46	48	50	.	0	24	1	1	3	1	2	2.640	.	.	.
182	1	1039	58	60	62	.	56	0	31	1	2	4	1	1	3.483	.	.	.
183	1	1040	52	54	48	50	.	1	48	1	2	4	2	2	.	.	.	.
184	1	1041	56	56	48	.	50	0	27	1	1	2	1	2	2.753	.	.	.
185	1	1042	48	50	44	49	.	1	30	1	1	2	2	2	.	.	.	.
186	1	1043	52	54	58	.	52	0	19	2	2	3	2	1	2.240	.	.	.
187	1	1044	54	50	50	48	.	0	29	1	2	3	1	2	2.480	.	.	.
188	1	1045	64	62	66	.	68	0	40	1	2	4	1	2	3.120	.	.	.
189	1	1046	46	44	48	46	.	1	26	1	1	2	2	1	.	.	.	.
190	1	1047	62	64	60	.	60	0	28	1	2	2	2	2	3.640	.	.	.
191	1	1048	54	52	58	54	.	0	19	1	1	3	1	2	2.750	.	.	.
192	1	1049	52	56	50	.	48	2	48	2	2	3	1	1	.	.	.	.
193	1	1050	48	48	54	50	.	0	32	1	2	3	1	2	2.185	.	.	.
194	1	1051	62	60	66	.	64	0	28	1	1	4	1	1	3.645	.	.	.
195	1	1052	64	58	60	.	60	0	18	1	2	3	2	2	3.140	.	.	.
196	1	1053	48	46	44	50	.	1	27	1	2	3	1	2	.	.	.	.
197	1	1054	52	52	50	.	49	0	32	1	1	4	2	1	2.350	.	.	.
198	1	1055	54	56	52	.	48	0	40	1	1	3	1	1	2.600	.	.	.
199	1	1056	67	64	64	.	62	0	44	2	2	3	1	2	3.300	.	.	.
200	1	1057	60	62	60	58	.	2	31	1	1	3	2	2	3.150	.	.	.
201	1	1058	48	50	48	50	.	0	24	1	2	4	1	1	2.085	.	.	.
202	1	1059	52	54	50	49	.	1	18	1	2	2	1	2	1.900	.	.	.
203	1	1060	52	52	48	50	.	0	20	1	1	4	1	1	2.450	.	.	.
204	1	1061	46	48	47	50	.	0	42	1	2	2	2	2	1.890	.	.	.
205	1	1062	52	54	50	.	49	0	51	1	2	3	2	2	2.360	.	.	.
206	1	1063	60	56	54	56	.	2	34	2	1	4	1	1	.	.	.	.
207	1	1064	60	64	62	.	60	0	19	1	2	4	1	1	3.150	.	.	.
208	1	1065	58	54	58	54	.	0	21	1	2	4	1	2	3.015	.	.	.
209	1	1066	64	60	56	56	.	0	24	1	2	3	2	2	3.450	.	.	.
210	1	1067	52	52	49	48	.	1	19	2	1	3	1	1	.	.	.	.
211	1	1068	48	46	46	46	.	1	28	1	2	2	2	2	.	.	.	.
212	1	1069	50	48	52	.	50	0	36	1	2	3	1	2	2.240	.	.	.
213	1	1070	62	60	64	.	68	0	26	2	1	4	1	1	3.600	.	.	.
214	1	1071	64	66	60	.	62	0	28	1	2	3	1	2	3.420	.	.	.
215	1	1072	49	48	52	50	.	2	24	1	2	2	2	2	.	.	.	.
216	1	1073	56	52	50	.	52	0	19	1	1	3	1	2	2.500	.	.	.
217	1	1074	52	52	49	50	.	0	21	1	1	3	2	2	2.495	.	.	.
218	1	1075	52	54	54	.	57	0	18	1	2	4	1	1	2.360	.	.	.
219	1	1076	54	52	60	58	.	0	23	1	2	4	1	1	3.175	.	.	.
220	1	1077	66	64	60	.	54	0	37	1	1	3	2	2	3.225	.	.	.
221	1	1078	60	62	64	.	56	0	43	1	2	4	1	1	3.115	.	.	.
222	1	1079	52	54	58	48	.	2	27	1	1	2	1	2	.	.	.	.
223	1	1080	48	50	50	48	.	1	41	2	2	4	1	1	.	.	.	.
224	1	1081	54	52	54	.	50	0	24	1	1	4	1	1	2.485	.	.	.

OBS	GRP	ID	R	E	C	AA	AG	WD	AGE	RACE	SEX	ES	DN	FAID	GPA	Q1	Q2	Q3
225	1	1082	58	56	52	.	49	0	19	1	2	3	1	2	2.850	.	.	.
226	1	1083	64	66	62	64	.	0	26	1	1	2	2	2	3.200	.	.	.
227	1	1084	60	62	66	60	.	0	21	1	1	3	1	2	3.140	.	.	.
228	1	1085	56	54	52	.	50	2	38	2	2	4	1	1	2.250	.	.	.
229	1	1086	56	58	54	.	47	0	19	1	2	4	1	2	2.465	.	.	.
230	1	1087	52	52	50	.	49	1	28	1	1	2	2	2	.	.	.	.
231	1	1088	50	48	46	50	.	0	42	2	1	3	1	1	1.900	.	.	.
232	1	1089	64	60	62	.	58	0	52	1	2	1	1	2	3.345	.	.	.
233	1	1090	54	58	49	.	54	0	29	1	1	4	1	1	2.460	.	.	.
234	1	1091	45	48	47	50	.	1	18	2	2	3	2	2	.	.	.	.
235	1	1092	52	52	50	.	49	0	31	1	1	2	2	2	2.225	.	.	.
236	1	1093	50	54	60	.	56	1	24	1	1	2	2	2	.	.	.	.
237	1	1094	64	62	64	.	58	0	28	1	2	3	1	1	3.450	.	.	.
238	1	1095	48	50	50	48	.	2	26	1	2	3	1	2	.	.	.	.
239	1	1096	56	58	49	46	.	0	43	1	2	2	2	2	2.890	.	.	.
240	1	1097	50	52	50	50	.	1	21	2	1	3	1	2	.	.	.	.
241	1	1098	62	64	60	.	56	0	24	1	1	4	1	1	3.115	.	.	.
242	1	1099	48	50	54	50	.	0	28	1	2	2	1	2	1.990	.	.	.
243	1	1100	50	52	50	49	.	0	32	1	2	3	2	1	2.750	.	.	.
244	1	1101	52	56	56	.	49	0	19	1	1	3	1	2	2.500	.	.	.
245	1	1102	48	50	60	58	.	0	48	1	1	3	1	2	2.210	.	.	.
246	1	1103	56	60	62	.	56	0	23	1	2	4	1	1	2.750	.	.	.
247	1	1104	50	52	50	54	.	0	38	2	1	4	1	1	2.560	.	.	.
248	1	1105	62	60	64	.	60	2	52	1	2	2	2	2	3.250	.	.	.
249	1	1106	60	58	49	.	47	0	30	2	2	4	1	1	2.800	.	.	.
250	1	1107	52	54	60	.	52	0	32	1	2	4	1	1	2.450	.	.	.
251	1	1108	48	50	50	54	.	1	19	1	2	2	2	2	.	.	.	.
252	1	1109	46	48	48	50	.	0	27	1	1	4	1	1	1.850	.	.	.
253	1	1110	54	56	50	.	56	2	27	2	2	2	2	2	.	.	.	.
254	1	1111	56	54	54	.	52	0	26	1	1	3	1	2	2.480	.	.	.
255	1	1112	50	52	48	50	.	0	38	2	2	3	1	1	2.250	.	.	.
256	1	1113	61	60	60	.	62	0	19	1	1	4	1	2	3.220	.	.	.
257	1	1114	60	66	58	.	56	0	21	1	2	4	1	1	3.360	.	.	.
258	1	1115	49	50	48	50	.	1	40	1	2	2	1	2	.	.	.	.
259	1	1116	56	58	60	.	62	0	24	1	1	4	1	1	2.740	.	.	.
260	1	1117	58	52	52	.	.	0	28	2	1	3	1	2	2.850	.	.	.
261	1	1118	48	50	48	48	.	1	35	1	2	4	1	1	.	.	.	.
262	1	1119	52	52	48	53	.	0	19	1	2	3	2	1	2.350	.	.	.
263	1	1120	50	56	60	60	.	0	22	1	1	4	1	2	2.880	.	.	.
264	1	1121	48	50	50	50	.	1	41	2	2	2	1	1	.	.	.	.
265	1	1122	54	56	54	50	.	0	19	1	1	3	1	2	2.245	.	.	.
266	1	1123	52	52	49	.	48	2	18	1	2	2	2	2	.	.	.	.
267	1	1124	56	54	56	.	54	0	26	1	2	4	1	2	2.450	.	.	.
268	1	1125	64	62	66	.	56	0	28	1	2	3	1	1	3.275	.	.	.
269	1	1126	60	62	60	.	52	0	32	1	2	2	2	2	3.180	.	.	.
270	1	1127	50	52	54	50	.	0	36	1	1	4	1	1	2.400	.	.	.
271	1	1128	52	50	50	52	.	1	25	2	2	3	1	1	.	.	.	.
272	1	1129	52	54	49	50	.	0	29	1	2	3	1	2	2.360	.	.	.
273	1	1130	60	60	52	.	56	0	23	1	1	3	2	2	3.250	.	.	.
274	1	1131	66	64	62	.	60	0	19	1	2	4	1	2	3.523	.	.	.
275	1	1132	47	50	50	52	.	1	47	1	2	2	1	1	.	.	.	.
276	1	1133	50	54	52	49	.	1	50	2	2	4	1	1	.	.	.	.
277	1	1134	54	52	50	50	.	0	43	1	1	3	2	2	2.410	.	.	.
278	1	1135	54	52	56	.	50	0	22	1	2	3	1	2	2.390	.	.	.
279	1	1136	52	58	60	.	60	0	28	1	1	3	1	2	2.260	.	.	.
280	1	1137	60	64	62	.	58	2	32	2	1	4	1	1	.	.	.	.

OBS	GRP	ID	R	E	C	AA	AG	WD	AGE	RACE	SEX	ES	DN	FAID	GPA	Q1	Q2	Q3
281	1	1138	61	56	58	.	57	0	34	1	1	3	1	2	3.015	.	.	.
282	1	1139	49	50	48	44	.	1	21	1	2	4	1	2	.	.	.	.
283	1	1140	50	42	52	48	.	1	22	1	1	3	1	1	.	.	.	.
284	1	1141	52	50	50	54	.	0	19	1	2	4	1	1	2.225	.	.	.
285	1	1142	54	52	48	50	.	0	36	1	2	4	1	1	2.190	.	.	.
286	1	1143	54	56	60	.	60	1	40	1	1	2	2	2	2.480	.	.	.
287	1	1144	56	52	54	.	49	2	29	2	2	4	1	2	.	.	.	.
288	1	1145	62	64	66	.	56	0	23	1	1	3	1	1	3.210	.	.	.
289	1	1146	64	66	60	.	54	0	26	1	1	2	2	2	3.650	.	.	.
290	1	1147	52	52	49	50	.	0	21	2	2	3	1	2	2.410	.	.	.
291	1	1148	46	49	48	49	.	1	36	1	2	3	2	2	.	.	.	.
292	1	1149	50	52	50	.	54	0	25	1	1	3	2	2	2.150	.	.	.
293	1	1150	52	54	56	52	.	0	19	1	2	3	1	1	2.300	.	.	.
294	1	1151	52	52	48	48	.	1	32	2	1	3	1	2	.	.	.	.
295	1	1152	61	60	64	.	58	0	19	1	1	3	1	1	2.450	.	.	.
296	1	1153	49	50	50	49	.	1	18	2	2	4	1	1	.	.	.	.
297	1	1154	54	56	60	.	50	0	24	1	2	4	1	1	2.380	.	.	.
298	1	1155	56	54	50	.	47	0	27	1	1	3	2	2	2.460	.	.	.
299	1	1156	50	50	48	52	.	0	34	2	2	3	2	2	1.940	.	.	.
300	1	1157	58	56	54	54	.	2	21	1	2	4	1	1	.	.	.	.
301	1	1158	48	50	49	50	.	0	19	1	2	3	2	2	2.015	.	.	.
302	1	1159	46	52	50	48	.	1	26	1	1	2	2	2	.	.	.	.
303	1	1160	54	52	58	.	56	0	34	1	1	4	1	1	2.225	.	.	.
304	1	1161	62	60	64	.	62	0	28	1	2	3	2	2	3.240	.	.	.
305	1	1162	60	64	60	.	60	0	46	1	2	3	1	1	3.225	.	.	.
306	1	1163	58	56	56	52	.	2	44	2	1	3	2	2	.	.	.	.
307	1	1164	56	56	52	.	52	0	30	1	2	3	2	1	2.840	.	.	.
308	1	1165	52	52	54	.	49	0	19	1	2	4	1	1	2.450	.	.	.
309	1	1166	52	54	50	.	52	0	27	1	2	4	1	1	2.510	.	.	.
310	1	1167	57	56	58	56	.	2	29	2	1	2	1	2	.	.	.	.
311	1	1168	56	52	52	52	.	0	45	1	1	2	2	2	2.350	.	.	.
312	1	1169	50	48	49	50	.	0	51	1	2	4	1	2	2.010	.	.	.
313	1	1170	62	64	62	.	64	0	27	1	2	3	2	2	3.300	.	.	.
314	1	1171	47	50	50	48	.	1	24	1	1	2	1	1	.	.	.	.
315	1	1172	49	48	49	53	.	0	23	1	2	3	1	2	2.150	.	.	.
316	1	1173	56	52	56	54	.	0	33	1	1	2	1	1	2.485	.	.	.
317	1	1174	50	50	52	.	58	2	19	1	2	4	1	2	.	.	.	.
318	1	1175	48	52	52	52	.	1	18	2	2	4	1	2	.	.	.	.
319	1	1176	60	62	64	.	70	0	26	1	1	3	1	1	3.250	.	.	.
320	1	1177	52	54	60	.	62	1	39	2	2	4	1	1	.	.	.	.
321	1	1178	54	56	52	.	49	0	24	1	1	3	2	2	2.750	.	.	.
322	1	1179	50	52	50	48	.	0	28	1	2	4	1	1	2.400	.	.	.
323	1	1180	58	56	54	.	54	0	25	1	1	4	1	1	2.860	.	.	.
324	1	1181	52	52	54	.	56	0	32	2	2	4	1	1	2.200	.	.	.
325	1	1182	56	58	58	.	50	0	19	1	1	3	1	2	2.750	.	.	.
326	1	1183	48	50	50	46	.	1	29	1	2	3	1	1	.	.	.	.
327	1	1184	64	62	64	60	.	0	24	1	1	2	2	2	3.350	.	.	.
328	1	1185	58	56	54	.	47	1	37	2	2	4	2	2	.	.	.	.
329	1	1186	52	52	49	53	.	2	42	1	1	2	2	2	.	.	.	.
330	1	1187	50	54	50	49	.	0	18	1	2	3	1	2	2.240	.	.	.
331	1	1188	54	58	60	.	62	0	27	1	2	3	1	1	2.865	.	.	.
332	3	3001	.	.	.	.	.	0	19	1	1	4	1	1	2.150	3	2	3
333	3	3002	.	.	.	.	.	0	27	2	2	3	2	2	2.405	3	3	3
334	3	3003	.	.	.	.	.	1	38	1	2	4	1	1	.	.	.	.
335	3	3004	.	.	.	.	.	2	24	2	2	3	2	2	.	3	3	3
336	3	3005	.	.	.	.	.	0	26	1	2	4	1	1	3.010	3	4	3

OBS	GRP	ID	R	E	C	AA	AG	WD	AGE	RACE	SEX	ES	DN	FAID	GPA	Q1	Q2	Q3
337	3	3006	.	.	.	.	.	0	34	1	1	4	1	1	2.140	2	2	2
338	3	3007	.	.	.	.	.	1	18	1	2	3	2	2	.	.	.	.
339	3	3008	.	.	.	.	.	0	22	2	1	3	2	2	3.500	3	3	4
340	3	3009	.	.	.	.	.	0	47	1	2	4	1	1	2.875	3	2	3
341	3	3010	.	.	.	.	.	0	29	1	2	4	1	1	2.210	2	1	2
342	3	3011	.	.	.	.	.	1	22	2	2	3	1	1	.	2	2	2
343	3	3012	.	.	.	.	.	0	20	1	1	3	1	2	2.350	2	3	2
344	3	3013	.	.	.	.	.	1	35	1	1	2	2	2	.	.	.	.
345	3	3014	.	.	.	.	.	0	24	1	1	4	1	1	3.250	4	4	4
346	3	3015	.	.	.	.	.	2	27	1	1	3	1	2	.	.	.	.
347	3	3016	.	.	.	.	.	0	36	1	2	2	2	2	3.180	4	3	4
348	3	3017	.	.	.	.	.	0	24	1	2	3	2	2	2.160	2	1	2
349	3	3018	.	.	.	.	.	1	19	1	1	3	1	1	.	2	2	3
350	3	3019	.	.	.	.	.	2	21	2	2	3	1	2	.	3	3	3
351	3	3020	.	.	.	.	.	0	37	1	2	4	1	1	1.950	2	2	1
352	3	3021	.	.	.	.	.	0	29	1	1	3	1	2	2.920	3	3	3
353	3	3022	.	.	.	.	.	1	23	1	1	2	2	2	.	2	2	2
354	3	3023	.	.	.	.	.	0	43	1	2	3	1	1	2.455	2	3	2
355	3	3024	.	.	.	.	.	0	24	1	2	3	1	2	2.370	2	2	2
356	3	3025	.	.	.	.	.	2	44	2	2	4	1	2	.	.	.	.
357	3	3026	.	.	.	.	.	1	28	1	1	3	1	1	.	1	2	1
358	3	3027	.	.	.	.	.	0	30	2	1	3	1	2	2.615	3	3	3
359	3	3028	.	.	.	.	.	0	19	1	2	4	2	1	2.750	3	4	3
360	3	3029	.	.	.	.	.	0	27	1	2	4	1	1	2.430	3	4	3
361	3	3030	.	.	.	.	.	2	36	1	1	2	2	2	.	4	4	4
362	3	3031	.	.	.	.	.	0	19	1	1	4	1	1	3.125	3	4	3
363	3	3032	.	.	.	.	.	1	24	2	2	3	1	1	.	.	.	.
364	3	3033	.	.	.	.	.	0	36	1	2	4	1	1	3.650	4	4	4
365	3	3034	.	.	.	.	.	0	21	1	2	3	2	2	2.600	3	2	3
366	3	3035	.	.	.	.	.	0	26	2	1	3	1	2	2.180	2	2	2
367	3	3036	.	.	.	.	.	1	22	1	1	2	2	2	.	1	2	1
368	3	3037	.	.	.	.	.	2	28	1	2	4	1	1	.	2	3	2
369	3	3038	.	.	.	.	.	0	24	1	1	3	2	2	2.650	3	3	3
370	3	3039	.	.	.	.	.	0	31	1	1	2	2	2	2.475	3	4	3
371	3	3040	.	.	.	.	.	1	25	2	2	3	1	1	.	2	2	1
372	3	3041	.	.	.	.	.	0	29	1	2	3	1	1	3.120	3	3	3
373	3	3042	.	.	.	.	.	2	19	1	1	2	2	2	.	3	2	3
374	3	3043	.	.	.	.	.	0	43	2	2	3	1	1	2.840	3	3	3
375	3	3044	.	.	.	.	.	0	27	1	2	3	1	1	2.150	4	3	4
376	3	3045	.	.	.	.	.	0	22	1	1	3	1	2	2.905	3	2	4