

1991

A comparison of the performance of students prepared for study at Old Dominion University through a developmental program with those accepted directly from secondary schools

Nathaniel Elias Villaire
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at Old Dominion University through a developmental program
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Villaire, Nathaniel Elias, Ed.D.

The College of William and Mary, 1991

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300 N. Zeeb Rd.
Ann Arbor, MI 48106

A COMPARISON OF THE PERFORMANCE
OF
STUDENTS PREPARED FOR STUDY AT OLD DOMINION UNIVERSITY
THROUGH
A DEVELOPMENTAL PROGRAM
WITH
THOSE ACCEPTED DIRECTLY FROM SECONDARY SCHOOLS

A Dissertation

Presented to

The Faculty of The School of Education
The College of William and Mary in Virginia

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Education

by

Nathaniel Elias Villaire

May 1991

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Approved May 1991 by



Deborah M. DiCroce, Ed.D



William Losito, Ph.D.



Armand J. Galfo, Ed.D.
Chairman Of Doctoral Committee

DEDICATION

This research effort is dedicated to my four children who suffered the loss of their parents during the many years of night classes, library weekends, homework nights, and research trips which frequently replaced their family time at home. It is also a reminder to them, and all the students who approach higher education with trepidation, that you are never too old, too busy, too depressed, too poor, or too poorly prepared to start improving your education. There are legions of dedicated teachers and a multitude of fine institutions waiting to help you up the educational ladder to a more enjoyable and fulfilling life through better understanding.

Perhaps my research will help improve educational opportunities, or stimulate other useful research which will improve educational opportunity, for those who can not reach or climb the education ladder. I ask each of you, Angela, Katherine, Anthony, and Pamela to reach out and help someone less fortunate than you to climb onto at least the lowest rung of the ladder. It will be your legacy. Perhaps the wake from your boat will have an effect long after your hull has been hauled.

Love,

Dad

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Some individuals give of themselves without thought or reward, and they make things possible that would not be possible otherwise. Ms Martha A. Smith, Associate Director of Institutional Research and Planning at Old Dominion University never failed to bring a cheerful smile and expert assistance in acquiring Old Dominion University's approval and data for this project. This dissertation would not exist without her help and advice. Similarly, Dr. James R. LaForce, a close friend, spent hours on the phone, and on his computer, helping me decipher some of the statistics generated in this effort.

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ABSTRACT

The purpose of this study was to investigate the performance of freshmen, as measured by cumulative GPA, who received developmental preparation at the college level with those who were prepared by the secondary school systems. The author's intention was to obtain data for accountability of institutional performance and provide public officials with a program effectiveness base.

Data were obtained from the institutional research office of Old Dominion University in Norfolk, Virginia on all entering freshmen students for the years 1988 and 1989. The data base was sanitized for confidentiality and contained information on the sex, age, ethnic background, high school GPA, SAT scores, cumulative academic GPA at the end of the freshmen year, and whether they required developmental courses to begin college level courses. The data were placed in an ASCII file and analyzed by three different computer packages.

The question was reformatted into a null hypothesis which declared that there would be no difference in the performance of the two groups. Further, subsidiary null hypotheses were formed to declare that the performance would be the equal when gender, age, ethnic background, SAT scores and high school GPAs were considered.

It was concluded that there is, indeed, a small but statistically significant difference in the performance of the two groups. However, it was also concluded that the parameters selected in this case had little predictive value in forecasting performance. The best predictors of performance were high school GPAs, and they were not statistically significant. All other parameters, including SAT Scores, proved to be poor predictors of performance, but they may explain the small difference in cumulative GPA.

Further research is needed to find predictors of performance, and to explore the complex ethnic background - gender - GPA matrix discovered during the study.

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THE COLLEGE OF WILLIAM AND MARY IN VIRGINIA

CHAPTER I

INTRODUCTION

A) Justification of the Study

Old Dominion University places itself in the following terms:

Old Dominion is located in Hampton Roads, one of the world's major seaports. Since the early seventeenth century, Hampton Roads has been the state's gateway to the rest of the world and the world's gateway to Virginia in commerce and industry, in recreation and culture, and in national security. Now a complex of seven major cities, it is a microcosm of the opportunities and challenges of contemporary urban America. (ODU Catalog, 1990 - 92)

In its mission statement, the University makes a special effort to highlight its target population and emphasize its role:

The University seeks in its student body a diversity of age, gender, ethnic, religious, social, and national backgrounds. It actively recruits American minority students along with students from other countries worldwide in such numbers as to have their presence make a discernible impact upon the University's educational process.

Old Dominion recognizes its mandate to serve both the academically gifted and those who have the potential for academic success despite educational, social, or economic disadvantages. (ODU Catalog, 1990 - 92)

First year students entering Old Dominion University in Norfolk, Virginia are given placement tests which determine if they may start their studies of college accredited courses immediately or must complete some remedial education first. As a result, the University, in an attempt to provide equal educational opportunities to all Virginians, offers a series of developmental courses designed to enhance writing, language and mathematical skills of students with inadequate skills. Normally, secondary school graduates are expected to have adequate skills for normal college work. Unfortunately, large numbers of entering freshmen at four year colleges need some remediation (SCHEV, 1983), and Old Dominion University places those needing remediation in its developmental program.

The developmental courses are expensive to carry and constitute a major investment in resources and effort by both the University and the Commonwealth of Virginia. (SCHEV, 1983) The Commonwealth has made it clear that higher education, especially the community college system, has a mission to provide citizens with the opportunity to succeed at the college level. (SCHEV, 1987) Virginia's determination to

provide citizens with the opportunity to pursue higher education goals includes a community college "Open Door" policy and has prompted institutions to offer developmental programs. Not only the community college system, but seven of the Commonwealth's four year, senior institutions have now assumed the mission to provide marginally prepared and disadvantaged students with developmental programs. In addition, the entire higher education system in Virginia is being pressed to evaluate the effectiveness of the programs being offered, and correspondence from state officials emphasize "accountability" by public institutions. (Dolgin, 1990) Opposition to developmental program expansion comes in the form of political pressure to keep the costs of education as low as possible, and the executive branch of the government is especially critical of costly programs which seem to duplicate educational opportunities already being funded. (Potter, 1990) The higher education community itself is divided over the issue, with the community colleges seeing developmental studies as part of their mission, the advocates of "excellence" who want to limit higher education to an elite few, and administrators who see developmental studies as a source of raw material for university expansion all press their point of view upon the legislature. (Potter, 1990) This frequently results in duplication of effort, unnecessary expenditures, and inefficient use of resources.

This study effectively evaluates the apparent presumption that developmental courses adequately prepare students for college level studies. (SCHEV, 1988) It delivers data on the effects that sex, age, high school GPA, SAT scores and ethnic background have on developmental effectiveness. In addition, perhaps, it provides the information large institutions with large developmental programs need to satisfy accountability tests, and, in fact, it may help decide whether accountability ought to be presented in terms of relative progress or some absolute standard. (Potter, 1990)

This study also helps provide independent data for use by University and State officials in determining support for developmental programs at Old Dominion University, and hopefully it will stimulate further research into higher education developmental effectiveness.

B. Statement Of The Problem (Research Questions)

The purpose of this study is to examine the relationship of the overall grade point average (GPA) of secondarily prepared freshmen with the overall grade point average (GPA) of developmentally prepared freshmen. The final grade point average (GPA) used in the study was taken at the end of the freshman year.

Assuming that Old Dominion University's placement system for entering freshmen is a valid and appropriate method of placement, the following hypothesis is proposed:

The first year academic performance of developmentally prepared students at Old Dominion University is equal to the first year academic performance of secondarily prepared students at Old Dominion University.

If this hypothesis is valid, the developmental programs at Old Dominion University are performing the service which the University assumes they are performing.

Literature on developmental programs indicates several other variables must be considered if the true effect of these programs is to be realized. Researchers have found that race

(Jason, 1976; Kogleman, 1981; Glazer, 1982), sex (Glazer, 1982; Tobias, 1977; Kerber, 1978), age (Harding, 1980; Chang, 1980; Yanosko, 1981), high school GPA (Presley, 1981; Glazer, 1982; Lombardi, 1979), and Scholastic Aptitude Test scores (Glazer, 1982; Snowman, 1980; Thompson, 1979) all have some effect upon academic performance. No research appears to look at those effects in developmental situations. Therefore, several subsidiary questions were developed, in addition to the primary question, which have been addressed.

Primary Question:

1. Is there a statistically significant difference in the academic performance of the developmentally prepared students as compared to the academic performance of the secondarily prepared students?

Subsidiary Questions:

2. Is there a statistically significant difference in the academic performance between the developmentally prepared and the secondarily prepared students when their sex is considered?

3. Is there a statistically significant difference in the academic performance between the developmentally prepared and the secondarily prepared students when their ethnic background is considered?

4. Is there a statistically significant difference in the academic performance between the developmentally prepared and the secondarily prepared students when their age is considered?

5. Is there a statistically significant difference in the academic performance between the developmentally prepared and the secondarily prepared students when their high school GPA is considered?

6. Is there a statistically significant difference in the academic performance between the developmentally prepared and the secondarily prepared students when their Scholastic Aptitude Test (SAT) scores are considered?

C. Definition of Terms

High School GPA -

The cumulative average of all high school work completed.

OV / GPA -

Overall grade point average of each student at the end of the first academic year.

SAT Scores-

The scores received on a series of tests administered nationally to all high school students wishing to enter college.

The tests are the Scholastic Aptitude Tests (SAT)

DEVELOPMENTAL PROGRAM -

A program of study which fills voids in an education by replacing them with the appropriate studies.

REMEDIAL PROGRAM -

A term used interchangeably with DEVELOPMENTAL PROGRAM.

DEVELOPMENTALLY PREPARED STUDENT - A student who must take courses specifically designed to bring an academically weak student's skills up to a level which will ensure

him or her an opportunity for success with college level work.

SECONDARILY PREPARED STUDENT -

A student who attended a secondary school, or its equivalent, and possesses the minimum reading, writing and mathematical skills required to do college level work.

D. Design of the Study.

1. Data Description and Gathering Procedures -

Institutional Research at Old Dominion University made the information required to conduct this study available from the records of all entering freshmen for the specific years of 1988 and 1989. The University generates well over 400 developmentally prepared students per year. The entire two year sample in time was used. Therefore, the sample is to be considered a year among years in general since the same procedures are used each year to select students for developmental preparation. The sample was separated into two groups: secondarily prepared students and developmentally prepared students. Randomly assigned numbers replaced student names and social security numbers to preserve anonymity. All student demographic data were classified under the record's

assigned number in order to maintain the privacy of the individuals.

Each record was sorted and entered into the computer by developmentally prepared or secondarily prepared status, sex, ethnic background, age, SAT score (Math), SAT score (Verbal), SAT score (Total), high school GPA, cumulative grade point average (OV / GPA) at the end of the freshman year, and the enrollment year. The data base was then printed, producing a hard copy of eleven (11) columns of data, and saved on a computer disc in an ASCII file. All records and data were carefully handled in accordance with the highest ethical standards annotated under, **ETHICAL CONSIDERATIONS**, in this document.

E. Limitations of the Study

The study is limited to entering freshmen of two specific years, 1988 and 1989, at Old Dominion University in Norfolk, Virginia. Due to the legal protection offered individual citizens concerning confidentiality of records (Federal Privacy Laws), and the corresponding unavailability of the data, the study was limited to student information legally maintained by Old Dominion University.

Since a student's financial status, marital status, number, age and sex of any dependents, and employment status are also legally protected, and change randomly throughout the

academic year, they were not be addressed in this study. The year a student entered school was not considered in the original proposal, nor was it part of any of the primary or secondary hypotheses. Therefore, even though the data are available, entry year is not part of this study.

F. Ethical Considerations

Confidentiality of student records has been achieved by randomly assigning numbers to identify each record. No names or social security numbers have been used in the input of the data. All records remained in the custody of Old Dominion University, and only the requested data were posted against the record's randomly assigned number. Copies of the data bank were retained by Old Dominion University and myself. Additional copies of the data were sent to The Florida Institute of Technology for my use in analysis, and that copy remains on the main frame system at the Florida Institute of Technology (ROO) for possible post graduate study. The study requirements were submitted to both the College of William and Mary and Old Dominion University for review by their respective Human Subjects Review Committees. Both universities approved the study.

CHAPTER II

CRITICAL REVIEW OF THE LITERATURE

A) Introduction

The purpose of this chapter is to review the history, development and current status of developmental education efforts at the senior college level, especially as it affects educational institutions in the Commonwealth of Virginia. Initial electronic and catalog searches revealed over three thousand (3,000) references on remedial and developmental education subjects. Vast quantities of placement scores and reports are available from a few states such as New Jersey and New York, California, and Florida, and a great deal of work has been done on developing testing systems which evaluate math and verbal deficiencies. Developmental programs at the senior college level have been implemented in several states, but California, Florida and New Jersey have placed exceptional emphasis on their programs while Virginia has studied the situation and made some general policy guidelines for its public colleges and universities. (McCartan, 1991) The overwhelming volume of the materials available dictated a narrowing of the types of literature reviewed, and literature included here is directly associated with this research

effort. Therefore, this review emphasizes historical background, related research projects, and developmental programs in a few key states and within the Commonwealth of Virginia.

B) **Early Findings**

Remediation of college bound students is not new, and it appears that unprepared students are endemic to our society because of our commitment to a democratic social structure which emphasizes an educated citizenry. (Trow, 1982-83) In colonial times colleges changed or reduced standards, set up special schools and sometimes offered departmental tutoring to attract students including those not really prepared for college work. These efforts grew out of an American idealization of education for the common man, and ultimately lead to the passage of the Morrill Act of 1862 which emphasized agrarian and mechanical education for the working citizen. (SCHEV, 1983) As early as 1852, the University of Michigan looked at the problem of poorly prepared students as did Iowa State University in 1862. (Mickler, 1989). Francis Wayland of Brown University complained about the poor ability of entering freshmen in 1841. Harvard, with its remedial composition course in 1874, Yale, Princeton and Columbia all faced similar problems in their history. (Stonehocker, 1985). The situation continued to deteriorate even though attempts to

arrest the decline, such as the establishment of the College Entrance Examination Board in 1890, were frequently proposed and implemented. By 1907 the quality of college bound students declined to the point that 50% of the freshmen classes at Harvard, Yale and Columbia could not meet the institutions' admission standards. (SCHEV, 1983)

Similar complaints and a few attempts at solutions marked the years. By 1960 several large remedial programs were attempted at higher education institutions, but they were generally poorly planned and poorly taught, and the results were disastrous. Remediation programs were rarely mandatory until they were redesigned in the 1970s and implemented in the 1980s. (Mickler, 1989). Now, additional developmental programs have been inspired by research which is beginning to show specific patterns in the differences in the progress of prepared and underprepared students.

The prepared college student seems to be willing to study at an elevated level; is able to resolve personal conflicts and difficulties; sets specific, though often lofty, goals; becomes involved in the academic and social world; receives support from family and friends; tends to accept responsibility for his or her own life; and is highly motivated. (Rounds, 1984) Conversely, the poorly prepared student tends to have a poor self image (Stonehocker, 1985), caused by a variety of social problems including degrading or defeating educational experiences. (Thornton, 1975) He or she

does not have clearly defined goals, and the goals that he or she does have are usually unrealistic. The student has little motivation; reads and writes poorly; has difficulty with math; cannot define study patterns or skills; is frequently absent from school or work; and does not adapt well to change. (Stonehocker, 1985)

C. Student Profiles

Poorly prepared students have little confidence in themselves and tax the social services of a college severely by clogging the system; avoiding learning activities; and trying only those situations in which success is assured. (Miller, 1982) Frequently, the under prepared mistrust teachers, counselors, and the college itself. They see themselves as social and academic failures but fight for one more chance to prove themselves. (Martin, 1984)

Society has created some poorly prepared students. Some scholars see the one parent home, economic deprivation (Young, 1978), and poor reading instruction in the lower grades as major causes of under preparation. (Davies, 1983) Therefore, a great deal of basic work is required with each poorly prepared student, and these "high risk" students generally need additional training in reading, writing and arithmetic. (Marshall, 1981)

Secondary teachers, the general public and college faculty generally feel that entering freshmen are not as literate as they were just a few years ago. (Jacob, 1981) As many as 50% - 60% of all college freshmen are deficient in at least one of the skills, reading, composition or mathematics, considered essential for successful college work. (Miller, 1982; Mennick, 1980) Educational researchers have verified society's feelings with additional investigations into educationally weak areas, and published works clearly illustrate the problem. Nearly 23 million adults have serious literacy or mathematical skill deficiencies, and 13% of the teen age children (17 yrs old) are technically illiterate. High school students are increasingly likely to choose the "general track" rather than the college preparatory track, and their SAT scores have dropped over 50 points in verbal skills and 40 points in math skills since 1963. (SCHEV, 1983)

Prominent scholars were concerned, and frequent criticism of the system was voiced:

By the late 1960s the most offered courses in American Community Colleges were remedial reading, remedial writing and remedial arithmetic. As many as 50% of any entering freshman class were found in need of essential remedial work. (Roueché, 1984)

D) Developmental Programs

With the mean SAT score for entering freshmen dropping by 66 points between 1968 and 1980, Florida and California were two of the first states to place remediation laws on their books. (Cox, 1985) These states were concerned with the reports that 30 million high school students dropped out in 1979, and fully 35% of the adult population was functionally illiterate. Nearly 20 million of those adults will attempt to return to education. (Cox, 1985)

In the case of California, the state created The California Round Table on Educational Opportunity which was composed of representatives from the three major branches of the state's higher education systems. In 1981, the leaders of the Academic Senates of the California Community Colleges, the California State University, and the University of California joined the Round Table on Educational Opportunity in the issuing of a Statement on Competencies in English and Mathematics Expected of Entering Freshmen. (Statement on Competencies in English and Mathematics Expected of Entering Freshmen, 1982) These standards are specific and have had a profound effect upon California's educational system and its educational laws. The new laws had a special effect upon the University of California and the California Community College

System. The University of California increased its entrance requirements in mathematics, English, social studies and foreign languages in 1982. The Community College System revised its grading system, dismissal policies, minimum graduation skills and redefined the Associate Degree requirements. (Cox, 1985)

Florida mandated that remediation be offered in all state community colleges, and the guidance and placement programs at schools like Miami-Dade Community College soon flourished. They are now cited as superb examples of what can be done in the developmental field. (Mickler, 1989) The overall effect is that Florida's philosophy incorporates several controversial ideas advocated in literature on the subject. Recommendations by the state were:

1. Skills training must be integrated into the college experiences.
2. Cognitive skills training must be combined with social and emotional development.
3. Staff should be selected for their interest, commitment, and knowledge about learning problems.
4. Degree credit should be granted for remedial classes.
5. Remediation should be approached with flexibility. (Woodfaulk, 1982)

By the Fall of 1984, all Florida students were required to pass a "functional literacy test" for communications, computations and reasoning in order to complete the requirements for an associate degree or to transfer to a four year, state institution. (SCHEV, 1983)

Before progressing further, the terms remediation and developmental used in the literature should be defined. Many authors use the terms interchangeably, while others insist there is a serious difference. Dr. David Potter, Vice President of Executive Affairs at George Mason University, a principle investigator in Virginia's analysis of developmental programs, states that the only people he found interested in using the word "developmental" were those who taught it. (Potter, 1990) Perhaps the best and clearest definitions found in the literature reviewed are expressed by Stonehocker:

The difference between remedial and developmental education is in emphasis. Remedial education assumes poor performance results from deficiencies within the student; it is preparatory in nature, and it is the final solution. Developmental education assumes academic performance develops through stages which cannot be skipped, and each stage is more complex than the previous stage. (Stonehocker, 1985)

Institutions such as Old Dominion University are responding to Stonehocker's definition of developmental by offering courses (stages) which may have been skipped, literally or figuratively, by the student. Many prominent scholars feel that moving students between remedial courses, yet denying them entry into regular courses, simply does not work well. The students resent the courses which do not really prepare them for college level work, and their performance is subsequently poor. (Roueche, 1984; Clausow, 1979) Finally, ethical considerations are now becoming more evident. Mickler and Chapel present a sobering point of view in their article printed in the Journal of Developmental Education, Fall, 1989. These educators assert that:

The school that accepts a student for admission is morally obligated to develop instructional methods that will offer the student those skills he or she will need to be successful academically.

Therefore, this study will assume that remediation is the process of providing essential steps in the educational experience which a student has skipped.

E) The Commonwealth of Virginia's Developmental Concept

Virginia's remediation program is focused primarily in the Community College System, but seven state supported, senior institutions offer developmental programs for entering freshmen. (SCHEV and the Community College System, 1989) The state mounted an extensive effort to study the usefulness of developmental programs in Virginia which consumed at least \$16 million, and perhaps more, during the 1981 - 82 academic year. The Task Force, under the sponsorship of The Council of Higher Education, found that:

Remedial students are likely to have: poor high school grades in basic skill subjects; little or no advanced work in high school; poor achievement as measured by high school rank; less likelihood of having received a high school diploma; poor reading skills; poor scores on college entrance or placement examinations; a history of educational disadvantages; relatively poor socio-economic backgrounds; or less sustained involvement in higher education. (SCHEV, 1983)

It also found that there were other problems with the system which needed attention. Testing and placement at most

institutions needed revision; A variety of competency definitions existed between the institutions; Each institution determined if a student met its standards for admission without reference to outside standards. Among the Task Force's recommendations were:

1. Each institution should continue to determine whether or not to admit students lacking skills consistent with the school's mission.
2. The public colleges and universities of the Commonwealth should jointly define minimum competencies.
3. Institutions should administer placement examinations in English grammar and composition, reading, and mathematics to all entering students presenting a high school diploma or less.
4. Students taking remedial work must take proficiency tests to certify that they have met the institution's entrance requirements.
5. College credit should not be awarded for remediation.
6. Time limits should be placed on remediation efforts.
7. A skills floor should be established below which remediation at the college level would not be attempted.
8. All future students seeking admittance to public institutions in the state must meet the new, upgraded minimum requirements. (SCHEV, 1983)

A follow-up examination was made by the State Council of Higher Education in 1989 which showed that six of the state's

four-year institutions, all 23 state community colleges, and Richard Bland College had implemented some form of academic remediation. (SCHEV, 1989) Since that time, a seventh senior institution has also established a developmental program. (McCartan, 1991) The Council also introduced a new term into the remediation arena when it labeled remedial or developmental teaching, "foundation instruction", and specified an instruction ratio of one (1) instructor for every fifteen (15) students in the programs. Three previously stated objectives (SCHEV, 1987) were also addressed in this report, and the following actions were taken:

1. Minimum levels of competence for students wishing to do college-level work for degree credit were defined, but individual colleges were urged to set their own levels at or above those outlined in the report.
2. Assessment of students completing remedial or developmental programs is required, and it recommended that pre-tests and post-tests be administered.
3. Stated that community colleges should shoulder the majority of the developmental mission. (SCHEV, 1989)

Some institutions responded quickly and positively to the reports and recommendations while others did not. Certain universities within the Commonwealth seemed to represent the goals and ideals of the reports issued by the State Council of

Higher Education better than others. Old Dominion University is often cited, (Stonehocker, 1985), as an institution which does a good job of systematically tracking and evaluating the progress of developmental students. (Va. Council on Higher Education, 1988) The university is neither the largest nor smallest of Virginia's senior institutions; its standards are not the highest nor the lowest; it is urban in nature, but draws heavily from the state's southern, rural areas as well; it has good academic and research facilities, but they are not as fine as several other, more famous state institutions; it received a solid academic heritage from its mother, The College of William and Mary, and it is moderately well known nationally and internationally. (SCHEV, 1987) With a total operating budget of nearly \$200,000,000, a faculty of 570, a diverse enrollment of over 15,000 and an institutional research department with a good reputation for accuracy, Old Dominion University represents the average Virginia senior institution well. (SCHEV, 1987; Stonehocker, 1985) With its urban setting, large numbers of under prepared applicants and the availability of quality data, Old Dominion University is an ideal case in the study of developmental education effectiveness in Virginia.

CHAPTER III

METHODOLOGY

A) A Sample in Time

Data were retrieved by Old Dominion's office of Institutional Research and Planning for all entering freshmen in the Fall of 1988 and 1989. The university's student information system yielded the developmentally or secondarily prepared status of each student, his or her age, ethnic background, math SAT scores, verbal SAT scores, total SAT scores, high school GPA and first collegiate year cumulative GPA. The raw data were sorted into the following variables:

IDNO	=	A randomly assigned identification number for each student to insure privacy. Located in columns 1 - 5.
DEVE	=	Developmentally prepared (1) and secondarily prepared (2). Located in column 7.
GENDER	=	Male (1) and female (2). Located in column 12.
ETHNIC GROUP	=	White (Wh = 1), Black (Bl = 2), Asian (As = 3), Hispanic (Hs = 4),

and Native American (NA = 5).
Located in columns 14 - 15.

AGE = In years. Located in columns 17 -
18.

SATMAT = Mathematical Scholastic Aptitude
Test scores. Located in columns 20
- 22.

SATVER = Verbal Scholastic Aptitude Test
scores. Located in columns 24-26.

SATTOT = Combined mathematical and
verbal SAT scores.
Located in columns 28-31.

HSGPA = The cumulative high school grade
point average to two decimal
places. Decimals are omitted.
Located in columns 33 - 35.

CUMGPA = The cumulative grade point average
for all college, credit courses
taken during the first year to two
decimal places. Decimals are
omitted. Located in columns 37 -
39.

YEAR = The year the student entered
school. Only last two digits of
the year are shown. Located in
columns 41 - 42.

B) Procedures

1. Data gathering methods: Data from student records were requested from the Old Dominion University office of Institutional Research and Planning. Random numbers were generated to replace student names, and certain modifications, noted below, to the data were generated to produce a more homogeneous and representative sample. The sample is, in fact, a sample in time for the years 1988 and 1989. Non-resident aliens were excluded because many of these students had a marginal grasp of the English language, and including them would change the native born, English speaking data base.

The data were also modified to exclude students under the age of 16 or over age 85, and values of "0" in the SATMAT, SATVER, SATTOT and HSGPA variables were ignored. The entire modified data base was downloaded to a 5 1/4" high density disc and placed in an ASCII file. The data were analyzed on three different computers using three different brand name statistical packages to confirm the primary analyses conducted on the Florida Institute of Technology's main frame computer and aeronautics lab computers using a SPSS program and a NCSS program

2. Interventions - This is a descriptive study and included no interventions.

3. Ethical safeguards - Safeguards were addressed previously in CHAPTER I, section F.

C) Data Base Structure

1. Description -

As noted previously, the Old Dominion University placement test system is presumed to effectively place students in either developmental courses or college level, accredited courses. It is assumed that individuals placed in regular courses were adequately prepared for those courses by a secondary school system, and those individuals placed in developmental courses were not adequately prepared by the secondary system. No attempt has been made in this study to determine the actual method of preparation (high school, GED, self study, tutorial, military service courses, etc.) received by the group placed in regular classes, and no attempt has been made to determine the actual cause (illness, poor motivation, financial hardship, intellectual ability, social problems, lack of opportunity, etc.) which required the other group to take developmental courses.

Once identified and placed in a group, identical demographic profile data were obtained for each individual in each group and recorded as noted earlier.

D) Research Design

The ASCII file was loaded into the memory of the main frame computer (R00), and a 386 personal computer, at Florida Institute of Technology, and the SPSS and NCSS statistical packages capable of performing data comparisons using t-tests, and a Multiple Regression operation were used to analyze the data. The OV/GPA of the two groups being studied became the dependent variable in the initial analysis. The variables classification of developmentally prepared or secondarily prepared student, sex, ethnic background, age, SAT scores, and high school GPA scores were added to a multiple regression analysis equation one at a time to determine "effects" (relationships and interrelationships). For statistical clarity, the null hypothesis for developmentally vs secondarily prepared students was changed to the following:

E> Specific Null Hypotheses

1. "There is no difference in the first year academic performance of secondarily prepared students and developmentally prepared students at Old Dominion University."

Successful college educational experiences have been measured by the student's academic GPA for many years. Universities decide whether the student does or does not stay in school, receive a degree, is placed on probation, or is eligible to participate in certain aspects of college life based upon his or her GPA. The relative measure of success or failure of freshmen students is presumed to be their overall GPA at the end of the first year, and it was used as a measuring standard throughout the study.

Once the basic hypothesis was evaluated, the following hypotheses were considered:

2. "There is no difference in the first year academic performance of secondarily prepared students and developmentally prepared students at Old Dominion University when their sex is considered."

3. "There is no difference in the first year academic performance of secondarily prepared students and developmentally prepared students at Old Dominion University when their ethnic background is considered."

4. There is no difference in the first year academic performance of secondarily prepared students and

developmentally prepared students at Old Dominion University when their age is considered."

5. "There is no difference in the first year academic performance of secondarily prepared students and developmentally prepared students at Old Dominion university when their high school GPA is considered."

6. "There is no difference in the first year academic performance of secondarily prepared students and developmentally prepared students at Old Dominion University when their Scholastic Aptitude Test (SAT) scores are considered."

F) Statistical Analysis Technique

The hypotheses were tested using a t-test, a Cross Tabulation, and a Multiple Regression Analysis package. The Multiple Regression Analysis was performed in a stepwise fashion. Three different computer systems, with three different packages, were used to verify the results.

G) Summary of Methodology

The entire Old Dominion freshman populations from the years 1988 and 1989, were used as the sample. The group used was considered to be a sample in time since the criteria for selection to require developmental work is the same each year.

Data were separated into the categories of identification (random number assignment), developmentally or secondarily prepared, gender, ethnic group (five groupings), age, SAT scores for math, SAT scores for verbal comprehension, total SAT scores, high school GPA, cumulative freshman GPA, and year of entry into Old Dominion University. Specific null hypotheses were analyzed using t-test techniques and cross tabulations. A step-wise multiple regression was performed to identify the variables which seemed to have the most influence on the dependent variable (cumulative GPA).

Statistical packages produced by the Apple Computer Corporation, as well as one produced for IBM compatible computers, NCSS, were used to verify the Statistical Package for the Social Sciences (SPSSx), multiple regression results. The step-wise multiple regression equation added data from each independent variable one step at a time. That allowed the interpretation of the overall effect of each independent variable on the correlation coefficient. The effect was evident in the change in the coefficient and was reported by the analysis package in a manner which reflected the percentage change effected. The minimum level of significance used in this study was 0.05. The statistical packages reported the correlation as "R" and the effect of each independent variable upon the correlation as the square of "R". Therefore, a correlation of 0.40 (R) serves as an index of relative correlation, and the effect of the variable on the

total correlation would be 16% (R squared). Thus, the contribution of each independent variable to the overall effect on the dependent variable was determined and recorded.

CHAPTER IV

ANALYSIS OF RESULTS

The purpose of this case study was to determine if developmentally prepared and secondarily prepared freshmen students performed equally well during their first year of academic work at Old Dominion University. A comparison of specific variables of both groups was made using standard statistical techniques to determine the viability of specific hypotheses. This chapter presents the resulting data and is divided as follows:

- A. Sample Source
- B. Sample Characteristics
- C. Sample Demographics
- D. Sample Adjustments
- E. Hypotheses Analyses

A. Sample Source

Old Dominion University's office of Institutional Research and Planning in Norfolk, Virginia supplied the requested data on all freshmen entering the University during the Fall semesters of 1988 and 1989. A random, five place number was generated to replace each student's name, to ensure privacy, and each variable for each student was assigned

against the number. The entire classes were included in the data file and constitute a sample in time. A variable code list is included in Appendix A.

B. Sample Characteristics

All data were archival in nature and stored on Old Dominion's main frame computer. All entering freshmen for the specified times were included in the original data request without modification. Specific data protected by law, and data not relevant to this study, were not requested or provided. All students had met Old Dominion University's entrance requirements, and had taken the appropriate placement tests. Students were not notified of this study, and have had no input or influence on the study.

C. Sample Demographics

The population consisted of 3752 students divided into the two categories of developmentally prepared or secondarily prepared. Each of these groups was then divided into sub groups by gender. The 1576 developmentally prepared students, 42% of the sample, consisted of 823 females, 21.93% of the sample, and 753 males, 20.07% of the sample. The secondarily prepared students numbered 2176, 58% of the sample, and contained 1099 females, 29.29% of the sample, and 1077 males, 28.70% of the sample. Overall, females constituted 51.23% of the freshmen classes while the males made up 48.77% of the

classes. Appendix B provides a summary of all demographic parameters. (Tables 1 & 2)

A cross-tabulation of the data by ethnic background and gender, with ethnic background broken down into five (5) categories, was generated to demonstrate the diversity of the population. The ethnic codes were assigned against numerical density. Thus, the largest grouping in the sample was of individuals labeling themselves as "White", and that group became "Code 1"; the second largest grouping became "Code 2", etc. The data base was modified to exclude non-resident aliens, and they were not coded. The ethnic groups were coded as follows:

<u>CODE</u>	<u>ETHNIC GROUP</u>
1	White
2	Black
3	Asian
4	Hispanic
5	Native American

Males constituted a slight majority of the White freshmen, 50.94%, the Asian freshmen, 54.5%, the Hispanic freshmen, 50.98%, and the Native American freshmen, 52%, but they comprised only 32.37% of the Black freshmen. (Tables 3 & 4)

Further cross-tabulations of secondarily and developmentally prepared students with ethnic grouping helps clarify the differences in the sample. In the secondarily prepared group were 1791 White, 82.31%, 210 Black, 9.65%, 137

Asian, 6.3%, 210, 27 Hispanic, 1.24%, and 11 Native American, 0.51%, students. The developmentally prepared group was comprised of 1181 White, 74.94%, 272 Black, 17.26%, 85 Asian, 5.39%, 24 Hispanic, 1.52%, and 14 Native American, 0.89%, students. (Tables 5 & 6) A closer look at the distribution, with gender and method of preparation considered, shows that females slightly outnumber males in the developmental grouping. In the developmental grouping of 1576 students, 52.22% were female, but they comprised only 51.2 % of the total population. (Table 7)

Included in this research is a cross-tabulation of age and gender. (Tables 8 - 12) The frequency distribution tables give a clear picture of the age diversity which characterizes Old Dominion's educational program. The data base was modified to disregard ages of less than 16 years or more than 85 years, and divided into two groups, ages of 20 years or less and ages of 21 years or more, for analysis. Almost every decade of life is represented in the freshman class except the sixties and seventies. One 82 year old female represents the octogenarian set.

A frequency-distribution table (Tables 13 - 22) was the result of a cross tabulation of age and method of preparation. The tables reflect actual numbers of students in each grouping by age and by percentage. Most age groups are represented in both of the preparation method groupings, with the vast

majority of the students falling into the 18 and 19 year age brackets.

The cross-tabulation of age with ethnic origin was a little more complicated, but it produced excellent information. (Tables 23 - 32) The data emphasized the racial and age diversity of the population being studied. It detailed the dominance of white, 18 year old students in the freshmen class, 2359 individuals, but it also outlined the relatively large number of Black, 409, and Asian, 181, 18 year old students beginning their studies.

D) **Sample Adjustments**

The data base has few adjustments; the entire sample in time was used for the research. However, non-resident aliens were excluded because many aliens require extensive English language remediation before beginning class work, and their presence within the data base could influence the study which is centered upon US Citizenship. Similarly, students less than 16 years of age were considered to be special or gifted students who have special programs especially designed for them, and they are not normally prepared for college by either the secondary school system or the developmental system. Since life expectancy in the United States is generally considered to be approximately 75 years of age, an upper age limit of 85 was set to accommodate almost anyone likely to enter the freshmen class.

E. Statistical Techniques Used

1. The t-test. This test is often used to test the statistical significance of the difference between two means, and assumes that variances are approximately the same and that the error component of the data are distributed as a function of a bell shaped distribution curve. (Galfo, 1975; NCSS, 1988) If the variances are not approximately the same, a "F"-ratio for testing group variances can be generated which uses the numerator degrees of freedom minus one as the first group size, and the denominator degrees of freedom minus one as the second group size. If the resulting "F"-ratio has a confidence level of less than 0.1000, then an unequal, or pooled, variances method of calculating (t) should be used. (Witte, 1980) The (t) statistical measure was selected over the "F" because the groups being examined come from different populations to form a new population. The developmentally prepared group came to Old Dominion University technically unprepared, as defined by placement tests, for college level work, while the secondarily prepared group came adequately prepared, as determined by placement tests, for college level work. The fact that the first group was separated into special classes and exposed to a different environment for part of the first year defined it as a separate population even though it later took classes with the second group. As

noted in literature (Galfo, 1975), a decision as to whether the samples are from the same population, in which case a "F" statistical procedure would be appropriate, or different populations, in which case a (t) statistical procedure would be appropriate, had to be made. The (t) statistic appeared to be appropriate for this study.

The (t) values generated for this research included additional information such as the number of observations in any given group, the mean, confidence level of the mean (95%), standard deviation, standard error, significance level of the (t) value, differences between means, degrees of freedom, standard error of the difference, confidence (95%) level for the population difference, a "F"-ratio, a significance level (0.1000) for the "F"-ratio, and graphic plots of the data which helped with interpretation. (NCSS, 1988) All critical values were selected using the tables offered in standard statistical texts. (Galfo, 1975; Hamburg, 1985; Witte, 1980)

2. The Multiple Regression (Stepwise) The procedure used to analyze the predictive value of each of the independent variables was the stepwise multiple regression. The statistics generated allowed an examination of the overall linear relationship between and among the various variables, and produced a clearer picture of each variable's effects. The multiple regression process generated information on the independent variable(s), parameter estimates, confidence

intervals (95%) for upper and lower limits, standard parameter estimates, standard error, variance of the parameter, a (t) for the parameter, probability levels for the t, simple correlation (r), partial correlation coefficients, r-squared, sequential r-squared, overall r-squared, sequential sum squares, last sum squares, total sum squares, model sum squares, the mean, standard deviation, variance inflation, and tolerance level. (NCSS,1988) The abundance and level of analyzed data enhanced the confidence level of the information.

3 Cross Tabulation This technique is the two-way tabulation of variables and data. It helps sort data into a multitude of useful patterns which make quick associations relatively easy. It was used to analyze the demographics of the sample being studied and to indicate the need for additional data bases. There were 22 complete data bases of over 3700 observations each carved out of the original data base core supplied by Old Dominion University. These data bases made it possible to examine the freshmen from the years 1988 and 1989 in almost any conceivable combination desired.

The type of information generated by this technique included cross tabulation tables, Chi-Square statistics, frequency tables, summary tables and graphic plots. The tables generated provided new ways of examining the data, and

resulted in the procurement of additional assistance in interpreting findings.

F. Discussion of Research Questions

The basic research question, and the results obtained by its examination, are discussed in this section.

1. THERE IS NO DIFFERENCE IN THE FIRST YEAR ACADEMIC PERFORMANCE OF SECONDARILY PREPARED STUDENTS AND DEVELOPMENTALLY PREPARED STUDENTS AT OLD DOMINION UNIVERSITY.

A t-test for independent samples of the groups, developmentally prepared and secondarily prepared, was run using the selected statistical package. The cumulative GPA for the two groups was used as a basis for comparison in the formulas for the t-test. The statistical mean for the secondarily prepared students was 2.43551, while the statistical mean for the developmentally prepared students was 2.204457. A unequal variance estimate of $t = -9.861964$ with 3503.446 degrees of freedom and a 2-tailed probability of 0.000 was obtained. (NCSS, 1988) A critical value of (t) was obtained by entering the table with infinite degrees of freedom and a 0.05 significance level. The critical value was 1.960. (Witte, 1980) With the high (t) and the four decimal

place probability, it is obvious that there was a statistically significant difference between the cumulative GPAs of the two groups. The standard deviation for the secondarily prepared group was 0.7447002; the standard deviation for the developmentally prepared group was 0.6667917. The standard error for both groups was very close and small indicating a relatively continuous numerical data base. (NCSS, 1988) The secondarily prepared group's error was 0.01611317, and the developmentally prepared group's error was 0.017008.

Therefore, the null hypothesis was rejected. There is a small but statistically significant difference between the academic, cumulative GPAs of secondarily prepared students and developmentally prepared students at Old Dominion University.

Once the difference was established, a stepwise, multiple regression analysis was run to determine the effect each of the variables of developmental / secondarily prepared students, sex, ethnic background, age, total SAT scores, and high school GPAs had on the academic GPA. The procedure produced a correlation matrix, an analysis of variance report, individual regressor reports on each variable, and a stepwise regressor report. A t-test was run on each of the variables involved in the subsidiary questions, and the results were matched with the appropriate multiple regression reports.

2. Is there a statistically significant difference in the academic performance between the developmentally prepared and the secondarily prepared students when their gender is considered?

The cumulative GPA of all developmentally prepared males and females was compared to the cumulative GPA of all secondarily prepared males and females. The male developmental group consisted of 736 students while the male secondarily prepared group numbered 1053. The developmentally prepared female group consisted of 801 individuals while the secondarily prepared female group numbered 1083. The (t) value of -5.572046 with a probability level of 0.0000 for the male group, and a (t) value of -8.378621 with a probability level of 0.0000 for the female group is greater than the +/- 1.960 critical value (95% confidence level) (Hamburg, 1985) which indicates that there is a statistically significant difference in the cumulative GPAs of these two groups.

Thus, the null hypothesis for the second question was also rejected; there is a statistically significant difference in the performance of developmentally and secondarily prepared students when sex is considered.

Another t-test was performed which eliminated the preparation variable and compared the performances, as

measured by cumulative GPA, of all men with all women in the population. The 1789 males had a mean GPA of 2.301912, and the 1884 females had a mean of 2.373875. The (t) of -3.025029 with a probability of 0.0025 and 3672.042 degrees of freedom exceeded the critical value of +/-1.960 (95% confidence level). (Hamburg, 1985) Therefore, it is reasonable to assume that there was a statistically significant difference in the performance of men and women during their freshmen year at Old Dominion University regardless of how they were prepared for college level work.

3. Is there a statistically significant difference in the academic performance between the developmentally prepared and the secondarily prepared students when their ethnic background is considered?

Using the cumulative GPA as a measure, a complex matrix comparing the performance of each of the groups, developmentally or secondarily prepared, with each of their respective background groups, White, Black, Asian, Hispanic, and Native American, was effected. White developmentally prepared (Count = 1150; Mean = 2.269939) were compared to White secondarily prepared (Count = 1759; Mean = 2.460517) students. The resulting (t) of -7.162101 with a probability level of 0.0000 and 2659.717 degrees of freedom exceeded the critical value of +/-1.960 (95% confidence level). (Hamburg,

1985) That indicates that there was a statistically significant difference in the performance of White developmentally prepared and White secondarily prepared students.

Each of the ethnic background groups were analyzed in a similar manner:

a. The developmentally prepared Black group (Count = 2268; Mean = 1.946343) and secondarily prepared Black group (Count = 206; Mean = 2.159757) had a (t) of -3.807039 with a probability of 0.0001 and 472 degrees of freedom. That exceeded the critical value of 1.960 (95% confidence level) and indicates that there was a statistically significant difference between the two groups.

b. The developmentally prepared Asian group (Count = 82; Mean = 2.177195) and secondarily prepared Asian group (Count = 135; Mean = 2.560371) had a (t) of -3.888506 with a probability of 0.0001 and 215 degrees of freedom. That exceeded the critical value of +/- 1.960 (95% confidence level) and indicates that there was a statistically significant difference between the two groups.

c. The developmentally prepared Hispanic group (Count = 23; Mean = 2.11913) and secondarily prepared Hispanic group (Count = 26; Mean = 2.237308) had a (t) of -0.5277097 with a probability of 0.6002 and 46.12085 degrees of freedom. That does not exceed the critical value of +/-2.011 (95% confidence

level) and indicates that there was not a statistically significant difference between the two groups.

d. The developmentally prepared Native American group (Count = 14; Mean = 2.066429) and secondarily prepared Native American group (Count = 10; Mean = 2.547) had a (t) of -1.899233 with a probability of 0.0707 and 22 degrees of freedom. That does not exceed the critical value of +/-2.074 (95% confidence level) and indicates that there was not a statistically significant difference between the two groups.

These tests, with their varying results, lead to further exploration and a comparison of the cumulative GPAs of the various ethnic groups. The analyses were conducted in the same manner using the same techniques, and those test results were:

e. The developmentally prepared White group (Count = 1150; Mean = 2.269939) and developmentally prepared Black group (Count = 268; Mean = 1.946343) had a (t) of 7.767489 with a probability of 0.0000 and 434.4805 degrees of freedom. That exceeds the critical value of +/-1.960 (95% confidence level) and indicates that there was a statistically significant difference between the two groups.

f. The secondarily prepared White group (Count = 1759; Mean = 2.460517) and secondarily prepared Black group (Count = 206; Mean = 2.159757) had a (t) value of 6.522739 with a probability of 0.0000 and 284.4585 degrees of freedom. That exceeds the critical value of +/-1.960 (95% confidence level)

and indicates that there was a statistically significant difference in the two groups.

g. The developmentally prepared White group (Count = 1150; Mean = 2.269939) and developmentally prepared Asian group (Count = 82; Mean = 2.177195) had a (t) value of 1.215247 with a probability of 0.2243 and 1230 degrees of freedom. That does not exceed the ± 1.960 (95% confidence level), and indicates that there was not a statistically significant difference between the groups.

h. The secondarily prepared White group (Count = 1759; Mean = 2.460517) and secondarily prepared Asian group (Count = 135; Mean = 2.560371) had a (t) value of -1.490764 with a probability of 0.1360 and 1892 degrees of freedom. That does not exceed the ± 1.960 (95% confidence level), and indicates that there was not a statistically significant difference between the groups.

i. The developmentally prepared White group (Count = 1150; Mean = 2.269939) and developmentally prepared Hispanic group (Count = 23; Mean = 2.11913) had a (t) value of 1.075931 with a probability of 0.2820 and 1171 degrees of freedom. That does not exceed the critical value of ± 1.960 (95% confidence level) and indicates that there was not a statistically significant difference between the groups.

j. The secondarily prepared White group (Count = 1759; Mean = 2.460517) and secondarily prepared Hispanic group (Count = 26; Mean = 2.237308) had a (t) value of 1.228811 with

a probability of 0.2301 and 25.535 degrees of freedom. That does not exceed the critical value of ± 2.060 (95% confidence level) and indicates that there was not a statistically significant difference between the groups.

k. The developmentally prepared White group (Count = 1150; Mean = 2.269939) and developmentally prepared Native American group (Count = 14; Mean = 2.066429) had a (t) value of 1.136018 with a probability of 0.2559 and 1162 degrees of freedom. That does not exceed the critical value of ± 1.960 (95% confidence level) and indicates that there was no statistically significant difference between the groups.

l. The secondarily prepared White group (Count = 1759; Mean = 2.460517) and secondarily prepared Native American group (Count = 10; Mean = 2.547) had a (t) value of -0.5337486 with a probability of 0.6064 and 9.274994 degrees of freedom. That does not exceed the critical value of ± 2.262 and indicates that there is no statistically significant difference between the groups.

This series of t-tests completed the analyses of the majority White groups with the Minorities represented in the Old Dominion University freshman class. Additional comparisons between the various minorities were also accomplished, but the results go beyond the null hypothesis proposed by question three. Based upon these results, it is not possible to make a generalized statement of acceptance or rejection of the hypothesis. Acceptance or rejection would

depend upon the specific ethnic group of concern. Therefore, the null hypothesis for this question is conditionally accepted.

4. Is there a statistically significant difference in the academic performance between the developmentally prepared and the secondarily prepared students when their age is considered?

The large size of the population and age spread made an analysis of each age virtually impossible. The cross tabulation of the data indicates two general groups of students were entering the freshman class; those just out of secondary school, and those returning to school. Therefore, the population was divided into groups which were equal to or less than 20 years old, and those who were equal to or greater than 21 years old. Two new data bases were created for the two new variables, and these were run, using cumulative GPA as the dependent variable, against the developmentally prepared and secondarily prepared status of the students.

a. Developmentally prepared students who were less than or equal to 20 years of age (Count = 1492; Mean = 2.192989) and secondarily prepared students who were less than or equal to 20 years of age (Count = 2087; Mean = 2.427729) were compared. They had a (t) value of -10.00327 with a probability of 0.0000 and 3414.793 degrees of freedom. That

exceeds the critical value of ± 1.960 (95% confidence level) and indicates that there was a statistically significant difference between the groups.

b. Developmentally prepared students who were greater than or equal to 21 years of age (Count = 45; Mean = 2.584667) and secondarily prepared students who were greater than or equal to 21 years of age (Count = 49; Mean = 2.766939) were compared. They had a (t) value of -0.9916964 with a probability of 0.3239 and 92 degrees of freedom. That does not exceed the critical value of ± 1.990 (95% confidence level) and indicates that there was not a statistically significant difference between the groups.

Since the analyses of the two combined age populations indicated diversity within the groups, further analyses were conducted using a system of grouping two age groups at a time. The cumulative GPA was used as the dependent variable, and the two year groupings were categorized as developmentally prepared or secondarily prepared. Age groupings analyzed were 17-18, 19-20, 21-22, 23-24, and 25-26 for each preparation method. The developmentally prepared category showed no statistically significant difference in each of the five groupings. Similarly, the secondarily prepared category showed no statistically significant difference in each of the five groups tested.

The contradictory evidence suggests that the null hypothesis should be conditionally rejected. Depending upon

the groups selected for comparison, there appears to be a statistically significant difference in the performance of developmentally prepared and secondarily prepared students when their age is considered.

5. Is there a statistically significant difference in the academic performance between the developmentally prepared and the secondarily prepared students when their high school GPA is considered?

Since GPAs can have a virtually unlimited number of discrete values, and the population being studied was so large, the GPAs were divided into two distinct groups for study. The first group had GPAs of 0.00 - 2.49, and the second group had GPAs from 2.50 - 4.00. In actual practice, the first group was labeled as having values of less than or equal to 2.49; the second group as having values of greater than or equal to 2.50. Each of these groups was analyzed under the developmentally or secondarily prepared status.

a. Developmentally prepared students with GPAs of 2.49 or less (Count = 653; Mean = 2.008086) and secondarily prepared students with GPAs of 2.49 or less (Count = 541; Mean = 2.130055) had a (t) value of -3.085735 and a probability of 0.0020 with 1100.636 degrees of freedom. That exceeds the critical value of +/-1.960 (95% confidence level) and

indicates that there was a statistically significant difference between the two groups.

b. Developmentally prepared students with GPAs of 2.50 or more (Count = 884; Mean = 2.349514) and secondarily prepared students with GPAs of 2.50 or more (Count = 1595; Mean = 2.539116) had a (t) value of -6.670128 and a probability of 0.0000 with 2005.292 degrees of freedom. That exceeds the critical value of +/-1.960 (95% confidence level) and indicates that there was a statistically significant difference between the two groups.

These results allow the rejection of the null hypothesis. Therefore, there is a statistically significant difference in the academic performance between the developmentally prepared students and the secondarily prepared students when high school GPA is considered.

6. Is there a statistically significant difference in the academic performance between the developmentally prepared and secondarily prepared students when their Scholastic Aptitude Test (SAT) scores are considered?

The SAT scores have a wide range and could have an almost unlimited number of specific values, especially when analyzing such a large group. To alleviate this problem, the scores were grouped into ranges of 500 or less, 900 or less, which included the previous 500 or less grouping, 1200 or more, and

901 or more, which included the 1200 or more grouping. With this arrangement, both extremes could be examined without destroying their effect on the larger upper and lower halves.

a. The developmentally prepared students with SAT scores of 500 or less (Count = 87; Mean = 2.116437) and secondarily prepared students with scores of 500 or less (Count = 93; Mean = 2.285914) had a (t) value of -1.25588 and a probability of 0.2109 with 171.1796 degrees of freedom. That does not exceed the critical value of +/-1.960 (95% confidence level) and indicates that there was no statistically significant difference in the two groups.

b. The developmentally prepared students with SAT scores of 900 or less (Count = 1120; Mean = 2.156661) and secondarily prepared students with SAT scores of 900 or less (Count = 726; Mean = 2.315083) had a (t) value of -4.844648 and a probability of 0.0000 with 1443.15 degrees of freedom. That exceeds the critical value of +/-1.960 (95% confidence level) and indicates that there was a statistically significant difference between the groups.

c. The developmentally prepared group with SAT scores of 901 or greater (Count = 417; Mean = 2.33283) and the secondarily prepared group with SAT scores of 901 or greater (Count = 1410; Mean = 2.497518) had a (t) value of -4.127376 and a probability of 0.0000 with 723.1346 degrees of freedom. That exceeds the critical value of +/-1.960 (95% confidence

level) and indicates that there was a statistically significant difference between the two groups.

d. The developmentally prepared students with SAT scores of 1200 or more (Count = 13; Mean = 2.256923) and the secondarily prepared students with SAT scores of 1200 or more (Count = 110; Mean = 2.874909) had a (t) value of -2.660922 and a probability of 0.0088 with 121 degrees of freedom. That exceeds the critical value of +/-1.980 (95% confidence level) and indicates that there was a statistically significant difference between the two groups.

G. Discussion of Research Questions (Multiple-Regression)

In an effort to determine the predictability of each of the independent variables, preparation status, gender, ethnic background, age, total SAT score and high school GPAs, a multiple regression procedure was performed. The procedure produces a correlation coefficient with an index that ranges from -1 to 1. (NCSS, 1988) The index attempts to arrange the data in a linear relationship which is interpreted as a straight line at values of -1 and 1. Any value at or near zero indicates a poor or no direct relationship between the variables in question. The procedure was performed in a stepwise manner to indicate the effect of each variable on the cumulative GPA of the students, and an individual regression report was produced for each independent variable.

Each report on each independent variable produced a simple correlation (r), which is the same as the correlation coefficient, a partial correlation coefficient, which is the correlation of this independent variable with the dependent variable without the influence of the other independent variables, and a simple r -squared value which is good only for the independent variable in question. A partial r -squared, which indicates the amount which the overall r -squared would be reduced if this independent variable were dropped, and an overall r -squared, which is the value of r -squared with all the independent variables in the equation, was also generated. (NCSS, 1988) The r -squared value is often read as a percentage, and it was used in that manner during the multiple regression analysis.

1. The independent variable for preparation method, developmentally prepared or secondarily prepared, was regressed against the cumulative GPA. The regression accounted for 2.47% of the variance (r -squared = 0.0247), and produced a correlation coefficient (r) of 0.1573.

2. The independent variable for sex was regressed against the cumulative GPA next. The regression accounted for just 0.22% of the variance (r -squared = 0.0022), and produced a correlation coefficient (r) of 0.0472.

3. The independent variable for ethnic background was regressed against the cumulative GPA. The regression accounted for only 0.49% of the variance (r -squared = 0.0049), and produced a correlation coefficient (r) of -0.0703.

4. The independent variable for age was regressed against the cumulative GPA. The regression accounted for 0.08% of the variance (r -squared = 0.0008), and produced a correlation coefficient (r) of 0.0276.

5. The independent variable for high school GPA was regressed against the cumulative GPA. The regression accounted for 16.26% of the variance (r -squared = 0.1626), and produced a correlation coefficient (r) of 0.4032.

6. The independent variable for total SAT scores was regressed against the cumulative GPA. The regression accounted for 6.47% of the variance (r -squared = 0.0647), and produced a correlation coefficient (r) of 0.2543.

An automatic correlation, in which the computer selects the independent variables to be regressed, was run, and only the high school GPA was selected for regression. None of the independent variables proved to be statistically significant enough for predictability. The correlations (r) and r -squared results of this procedure are summarized in Table(53).

CHAPTER V

CONCLUSIONS

This chapter summarizes the research, draws conclusions based upon the results, and suggests future research opportunities opened by this effort.

A. Summary:

The original purpose of this research was to examine the differences in academic performance, if any, between developmentally prepared students and secondarily prepared students. Further, an attempt was made to determine if preparation method, gender, age, ethnic background, high school GPAs, and SAT scores could be used to predict academic performance. Both of these concepts were examined thoroughly in this research project.

The analyses clearly show a small difference in the performance between developmentally prepared and secondarily prepared students. The study revolved around the null hypothesis that there would not be a significant difference in the academic performance between the two groups, but it had to be rejected. The rejection of the hypothesis lead to a detailed examination of the independent variables, and they were all tested for the null hypothesis that there would not

be a difference between the developmental and secondarily prepared groups when each of the variables was considered. To examine those relationships, several subsidiary questions were developed and formatted into null hypotheses. The questions were:

a. Was there a difference between the developmental and secondarily prepared groups when gender was considered?

b. Was there a difference between the developmental and secondarily prepared groups when ethnic backgrounds were considered?

c. Was there a difference between the developmental and secondarily prepared groups when age was considered

d. Was there a difference between the developmental and secondarily prepared groups when high school GPA was considered?

e. Was there a difference between the developmental and secondarily prepared groups when total SAT scores were considered?

The null hypothesis for gender was rejected because there was a clear difference in performance between the developmentally prepared and secondarily prepared groups when gender was introduced. The developmentally prepared males performed at a statistically significant lower level than the secondarily prepared males. Similarly the developmentally prepared females performed at a statistically significant lower level than the secondarily prepared females. However,

it should be noted that developmentally prepared males and females did not perform at statistically significant different levels while secondarily prepared females performed significantly better than the secondarily prepared males.

The null hypothesis for ethnic background was conditionally accepted because there was no statistically significant difference in the performance of the developmentally prepared White group (majority) and the developmentally prepared groups of Asians, Hispanics and Native Americans. Similarly, there was no statistically significant difference in the performance of the secondarily prepared White group (majority) and the secondarily prepared groups of Asians, Hispanics, and Native Americans. However, there was a statistically significant difference in the performances of both developmentally prepared and secondarily prepared groups of White and Black students.

The null hypothesis for age was rejected for ages of 20 years or less because there was a statistically significant difference in the performance of the developmentally prepared group when compared to the secondarily prepared group. However the null hypothesis for age was accepted for ages 21 years or more because there was not a statistically significant difference in the performance of developmentally prepared groups when compared to secondarily prepared groups.

The null hypothesis for high school GPA was rejected because there was a statistically significant difference in

the performance of both the developmentally prepared and secondarily prepared groups at all levels of high school GPA scores. It appears that students with high GPAs in high school performed well at the college level too, and both groups' scores indicate that high school GPA is a strong factor influencing overall performance.

The null hypothesis for total SAT scores was conditionally accepted because there was a statistically significant difference between the performance of developmentally prepared and secondarily prepared students when their total SAT scores were considered at all levels except the very lowest. However, the null hypothesis would have to be accepted for both groups of students with total SAT scores of 500 or less. There was not a statistically significant difference in the performance between developmentally and secondarily prepared students with SAT scores below 500.

The stepwise multiple regression report rejected all of the independent variables as significant predictors of performance. The extremely low values for all but the high school GPA variable discourages any attempt to forecast performance using preparation method, gender, ethnic background, age, or total SAT scores. The high school GPA had a more predictive effect than all the other variables combined, but it still was not statistically significant enough to accept as a predictor.

B. Conclusions:

"Yes, there is a statistically significant difference, but it doesn't really make a practical difference since the predictor equations produced by the stepwise method are weak predictors." That seems to explain what is happening within the developmental program at Old Dominion University. However, the specific conclusions contained in that statement are rather complex.

a. First, there is a definite, small, but statistically significant difference in the academic performance of developmentally prepared and secondarily prepared freshmen, as measured by cumulative GPA, at Old Dominion University.

There is no denying that the scores are different, but why they are different continues to elude description. In an attempt to find a factor which would account for the differences, several parameters of each student were examined closely, and their impact varied.

1. Women performed better than men in nearly every variable category whether they were in the developmentally prepared or secondarily prepared group. The exception to that trend occurs in the performance of developmentally prepared men and women. In this one category, both men and women seemed to perform equally well or poorly.

2. Older students seemed to perform more consistently in both the developmentally prepared and secondarily prepared groups. The very high cumulative GPA scores for both of these groups seems to indicate that older students, regardless of how they got into classes, make higher grades.

3. White students in the developmental program tend to perform at a higher level than Black students in the developmental program, but their performance was not any better than that of the Asian, Hispanic or Native American ethnic minorities in the same program. The same situation exists in the secondarily prepared group where White students performed at a significantly higher level than their Black colleagues, but not better than the Asian, Hispanic or Native American groups. Further examination of the performance between ethnic groups did not contribute to answering the basic question, and it remains a topic for future research.

4. The effect of the high school GPA was consistent at all levels. Those students in the secondarily prepared group performed at a higher level than those in the developmentally prepared group at every GPA level examined.

5. Individuals with low SAT scores (500 or less) performed at about the same level in both the developmentally and secondarily prepared groups. However, all other score levels produced a difference in performance between the two

groups. This effect was fairly constant at all levels above 500.

The differences between the developmentally prepared and the secondarily prepared groups in each case was carefully examined to find some predictive thread which could be used to evaluate the effectiveness of the developmental program at Old Dominion University. The initial observations simply recorded that there are differences between the performance of the developmentally prepared students and those who initiate classes directly out of high school. In a continuing attempt to find a predictive element in the data, a stepwise, multiple regression procedure was run.

b. The multiple regression procedure is able to show the impact of each selected variable upon the total performance, as measured by cumulative GPA, of the students. It is predictive in nature and gives the overall effect (correlation = r) on the entire package of independent variables as well as the percentage effect (r -squared) on the situation of any one variable.

1. The predictive ability of each of the student parameters selected, preparation method, gender, ethnic background, age, and total SAT scores was very low. In fact, the total SAT score, which is widely used by colleges and universities to predict academic performance, accounted for only 6.47% of the total effect on performance. This indicates that even though there is a difference in the performance of

the two groups, that difference was not accounted for by the SAT scores.

2. When age was factored into the situation, only 0.08% of the impact on total performance could be attributed to the age factor. Other tests, previously discussed, show that older students performed better at all levels, and younger students performed differently within the two groups studied. This apparent contradiction points to the fact that there were differences in performances, but age had little effect upon those differences.

3. The overall effect of ethnic background was also surprising. Yes, there was a difference in the two groups studied, but the effect of ethnic background accounted for only 0.49% of the difference. It would appear that ethnic background can not be used to predict academic performance in either of the groups studied.

4. Since there was such a clear difference in the two groups studied when gender was considered, it came as a surprise to find that gender had almost no predictive value in this study. Gender accounted for just 0.22% of the effect upon cumulative GPA.

5. The cumulative GPA of the groups was significantly different, but the fact that a student was from the developmentally prepared or secondarily prepared group accounted for only 2.47% of the overall effect. Therefore, overall performance does not appear to depend on how you

managed to acquire the basic skills to enter normal freshman classes.

6. The high school GPAs used to be used extensively to determine if students were to be admitted to the college or university of choice. They have been replaced in many institutions with SAT scores, yet this study shows that high school GPAs appear to have a much higher predictive value than any of the other parameters selected. Even high school GPA did not have a truly predictive effect, and it did not have a correlation coefficient high enough for it to be considered as a predictor of cumulative GPA. The high school GPA did account for 16.26% of the overall effect on cumulative GPA.

The net effect of this study is that there is a difference between the performance of developmentally prepared students and secondarily prepared students, as measured by cumulative GPA, but none of the factors selected, preparation method, gender, age, ethnic background, total SAT scores or high school GPA, are practical predictors of that difference in performance. Those factors may account for the small differences between the developmentally prepared and secondarily prepared groups.

C. Further Research

This study unearthed a multitude of questions begging to be answered!

a. Would the predictive effect of preparation method be greater or less if the students who did not complete their freshman year were considered? Is it possible that the developmental program is serving as a simple filter of non traditional sources of students? Individuals who do not have a high school diploma, have not completed a GED program or simply have holes in a specific part of their education may still have the intelligence and minimal skills to pass through the developmental filter into normal college work, but the number of students filtered out do not show up in the data base. Similarly, students from the secondarily prepared group who leave school before completing their freshman year are not in the data base either, and their absence may be the reason that group has a higher cumulative GPA.

b. What is the effect of the unbalanced distribution of individuals by gender in the Black student population? All the other ethnic groupings are either split evenly or slightly towards the male side, but the Black student body is heavily weighted towards the feminine side.

c. What treatments cause the difference in scores between the Black ethnic group and the other ethnic groupings? Is it cultural, language, perceptive, economic, racist,

motivational, or some unknown factor? The difference is easily observed, but it is not predictive of performance.

d. Why do older individuals have such higher cumulative GPAs than other students in their preparation group? Are these individuals more motivated, intelligent, socially stable or do they simply have more time to study?

e. Why are SAT scores so important to admissions offices when they have such a low performance predictability? Perhaps the original ideas on high school performance are better than the newer, more sophisticated SAT system.

f. If the parameters studied in this research are not predictive of performance, what factors are predictive?

Several of these questions are already being examined by individuals who helped on this research program, and the author intends to continue examining these relationships in a post graduate forum.

APPENDIX A

Variables Code List

<u>Variable</u>	<u>Code</u>	<u>Description</u>
Preparation	1	Developmentally Prepared
	2	Secondarily Prepared
Gender	1	Male
	2	Female
Ethnic Background	1	White
	2	Black
	3	Asian
	4	Hispanic
	5	Native American
Age	1	20 years or Less
	2	21 years or More
SAT Scores	1	500 or Less
	2	900 or Less
	3	901 or More
	4	1200 or More

High School GPA	1	2.49 or Less
	2	2.50 or More

Cumulative HS GPA	The cumulative high school GPA from admissions forms.
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Cumulative GPA	Cumulative college GPA at the end of the first year.
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APPENDIX B

Population Demographics

<u>Description</u>	<u>Quantity</u>
Total Population.....	3752
Total Males.....	1830
Total Females.....	1922
Total White Population.....	2972
Total White Males.....	1514
Total White Females.....	1458
Total Black Population.....	482
Total Black Males.....	156
Total Black Females.....	326
Total Asian Population.....	222
Total Asian Males.....	121
Total Asian Females.....	101
Total Hispanic Population.....	51
Total Hispanic Males.....	26
Total Hispanic Females.....	25
Total Native American Population.....	25
Total Native American Males.....	13
Total Native American Females.....	12

APPENDIX C

Original References

 Florida Institute
of Technology

The School of Aeronautics
150 West University Boulevard
Melbourne, FL 32901-6988
(407) 768-8000, ext. 8120

October 31, 1990

Dr. David Potter
Vice President of Executive Affairs
Office of the President
George Mason University
Fairfax, Virginia 22030

Dr. Potter:

I enjoyed talking to you on Developmental Education, and I appreciate your cooperation in my research effort. If you have time to respond to my questions in writing, it certainly would increase the accuracy of the work. However, I realize your position keeps you very busy, and I'll be pleased to call you at your convenience for a discussion, or you may want to tape your thoughts.

Questions of concern:

1. What type of opposition to "Developmental Education" did you find in your study? Are they published?
2. In looking back, do you feel developmental studies are effective? Cost effective? Socially effective?
3. Should developmental studies be conducted by four year, senior division universities? Should they be confined to the community college or GED systems?
4. Should developmental course credits count toward degree requirements? Computed in GPA?
5. Should developmental courses be mixed with the normal college course load? (For example: A student may require developmental English but be well prepared for College Math courses. Should he be allowed to take both at the same time?)
6. Accountability is a prominent subject in education today. Should the relative performance of developmental programs be used in accountability schemes?
7. Do four year colleges have an obligation to provide developmental programs for marginally prepared students accepted by the college?
8. What do you see as possible, viable alternatives to developmental education?
9. Most of the literature presumes that developmental courses do prepare students for college level work. Do you think developmental students rise to that level?
10. Are the colleges with developmental programs usurping the mission of our secondary school system?

If you wish to dictate your response on tape, please do so, and send me the bill for your tape. If you feel your responses are too sensitive to print, I will handle them in accordance with your wishes, and they will be withheld from print or quoted without attribution.

Please lend me your expertise on the subject in any way you can. If you have suggestions, references, opinions, answers to questions I haven't asked, or data, I will be grateful for your assistance. I am trying to prepare a truthful, useful document, not just fill the dissertation square.

Thank you for your cooperation and assistance.

Respectfully,

Nathaniel E. Villaire
Nathaniel E. Villaire

George Mason University

Office of the President
Fairfax, Virginia 22030-4444
(703) 764-7900

November 8, 1990

Mr. Nat Villaire
Florida Institute of Technology
School of Aeronautics
150 West University Boulevard
Melbourne, FL 32901-6988

Dear Mr. Villaire:

You are raising questions that require major dredging of a failing memory, but I will do my best to answer them.

1. Opposition to developmental education could be found in the political system, leading the Council to explore the issue. The state, in particular the executive branch, was interested in seeing how much it cost, and wondering why the state should pay for "remedial work" within colleges and universities. The only people interested in using the word "developmental" were those who taught it. Further opposition came from some faculty at four-year institutions who thought remedial work was an improper activity threatening the prestige of such colleges and universities. Many institutions solved this problem by doing remedial work but not calling it that-- i.e. by incorporating remedial courses into the regular curriculum, or debasing the regular curriculum to meet the level of their students. Administrators, on the other hand, reluctantly supported remedial work because they feared if it were farmed out to the community colleges, enrollments at the four-year institutions would be threatened. The general community also was ambivalent toward remedial work, not really wanting to pay twice (once while students were supposedly graduating from high school with fully developed high school skills, later again in college) but not really being that much interested in such an issue except when told its cost. The community colleges were "opposed" in one way-- opposed to it being done at four-year colleges and universities because they wanted to claim it as an exclusive function of the community college mission. Finally, advocates of "excellence" who were avowed or closet opponents of "access" were opposed to remediation, preferring a system of higher education limited to a more homogeneous range of students.

I am not sure what you mean when you ask if opposition to developmental education was "published." I do not recall

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written documents of opposition, though people's negative reactions may have appeared in the media.

2. I am a proponent of developmental studies for reasons of accept and diversity. I think it was cost effective. Ultimately, though, its costs and its reason for being relate to the integration of higher education with elementary and secondary education. Until the two systems have some semblance of curricular progression and clear definitions of competencies expected at each level, we cannot resolve the problem. This is not to mention the need to tackle the broader social issues that underlie the need for remediation - inequality and racism.
3. Realistically, four-year colleges and universities must be involved because they depend on enrolling students who are not fully prepared for college-level work. The community colleges would be flooded and the four-year institutions severely reduced if we excluded it. I would prefer, in fact, that more four-year institutions acknowledged their need for it and preserved the integrity of the college curriculum by reassigning remedial work to courses outside the regular curriculum.
4. I do not think they should count toward college degree requirements, since it is not college-level work. By the same reasoning, it should be omitted from the GPA.
5. Yes, mixing should be permitted. Strict prohibitions should be imposed on mixing remedial and college work in subjects associated with the same skill deficiency. Otherwise, students should be free to pursue college work for which they have demonstrated skills.
6. I don't feel that comfortable with the accountability concept -- it often seems a surrogate for other criticisms of higher education (cost, access, anti-intellectualism). I would think most institutions could benefit from including results of developmental programs in their data on accountability-- my experience is that such programs work well, and do improve students' skills significantly. For institutions with large number of students needing remedial work, accountability ought to be presented in terms of progress rather than some absolute standard. If that is permissible, these programs measure up quite well.
7. Yes.
8. For the short term, I do not see viable alternatives. We simply do not have a pool of well-prepared students that could

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sustain our system of higher education at a reasonable level if we excluded those in need of remedial education. We also have a commitment to access which demands that some less well-prepared students participate in higher education. Longer term, the real solution lies in improving the system of elementary and secondary education.

9. I think the evidence shows developmental education to be a success, even for those who do not rise to college level work. For those, it gives additional skills which can be used outside of higher education.
10. "Usurping" is not the term I would use. It suggests an intent I do not find among colleges. Rather they must assume part of the responsibility which should fall to secondary schools by default-- because the secondary schools have been unable to accomplish this mission (not necessarily, I might add, because of their own "failure" but because of more systemic problems within the society as well).

You asked for additional comments. Here are a few. I was struck in doing the study by the dedication of those engaged in developmental education. They usually worked from a sound theoretical base, derived from developmental models. They devoted great amounts of time to individualized work with students. They had a clear sense of mission. On the other hand, they were sensitive to being treated by some as second class citizens.

The issue of race is entangled with developmental education in sometimes insidious ways. What is often overlooked is that the issue of class is also involved. As the society evolves toward a two-tiered workforce (low level service workers, high level knowledge workers), it will be interesting to see the forms these two issues take in the future.

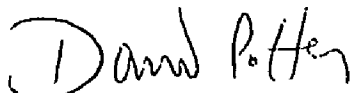
I think the erosion of the college curriculum is an issue of importance quite apart from remedial education. The extent to which college courses provide appropriate skills is worth investigating. It is becoming especially critical because of the globalization of the economy and increased international competition. We simply do not have the educational system we need to compete with other major "developed" nations. The fact that the average high school graduate in Japan has been in school several hundred days longer than his or her American counterpart is significant.

I did not find a copy of the report. I would think you could get one, though, if you contact the staff of the State Council of Higher Education in Richmond. You might ask for Mary Herndon who can be very helpful.

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Best wishes for a successful dissertation. If you have more questions, I will be happy to try to answer them.

Sincerely,

A handwritten signature in cursive script that reads "David L. Potter". The signature is written in dark ink and is positioned above the typed name.

David L. Potter
Vice President for Executive Affairs

INTERVIEW NOTES

OF:

Dr. Anne-Marie McCartan

Academic Programs Coordinator

State Council of Higher Education for Virginia

by:

Nathaniel E. Villaire

These notes are highlights of an interview with Dr. McCartan. This is not a transcript of that interview. The entire interview (2 hrs.) is on tape, and it will be retained by the author for content verification if required. The questions posed to Dr. McCartan are the same as those posed to Dr. Potter (See attached questions), but she answered them in a general conversation. Therefore, only her key responses are noted.

RESPONSE: No, I found no direct opposition to developmental education. If there is opposition, it is in the reluctance of some institutions to report that they do have a remediation program. seven senior Virginia institutions have reported formal programs, but all have some form of remediation.

RESPONSE: We need a standard definition of college level work. Some institutions use deficiencies in certain skills as filters for programs they want to protect. Many students could do well if they had been brought up to college level standards before being filtered out by key math or reading deficiencies.

RESPONSE: We have an unusual lack of public attention to developmental programs in Virginia. In California, remediation is hotly debated. You know what the standards are and who should do it. I do not really see that pressure in Virginia.

RESPONSE: I wouldn't put Virginia in the company of California, Florida or New Jersey. The Virginia study (SCHEV, 1983) was the first real interest in this state in remedial education. The study defines the standard for developmental education.

RESPONSE: Florida has its CLAST (College Level Academic Skills Test) system. It is infamous! Florida and California are far ahead of Virginia, and New Jersey is far ahead of everyone else in their basic skills and competency testing. They have developed extensive tests on a statewide basis.

RESPONSE: There is an extensive statewide remedial, developmental, program in the University of California system, the California State system, and the Community College system. Developmental education is performed in all three systems.

RESPONSE: Accountability? I think we've laid that concern to rest. We don't hear much about it any more. Every institution needs to be accountable for its own performance.

RESPONSE: Yes. Institutions have an obligation to provide remediation for students they accept who have academic deficiencies.

RESPONSE: Alternatives to developmental education. colleges and high schools need to work together to fight this remediation problem. this state has an excellent system of cooperation in mathematics, for example. It is needed in other fields.

RESPONSE: Studies show that developmental programs produce students who equal or excel other students in college.

RESPONSE: Two issues make modern education different from the past: The SAT pool has expanded greatly. The pool now contains Black, Hispanic, the poor, and returning students instead of the traditional white, stable, reasonably well

educated applicants of the past. The second thing is that community colleges came about in the sixties and accepted older students and former drop-outs who need some skill upgrading. The universities have not usurped the secondary missions, but the college mission has changed.

RESPONSE: There just isn't a college or university in the country that isn't accepting students with developmental needs. Even at a place like MIT.

RESPONSE: When we did the study (SCHEV, 1987), we learned very quickly that no one had any data on effectiveness. People did not follow through. When we investigated, there was only one institution in the state that had made any attempt to follow developmental students. Old Dominion University.

RESPONSE: We have asked each institution to collect data as part of the student assessment mandate. Out of the ten guidelines, three have to do with developmental studies. We will get the first findings when the reports come in in July (1991).

RESPONSE: Developmental courses should not carry college credit and should not be computed in the GPA.

RESPONSE: We are really behind in reading. There aren't many college reading courses. So, I would say reading is the big dividing line. We, like other states, are far behind in reading proficiency. It is not politically popular to emphasize reading. If the colleges really addressed peoples' reading needs, the reading courses would be full.

TABLES

TABLE 1

Cross Tabulation by Preparation Group & Gender			
Gender	Secondary	Developmental	Totals
F	1099	823	1922
M	1077	753	1083
Totals	2176	1576	3752

Note: These are raw data. Before processing, adjustments for missing information will be made.

TABLE 2

Cross Tabulation by Preparation Group & Gender in % Columns			
Gender	Secondary	Developmental	Totals
F	50.51%	52.22%	51.23%
M	49.49%	47.78%	48.77%
Totals	100%	100%	100%
Note: These are raw data. Before processing, adjustments for missing information will be made.			

TABLE 3

Cross Tabulation by Preparation Group & Gender in %			
Rows			
Gender	Secondary	Developmental	Totals
F	57.18%	42.82%	100%
M	58.85%	41.15%	100%
Totals	58.85 %	42.15%	100%

Note: These are raw data. Before processing, adjustments for missing information will be made.

TABLE 4

Cross Tabulation of Gender by Ethnic Background			
Ethnic Gp.	Female	Male	Totals
WH	1458	1514	2972
AS	101	121	222
BL	326	156	482
HS	25	26	51
NA	12	13	25
Totals:	1922	1830	3752
Data adjusted for missing values.			

TABLE 5

Cross Tabulation of Gender by Ethnic Background in %			
Rows			
Ethnic Gp.	Female	Male	Totals:
WH	49.06%	50.94%	100%
AS	45.5%	54.5%	100%
BL	67.63%	32.37%	100%
HS	49.02%	50.98%	100%
NA	48%	52%	100%
Totals:	51.23%	48.77%	100%
Data adjusted for missing values.			

TABLE 6

Cross Tabulation of Gender by Ethnic Background in %			
Columns			
Ethnic Gp.	Female	Male	Totals:
WH	75.86%	82.73%	79.21%
AS	5.25%	6.61%	5.92%
BL	16.96%	8.52%	12.85%
HS	1.3%	1.42%	1.36%
NA	0.62%	0.71%	0.67%
Totals:	100%	100%	100%
Data adjusted for missing values.			

TABLE 7

Cross Tabulation of Preparation Group by:			
Ethnic Background			
Ethnic Gp.	Secondary	Developmental	Totals:
WH	1791	1181	2972
AS	137	85	222
BL	210	272	482
HS	27	24	51
NA	11	14	25
Totals:	2176	1576	3752
Data adjusted for missing values.			

TABLE 8

Cross Tabulation of Preparation Group by:			
Ethnic Background & % Rows			
Ethnic Gp.	Secondary	Developmental	Totals:
WH	60.26%	39.74%	100%
AS	61.71%	38.29%	100%
BL	43.57%	56.43%	100%
HS	52.94%	47.06%	100%
NA	44%	56%	100%
Totals:	58%	42%	100%
Data adjusted for missing values.			

TABLE 9

Cross Tabulation of Preparation Group by:			
Ethnic Background & % Columns			
Ethnic Gp.	Secondary	Developmental	Totals:
WH	82.31%	74.94%	79.21%
AS	6.3%	5.39%	5.92%
BL	9.65%	17.26%	12.85%
HS	1.24%	1.52%	1.36%
NA	0.51%	0.89%	0.67%
Totals:	100%	100%	100%
Data adjusted for missing values.			

TABLE 10

Cross Tabulation of Gender by Age			
Age	Female	Male	Totals:
17	40	16	56
18	1604	1401	3005
19	212	314	526
20	18	46	64
21	7	10	17
22	8	11	19
23	5	5	10
24	4	7	11
25	1	7	8
26	2	4	6
27	3	4	7
28	5	0	5
29	1	0	1
30	0	0	0
31	0	0	0
32	2	0	2

33	1	2	3
34	1	0	1
35	1	0	1
36	1	1	2
37	0	0	0
38	0	1	1
39	0	0	0
40	0	0	0
41	1	0	1
42	2	0	2
43	1	0	1
44	0	0	0
45	0	0	0
46	0	0	0
47	0	0	0
48	0	1	1
49	0	0	0
50	0	0	0
51	0	0	0

52	1	0	1
53	0	0	0
54	0	0	0
55	0	0	0
56	0	0	0
57	0	0	0
58	0	0	0
59	0	0	0
60	0	0	0
61	0	0	0
62	0	0	0
63	0	0	0
64	0	0	0
65	0	0	0
66	0	0	0
67	0	0	0
68	0	0	0
69	0	0	0
70	0	0	0

71	0	0	0
72	0	0	0
73	0	0	0
74	0	0	0
75	0	0	0
76	0	0	0
77	0	0	0
78	0	0	0
79	0	0	0
80	0	0	0
81	0	0	0
82	1	0	1
Totals:	1922	1830	3752
Data adjusted for missing values.			

TABLE 14

Cross Tabulation of Preparation Group by Age			
Age	Secondary	Developmental	Totals:
17	32	24	56
18	1775	1230	3005
19	282	244	526
20	35	29	64
21	9	8	17
22	9	10	19
23	5	5	10
24	9	2	11
25	4	4	8
26	3	3	6
27	3	4	7
28	1	4	5
29	0	1	1
30	0	0	0
31	0	0	0
32	2	0	2

33	2	1	3
34	1	0	1
35	1	0	1
36	0	2	2
37	0	0	0
38	1	0	1
39	0	0	0
40	0	0	0
41	0	1	1
42	1	1	2
43	0	1	1
44	0	0	0
45	0	0	0
46	0	0	0
47	0	0	0
48	1	0	1
49	0	0	0
50	0	0	0
51	0	0	0

52	0	1	1
53	0	0	0
54	0	0	0
55	0	0	0
56	0	0	0
57	0	0	0
58	0	0	0
59	0	0	0
60	0	0	0
61	0	0	0
62	0	0	0
63	0	0	0
64	0	0	0
65	0	0	0
66	0	0	0
67	0	0	0
68	0	0	0
69	0	0	0
70	0	0	0

71	0	0	0
72	0	0	0
73	0	0	0
74	0	0	0
75	0	0	0
76	0	0	0
77	0	0	0
78	0	0	0
79	0	0	0
80	0	0	0
81	0	0	0
82	0	1	1
Totals:	2176	1576	3752
Data adjusted for missing values.			

TABLE 18

Cross Tabulation of Ethnic Background by Age						
Age	WH	AS	BL	HS	NA	Totals:
17	37	3	14	2	0	56
18	2359	181	409	34	22	3005
19	446	29	42	9	0	526
20	49	6	4	3	2	64
21	13	3	1	0	0	17
22	17	0	1	1	0	19
23	10	0	0	0	0	10
24	7	0	3	1	0	11
25	7	0	1	0	0	8
26	6	0	0	0	0	6
27	4	0	2	0	1	7
28	3	0	2	0	0	5
29	1	0	0	0	0	1
30	0	0	0	0	0	0
31	0	0	0	0	0	0
32	2	0	0	0	0	2

33	1	0	1	1	0	3
34	1	0	0	0	0	1
35	1	0	0	0	0	1
36	1	0	1	0	0	2
37	0	0	0	0	0	0
38	1	0	0	0	0	1
39	0	0	0	0	0	0
40	0	0	0	0	0	0
41	1	0	0	0	0	1
42	2	0	0	0	0	2
43	1	0	0	0	0	1
44	0	0	0	0	0	0
45	0	0	0	0	0	0
46	0	0	0	0	0	0
47	0	0	0	0	0	0
48	1	0	0	0	0	1
49	0	0	0	0	0	0
50	0	0	0	0	0	0
51	0	0	0	0	0	0

52	0	0	1	0	0	1
53	0	0	0	0	0	0
54	0	0	0	0	0	0
55	0	0	0	0	0	0
56	0	0	0	0	0	0
57	0	0	0	0	0	0
58	0	0	0	0	0	0
59	0	0	0	0	0	0
60	0	0	0	0	0	0
61	0	0	0	0	0	0
62	0	0	0	0	0	0
63	0	0	0	0	0	0
64	0	0	0	0	0	0
65	0	0	0	0	0	0
66	0	0	0	0	0	0
67	0	0	0	0	0	0
68	0	0	0	0	0	0
69	0	0	0	0	0	0
70	0	0	0	0	0	0

71	0	0	0	0	0	0
72	0	0	0	0	0	0
73	0	0	0	0	0	0
74	0	0	0	0	0	0
75	0	0	0	0	0	0
76	0	0	0	0	0	0
77	0	0	0	0	0	0
78	0	0	0	0	0	0
79	0	0	0	0	0	0
80	0	0	0	0	0	0
81	0	0	0	0	0	0
82	1	0	0	0	0	1
Totals	2972	222	482	51	25	3752
Data adjusted for missing values.						

TABLE 22

"T- test Cumulative GPA		
Group =	Developmental (1)	Secondary (2)
Count =	1537	2136
Mean =	2.204457	2.43551
Std. Error =	0.017008	0.01611317
"T"-value =	-9.861964	
df =	3503.446	
Probability =	0.0000	
Null Hypothesis Rejected		

TABLE 23

"T"- test			
Gender & Cumulative GPA			
Group	=	Male (1)	Female (2)
Count	=	1789	1884
Mean	=	2.301912	2.373875
Std. Error	=	0.01673968	0.01690294
"T"-value = -3.025029			
df = 3672.042			
Probability = 0.0025			
Null Hypothesis Rejected			

TABLE 24

"T" - test			
Ethnic Background & Cumulative GPA			
Group	=	White (1)	Black (2)
Count	=	2909	474
Mean	=	2.385177	2.039093
Std. Error	=	0.01345452	0.02818164
"T"-value = 11.08226			
df = 708.1898			
Probability = 0.0000			
Null Hypothesis Rejected			

TABLE 25

"T"-test			
Ethnic Background & Cumulative GPA			
Group	=	White (1)	Asian (3)
Count	=	2909	217
Mean	=	2.385177	2.415576
Std. Error	=	0.01345452	0.04931506
"T"-value = -0.5952427			
df = 3124			
Probability = 0.5517			
Null Hypothesis Accepted			

TABLE 26

"T"-test			
Ethnic Background & Cumulative GPA			
Group	=	White (1)	Hispanic (2)
Count	=	2909	49
Mean	=	2.385177	2.181837
Std. Error	=	0.01345452	0.1134113
"T"-value = 1.942053			
df = 2956			
Probability = 0.0521			
Null Hypothesis Accepted			

TABLE 27

"T"-test			
Ethnic Background & Cumulative GPA			
Group	=	White (1)	Nat. American (5)
Count	=	2909	24
Mean	=	2.385177	2.266667
Std. Error	=	0.01345452	0.1316281
"T"-value = 0.7974364			
df = 2931			
Probability = 0.4252			
Null Hypothesis Accepted			

TABLE 28

"T"-test		
Age (20 yrs. or Less) & Cumulative GPA		
Group	=	Developmental (1) Secondary (2)
Count	=	1492 2087
Mean	=	2.192989 2.427729
Std. Error	=	0.0170031 0.01617283
"T"-value	=	-10.00327
df	=	3414.793
Probability	=	0.0000
Null Hypothesi Rejected		

TABLE 29

"T"-test			
Age (21 yrs. or More) & Cumulative GPA			
Group	=	Developmental (1)	Secondary (2)
Count	=	45	49
Mean	=	2.584667	2.766939
Std. Error	=	0.129267	0.1301135
"T"-value	=	-0.9916964	
df	=	92	
Probability	=	0.3239	
Null Hypothesis Accepted			

TABLE 30

"T"-test			
Gender (Male) & Cumulative GPA			
Group	=	Developmental (1)	Secondary (2)
Count	=	736	1053
Mean	=	2.193044	2.378006
Std. Error	=	0.02445974	0.0244117
"T"-value = -5.572046			
df = 1669.707			
Probability = 0.0000			
Null Hypothesis Rejected			

TABLE 31

"T"-test			
Gender (Female) & Cumulative GPA			
Group	=	Developmental (1)	Secondary (2)
Count	=	801	1083
Mean	=	2.214944	2.491422
Std. Error	=	0.02367242	0.02298885
"T"-value			
	=	-8.378621	
df			
	=	1824.269	
Probability			
	=	0.0000	
Null Hypothesis Rejected			

TABLE 32

"T"-test		
SAT (500 or Less) & Cumulative GPA		
Group	=	Developmental (1) Secondary (2)
Count	=	87 93
Mean	=	2.116437 2.285914
Std. Error	=	0.08216676 0.1070482
"T"-value	=	-1.25588
df	=	171.1796
Probability	=	0.2109
Null Hypothesis Accepted		

TABLE 33

"T"-test		
SAT (900 or Less) & Cumulative GPA		
Group	=	Developmental (1) Secondary (2)
Count	=	1120 726
Mean	=	2.156661 2.315083
Std. Error	=	0.01930938 0.02639061
"T"-value	=	-4.844648
df	=	1443.15
Probability	=	0.0000
Null Hypothesis Rejected		

TABLE 34

"T"-test			
SAT (901 or More) & Cumulative GPA			
Group	=	Developmental (1)	Secondary (2)
Count	=	417	1410
Mean	=	2.33283	2.497518
Std. Error	=	0.03447737	0.02008557
"T"-value = -4.127376			
df = 723.1346			
Probability = 0.0000			
Null Hypothesis Rejected			

TABLE 35

"T"-test			
SAT (1200 or More) & Cumulative GPA			
Group	=	Developmental (1)	Secondary (2)
Count	=	13	110
Mean	=	2.256923	2.874904
Std. Error	=	0.2284041	0.07516374
"T"-value = -2.660922			
df = 121			
Probability = 0.0088			
Null Hypothesis Rejected			

TABLE 36

"T"-test			
High school GPA (0-2.49) & Cumulative GPA			
Group	=	Developmental (1)	Secondary (2)
Count	=	653	541
Mean	=	2.008086	2.130055
Std. Error	=	2.506047	3.056715
"T"-value	=	-3.085735	
df	=	1100.636	
Probability	=	0.0020	
Null Hypothesis Rejected			

TABLE 37

"T"-test			
High School GPA (2.50-4.00) & Cumulative GPA			
Group	=	Developmental (1)	Secondary (2)
Count	=	884	1595
Mean	=	2.349514	2.539116
Std. Error	=	0.0293695	0.02842562
"T"-value = -6.670128			
df = 2005.292			
Probability = 0.0000			
Null Hypothesis Rejected			

TABLE 38

"T"-test		
Developmentally Prepared (by Gender) & Cumulative GPA		
Group	=	Male (1) Female (2)
Count	=	736 801
Mean	=	2.193044 2.214944
Std. Error	=	0.02445974 0.02367242
"T"-value	=	-0.6431255
df	=	1535
Probability	=	0.5201
Null Hypothesis Accepted		

TABLE 39

"T"-test			
Secondarily Prepared (by Gender) & Cumulative GPA			
Group	=	Male (1)	Female (2)
Count	=	1053	1083
Mean	=	2.378006	2.491422
Std. Error	=	0.03214344	0.03212621
"T"-value = -3.528443			
df = 2134			
Probability = 0.0004			
Null Hypothesis Rejected			

TABLE 40

MULTIPLE REGRESSION							
CORRELATIONS							
	DEVE	GEND	RACE*	AGE	SAT	HSGPA	C-GPA
DEVE	1.000	-.017	-.058	-.033	0.427	0.249	0.157
GEND	-.017	1.000	0.033	-.033	-.205	0.151	0.047
RACE*	-.058	0.033	1.000	0.006	-.184	0.016	-.070
AGE	-.033	-.033	0.006	1.000	-.012	0.018	0.028
SAT	0.427	-.205	-.184	-.012	1.000	0.350	0.254
HSGPA	0.249	0.151	0.016	0.018	0.350	1.000	0.403
C-GPA	0.157	0.047	-.070	0.028	0.254	0.403	1.000

* = Ethnic Background, Not a True Race Classification

TABLE 41

MULTIPLE REGRESSION		
Descriptive Statistics		
	MEAN	STD. DEVIATION
DEVE	1.58578	0.4926578
GENDER	1.513817	0.499881
RACE*	1.313472	0.7044815
AGE	18.21589	1.274807
SAT TOTAL	917.3806	144.1851
HSGPA	2.742922	0.478684
CUMGPA	2.345161	0.7144428

* = Ethnic Background, Not a True Race Classification

TABLE 42

MULTIPLE REGRESSION	
Individual Regressor Report	
Dependent Variable	Cumulative GPA
Independent Variable	Developmental (1) (2)
Simple Correlation (r)	0.1573
Simple R Squared (r ²)	0.0247
Overall R Squared	0.1812

TABLE 43

MULTIPLE REGRESSION	
Individual Regressor Report	
Dependent Variable	Cumulative GPA
Independent Variable	Gender (1) (2)
Simple Correlation (r)	0.0472
Simple R Squared (r ²)	0.0022
Overall R Squared	0.1812

TABLE 44

MULTIPLE REGRESSION	
Individual Regressor Report	
Dependent Variable	Cumulative GPA
Independent Variable	Ethnic Background
Simple Correlation (r)	-0.0703
Simple R Squared (r ²)	0.0049
Overall R Squared	0.1812

TABLE 45

MULTIPLE REGRESSION	
Individual Regressor Report	
Dependent Variable	Cumulative GPA
Independent Variable	Age
Simple Correlation (r)	0.0276
Simple R Squared (r ²)	0.0008
Overall R Squared	0.1812

TABLE 46

MULTIPLE REGRESSION	
Individual Regressor Report	
Dependent Variable	Cumulative GPA
Independent Variable	SAT Total
Simple Correlation (r)	0.2543
Simple R Squared (r ²)	0.0647
Overall R Squared	0.1812

TABLE 47

MULTIPLE REGRESSION	
Individual Regressor Report	
Dependent Variable	Cumulative GPA
Independent Variable	High School GPA
Simple Correlation (r)	0.4032
Simple R Squared (r ²)	0.1626
Overall R Squared	0.1812

TABLE 48

MULTIPLE REGRESSION			
Stepwise Regression Report			
Dependent Variable = CUMULATIVE GPA			
IN equation	Variables	r	r ²
Yes	HS GPA	0.40	0.163
No	Deve	-	0.003
No	Gender	-	0.000
No	Ethnic Bkg	-	0.006
No	Age	-	0.000
No	SAT Total	-	0.015
Only HS GPA was retained: T-value = 26.0; Prob.= 0.0000			

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VITA

Nathaniel Elias Villaire

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Birth place: MacClenny, Florida

Education :

1984 - 1987 The College of William and Mary
Williamsburg, Virginia
Education Specialist Certificate

1978 - 1980 Golden Gate University
San Francisco, California
Master of Public Administration

1958 - 1962 The University of Georgia
Athens, Georgia
Bachelor of Science

Professional Experience:

1990 - 1991 Florida Institute of Technology
Melbourne, Florida
Assistant Professor Aeronautics

1989 - 1990 Management Consultant
Richmond and Norfolk, Virginia
Human Factors Solutions, Inc.
Rockville, Maryland

1984 - 1989 Hampton Roads Academy
Newport News, Virginia
Department Head of Biology

1962 - 1984 United States Air Force
Department of Defense
Military Officer

Post Graduate Education:

1962 - Post Graduate - Microbiology
The University of Georgia

1967 - Post Graduate - Corporate Management

The University of S. California

- 1969 - Post Graduate - Pulmonary Physiology
The School of Aerospace Medicine
- 1970 - Post Graduate - Public Administration
The University of Oklahoma
- 1978 - Post Graduate - Industrial Management
Industrial College of The Armed Force

Technical Education:

- 1964 - Aeronautical Rating - Jet Pilot
USAF, Craig AFB, Alabama
- 1964 - Type Rating - Multi-engine Jet
USAF, Castle AFB, California
- 1969 - Certification - Hyperbaric
Certification - Hypobaric
USAF, Brooks AFB, Texas
- 1974 - Certification (FAA) - Air Traffic
Control Tower/Radar
FAA/USAF, Tyndall AFB, Florida

Awards:

- 1964 - 1984 Numerous Military Decorations
- 1975 - 1976 National Air Traffic Control
Facility of the Year (DOT)
- 1976 - 1976 Earl Ward Memorial Award - Third
Best Air Traffic Control Facility
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Professional Work History:

1964 - 1984 Pilot for the US Government; Aviation Physiological Training instructor and facility manager; Instructor pilot; Communications Complex manager; Director of Training and Standardization for ATC; Airspace and ATC manager for The Republic of Korea.

1984 - 1991 Teacher of biology, aviation safety, aviation law, aviation weather, pulmonary physiology, and mathematics at the grade school, high school, community college, and university level.

