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A Comparison Of The Characteristics Of Successful And Non-Successful Associate Degree Nursing Students. .

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A COMPARISON OF THE CHARACTERISTICS OF SUCCESSFUL AND NON-SUCCESSFUL ASSOCIATE DEGREE NURSING STUDENTS

by

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A MAJOR APPLIED RESEARCH PROJECT PRESENTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF EDUCATION

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ABSTRACT

Applications for enrollment in the Associate Degree Nursing program at Fayetteville Technical Institute have for several years far exceeded the number of students who could be accommodated. During this same period, attrition from the program was among the highest of the nursing schools in North Carolina. The problem that must be faced is how to improve the qualified applicant pool without jeopardizing open access. If an objective means for screening candidates could be determined, the selection process could be improved and those candidates with the greater potential for success in the program and graduation would be admitted. An awareness of the factors which contributed to the success of graduates will also permit the development of programs and procedures that will enhance student retention.

Based on the data for all 197 students who enrolled in the program over a three-year period, a Chi-Square analysis was used to determine the significance of the relationship between successful completion of the ADN program and fourteen variables associated with high school prerequisites, pre-admission preparation, and performance in the first quarter of the program.

The high school prerequisite factors included high school class rank; grades in high school algebra, biology, and chemistry; and the years of elapsed time between the completion of these prerequisites and the start of the ADN program. Pre-admission factors included the grades in a mathematics prerequisite course, the number of college credit hours transferred to the program, credit hours completed in developmental courses, credit hours attempted in nursing-related courses prior to the start of ADN, and the grade point average attained in these curriculum related courses. The performance factors included the number of credit hours attempted in the first quarter, grades in the co-requisite biology and the introductory nursing courses, and the first quarter grade point average.

The study revealed that successful students were better prepared academically. They had completed more of the high school prerequisite courses with higher grades. Successful students transferred a greater number of college credits, received higher grades in the mathematics prerequisite, and they achieved a higher grade point average in the related courses completed before the start of the program. Successful students required fewer developmental courses and attempted fewer courses in the first quarter of ADN than did the non-successful students. Grades in biology and in the introductory nursing course, together with the GPA after the first quarter in the program, were found to be significant factors predicting success.

Two variables considered in the study were not found to be significantly related with success. These variables were the requirements that the high school prerequisites be completed within five years prior to enrollment and the number of related courses completed prior to the start of the ADN program.

The study resulted in six recommendations. They were:

1. To disseminate the profile comparing successful and non-successful students to interested applicants, area high school counselors, and faculty advisors for their information and use.

2. To revise some of the current admission prerequisites and procedures.

3. To review the adequacy of entrance testing policies.

4. To develop a basic nursing skills course for the first quarter students to replace the current mathematics prerequisite course which would incorporate other knowledge and skills essential to early performance.

5. To review the ADN curriculum to determine if the current structure could be redesigned to reduce the workload in the early part of the program. Two alternatives suggested included establishing a "two-step" program where students would complete the Practical Nursing program before entering ADN or development of a health occupations preparatory curriculum that would include the

related curriculum courses common to all allied health students.

6. To establish an institutional research program as a continuing, dedicated effort to address the persistent problems associated with oversubscription and attrition in Associate Degree Nursing and other curriculum programs.

TABLE OF CONTENTS

Page

LIST OF TABLES viii

Chapter

1. INTRODUCTION. 1

Background and Significance 3

Purpose of the Study. 8

Statement of the Problem. 10

Study Approach. 12

Research Questions. 16

Hypotheses. 20

Definition of Terms 21

Limitations 21

Assumptions 22

2. REVIEW OF RELATED LITERATURE. 23

3. PROCEDURES AND METHODOLOGY. 38

4. PRESENTATION OF THE RESULTS 54

5. INTERPRETATION, CONCLUSIONS, AND RECOMMENDATIONS 77

Interpretation of the Results 78

Conclusions 91

Recommendations for the Improvement of Practice, Including Strategies for Diffusion, Implementation, and Improvement. 96

BIBLIOGRAPHY 109

APPENDIX 115

LIST OF TABLES

Table		Page
1.	Number of ADN Students with Transfer Credits 1980-1982	28
2.	Number of ADN Students Completing Developmental Courses 1980-1982	29
3.	Number of Curriculum Related Courses Completed by ADN Students 1980-1982	31
4.	Number of Credit Hours Attempted in First Quarter of ADN 1980-1982.	33
5.	Associate Degree Nursing Enrollment 1980-1982	39
6.	Variables Under Study	41
7.	Categories of Elapsed Time Between High School Prerequisites and Entry into ADN	44
8.	Grade Distribution - Nursing 101 1980-1982.	50
9.	Results of Chi-Square Analysis of Variables Associated with Success in Associate Degree Nursing 1980-1982	55
10.	Distribution of High School Prerequisite Factors	57
11.	Distribution of Pre-Admission Factors	60
12.	Comparison of Curriculum Related Courses and Grades Received in Introduction to Nursing.	64
13.	Distribution of First Quarter Performance Factors	66
14.	Reasons Given by ADN Students for Withdrawing From Program 1980-1982.	69
15.	The Profile of Successful and Non-Successful ADN Students at FTI	73

Chapter 1

INTRODUCTION

The education of professional nurses in the United States was significantly changed when, in 1950, the first Associate Degree Nursing program was started. Since that time, nurses have been prepared in one of three types of educational programs: the traditional diploma program sponsored by hospital facilities, a four-year institution where they attained a baccalaureate degree, or a local community college to obtain an associate degree in nursing. Graduates of all three programs are submitted to identical licensing exams, which are required for them to practice as registered nurses in their state. These programs differ on a number of accounts, as Dennis (1979) points out: "...the graduates of all three are accorded the title of 'professional nurse' and are held legally responsible for having equivalent nursing knowledge."

Since the community colleges in the United States have expanded at a rapid pace over the past three decades, it is not surprising that the largest growth in the number of nursing programs offered has also occurred in the community college associate degree programs. Associate Degree Nursing programs have already contributed nearly one out of

every four licensed professional nurses in the health care field since their inception (Betz, 1981).

The availability of a low-cost local nursing program, with minimal admissions requirements, provided a significant opportunity to the community. This fact was quickly recognized and applications promptly outpaced the number of students who could be accommodated in most of these programs by a factor of five to one or better (Dennis, 1979). The fact that ADN programs are oversubscribed across the United States is one indication of the popularity of the nursing profession as a career. Accompanying this popularity has been a persistent high rate of attrition of students from nursing programs. The attrition rate across the nation has for a number of years remained at a level of approximately one out of every three students who have entered the program (Donsky, 1981). It has often been accepted that high attrition was a result of the increasing complexity of the nursing profession. The development of a highly structured and technical program to meet these needs most certainly requires a great deal of commitment on the part of a student. While the need for broader technical knowledge may partially explain the attrition statistics, another consideration must be that the location of the majority of the ADN programs is in the two-year community colleges. Since two-year institutions have generally operated under an open access concept, the limitations established on

admission of applicants has often been based on the number of students who could be accommodated in the program. It has become apparent in many institutions that the lack of applicant screening has permitted the admission of underprepared students and that a high rate of attrition may be inevitable in these circumstances. The same philosophy which has contributed so greatly to the growth of the community colleges may also be partially responsible for the persistent high attrition. The continued oversubscription and high attrition of students from popular and highly technical programs such as Associate Degree Nursing has forced the recognition that some type of selective admissions procedures must include a means to measure the applicant's potential for successful completion of the program.

Background and Significance

Interest in the problems associated with the selection and recruitment of nurses was addressed in a 1963 study by Taylor and others when they attempted to determine what research had been done on selection of nursing candidates. The results of their extensive study encouraged schools of nursing to improve their selection process and to undertake local studies in the prediction of nursing performance, both in schools and on-the-job. Since that time, a large number of studies have attempted to predict nursing performance as the basis to establish

admission requirements that would attract and retain the best qualified candidates for the profession.

Franklin (1966) compared community college nursing programs using a selective admissions procedure with those operating under a nonselective admissions policy. She reported a significantly lower rate of attrition due to academic failure, and an improved performance on the State Board Test Pool Examination for Registered Nurses from the schools with selective admissions.

De Frank, in her 1975 study of twenty-two schools of nursing, noted that oversubscription of applicants to nursing programs has become a nationwide phenomenon, and that there also appeared to be many interpretations of the open access concept - particularly as to the minimum entrance requirements for admission. She estimated that nearly two-thirds of the nursing schools in the United States employed some type of admissions screening.

This change was not limited only to schools of nursing, as Hagemeyer (1976) indicated when he addressed the problem of high attrition associated with the "open door" community colleges:

> Historically, all who could benefit were admitted, but the pressure of increased numbers of applicants and a high attrition rate have begun to play a part in changing the admissions picture in community colleges.

Cohen and Brawer (1982) considered the use of admissions screening from the standpoint of improving the service that such a practice would provide to the community

when they commented:

> When programs do have selective admissions, such as in nursing and some of the higher-level technologies, most of the entrants graduate and obtain positions in the fields for which they were trained. When programs are open to everyone, as in most of the less professionalized trades, then chances that a matriculant will complete the curriculum and begin working in that field are markedly reduced. "Dropout" is a reflection of the structure of the program. An institution, or a program within that institution, that places few barriers to student matriculation cannot expect a high rate of program completion.

Adding to the difficulties in determining what constitutes an appropriate and objective admissions standard and contributing to the high attrition rate from the program is the technical nature of the Nursing curriculum. The need to assimilate the vast amount of technical knowledge required by the nursing professional necessitates a course of study which is usually very demanding of the student. Institutions which offer nursing programs frequently require students to follow a highly structured curriculum, in that their courses are usually arranged in a sequential fashion with demanding prerequisites. Cohen and Brawer (1982) indicated that this is not unusual for career programs, which they found typically maintained curricula in which the courses were sequential. Many of these programs, "...especially those in the technologies and the health fields, had selective admissions policies. Students were forced to make an early commitment,

be admitted to the program, and make satisfactory progress through them."

Attempts to establish selective admissions procedures in the face of these difficulties have not been very successful. One major obstacle has been how to determine which students seeking admission must be turned away without jeopardizing the open access. This has been particularly the case in the two-year community colleges which frequently operate under a philosophy of open admissions, usually stated by a policy which declares that:

> ...any person, whether a high school graduate or non-graduate, who is eighteen years or older, and who is able to profit from further formal education, will be served by the institution. Students are screened and placed in a program which serves their needs and objectives in life, as indicated by their background, aptitudes and expressed interests... (FTI Staff and Faculty Handbook, 1983).

Even though this statement of the "open door" policy recognizes that some screening of applicants may be required, the emphasis is clearly on the interests and objectives of the student and not on their potential success in academic programs. The impression is widely held that anyone can apply for, and be admitted to, any program of interest offered in open access institutions.

The Carnegie Council on Policy Studies in Higher Education (1977) recognized that there is a distinction between the admissibility considerations of the applicants and the selection of students. The commission considered

that admissions questions should determine whether the applicant possesses, "...the requisite prior education and minimum intellectual abilities and aptitudes necessary to pursue a sustained program of academic study offered by the institution."

The Carnegie Council further recognized that there may be a need for a distinction between meeting minimal admissions requirements and selection, but that "...understanding that such a distinction may exist and that there may be a justification for establishing a 'floor' with regard to expected academic competency does not insure that such a distinction is widely understood nor always accepted."

Recognizing the dual problems of how to deal with the continued increase in the number of applications for a limited number of spaces and a persistent high rate of attrition, a typical response is to suggest a revision to the admissions prerequisites or procedures. In an attempt to appear clearly objective and fair in the eyes of the community, such a response is often considered a safe admissions policy. Fayetteville Technical Institute has established a set of minimal prerequisites and accepts students based on the date of their application. According to Moore (1974), such practices have often presented the faculty with "...the impossible task of maintaining standards of 'academic excellence' in the face of an underprepared student population."

Knoell (1966) recognized the significance of the problem of maintaining open access and of the need to improve the quality of entering college applicants when she reported,

> ...institutions with open-door admission policies are now becoming more selective, both by restricting admission to applicants who appear to have a reasonable probability of success and by doing a better job of informing the high schools about the kind of students who will succeed in their programs.

The Carnegie Council has suggested a similar approach to improve the present situation:

> Logically there are two major ways to improve the quality of students.... One is to pick better ways of selecting applicants from the existing applicant population. Another is to increase the general quality of the pool of applicants.... Information to dispel ignorance and mistaken beliefs about the admissions policies of institutions could be reasonably expected to help improve the quality of the applicant pool and such policies and would, therefore, not only be in the service of better fulfilling the ethical oblications...to their applicants, but also would be in the self-interest of the schools themselves.

Purpose of the Study

This study was centered around four goals:

1. The first goal was to determine whether the current prerequisites, admissions procedures, pre-admission preparation patterns, and early performance could be used to provide information concerning the student's potential for successful completion of the ADN program.

2. The second goal was to determine the validity of the relationships between available information and potential student performance by statistical analysis of the data collected concerning the student characteristics relating to their high school educational background, their academic preparation prior to entering the ADN programs and their early performance as student nurses.

3. The third goal was to interpret the results of the statistical analysis and develop specific recommendations concerning the ADN program.

4. The fourth goal was to disseminate information to interested candidates, local high school counselors, and faculty advisors concerning the factors which differentiated the successful students from those who were not successful. The dissemination of this information is expected to improve the advising of prospective candidates and the retention of students already enrolled. Aspiring candidates should be able to use this information to assist in their preparation for successful matriculation and completion of the program, thereby improving the pool of qualified applicants.

Selecting from an improved pool of applicants should reasonably be expected to improve the attrition statistics by providing both the faculty advisors and students with indicators that will allow the early development of intervention strategies for students in academic difficulty. Such an approach would fulfill

the model proposed by Moore (1974) when he commented that:

> Relative to the problem of student attrition, and particularly in the open access community college, the working hypothesis is this: the aim of the model must be prophylactic and not prophetic...our model to attack the multivariate and aggregated causal factors of student attrition should be able to point out specific changes which in turn can prevent the projected results.

Statement of the Problem

The enrollment at Fayetteville Technical Institute has steadily increased over the past five years. One of the most popular curriculum programs offered is that of Associate Degree Nursing. Since the program was started at FTI in 1968, over 500 nurses have graduated. Over the same period, there have been far more applicants for the program than could be accommodated by the faculty and available facilities. The number of new students who can be accepted for the ADN program at FTI has been set at seventy, while as many as three to five times that many may be expected to apply each year. Many potential applicants must be refused admission to the program or asked to delay their entry.

The results of the North Carolina State Board Test Pool Examination for Registered Nurses is generally considered an indication of the quality of programs offered throughout the state. In this regard, the program

at FTI must be acknowledged as a success. Over the past five years, nearly ninety-six percent of the graduates of the FTI program passed the test on the first attempt compared to an average of only eighty-three percent for the other thirty-three institutions offering Associate Degree Nursing programs in the state (North Carolina State Board of Nursing, 1983).

This success has not been achieved without difficulty. Donsky (1981) has reported that attrition from Associate Degree Nursing programs in the United States has remained at a level of approximately one out of every three students who enter the program. Among the thirty-three schools of nursing offering Associate Degree Nursing programs in North Carolina, the rate of completion in 1983 was nearly sixty-five percent (North Carolina Board of Nursing, 1983). While the retention rate across North Carolina has approximated the national average, the attrition rate at FTI over the past five years has numbered more than fifty-five percent of the students who enrolled (FTI Registrar's Office, 1984). Even though a high attrition rate is not isolated to this institution, the attrition rate from the ADN program at FTI is among the highest of the schools of nursing in North Carolina, and a source of great concern. A review of the pattern of attrition revealed that as many as forty-five percent of the students who were admitted to the ADN program will not survive the first year of the

curriculum. The attrition rate for the class starting in the fall, 1983, term for example, exceeded twenty percent after the first quarter and fourteen percent after the second quarter. At the end of the first year of the program, the class numbered only thirty-nine of the original seventy who started. The admissions process which introduced thirty-one prospective nurses into training who could not successfully complete the first year of the program deserves study.

Study Approach

Attempts to deal with the problems of oversubscription and attrition from nursing programs are commonly found in the literature. Many of these studies have concluded that changes in the admissions procedures or the establishment of additional prerequisites may be the best means to improve the general qualifications of applicants and to retain students in the program. Studies by Brown (1978) and Schwirian (1979) addressed the oversubscription to ADN programs, finding that this is a national phenomenon. They reported that most nursing schools employ some type of selective admissions procedures. The measures which were usually employed to handle admissions in programs where there is an oversubscription included a) the acceptance of applications from qualified applicants in the order they are received, b) the establishment of specific program prerequisites

to structure the qualifications of the applicants, c) the use of some type of entrance testing program to screen out those applicants with lesser qualifications, or d) the use of interviews or letters of recommendation to assist in the admissions process.

The North Carolina Department of Community Colleges has established a set of high school prerequisite courses as the minimal requirement for admission to the Associate Degree Nursing programs throughout the state. This same agency has placed a limit as to the number of students who may be admitted to the local ADN programs based on the capacity and availability of local clinical facilities appropriate for training in the various phases of nursing. Both of these restrictions were intended to improve the qualifications of the entering students and to insure the adequacy of the clinical portion of the program. Unfortunately, these measures have not been found to have significantly improved the qualifications of the applicants nor have they reduced the attrition rate. In addition, the restriction on the number of students who may be admitted based on available clinical space has often resulted in underutilized clinical space because of attrition.

The current admissions process at FTI is based upon an "open door" policy. The selection of candidates for admission to the ADN program is on a first-come, first-served basis and does not involve selection beyond

the basic requirements of high school graduation and minimum given course and program prerequisites. Students who do not possess the requisite qualifications are directed to take developmental courses. After completion of the necessary developmental courses, they are considered qualified for admission and placed on a "waiting list" until the next class in nursing starts in the fall term. Students who do not require developmental courses and those on the waiting list are encouraged to take the related curriculum courses. The result of this procedure has been that a typical student spends three to four years at FTI in order to complete the two-year ADN program.

Fayetteville Technical Institute has attempted several methods to address the problems associated with admissions and retention in the ADN program, but the problems persist. This experience is in keeping with the conclusions of both the Brown and the Schwirian studies which indicated that measures restricting admissions could not be found to be of particular value in improving the attrition rate.

The approach suggested in this study involves the development and dissemination of a profile comparing the successful and non-successful ADN students. Using the classes registered in 1980, 1981, and 1982 as the sample, the demographic data and selected variables were analyzed to determine the valid relationships which exist that are

predictive of successful completion and graduation from the ADN program.

The study provided information and recommendations in four major areas. First, the study developed an objective appraisal of the validity of the current academic program and admissions prerequisites. Second, the information on the students' high school background and the characteristics of their pre-admission preparation for the program will provide a measure of the potential of applicants to persist and successfully complete the curriculum which will be useful in admissions decisions and in advising prospective students. Third, the data concerning performance in the first quarter of the program may improve the retention of students by indicating those students who may experience academic difficulty early enough to develop an appropriate intervention strategy. Finally, the dissemination of the results of the study to the local community will inform the community of the requirements and demands of the program and will permit interested candidates to assess their own potential for success. Area high school counselors should also find the profile of assistance in encouraging student efforts toward improving their preparation in the high school prerequisite courses. The dissemination and use of the profile developed in this study has the potential to improve the applicant pool and to improve the retention of students already enrolled as well

was to inform the community as to the objective basis for the admissions requirements to the Associate Degree Nursing program at FTI.

Research Questions

This study consisted of an ex post facto research project to examine the indices of success among Associate Degree Nursing students at Fayetteville Technical Institute. Data concerning the independent variables associated with high school prerequisites, student preparation prior to admission to the program, and the performance of candidates in the first quarter of the nursing curriculum were obtained from official student records. The data were subjected to statistical analysis to compare the students who successfully completed the Associate Degree Nursing program and graduated, and those who failed to complete the prescribed two-year curriculum. Based on this information, a profile of the characteristics of students who successfully completed the ADN program was developed.

The prerequisite factors included in the study were high school class rank, grades received in high school course prerequisite courses of algebra, biology, and chemistry, and the time which elapsed between the completion of these high school prerequisites and the start of the program. The variables associated with student preparation included the number of transferable college-level courses accepted for admission to the program,

the number of developmental credits earned, and the number of credit hours in curriculum-related courses completed by the candidate at FTI prior to attempting the first quarter of work in the program. The cumulative grade point average obtained prior to the start of the ADN program in these curriculum-related courses, and the grade in the nursing program mathematics prerequisite course were also considered as a part of the student preparation for the ADN coursework. The measures associated with student performance in the first quarter of the ADN program included the number of credit hours attempted in the first quarter of the nursing curriculum, the grade received in the co-requisite course in anatomy and physiology, the grade in the introductory nursing course, together with the grade point average attained in the first quarter of the program.

The results of the analysis were used to develop a profile of the characteristics of the students who successfully completed the program and graduated. The profile was provided to local high school guidance counselors and admission counselors at FTI to use in the advising of potential applicants and to the ADN faculty to advise students whose characteristics indicate that they may experience academic difficulty. The development of information comparing the successful and unsuccessful students is expected to improve the pool of qualified applicants for the program by providing a means of self-

evaluation to potential candidates. The profile developed by this study may be reasonably expected to assist in the problems involved with the oversubscription and high attrition rate presently associated with the ADN program at Fayetteville Technical Institute.

The research questions addressed in the study were as follows:

1. Is high school class rank related to success in the Associate Degree Nursing program?

2. Are the grades received in the prescribed prerequisites of high school algebra, biology, and chemistry related to success in the nursing program?

3. Is the time which elapsed between the completion of the high school prerequisites and the date the candidate started the ADN program related to success in the program?

4. Is the number of college-level courses accepted for transfer at the time of admission to the program related to later success?

5. Is the number of credit hours of developmental courses completed prior to entry into the program related to the success of the student?

6. Is the current prerequisite course, "The Mathematics of Dosages and Solutions," related to success in the ADN program?

7. Is there a relationship between the number of credit hours earned in related curriculum courses completed

at FTI prior to entry into the ADN program and the success of the student?

8. Is the cumulative grade point average attained in curriculum courses completed prior to the start of the program related to success in ADN?

9. Are the number of credit hours attempted in the first quarter of work in the ADN program related to success?

10. Is the grade received in the co-requisite course in anatomy and physiology related to program success?

11. Is the grade attained in the first course in nursing related to the later success of the student in the nursing program?

12. Is the cumulative grade point average attained after completion of the first quarter of the curriculum related to success and graduation from the program?

An additional inquiry involved the reasons students gave for withdrawal from the program. The inquiry was considered necessary to determine if a set of common reasons existed for the withdrawal of those students who appeared to have the profile which indicated that they would be successful, but did not graduate. This information was expected to assist in counseling and the retention of students who might otherwise leave the program.

Hypotheses

The hypotheses of the study concerned the relationships among the successful and the unsuccessful Associate Degree Nursing students at Fayetteville Technical Institute. Using the academic records and applications data submitted by students who entered the program in 1980, 1981, and 1982, the relationships which exist among the prerequisite qualifications and student preparation which are considered in the admissions process, and the performance of the student in their first quarter of nursing were compared between those students who later graduated and those who failed to successfully complete the program. The information concerning the students who withdrew was not subjected to statistical analysis.

It was hypothesized that there was no significant relationship between the proportion of the students who were successful and graduated and those who did not complete the ADN program based on a set of independent variables represented by the research questions. The null hypothesis was expressed as H_o: $p_1 - p_2 = 0$. This was interpreted as the basis for the classification of the observations were independent. The alternative hypotheses were expressed as H_a: $p_1 - p_2 \neq 0$. A Chi-Square test was used to determine whether the relationship was significant for each of the research questions except for the question concerning reasons for withdrawal.

Throughout the study, the .05 level was accepted as statistically significant.

Definition of Terms

Definitions used in the study are as follows.

Developmental courses - Developmental courses are non-credit remedial courses. Students may request these courses or they may be required of students who do not possess the necessary prerequisites for admission to the program they seek.

Grade Point Average - Grade Point Average is the numerical average on a 4.00 scale, where 4.00 = A, 3.00 = B, 2.00 = C, 1.00 = D, and 0.00 = F.

Related Curriculum Courses - All courses prescribed in the current nursing curriculum, other than those identified as nursing technology courses, were considered related curriculum courses.

Success - For the purpose of this study, success is defined as graduation from the Associate Degree Nursing program at Fayetteville Technical Institute.

Limitations

The interpretations of the results of this study were limited to the classes enrolled in the ADN program in 1980, 1981, and 1982 at Fayetteville Technical Institute. No reference will be made to other curricula or the Associate Degree Nursing programs at other institutions.

The analysis of student performance was limited to the first quarter of the program due to the inclusion of high school prerequisite information in the study. A number of studies have concluded that measures of high school performance may not be predictive beyond the first quarter of college work. Since better than half of the students who will leave the program because of academic difficulties will leave during or immediately after the first quarter, it was considered appropriate to concentrate on the factors associated with early performance in order to maximize the use of available data.

Assumptions

Certain assumptions were essential to this study. The statistical significance upon which this study was based assumed the following:

1. Since the assignment of members to the observed categories was based on students who were already enrolled in the ADN program, membership in these categories was of arbitrary origin and the sample was considered random.

2. Each observation was independent.

The reasons given for withdrawal of the students were assumed to accurately describe their reasons and were accurately recorded in the records.

Chapter 2

REVIEW OF RELATED LITERATURE

A review of the literature established the existence and influence of variables associated with success in Associate Degree Nursing programs. The purpose of this study was to compare the profile of successful and non-successful ADN students as to their educational background, preparation, and early performance in the program to determine those factors which appeared predictive of success. The variables considered in the study included the students' high school prerequisite qualifications, the type and the pattern of their preparation prior to admission, and their performance in the first quarter of the ADN program.

Factors Associated with High School Prerequisites

The high school prerequisite factors examined in this study included the students' high school rank; their grades in high school algebra, biology, and chemistry; and, the local requirement that these prerequisites be completed no earlier than five years prior to entering the ADN program at Fayetteville Technical Institute.

Based on a nationwide survey of 150 nursing schools, Schwirian (1976) reported that high school rank and grade

point average were among the most commonly used data in admission decisions. Thompson (1974) established the validity of high school rank as a predictor of success in college. Chase and Johnson (1977) reported that students in the upper third of the high school class tended to be more successful in college. The validity of high school class rank as a measure of future performance was supported in the study by Ramer (1984) which indicated that rank can be correlated with the grade point average (GPA) the student attained in the first quarter of their college work.

High school grades had also been found to be predictive of performance in college (Smith, 1984). Early studies from Douglas (1931) to Scannell (1960) have indicated a strong correlation between high school average grades and college grade point average with correlations reported ranging from .56 (Douglas) to .69 (Scannell). Stankovick (1977) indicated that success in nursing programs may be predicted by high school GPA. Keene (1968) reported a study indicating that students whose high school grade point average was below 2.0 are poor risks in nursing programs.

The relationship between the grades attained in high school algebra, biology, and chemistry and the grades attained by the student in the first quarter of the program has been established in several studies. Houston (1974) and Bello (1977) indicated that high school algebra correlated favorably with success in

nursing programs. Beistreich (1977) indicated that high school science courses were useful in predicting withdrawal and graduation in the allied health fields. Stankovick (1977) reported high school biology and mathematics were useful predictors of performance in nursing. In a 1983 study, Capoor also related grades in high school biology and chemistry to success in nursing programs.

Despite the research indicating the predictive validity of high school rank and high school grades, their usefulness may be limited. Studies by Hess (1984) and Warner (1984) represent two of the more recent studies that have found that measures of achievement in high school, evidenced by high school grades and class rank, may not be useful predictors of college performance beyond the first quarter of college work. Because of findings such as these, this study was limited to the variables considered important to success that could be obtained from official records required by the admissions process or may be observed during the first quarter of work in the ADN curriculum.

One unit of high school algebra, biology, and chemistry is required by the North Carolina State Board of Nurses as prerequisites for admission to the ADN programs throughout the state. FTI requires that these courses must have been completed within the five years immediately prior to admission to the program (FTI Staff and Faculty Handbook, 1984). Students are required to

retake these prerequisites as developmental courses if more than five years has elapsed since the completion of these prerequisites and their entry into the program. A recent study at FTI by McMillan (1983) found no significant difference in the course grades received in the anatomy and physiology course between the students who completed high school biology more than five years prior to admission and those who finished more recently. The relationship between program success and the time which elapsed between the completion of the high school prerequisites and entry into the ADN program was examined as a part of the considerations associated with the prerequisite factors in this study.

Factors Associated with Student Pre-Admissions Preparation

The factors associated with the pre-admission preparation of the ADN students included the number of course credits transferred from other colleges, the number of developmental credit hours completed, and the grade received in the required developmental level course in the mathematics of dosages and solutions. The number of co-requisite and related curriculum courses completed prior to the start of the ADN program and the grade point average in these courses were examined to determine if they were related to success.

Schwirian indicated the importance of prior college grades in her 1977 nationwide study of admission practices

at nursing schools when she found that prior college grades were a widely used consideration for selection. Her 1979 follow-up study commented on the value of prior college experience in the selection of candidates for admission. Institutions that considered data on prior college performance as an indicator of the potential of a candidate reported a greater rate of success in their programs. Many of these institutions also reported a lower attrition rate as well as a more satisfactory level of performance by their students. Donsky (1981) described a positive relationship between prior college experience and persistence in an ADN program. Bell (1983) documented the use of prior college credits as a predictor of attrition rates among junior college students.

Credits for college level-courses completed at other institutions are accepted for transfer at FTI if they are related to the curriculum program in which they are seeking admission, and are at least equal to a "C" (2.00) or better. The fact that more than half of the students who were admitted to the ADN program transferred one or more courses to the ADN curriculum made the relationship between successful completion of college-level coursework at other post-secondary institutions and success in the ADN program at FTI a factor to be considered in this study.

Table 1

Number of ADN Students With Transfer Credits 1980-1982

NUMBER OF CREDIT HOURS TRANSFERRED	NUMBER OF STUDENTS	PERCENT
None	87	44.2
1 to 12 Hours	37	18.8
13 to 24 Hours	44	22.3
Over 24 Hours	29	14.7
TOTALS	197	100.0

Applicants who do not have the necessary prerequisites for the ADN curriculum are required to enroll in developmental courses. Developmental courses are designed to provide remediation of basic skills already mastered or to introduce students to the basic skills needed in curriculum coursework (FTI Staff and Faculty Handbook, 1984). The number of developmental courses attempted by the student prior to the first quarter of the ADN coursework is considered to have an influence on the grades received in the first quarter of work in the curriculum. Lomonaco (1983) reported finding that the success of developmental courses in helping to attain an acceptable grade point average tends to be correlated with the purpose of the remediation program. If the remediation is intended to

refresh basic skills previously mastered, but forgotten, it tends to be successful; however, if it is used to learn basic skills never mastered, it then tends to be unsuccessful. Nash (1981) found that nearly seventy-two percent of ADN students have reinforcement or remedial courses before attempting regular coursework. A review of the records of the ADN students at FTI indicates that fifty-eight percent required one or more developmental courses while twenty-six percent needed more than two quarters of full-time work in developmental courses before entering the nursing program. The data in Table 2 indicate that the relationship between the number of developmental courses taken prior to entry into the ADN program and student success may be an important consideration in pre-admission preparation.

Table 2

Number of ADN Students Completing Developmental Courses 1980-1982

COURSES	NUMBER OF STUDENTS	PERCENT
3 Credit Hours (Math 98 Only)	83	42.1
4-12 Credit Hours	24	12.2
13-24 Credit Hours	38	19.2
Over 24 Credit Hours	52	26.5
TOTALS	197	100.0

Bello (1977), in a study of 358 students to develop factors predicting success in a community college ADN program, recommended that a pre-admission mathematics course be required of Associate Degree Nursing students at her institution. Similar concerns prompted the addition of a developmental level mathematics course to be taken as a prerequisite before entering the ADN program. This course is the Mathematics of Dosages and Solutions (MAT 98). A review of the records revealed that forty-two percent of the students in the ADN program were required to complete MAT 98 as their only developmental requirement. The relationship between the grade received in this developmental course and later success in the program has not been previously researched at FTI and was considered as part of this study.

Because of the delay between admission and the start of the class each fall, qualified candidates for the ADN program are encouraged to enroll in the nursing-related courses which are required throughout the program. Based on twelve credit hours as the number of credit hours expected of a full-time enrolled student, the data in Table 3 indicate that over half of the students who are admitted to the ADN program have already completed more than two quarters of related coursework prior to their entrance into the nursing program. This factor was examined in the study to determine if the

number of curriculum courses completed prior to the start of ADN coursework can be related with success in the program.

Table 3

Number of Curriculum Related Courses Completed by ADN Students 1980-1982

NUMBER OF CREDIT HOURS COMPLETED	NUMBER OF STUDENTS	PERCENT
None	26	13.2
1 to 12 Hours	33	16.8
13 to 24 Hours	34	17.2
25 to 36 Hours	51	25.9
Over 36 Hours	53	26.9
TOTALS	197	100.0

The final pre-admission factor considered was the grade point average attained by the students in the related curriculum courses completed prior to entry into the ADN program. Brown (1982), in a survey of fifty-one nursing schools, attempted to determine the preferred method used to handle the oversubscription of nursing applicants. She reported that respondents ranked grades in courses required for nursing as the most important consideration used in selection for admission to nursing programs. Bistreich (1980) indicated that the student's GPA at the time of

entry was predictive of success in an allied health program at Miami-Dade Community College. Carlson (1967) and Ramer (1983) also reported pre-nursing GPA could be related to success in the ADN programs, indicating that prior GPA in related coursework should be a factor considered in this study.

Factors Associated with Student Performance in the First Quarter of Nursing

Smith (1983), studying the relationship of selected variables to persistence and achievement in community colleges, found the number of courses taken in the first quarter to be predictive of student performance and persistence. The FTI Associate Degree Nursing Department advises students not to engage in outside employment because of the workload in the program, and outlines the requirement that co-requisite courses must be completed not later than the quarter scheduled.

Even though the curriculum schedule requires twenty credit hours in the first quarter of the ADN program, it appears that a large number of ADN candidates are undertaking only the minimum number of courses during the first quarter. Many have completed the majority of the required co-requisite courses prior to their entry into the program. Nearly forty-two percent of the students take only the introductory nursing course in the fall term. An additional eighteen percent take only one 3-credit-hour course in the fall quarter along with the

nursing course. These data indicate that the number of courses attempted in the first quarter of the ADN program may influence success in the program and should be included in this study.

Table 4

Number of Credit Hours Attempted in First Quarter of ADN 1980-1982

NUMBER OF CREDIT HOURS	NUMBER OF STUDENTS	PERCENT
8 Hours (NUR 101)	82	41.6
9 to 11 Hours	39	19.8
Over 12 Hours	76	38.6
TOTALS	197	100.0

There is also some evidence of a correlation between grades received in an anatomy and physiology course and performance on the registered nursing examination (Stankovick, 1977). Ussery and Little (1979) reported the correlation (r=.35) between grades in the biology course and later achievement in the North Carolina State Board Test Pool Examination for Registered Nurses. Efurd, in a 1978 study, found the grades of freshmen nursing students in biology and success in ADN were significantly related. The first biology course in the FTI Associate Degree Nursing program is Anatomy and Physiology I (BIO 106).

The relationship between grades received in this course and success in the program was examined as part of this study.

Ussery and Little related the importance of the introductory first course in nursing to later success on the North Carolina State Board Test Pool Examination for Registered Nurses. They found the correlation of .35 between introductory nursing course grades and the scores on the North Carolina Examination for Registered Nurses. Bello (1977) and Efurd (1978) reported college science courses as valid factors predictive of success or failure in ADN programs. Since the Introduction to Nursing (NUR 101) is the first course in the curriculum where the students receive actual experience in their chosen profession, this course is considered to be very important to later performance in the program. The course consists of two elements: classroom nursing theory and clinical practice. Students must maintain a "C" in both phases in order to progress to the next course in the nursing sequence. Failure to satisfactorily complete the clinical portion of the course with a "C" or better requires an evaluation by the full faculty for a recommendation to allow the student to continue in the program. Students who receive a "D" in classroom theory may be allowed to continue in the curriculum upon the recommendation of their faculty advisor; however, they must have an overall GPA of at least 2.50 to be considered for continuation. This grade point

average has been informally established because it is thought that lower grades may indicate a lack of ability to complete the succeeding coursework. Since the introductory nursing course is only offered in the fall term, permission to reenroll means the wait of an additional year in some instances. The relationship between the grade received in the course, Introduction to Nursing (NUR 101), and success in the program was considered an important measure of student performance.

The final variable associated with success in the first quarter performance was the grade point average attained in the first quarter of work in the program. There is little question that the first quarter grade point average is an important factor in the success of college students. Astin's study of attrition (1979) indicated that the dissatisfaction with first quarter grades may be a significant reason for withdrawal from college. St. Thomas (1982) reported a strong relationship between first semester grades and Nursing Board test scores. Other studies by Lenning (1980) and Ramer (1983) established that the first quarter GPA was a valid measure of persistance and success in the ADN programs.

Factors Associated with Withdrawal From the Program

Out of the 197 students who started the program during the years 1980 to 1982, only eighty-eight

successfully completed the requirements for graduation. The analysis of the factors which differentiated the successful students from those who were not successful should also consider the reasons why students withdrew to determine whether or not the study considered all of the factors of major significance. The reasons given by the students who withdrew were included in the study based on the comments obtained from the personal records of the 109 students who withdrew over the period of the study. Lenning (1980) cautioned that self-reported information may give an incomplete, distorted, or erroneous picture of the pattern of reasons for dropping out. Since a student needs a faculty recommendation to reenter the program, and also usually needs a recommendation if they wish to transfer to another nursing or health related program, this study assumed the reasons given in the exit interview with their faculty advisors to be accurately reported.

Summary of the Related Research

The purpose of this study was to identify the predictors of success among associate degree nursing students at Fayetteville Technical Institute. A review of the literature indicated the variables in the study could be related to the success of students in the ADN program. Indices of success tested included the factors of high school class rank; grades in the high school prerequisites of algebra, biology, and chemistry; and

the effect of the time which elapsed between students' completion of the high school prerequisites and the start of the program. The number of college-level courses transferred, the number of developmental and curriculum-related courses completed prior to admission to the ADN program, the grade in the developmental mathematics course, and the GPA attained before entering the first quarter of work in the ADN program were examined. The number of credit hours attempted in the first quarter, the grades in the course in biology, the introductory nursing course, and the cumulative GPA after the first quarter of work in the program were all subjected to statistical analysis. One final inquiry concerned the reasons why students withdrew from the program. A profile comparing successful and non-successful Associate Degree Nursing students was constructed using the independent variables found to be significant in the study and recommendations were made concerning improvement in the selection and retention of qualified students.

Chapter 3

PROCEDURES AND METHODOLOGY

This study examined factors associated with prerequisite qualification, pre-admission preparation, and student performance in the first quarter of work in Associate Degree Nursing at Fayetteville Technical Institute. The purpose of the study was to determine the relationship of these variables to the success of students in the program. Fourteen independent variables were included in an ex post facto research design. A series of Chi-Square tests were used to analyze the relationships between the set of independent variables pertaining to the students who successfully completed the ADN program and those who did not succeed. The independent variables that indicated a significant relationship with success were constructed as a profile to compare the two groups of students in the study.

The Population

The data collected concerned the characteristics of the 197 students who entered the Associate Degree Nursing program at FTI in the fall term 1980, 1981, and 1982. These classes were selected because they represent the most recent graduating classes for which adequate

information was available and who were admitted under similar conditions and procedures. The data on enrollment and graduation are found in Table 5.

Table 5

Associate Degree Nursing Enrollment
1980-1982

YEAR	1980	1981	1982	TOTAL
Number Enrolled	64	69	70	203
Graduated (two years later)	31	24	33	88
Percent Graduated	48.4	34.7	47.1	43.3
Withdrew	33	45	37	115
Attrition Percent	51.6	65.2	52.9	56.7

The Research Design

The study consisted of the analysis of relationships among fourteen independent variables and the successful completion of the Associate Degree Nursing program. It was hypothesized that there is no significant difference between the proportions of the successful students and those who were not successful, relative to the independent variables tested. The hypothesis was tested using Chi-Square analysis. The application of the Chi-Square test was considered an appropriate method of evaluation because the two groups (successful and non-successful) are

independent, and because the independent variables under study are frequencies in discrete categories (Seigal, 1956).

The independent variables included the existing high school prerequisites and qualifications for admission. The factors considered included the students' high school class rank; their grades in the high school prerequisite courses of algebra, biology, and chemistry; and the effect of the time which elapsed between the completion of the high school prerequisites and the start of the program. The number of college-level credit hours transferred from other colleges to FTI at admission, the number of credit hours completed in developmental courses, the grade in the mathematics prerequisite course taken at FTI, the number of curriculum-related credit hours accumulated prior to entry into the ADN program, and the grade point average in these related courses were considered as pre-admission preparation factors. The number of credit hours attempted by the students in the first quarter of work in the ADN curriculum, grades in the course in anatomy and physiology, and the grades in the introductory course in the nursing curriculum sequence, together with the first quarter grade point average were used to determine the student's performance in the first quarter. Using the factors which were found significant, the profile comparing the successful and non-successful ADN students at FTI

was developed. A summary table of the variables in the study is found in Table 6.

Table 6

Variables Under Study

VARIABLE	MEASURED BY	RESEARCH QUESTION
High School Prerequisites		
Class Rank	Position in High School Class	1
Algebra Grade	Grade in High School Algebra	2
Biology Grade	Grade in High School Biology	2
Chemistry Grade	Grade in High School Chemistry	2
Time Since Completion	Years Since Completion of High School Prerequisites	3
Pre-Admission Preparation		
Transfer Credits	Credit Hours Accepted for Transfer	4
Developmental Credits Earned	Developmental Credit Hours Earned Prior to Entry Into ADN	5
Mathematics Prerequisite	Grade in Math Prerequisite (MAT 98)	6
Related Credit Hours Earned	Number of Credit Hours in Related Curriculum Courses	7
Related Course Grade Pt Avg	Cumulative Grade Point Average in Courses Completed Prior to ADN	8
First Quarter Performance		
Course Hours Attempted First Qtr	Number of Credit Hours Attempted in First Quarter of ADN	9
Anatomy and Physiology	Grade in Anatomy and Physiology Course (BIO 106)	10
Intro to Nursing	Grade in Introductory Nursing Course (NUR 101)	11
First Quarter Grade Pt Avg	Cumulative Grade Point Average After First Quarter of ADN	12

An additional inquiry sought the reasons students withdrew from the program. The reasons given for withdrawal

in exit interviews were collected to determine if the variables considered in this study represented those of major significance or whether additional factors associated with program completion needed to be examined.

Source and Collection of Data

The class rosters of the Introduction to Nursing (NUR 101) were used as the basis to determine the pool of qualified applicants who were admitted to the ADN program in each of the three years in this study. This 8-credit-hour course is required of all students in the first quarter of work in the ADN program. The course is offered only in the fall quarter of each year, followed by the second course in the prescribed nursing curriculum. Students who are unable to complete the course must wait until the next fall term to attempt the course again. Such students are not routinely readmitted to the program, but they must have the faculty recommendation and space must be available. During the period under study, there were five students who repeated the course. These students were included in the study based on the grades that they attained on their first attempt in the program.

An information sheet was made for each name on the Nursing 101 rosters for the fall terms of 1980, 1981, and 1982. All students enrolled in this course during the three year period were included in the study. Information on each variable included in the study was obtained from

the official student records, from student application forms, and from official transcripts submitted as part of the admission process. All data was recorded on an individual information sheet. After the data was secured, the section of the information sheet with the student's identification was removed, and the subsequent identification was recorded by subject number to maintain confidentiality.

Success in the ADN program and graduation were determined from the official records. All grades, and the grade point average information used in the study, were obtained from student transcripts. Grades were established on the basis of a 4.00 quality point system.

The variable of high school rank was determined by the class standing of the student at graduation expressed as a percent of the total number of students in their high school class. Students were assigned to the category representing the appropriate third of their class in which they were ranked. Ranking by thirds recognized the current admission procedures which permits the waiver of entrance tests for students who graduated in the upper one-third of their high school class. Students for whom class rank was not available were assigned to the category designated "other."

The curriculum standards established by the North Carolina State Board of Community Colleges requires that all individuals interested in a career in registered nursing must have one unit of algebra, biology, and

chemistry prior to entering the program. The high school transcripts furnished with the application were reviewed to determine the grade in each of these courses. Grades were recorded on a 4.0 scale for analysis. Students who either did not take these courses in high school or received their high school diploma through other sources were recorded in the category as "other."

The admission requirements at FTI include the completion of the above three prerequisite courses within the five years immediately prior to the entry into the ADN program. The student transcripts were reviewed to determine the date of completion of the last prerequisite course and compared with the date of entry into the ADN program.

Table 7

Categories of Elapsed Time Between High School Prerequisites and Entry Into ADN

CATEGORY	DEFINED AS
One or Less	Developmental or One Year Prior
2 to 4 Years	More Than One Year But Less Than Four
5 or More Years	Over Four Years

Students who took one of the prerequisites in their final high school year and entered the program the following

fall term were assigned to the category of one year or less elapsed time. Because of the five year time limit, a large number of students who have already completed the high school prerequisites may be required to retake them as developmental courses. Since the courses would have been completed immediately prior to the first quarter of ADN coursework, students whose transcripts indicated the completion of developmental courses in these subjects were also assigned to the category of one year or less elapsed time. Other students were assigned according to the number of years since completion of the courses. The category of five or more years included students who were granted college transfer credit in these subject areas.

The number of credit hours completed in college level courses prior to entry into the ADN program was considered to be a measure of the potential of a candidate to accomplish the coursework required in the ADN program. The official transcripts furnished with the student application were reviewed to determine the number of credit hours which were accepted for transfer to the ADN program at FTI.

The review of related literature revealed that the total number of credit hours of developmental courses which were completed prior to the first quarter of an ADN program could be considered a significant factor in success in college level work. The records of the students who had completed the high school prerequisite courses

within the five years preceding admission indicated that they attempted only three developmental credit hours, the required prerequisite mathematics course (MAT 98). Other students were included according to the number of developmental courses completed. Since a full-time enrolled student is defined as one who is enrolled for at least twelve credit hours per quarter, twelve credit hours was considered an appropriate interval for the categories used for analysis of this variable.

All students must take Mathematics of Dosages and Solutions (MAT 98) prior to the first quarter of the program, thus all prospective candidates must enroll in this course before the start of the fall term when the new nursing class starts. The students' records were screened for the grades they received in MAT 98 and recorded on the student information sheet for analysis.

Because of the delay between application for the program and the start of the new class each fall, a large number of students enter and complete many of the related curriculum requirements before their actual selection for the program. Experience over the past several years indicates that over fifty percent of ADN students had completed more than two full-time equivalent quarters of related coursework prior to entry into the program, while only thirteen students entered the program with no related courses completed. This fact introduced the question of the relationship between the number of related courses

completed prior to entry in the ADN program and success. The number of credit hours earned prior to the start of the Associate Degree Nursing was obtained from the official transcripts and categorized for analysis according to the equivalent full-time student workload of twelve hours per quarter.

Students in the ADN program must maintain at least a 2.00 GPA in all courses to graduate, and a "C" or better in nursing courses and related subjects in order to continue in the curriculum. The fact that many of the ADN students had completed several equivalent quarters of curriculum courses prior to the start of the nursing program indicated that the grade point average in these courses may be related to success in the program. The cumulative GPA attained in the related coursework completed prior to entry in the ADN program was obtained from official transcripts.

The number of credit hours attempted in the first quarter of work in the ADN program was considered an appropriate subject of inquiry in this study. The requirement for early application and subsequent completion of a number of the related curriculum courses prior to entry in the program has resulted in the student taking only the minimum number of credits in the first quarter of ADN. Forty-two percent of first quarter ADN students take only the 8-credit-hour introduction to nursing course. An additional eighteen percent take only three additional credit

hours, meaning that more than sixty percent of first quarter ADN students are officially "part-time" enrolled students. The number of credit hours attempted in the first quarter by the successful and the non-successful students was collected for analysis.

The grade received in Anatomy and Physiology I (BIO 106) was obtained from student records. The introductory course in anatomy and physiology is required prior to, or along with, the first quarter of ADN coursework. Similar courses have been found to be positively related to success and important to the successful completion of the licensing examination for registered nurses. Grades received in this course were recorded on the student information sheet for analysis based on a 4.00 grading system.

The grades attained in the Introduction to Nursing (NUR 101) were also examined as part of the study. This is the first course in the nursing technical sequence, and for many students, it is the first experience in their future career. Since the course carries 8 credit hours, it is a major factor on the first quarter grades. The course is designed in two parts: a classroom theory and a clinical practice segment. The final grade is based on ninety percent of the classroom theory grade and ten percent of the nursing clinical grade. A passing grade of at least a "C" must be maintained in both theory and clinical experience in order to continue to the next

course in the nursing technical sequence without faculty recommendation; however, a grade of "D" in nursing clinic will result in the student being dropped from the program. Students are evaluated weekly in clinical areas and advised of their progress.

Terwilliger (1971) wrote that grades which are not based on firm standards tend to develop a degree of consistancy over time. An instructor who assigns grades in a similar pattern may be expected to distribute the same number of failures even if the selection process and qualification of the students to the course were improved. Since the clinical grade has such an impact on the final course grade, a review of the grades awarded in this course during the period covered by this study was made. If the grades awarded indicated that they were relatively consistent, some leveling could be suspected. The results in Table 8 revealed no consistant percentage of grades were assigned during the three years in this study and it was concluded that the grades were representative of student performance in the course.

Even though the grades were considered to be representative of the student performance, the number of students who received an "A" in this course, which increased fivefold over the three year period, introduced the question of differences in the student preparation prior to this course. A review of the records revealed little noticeable difference in their high school background or in their

prerequisite qualifications. There were, however, two trends detected in the student characteristics that may form a partial explanation of the grade increase. First, there was a decline in the mean number of credit hours transferred by students in each of the three years. Second, the mean number of credit hours completed in the related curriculum courses was found to be increasing during the same period.

Table 8

Grade Distribution - Nursing 101
1980-1982

GRADE	1980 NO.	1980 %	1981 NO.	1981 %	1982 NO.	1982 %	TOTAL NO.	TOTAL %
A	3	4.6	8	22.6	15	21.4	26	12.8
B	21	32.8	36	52.2	32	45.7	89	43.8
C	25	39.1	12	17.4	16	22.9	53	26.1
D	4	6.3	4	5.8	2	2.9	10	4.9
F	2	3.1	1	1.4	0	0.0	3	1.5
WD, WP, WF	9	14.1	8	11.6	5	7.1	22	10.9
TOTAL	64	100.0	69	100.0	70	100.0	203	100.0

Comparing the students who received an "A" or a "B" in the introductory nursing course and the mean credit hours transferred was not found to be significant at the .05 level (df = 2, X^2 = 3.08). Likewise, the increase in

the number of related courses completed was not found significant (df = 2, X^2 = 1.83). Although neither of these trends were found to be significant to success and graduation, they may have revealed an important trend that provides a partial explanation for the improved grades in the introductory nursing course and will be further considered in the interpretation of the results of this study.

The final variable examined in the study was the first quarter grade point average. Several studies had indicated that this factor, more than any other, may differentiate the successful students from the unsuccessful. The official transcripts were used to furnish the first quarter GPA for analysis.

The information concerning the reasons for withdrawal given by those students who failed to complete the program was obtained from the student records. Students who withdraw are seen in an exit interview and the reasons for withdrawing are annotated in the student files maintained in the nursing department. This information was collected to insure that the significant factors considered in the study included those with major implications to student retention. No hypothesis was formed concerning the results.

Statistical Treatment and Analysis of Data

The data on the ADN students in this study were subject to Chi-Square analysis to test the independence

of characteristics of the population for each of the variables under consideration (Lapin, 1973). The X^2 test was also used to describe the statistical significance of a relationship which will permit the analysis and interpretation of frequency data (Kerlinger, 1973).

The null hypothesis used throughout this study was of the following form:

> H_0: There is no significant difference between the proportion of the students who were successful in the ADN program and those who were not successful that could be related to the categories of the independent variables tested.

The alternate hypothesis was:

> H_a: The relationship between the proportion of those students who were successful and those who were not successful in the ADN program and the factors under consideration were significantly different.

The Chi-Square test was used to determine whether the relationships between the independent variables and the two groups could be considered significant. A level of significance of .05 was used throughout the study. If the computed X^2 value is within the statistical table of critical values at the .05 level, the null hypothesis, H_0: $p_1-p_2=0$ was accepted. If the computed X^2 value exceeded the statistical table critical values at the .05 level, the null hypothesis was rejected. Upon rejection of the null hypothesis, the alternate hypothesis, H_a: $p_1-p_2\neq 0$ was accepted.

The analysis of the data concerning the reason why students withdrew from the program was analyzed according

to the frequency of the response and was not subjected to further statistical analysis.

Chapter 4

PRESENTATION OF THE RESULTS

This study attempted to quantify certain characteristics which were reported to be predictive of success in Associate Degree Nursing programs or related to success in early college performance. Fourteen independent variables were included in a Chi-Square analysis to determine whether the relationship of these variables to success of students in the ADN program at Fayetteville Technical Institute was significant. The results of these tests were used to develop a profile comparing the successful and non-successful students in three major areas: high school prerequisite qualifications, pre-admission preparation, and performance in the first quarter of the program. A review of the reasons given by the students who failed to complete the program was made to determine if additional variables should be included in the study. Information concerning the student population and the data tables used to determine the Chi-Square results are found in the Appendix, Tables 1 through 4.

Summary of Results of Chi-Square Tests: The results of the Chi-Square tests of the significance of the relationship between the distribution of the successful and non-successful students in each of the fourteen variables investigated are shown in Table 9.

Table 9

Results of Chi-Square Analysis of Variables Associated with Success in Associate Degree Nursing 1980-1982

RESEARCH QUESTION	FACTORS CONSIDERED	DF	X^2	SIG.
	HIGH SCHOOL PREREQUISITE FACTORS			
1	High School Class Rank	3	15.863	**
2	High School Algebra Grades	2	13.259	***
2	High School Biology Grades	2	17.021	***
2	High School Chemistry Grades	2	12.772	***
3	Yrs Between HS Prerequisites	2	3.401	N.S.
	PRE-ADMISSION FACTORS			
4	Credit Hours Transferred	3	19.629	***
5	Developmental Credit Hours	2	63.359	***
6	Grades Rec'd in Math Prereq.	1	4.825	*
7	Credit Hours Earned at FTI Prior to Entry into ADN	4	8.377	N.S.
8	Grade Pt Avg Prior to Entry	2	13.95	***
	FIRST QUARTER PERFORMANCE			
9	Credit Hours Attempted in First Quarter of ADN	2	4.203	*
10	Grades in Anatomy and Phys.	1	26.145	***
11	Grades in Introductory Nursing	1	51.485	***
12	First Qtr Grade Point Average	2	39.667	***

*p .05
**p .01
***p .001

The null hypothesis used throughout the study, H_o: $p_1-p_2=0$, was tested at the .05 level of significance. The results of the Chi-Square tests indicated that eleven of the fourteen factors were significant. The Chi-Square values computed for each of these variables exceeded the tabled value for the degrees of freedom of the frequency distribution under consideration. The null hypothesis for each of these variables was rejected and the alternate hypothesis, H_a: $p_1-p_2\neq0$, was accepted.

The null hypothesis failed to be rejected in the tests involving the time which elapsed between the completion of the high school prerequisites and the start of the ADN program. Likewise, the number of credit hours of related curriculum courses completed prior to entry into the program was not found to be significantly related to success in Associate Degree Nursing.

High School Prerequisite Factors: The results of the Chi-Square tests to determine the significance of the relationships between the variables associated with the high school prerequisite factors and the success of the student in the Associate Degree Nursing program are found in Table 10.

The analysis of the data in Table 10 indicated that a significant relationship exists between the high school class rank of the student and success in the ADN program. Nearly half of all students graduated in the upper third of their high school class. The high school class rank

of both groups were similar, with the rank mean for the successful students near the 67th percentile. The mean rank for non-successful students was approximately in the 63rd percentile.

Table 10

Distribution of High School Prerequisite Factors

RESEARCH QUESTION	FACTORS CONSIDERED	SUCCESS (N=88) %	NON-SUCCESS (N=109) %	TOTAL (N=197) %	DF	X^2
1	HIGH SCHOOL CLASS RANK					
	Upper Third	53.2	46.8	47.7		
	Middle Third	52.0	48.0	25.4		
	Lower Third	29.2	70.8	12.2		
	Other	17.2	82.8	14.7	3	15.863***
2	HIGH SCHOOL ALGEBRA GRADES					
	Over 2.0	61.4	38.6	35.5		
	2.0 or Less	38.0	61.9	46.7		
	Did not Take	28.6	71.4	17.8	2	13.259***
2	HIGH SCHOOL BIOLOGY GRADES					
	Over 2.0	60.4	39.6	46.2		
	2.0 or Less	30.9	69.1	35.5		
	Did not Take	31.6	68.4	19.3	2	17.021***
2	HIGH SCHOOL CHEMISTRY GRADES					
	Over 2.0	62.5	37.5	32.5		
	2.0 or Less	32.8	67.2	34.0		
	Did not Take	39.4	60.6	33.5	2	12.772***
3	YEARS BETWEEN HS PREREQUISITES AND ADN					
	1 Yr or Less	39.8	60.2	62.4		
	2 to 4 Yrs	47.6	52.4	10.7		
	5 or More Yrs	54.7	45.3	26.8	2	3.401 N.S.
TOTAL SAMPLE		44.5	55.3	100.0		

*p .05
**p .01
***p .001

The importance of high school performance was emphasized by the fact that only twenty-nine percent of the students who graduated in the lower third of their high school class were successful. Only one in five of those students who received their high school diploma from sources other than by graduation completed the ADN program.

Review of the student's high school records and transcripts revealed that many students had taken only one or two of the high school prerequisites required for entrance into the ADN program courses while in high school. Because of the variation found in the data, each course was considered a separate variable for the purposes of this study. The Chi-Square tests found that each of the three courses were significantly related to success in the ADN program. The grades attained by the successful students indicated that those students who received an "A" or "B" were more likely to be successful than those with lower grades. Furthermore, a greater proportion of the students who did not take these courses in high school did not succeed in Associate Degree Nursing. It was found that over one-third of the ADN students did not take high school chemistry, and approximately twenty percent had not completed either algebra or biology.

The Chi-Square analysis of the variable relating to the time which had elapsed between the completion of the high school prerequisites and the start of the ADN program was not found significant. The null hypothesis

failed to be rejected. There was no significant relationship between the time which elapsed from completion of the high school prerequisites and the start of the ADN program associated with success in associate degree nursing.

Students who had completed the high school prerequisite courses more than five years prior to starting the ADN program are required to retake these courses. Since these students had so recently comple these studies, they were assigned to the category of one year or less elapsed time for the purposes of this study. In order to determine if this categorization was appropriate, a second Chi-Square test was completed. Considering the total number of years which had elapsed between high school graduation and initial enrollment at FTI, a distribution of students who were graduated less than five years prior to admission and those who were graduated from high school more than five years prior to admission was determined. An analysis of the frequency distribution found the results were not significant at the .05 level (DF=1, X^2=2.953), supporting the earlier findings that there is no significant difference between success in ADN and the time which has elapsed between completion of high school prerequisites and admission to the ADN program.

Pre-admission Preparation Factors: The Chi-Square tests to determine the relationships between the pre-admission preparation variables and student success in the ADN program are found in Table 11.

Table 11

Distribution of Pre-Admission Factors

RESEARCH QUESTION	FACTORS CONSIDERED	SUCCESS (N=88) %	NON SUCCESS (N=109) %	TOTAL (N=197) %	DF	X^2
4.	CREDIT HOURS TRANSFERRED					
	None	27.6	72.4	44.2		
	1-12 Hrs	51.4	48.6	18.8		
	13-24 Hrs	63.6	36.4	22.3		
	Over 24 Hrs	58.6	41.4	14.7	3	19.629***
5.	DEVELOPMENTAL CREDIT HOURS					
	Three Hrs (MAT 98)	48.2	51.8	42.1		
	4-12 Hrs	79.1	20.8	12.2		
	13-24 Hrs	73.7	26.3	19.3		
	Over 24 Hrs	1.9	98.1	26.4	2	63.359***
6.	GRADES RECEIVED IN MATH PREREQUISITE (MAT 98)					
	Over 2.0	47.4	52.6	88.8		
	2.0 or Less	22.7	77.3	11.2	1	1.825*
7.	CREDIT HOURS EARNED AT FTI PRIOR TO ENTRY INTO ADN					
	None	65.4	34.6	13.2		
	1-12 Hrs	42.4	57.6	16.8		
	13-24 Hrs	50.0	50.0	17.3		
	25-36 Hrs	45.1	54.9	25.9		
	Over 36 Hrs	32.1	67.9	26.8	4	8.377N.S.
8.	GRADE POINT AVERAGE PRIOR TO ENTRY INTO ADN					
	Over 2.0	51.5	48.4	48.2		
	2.0 or Less	28.9	71.1	38.6		
	No Prior GPA	65.4	34.6	13.2	2	13.95 ***
	TOTAL SAMPLE	44.5	55.3	100.0		

*p .05
**p .01
***P .001

The analysis of data concerning the number of credit hours transferred revealed that while forty-four percent of all students did not transfer credits to the program, more than seventy percent of the students with no prior college experience were not successful. The data also revealed that successful students were likely to transfer more than one equivalent quarter of college credits. The mean credit hours transferred by the successful students approached fourteen credit hours, while non-successful students transferred an average of only nine credit hours (Source, Appendix Table 1). It was also noted that the mean credit hours transferred by both groups in the study had declined each year over the three years in the study.

The number of developmental credit hours completed by students prior to entry in the ADN program revealed an inverse relationship to success in the program. The fewer the number of developmental hours completed prior to entry to the program, the greater the chance that the student would be successful in associate degree nursing. Over twenty-six percent of the students who were not successful took more than twenty-four credit hours of developmental courses prior to starting the nursing curriculum which is the equivalent of better than two quarters of coursework. Less than two percent of the students with more than two quarters of developmental credits were successful. Also of interest was the fact that forty-two percent of all students

took only the prerequisite developmental mathematics course before starting the program.

The grades in MAT 98, the developmental mathematics course which is a prerequisite to the ADN program, were uniformly high for both groups of students. Nearly eighty-nine percent of all students received at least a "B" in this course. These results appear consistant with the fact that the students enrolled in the ADN curriculum were ranked high in their high school class and many had already completed algebra and high school science courses. The students who received a grade of "C" or less were successful only 22.7 percent of the time, indicating that poor performance in this course may be predictive of poor performance in the ADN program.

The number of credit hours earned in related curriculum courses prior to entering the program was not found significant at the .05 level. The null hypothesis failed to be rejected; there was no significant difference in the proportion of the successful and non-successful students relative to the number of credit hours in nursing curriculum related courses completed prior to entry in the Associate Degree Nursing program.

Although the data indicated that thirteen percent of the students did not attempt a single related course prior to the ADN program, more than half of the students had completed nearly two equivalent quarters of related courses before entering the nursing curriculum. The mean

number of related course credit hours earned by the successful students was found to be twenty-two hours with the mean of twenty-nine credit hours for the non-successful students (Source, Appendix Table 1). It was noted that approximately twenty-seven percent of students completed more than three equivalent quarters of work, with seventy percent of these hours accumulated by those students who were not successful. Furthermore, the relationship between the number of related courses completed and success is inverse, in that completion of more than two equivalent quarters of work does not appear to improve the potential for success in the program. The reason that this variable was not found to be significantly related to success may be due to the fact that many students had already completed a number of related courses and did not provide sufficient discrimination between the two groups based on this factor.

Considering these results in the light of the grades distribution in the introductory nursing course shown in Table 8 presents an apparent contradiction. One reason for the fivefold increase in the award of "A" and "B" grades over the period of the study was thought to have been the result of an increase in the number of related courses completed prior to attempting this course. A review of the records did reveal a trend towards an increase in the mean number of hours completed in related

courses by both successful and non-successful groups studied each year.

Table 12

Comparison of Curriculum Related Courses and Grades Received in Introduction to Nursing (NUR 101)

NUR 101 GRADES	MEAN RELATED CREDIT HOURS COMPLETED EACH YEAR 1980 N	1980 CREDIT HRS	1981 N	1981 CREDIT HRS	1982 N	1982 CREDIT HRS
A	(3)	18.0	(8)	20.9	(15)	28.0
B	(21)	20.0	(36)	19.5	(32)	28.0
C	(25)	27.3	(12)	29.8	(16)	34.7
D,F,or Withdrew	(15)	20.8	(13)	19.3	(7)	15.4
	(64)	20.8	(69)	21.3	(70)	28.3

The data shown in Table 12 indicate that the number of related courses completed by the students who received an "A" increased by fifty-six percent over the three years studied and by forty percent for the "B" students. In contrast, the number of courses completed by students who received "D", "F", or withdrew during this same period declined from twenty-one to fifteen credit hours. These data would seem to indicate that the completion of related courses prior to the start of the ADN program may improve performance in the introductory nursing course; however, there is no guarantee that they will contribute to later success in the program. Further study of the relationship between the number and type of related

courses completed prior to entering the ADN program may be merited.

The grade point average earned by students who completed the related curriculum courses was found to be significantly related to success in the program. Students who attained a GPA over 2.0 were almost evenly distributed between the successful and non-successful students; however, among those students with less than a 2.0 GPA, over twice as many were non-successful students. As expected, the number of students who had no prior GPA corresponds to the number of students who did not take related courses prior to entry into the ADN program.

First Quarter Performance Factors: The third set of factors considered to be related to success in Associate Degree Nursing were those concerning the performance of students in their first quarter of work in the ADN program. The distribution of the first quarter performance factors and the results of the Chi-Square analysis are found in Table 13.

The results of the analysis of the number of credit hours attempted in the first quarter of work in the ADN program and success were found to be significant in this study. The null hypothesis that there is no significant difference between successful and non-successful students related to the number of credit hours attempted in the first quarter of the ADN program was rejected and the

alternate hypothesis that a significant difference existed was accepted.

Table 13

Distribution of First Quarter Performance Factors

RESEARCH QUESTION	FACTORS CONSIDERED	SUCCESS (N=88) %	NON SUCCESS (N=109) %	TOTAL (N=197) %	DF	X^2
9.	CREDIT HOURS ATTEMPTED IN FIRST QUARTER OF ADN					
	8 credit hrs	46.6	37.6	41.6		
	9-11 credit hrs	22.7	17.4	19.8		
	12 hrs and over	30.7	45.0	38.6	2	4.203*
10.	GRADES IN ANATOMY AND PHYSIOLOGY (BIO 106)					
	Over 2.0	61.1	38.9	54.8		
	2.0 or Less	24.7	75.3	45.2	1	26.145***
11.	GRADES IN INTRODUCTORY NURSING (NUR 101)					
	Over 2.0	67.3	32.7	55.8		
	2.0 or Less	16.1	83.9	44.2	1	51.485***
12.	FIRST QUARTER GRADE POINT AVERAGE IN ADN					
	Over 3.0	67.0	32.9	44.7		
	Over 2.0 but less than 3.0	33.0	67.0	44.7		
	Less than 2.0	0.0	100.0	10.6	2	39.667***
	TOTAL SAMPLE	44.5	55.3	100.0		

*p .05
**p .01
***p .001

Nearly forty-two percent of all students take only the introductory nursing course in their first quarter of

the program. Including the students who take only one additional three credit hour course, more than sixty percent of the students enrolled in the first quarter are officially part-time students. Only twenty-five percent of the successful students were enrolled in both of the two major courses prescribed in the first quarter, the introduction to nursing and the co-requisite course in anatomy and physiology. The effect of the early completion of the related courses is indicated by the fact that over the three years covered in the study, only four percent (eight students) attempted the full course load of twenty credit hours prescribed in the curriculum guide for the first quarter of study. That so many students attempted to complete only one course in the first quarter may explain the reason that the number of related courses completed was not found to be significant.

Analysis of the data in Table 13 revealed a significant difference between the students who attempted only the introductory nursing course and one other required course, a total of eleven credit hours, and students who attempted more than eleven credit hours in the first term. The study found that two of every three students who attempted more than eleven hours during their first quarter were not successful in the ADN program (Appendix Table 4).

Grades received in both anatomy and physiology, and grades in introductory nursing were found to be significantly related to success in the Associate Degree Nursing program at FTI. The greater percentage of higher grades were attained by the successful students. Over sixty percent of the successful students earned a "B" or better in the biology course and sixty-seven percent received a "B" or higher in the introductory nursing course. The official transcripts indicated that the non-successful students received seventy-five percent of the grades of "C" or less in biology and eighty-three percent of the grades of "C" or below in introduction to nursing. Because of the requirement that students must maintain at least a "C" in both of these courses, the students who received a "C" in either course are at risk to complete the program.

The relationship of the first quarter grade point average and success in the ADN program established in the review of the literature was supported by the results in this study. The percentage of the students who had attained a cumulative grade point average of at least 2.0 by the end of the first quarter accounted for nearly ninety percent of all students. Two-thirds of the successful students had attained a cumulative GPA of better than 3.0 with the mean GPA of 3.17. Only six of the successful students had a GPA lower than 2.5, the lowest being 2.27. This is in contrast to the mean cumulative

GPA of the non-successful students of 2.39. Two-thirds of the cumulative grades of non-successful students fell between 2.0 and 3.0 and all of the marks below 2.0 (n=21) were received by the non-successful students.

Reasons for Withdrawal: The reasons given by the students for withdrawing from the program are found in Table 14. The frequency of the responses provided by the students indicated that academic failure was the most common reason for leaving the program. Thirty-seven percent indicated poor grades as the reason for withdrawal.

Table 14

Reasons Given by ADN Students for Withdrawing From Program 1980-1982

REASONS GIVEN FOR WITHDRAWING	NUMBER OF STUDENTS	PERCENT
Academic Grades	40	36.7
Personal Reasons	23	21.1
Clinical Advisement	16	14.7
Transfer of Spouse	11	10.1
Change Career Plans	8	7.3
Family Considerations	5	4.6
Heavy Workload	3	2.8
Financial Difficulty	2	1.8
Personal Health	1	.9
	109	100.0

The second most important consideration in the decision to withdraw from the program was stated as "personal reasons." This category was accepted for the purposes of this study only when no other indication of the reason could be determined from the review of the student records. Twenty-one percent of the students who withdrew gave personal reasons as the basis for their action.

Closely associated with academic failure was the category of "clinical advisement," the third most common reason for withdrawal noted in the student records. This expression is used in the Associate Degree Nursing Department to indicate the student is failing the clinical portion of the nursing technical courses and continuation in the program depends on improved performance in the clinical areas. If the 14.7 percent of the students in this category could be considered an extension to academic failure, then academic difficulty explains over half of the reasons for withdrawal.

The fourth most common reason given for withdrawing from the ADN program was the transfer of the spouse of the student. More than ten percent of all students who withdrew stated this as the reason for leaving the program. The location of Fayetteville Technical Institute, in proximity to two large military installations, may account for a number of transfers--the result of the number of military dependents who enroll in the program.

The remaining reasons for withdrawal were listed in the files as "personal reasons," however, where the records indicated that a more specific reason could be determined, they were classified in the study accordingly.

It was noted that the reasons given for withdrawing from the ADN program were mainly related to academic difficulties. It was determined that the reasons given by the students who withdrew were adequately covered by the research questions in the study. Reasons given that were other than academic in nature will be considered with the conclusions and recommendations of the study.

Characteristics of the successful or non-successful students are presented in Table 15. The characteristics that were significantly related to success were compared between the two groups in the study. The comparative profile developed reveals that the successful students possessed a superior educational background, and their potential for success in the ADN program is evidenced by better preparation and performance in the first quarter. Fifty-seven percent of the successful students graduated in the upper third of their high school class compared to forty percent of the non-successful students. This may be considered an indicator of their better high school achievement. The records of the successful students also indicated better high school preparation in the prerequisite courses both as to the number of courses completed and the higher grades they had received.

In each case it was noted that successful students had completed more of the required courses and were awarded higher marks. The number of non-successful students who had not completed the high school prerequisites may also be a significant indicator of potential difficulty in the ADN program.

Only two of three students completed high school chemistry, divided nearly equally by successful and non-successful students. The grades received in this course were generally found to be the lowest of all high school prerequisites, however, the grades attained by successful students were clearly higher. Considering the importance of the subject matter for potential nurses, greater emphasis on completion of this course in high school may be needed.

The characteristics associated with pre-admission preparation were also found to favor the successful students. Nearly seven of ten successful students transferred credit hours to the ADN program; almost twice the number as the non-successful students. Another indication of the better preparation of the successful students may be the finding that more of the successful students were required to complete only the developmental mathematics prerequisite course.

Table 15

Profile of Successful and Non-Successful ADN Students at FTI

	% OF SUCCESSFUL STUDENTS	% OF NON-SUCCESSFUL STUDENTS	% OF ALL STUDENTS
HIGH SCHOOL PREREQUISITE FACTORS:			
Graduated in Upper Third of HS Class	56.8	40.4	47.7
Graduated in Lower Third of HS Class	7.9	15.6	12.2
Graduated with HS GED Diploma	5.7	22.0	14.7
Completed HS Algebra	88.6	77.1	82.2
Received "A" or "B" in HS Algebra	48.9	24.8	35.5
Completed HS Biology	86.4	76.1	80.7
Received "A" or "B" in HS Biology	62.5	33.0	46.2
Completed HS Chemistry	70.4	63.3	66.5
Received "A" or "B" in HS Chemistry	45.5	22.0	32.5
PRE-ADMISSION PREPARATION FACTORS:			
Transferred College Credits to ADN Program	72.7	42.2	55.8
Developmental Courses Completed:			
Required Prerequisite Course Only (MAT 98)	45.5	39.4	42.1
1 Qtr of Credits (3-12 hrs)	21.5	4.5	12.2
2 Qtrs of Credits (13-24 hrs)	31.8	9.2	19.3
3 Qtrs of Credits (Over 25 hrs)	1.1	46.8	26.4
Received "A" or "B" in MAT 98 prereq. crs.	94.3	84.4	88.8
GPA in Related Courses of 2.0 or Higher	55.7	42.2	48.2
Did not Attempt Related Courses Prior to Start of ADN	19.3	8.3	13.2
FIRST QUARTER PERFORMANCE FACTORS:			
Credit Hours Attempted:			
11 Credit Hours or Less	69.3	55.0	61.4
12 Credit Hours or More	30.7	45.0	38.6
Received "A" or "B" in Anatomy & Phys.	75.0	38.5	54.8
Received "A" or "B" in Intro. to Nursing	84.1	33.0	55.8
Cumulative GPA after 1st Qtr of ADN			
Above 3.0	67.0	26.6	44.7
Above 2.0, but less than 3.0	33.0	54.1	44.7
Under 2.0	0.0	19.3	10.6

It was noted that the completion of more than twenty-four developmental credit hours may be an early indicator of potential academic difficulty in the program.

Nearly five of ten of the non-successful students were found to have completed at least that number of developmental credit hours compared with only one successful student who attempted that number. While a large percentage of successful students attempted at least two quarters of developmental they were found to either be completing the prerequisites missed in high school or taking refresher courses before entering the program.

The GPA in related courses was found to be higher among the successful students, with fifty-six percent attaining better than a 2.0 compared to only forty-two percent of the non-successful students. The successful students appeared to prove their greater potential as they prepared for work in the program. Typically, both groups completed related courses prior to entering the ADN program, although twice as many of the successful students were able to start the ADN program without completing related courses.

The first quarter performance factors were all found to be significant. The data on the number of credit hours attempted in the first quarter indicated that students who completed only the introductory nursing course and one additional three credit course were more likely to succeed than those who attempted more than eleven credit hours in the first quarter. The same number of successful and non-successful students took only the eight credit hour nursing course, nearly forty-two percent of all

students. An additional twenty percent completed a total of eleven credits. Even though nearly sixty-two percent of all students completed less than eleven credit hours in the first quarter, this number included seventy percent of the successful students and fifty-five percent of the non-successful. The fourteen percent of successful students who completed more than eleven credit hours contrasts sharply with the forty-five percent of those who attempted this number or more but were not successful (Appendix Table 4). It should also be noted that the current curriculum guide requires twenty credit hours in the first quarter of the ADN program. It appears that the first quarter workload should be reduced.

Successful students received better grades in the anatomy and physiology course and the introductory nursing course than non-successful students. Nearly eight out of every ten successful students received an "A" or a "B" in these courses compared to less than four out of ten awarded to non-successful students. Early success was likewise indicated by the records which revealed that more than sixty-seven percent of successful students attained a cumulative GPA above 3.0 after the first quarter, with only twenty-six percent of non-successful students able to attain these grades. Twenty percent of all students failed to earn at least a 2.0 GPA and either withdrew or were dropped from the program after the first quarter.

The profile developed by this study is expected to be used by students to assess their chances for success in the ADN program. It will also be used by high school counselors when working with students and to assist potential candidates in preparing for the work in the program. An awareness of the characteristics which indicate that a student may experience academic difficulties can be used by admissions counselors and faculty advisors in designing appropriate intervention strategies and support programs to help prevent the continued high attrition from the Associate Degree Nursin Program. It is further considered that the availability of an objectively determined profile of success in this highly desirable program will eventually result in an improved pool of qualified applicants from which to select future candidates for the program.

Chapter 5

INTERPRETATION, CONCLUSIONS, AND RECOMMENDATIONS

Analysis of the data indicated that successful students possessed a better educational background than non-successful students. Over half of the successful students graduated in the upper third of their high school class, completed the necessary high school prerequisites while in high school, and graduated from high school several years before entering the ADN program. Successful students were more than twice as likely to have completed some college courses for transfer to the ADN program than did the non-successful students.

The first year of enrollment at FTI could be considered by most students to constitute a year-long, pre-nursing program. Even though nearly half of the successful students took only the three credit hour developmental mathematics course, these students would spend over two full quarters of work at FTI taking an average of twenty-two credit hours of related courses prior to starting the ADN program. The study also found that about half of the successful students completed at least three developmental courses in addition to the prerequisite course indicating that they were concerned about their preparation for the work in the program. Only one

successful student required more than two quarters of developmental work which is in sharp contrast to the fifty-one non-successful students who needed more than twenty-four credits of developmental coursework. This indicates that the high school preparation is a significant factor in success in the ADN program. The successful students were likely to have received an "A" or a "B" in the mathematics prerequisite and maintained grade point averages better than a 3.00 in the related curriculum coursework completed prior to the start of the ADN program.

Half of the successful students attempted only the eight hour introductory nursing course in the first quarter of the ADN program having completed the co-requisite biology course in an earlier quarter. They were likely to receive an "A" or "B" in both the Anatomy and Physiology course (BIO 106), and the Introduction to Nursing course (NUR 101), and their cumulative GPA after the first quarter was greater than 2.5. Each of these factors were considered significant indicators of success that will assist in the counseling and advising of students.

Interpretation of the Results

Results found in Table 10 on page 57 indicated that the proportion of the successful and non-successful students in two of the three variables considered as

high school prerequisite factors were significantly different. The variable of high school class rank shows that nearly half of both the successful and non-successful students admitted to the ADN program had graduated in the upper third of their high school class, although the successful students received slightly higher grades in high school. According to current admission procedures, the majority of the students admitted to the ADN program were not required to complete an admissions test battery because they had ranked in the upper third of their high school class. Considering that almost half of the non-successful students were also ranked in the upper third of their high school class, the policy on the waiver of admissions testing should be reviewed.

Grades in each of the three high school prerequisite courses were related to success in the program. The highest marks were received in the biology course by both successful and non-successful students. This finding may indicate that an early interest in biology can be related to later performance in the Associate Degree Nursing program which may be of value in student counseling.

The study results indicated that those students who did not take the prerequisite courses in high school did not succeed as well in the program as did those students who had completed these courses in high school. This was particularly significant for students lacking

the high school chemistry course. Over one-third of the students admitted to the ADN program did not take high school chemistry, and although forty percent of these students were successful, attempting to catch up these basic skills through the developmental program was apparently not successful for the remaining sixty percent of the students. The importance of the completion of the high school prerequisite courses in high school should be stressed to potential candidates. The study also revealed that only seventeen percent of the successful students were not high school graduates, which further emphasizes the importance of adequate high school preparation to success in the program.

Pre-admission factors considered in the study were found to be significantly related to success in the program. The comparison of the percentage of successful and non-successful students in the categories of the variables in Table 11 on page 60 shows that the majority of successful students transferred between twelve to twenty-four credit hours to the ADN program which is the equivalent of one to two full quarters of work at Fayetteville Technical Institute. While nearly forty-five percent of the students admitted to the program transferred no credits, over seventy percent of these students with no prior college experience were not successful. It appears that success in college-level work is indicative of the potential to succeed in the ADN program. It was

also noted that nearly fifteen percent of all students had over twenty-four transfer credits. The reason for such a large number of transfer credits may be related to the number of military dependents from the local area who are enrolled in the program. It was observed that many student records contained transcripts from several different colleges, in one case as many as seven. This could be considered an indication of the persistence of the students in this program; however, it also underscores the finding in the portion of the study dealing with the reasons for withdrawal. The transfer of a military spouse was the reason given by ten percent of the students who withdrew, and in at least half of these cases, the student had transferred over twenty-four credits to FTI. The same circumstances which have brought these well-motivated individuals to the ADN program may also limit the amount of time they have available to complete the program.

More than forty-eight percent of the successful students took only the required developmental mathematics course. This fact is of concern to the administration, since many students must enroll in the spring or summer term prior to the start of the ADN program only to fulfill this requirement.

The study by Lomonaco (1983) reported that developmental courses taken in college in an effort to develop basic skills are not as effective as when they are taken

to refresh the skills already learned. The results of this study tended to confirm these findings. The mean number of developmental credit hours completed by successful students was eleven, and generally included two additional mathematics courses and the chemistry course they had not completed in high school. Non-successful students completed more than seventeen credit hours of developmental courses. The finding that successful students took fewer developmental courses than the non-successful students points to the better preparation of the successful ADN student. It appears that adequate high school preparation is an essential element of success in the ADN program.

Further study of the number of developmental courses revealed that the greater the number of developmental courses completed, the less the probability of success in the program. While twenty-five percent of all students completed more than twenty-four developmental credit hours, only one of these students successfully completed the ADN program. This student was one of only five successful students who obtained her high school diploma through the General Educational Development (GED) program and clearly a highly motivated individual. The number of developmental courses completed may serve as an early indication of potential difficulty in completing the required ADN coursework. Students in this category could be identified for additional assistance from faculty

counselors or advised to re-evaluate their career objectives. Enrollment in other Allied Health programs may be encouraged.

Grades in the mathematics prerequisite course (MAT 98) were uniformly high. While the variable of the grade received in this course was found to be significant in this study, a review of the course transcripts discovered that of the 462 students who took this course over the three years studied, seventy-one percent received either an "A" or a "B". Such finding was not unexpected since the educational background of most ADN candidates had already been found to be somewhat higher than would usually be found in other curricular programs offered at FTI. The successful students received fifty-six percent of the "A" grades awarded and only two of the successful students received a "C" in this course. Of equal importance is the fact that only twenty-two of all of the 131 students who received a "C" in this course were admitted to the ADN program during the three years covered in this study and only five of these were successful. An admission rate of eleven percent and a success rate of 2.5 percent of the students who received a "C" in this course may indicate that this course serves as an informal admission screen by the students themselves. Whether the course is of sufficient value to be retained as a prerequisite should be determined.

It was not surprising to find that the students who were successful maintained a higher cumulative grade point average in the related courses than the non-successful students. Fifty-five percent of the successful students held a GPA better than 2.00 in all curriculum courses completed prior to the start of the program. Only nineteen percent of the successful students did not take related courses prior to entry into the program. The reason that so many students have completed related curriculum courses prior to entry to the ADN program is seen partly as the result of the requirement to enroll early and complete the prerequisite mathematics course, and partly because of the delay experienced between the submission of the application for admission to the program and the start of the classes. Since students are required to enroll early, they have often elected to complete the related courses early. This has resulted in the situation where over sixty percent of the students enrolled in the first quarter of the ADN program have already completed a major portion of the related curriculum courses and are classified as part-time enrolled students for much of their first year in the program. It also means that many students who have completed these courses, but were not selected for the program will have invested up to one year or more of effort toward a program in which they will not receive a degree and may not be able to transfer to a program in another institution.

These students should be alerted to this possibility as early in their coursework as possible to enable them to make a reasonable decision concerning their future.

The high percentage of students in Table 11 who were shown as successful in the category of "no prior GPA" indicated that these students had taken none of the related curriculum courses prior to entry into the ADN program. Since the actual number of students represented only ten percent of the total students in the study, no conclusions were made regarding the significance of these results in the study.

The comparison of the percent of successful and non-successful students relating to the variables concerning their performance in the first quarter of work was presented in Table 13 on page 66. Over sixty percent of all students attempted only the introductory nursing course and one additional three credit course during the first term of the ADN program, despite the fact that the curriculum guide calls for twenty credits to be completed. One reason students take so few credits is that many have already completed the majority of the related courses prior to entering the program leaving only technical subject matter courses to be finished. Students who had not completed the related courses prior to entering ADN and those who attempted to complete more than eleven hours were not very successful. Thirty-nine percent of all students attempted over eleven credits and

only one third of these students were able to successfully complete the ADN program. The workload in the first term is a significant factor to later success in ADN.

Over sixty percent of the grades of "A" or "B" awarded in the course in anatomy and physiology and sixty-seven percent of the grades in the introduction to nursing course were received by the successful students. These high marks are reflected in the mean course grades of the successful students which were 3.10 in the biology course and 3.08 in the nursing course, compared to the mean grades of 2.35 and 2.08, respectively, that were awarded to the non-successful students in these courses. These data support the literature findings that the courses in anatomy and physiology and introductory nursing are related to success in Associate Degree Nursing.

Both the biology and the introductory nursing courses are required to be completed by the end of the first quarter of the ADN program. Student records for the three years covered in this study indicated that only forty-nine of the students enrolled in the program attempted to complete both of these courses in the first quarter, and only nineteen of these students were successful. If only twenty-five percent of the enrolled students attempt to take these courses as prescribed in the curriculum guide and less than ten percent are successful, the curriculum sequence requiring both of these courses in the same quarter may need to be examined.

The marked difference between successful and non-successful students in these two courses may indicate a useful measure of the potential future success of these students in the ADN program. The study found that over half of the students had completed the biology course prior to entry. Students who receive a "C" or lower should be considered at risk to complete the program, and necessary support should be provided to assist in their preparation for work in the program.

The introductory nursing course may be the best single indicator of the potential for success in the program. Unfortunately, this is a lagging indicator and students who experience difficulties have already committed themselves to the ADN program, and time available for remedial work is severely limited. Faculty advisors should alert their students to the fact that even a passing grade of "C" may be an indication of potential academic difficulty.

The first quarter grade point average has also been cited in the literature as being predictive of success. The grades in the first quarter of college are the initial measure which the students have of their potential success in the ADN program. The results of this study found that seventeen percent of the students were dropped for academic failure or withdrew after the first quarter. Astin, in his 1975 study of community college students, indicated that the attrition after the first quarter may

be as much the result of dissatisfaction with receiving lower grades than the students expected as it is to receiving a failing grade. The expectations of students who have become accustomed to academic success, such as those found in this study, may provide a partial explanation for the attrition of students who apparently possess the necessary credentials for success but withdraw early in the program. Using the results and the profile developed by this study, perhaps some students may be encouraged to continue in the program despite lower than expected grades if they were shown that three out of ten students who were successful held a GPA between 2.0 and 3.0 after their first quarter of work.

The fact that none of the successful students received a first quarter GPA of less than 2.0 is attributed to the requirement to maintain at least that grade in order to continue in the program. It was noted that even though nearly one third of the successful students had attained a GPA between a 2.01 to 2.99, the actual grade point average for this group was much closer to 2.5 with only six students below this level while the non-successful students only attained a mean GPA in this category of 2.39.

The performance in the first quarter appears to provide valuable information which can be used by the student counselors and faculty advisors when counseling students. The receipt of grades which indicates that the

student is potentially at risk to complete the program could be used as the basis to establish a program of individualized instruction that could ultimately improve the retention rate.

The reasons for withdrawal were presented in Table 14 on page 69. The major reasons given by the students who withdrew from the program were primarily the result of academic failure and difficulties experienced in clinical performance. Considering that both of these reasons are closely related, it can be considered that academic problems accounted for over half of the reasons for withdrawal. Over twenty percent of the students cited "personal reasons" for withdrawal. The remaining reasons for withdrawal from the Associate Degree Nursing program could also be considered personal in nature, including the reason given by ten percent of the students as "transfer of spouse."

The factors which were not found to be significant in this study included the current requirement for admission to the ADN program that no more than five years may have elapsed between completion of the high school prerequisites and the start of the program. The fact that no significant difference was found between the successful and non-successful students according to this study supports the earlier findings by McMillin that continuation of such a requirement is of questionable value.

The variable concerning the number of related courses completed prior to entry into the Associate Degree Nursing program was not found to be significantly related to success in the Associate Degree Nursing program. Since both groups completed approximately the same number of related courses prior to the start of the program, such a finding was not surprising. The large number of related courses completed is considered to be the result of the fact that candidates must enroll early to complete the developmental mathematics prerequisite and, therefore, are more likely to complete related curriculum courses along with this requirement. Furthermore, the prescribed curriculum in the first quarter requires a heavy schedule of classroom, clinic, and laboratory hours. The structure of the current curriculum which established a difficult schedule of prerequisite and co-requisite requirements encourages the early completion of related courses.

The fact that there appears to be a trend towards an increase in the number of courses completed prior to entering the Associate Degree Nursing program may provide some insight into the improved student performance in the introductory nursing course. The completion of related courses may have served to stimulate early commitment in the program that could merit closer examination.

Conclusions

There is little doubt that success in high school and the completion of prerequisite courses are excellent preparation for ADN candidates. The ADN program at Fayetteville Technical Institute has attracted students who possess an excellent educational background as evidenced by the uniformly high class rank of both the successful and non-successful students in the program. In this regard, the current policy that allows students graduating in the upper third of their high school class to waive the admission test battery may need to be reviewed. Less than half of the students who appeared to have the profile indicative of success completed the program. The use of admissions testing should be required of all ADN candidates to indicate the areas in which the student needs improvement to enhance their likelihood for successful completion of the program.

The grades attained in the high school prerequisites may be excellent measures of the potential of the candidates; however, it was evident that a large number of candidates have not completed these requirements in high school. The results of the study indicated that there appears to be a relationship between completion of these courses in high school that can be related to success in ADN. A higher percentage of the successful students completed these courses in high school rather than waiting

to finish them as developmental courses. The finding that under two percent of the students who completed more than two equivalent quarters of developmental courses were successful supports the literature research finding that attempting to make up for too many basic skills is not likely to be successful. Likewise, the requirement to complete the high school prerequisites within five years prior to entry into the ADN program may be a wasteful experience for the large number of students who already possess these qualifications. The study results indicate that the fact of completion of the high school prerequisites in high school may be of greater significance than the amount of time which had elapsed after they were completed, until the start of the ADN program.

The pre-admission factors indicated that success in other college-level programs may indicate the greater potential for success in ADN. While the students who did not transfer credit hours from other colleges were not as successful as those who did have prior college experience, the value of this finding may be difficult to prove for several reasons. First, there was a trend toward fewer credit hours being transferred by both groups. Second, many of the students without prior college experience were found to be those who were the most recent high school graduates who entered the program immediately after high school. The lack of success may introduce the element of maturity of the students as well as individual

motivation and preparation, which could be a subject that merits further study.

The number of developmental courses taken indicated that those students who completed more than two quarters of work were usually not successful in the program. Included in this group were those students who did not have the necessary high school prerequisites and those who were required to retake the prerequisite courses because five years had elapsed between completion and the start of the ADN program. Students who must take a large number of courses before attempting the related curriculum coursework must be considered at risk to complete the program. The completion of a year in the developmental sequence to be followed by another two or three quarters of related coursework appears to be heavy investment with no assurance of success.

The prerequisite mathematics course did appear to be related to success in the ADN program. Even though the grades awarded are quite high, it appears that the students who did not receive these high marks recognized that their chance of success in ADN was poor. Thus, the course may serve as a self-screen used by the students to assess their own potential. While this may be a useful purpose, the continuation of the course in its present format should consider several other factors. First, since a developmental course is defined as one which is remedial in nature, then the mathematics prerequisite

course is not truly a developmental course. A large amount of the information provided to the students is new material, such as apothecary weights and measures. A second consideration is that a large number of applicants take only this course in the developmental sequence. It appears that many students are being penalized by the requirement, since they must enroll at least one quarter in advance of the start of the program to complete this developmental prerequisite course. Early enrollment is considered as a partial reason for the completion of the large number of the related courses prior to entry in the ADN program. The end result is that, except for the nursing technical courses which must be completed in the quarter specified, the students have essentially established their own curriculum sequence in the completion of the related curriculum requirements. A third consideration should be that the requirement for this course may obscure other needs that may be equally important to success. The findings by Efurd (1978), for example, indicate that improving the reading level of ADN students resulted in an improvement in the academic grades earned in nursing technology and human biology courses. Bello (1977) recommended that a pre-admission reading comprehension and mathematics course be established for ADN students. These recommendations were also supported in the research by Capoor (1982) and by Sirkkan (1982), which related the results on the Nelson-Denny Reading Test to success in

Associate Degree Nursing programs. The Nelson-Denny Reading Test is one of the tests used in the present admissions test battery used at FTI. If all ADN candidates were required to take this test prior to admission, the need for a reading skills improvement program could be determined and may be one means to improve the performance and retention of students in the ADN program.

The cumulative grade point average earned in the related courses completed prior to the start of the ADN technical curriculum was found to be a useful measure of the potential for success in the program. This information could aid in advising students concerning their preparation for work in the program. Closely allied with the GPA would be the grade in Biology 106, Anatomy and Physiology, which has usually been completed by students prior to entering the program. The completion of this course with a grade of "C" appeared to indicate a marginal potential for success, since less than sixteen percent of the students who received this grade were successful. The grade in this course, used in combination with the cumulative GPA in the related courses, should prove to be useful to the admission counselors, the faculty advisors, and to the students as well.

Once the student has entered the program, the faculty advisor has only a copy of the student's prior grades to use for advising students. If the information concerning the variables that were found by this study to

be indicative of success were made available, students in potential academic difficulty could be identified and appropriate intervention strategies could be developed that would aid with the retention of these students in the program.

The fact that few students attempted the entire first quarter workload as described in the curriculum guide indicates that the structure of the curriculum may need to be reviewed. The structure is generally prescribed by the North Carolina Department of Community College guidelines which establishes minimum and maximum credit hours in the program. The arrangement and sequence is left to the individual institution. The combination of nursing technology courses and other related courses requires a heavy concentration on technical subject matter content. Most students attempt to complete as many of the related courses and electives as possible before starting the nursing technology sequence, which has resulted in a de facto pre-nursing program for many students.

Recommendations for the Improvement of Practice, Including Strategies for Diffusion, Implementation, and Improvement

The recommendations based on the findings and conclusions of this study are as follows:

1. Since one major purpose of this study was to attempt to improve the pool of qualified applicants to the

Associate Degree Nursing program, a profile that compared the successful and non-successful ADN students was developed. It is recommended that the profile in Table 15 be disseminated to high school counselors and advisors, interested prospective candidates, the institutional recruiting staff, admission counselors, and faculty advisors.

The variables which best indicated a potential for success in the ADN program were:

a. Completion of the three high school prerequisites and the grades received, particularly high school biology;

b. Prior college success as indicated by the number of college transfer credits;

c. The number of developmental credit hours completed. Students who required more than twenty-four credits should be considered at risk to complete the ADN program;

d. The number of credit hours attempted in the first quarter of work in the ADN program. Students who attempted more than eleven credit hours have a diminished probability of success;

e. Grades received by the students in the anatomy and physiology and the introduction to nursing courses; and,

f. The cumulative grade point averages in the related courses completed prior to entry into ADN

and the cumulative GPA after the first quarter of the program.

All of these measures should be useful in appraising the potential for success of the individual candidates for the program or identifying students who may experience academic difficulty. High school counselors should encourage students to complete the high school prerequisites while still in high school. The students who had not completed the required courses in high school needed a greater number of developmental courses and were not as successful as those with better preparation. Prospective students will also be able to use the comparison to better inform themselves as to the program requirements and assess their own potential for success. The comparative profile provides admission personnel, student counselors, and recruiters with information to objectively appraise the educational preparation of potential candidates for the program. Faculty advisors will be able to use the profile to identify students whose characteristics may be indicative of future academic problems. An "early warning" may allow the development of appropriate intervention strategies and other support programs to improve the retention of ADN students.

2. Two of the admissions prerequisites should be revised or dropped as they do not appear to contribute to the success of students in the program. First, the requirement that the student must complete the high school

prerequisites within five years prior to admission to the program should be dropped. There is no evidence of improved performance as a result of this requirement, and many students appear to be penalized by the additional time required to repeat these courses. Some students have a limited amount of time available to complete the program. Testing could be expanded to include biology, chemistry, and mathematics as part of the admission test battery.

A related recommendation concerns the developmental mathematics prerequisite course, the Mathematics of Solutions and Dosages. The results of the study indicated that although this course may act as an informal screen by students considering the program, the content is not solely developmental in nature. Furthermore, the requirement to complete this course during the period preceding entrance is seen as a major factor contributing to the completion of the large number of related courses before the start of the ADN program. The course should either be upgraded and recognized for curriculum credit or the essential material should be integrated into other technical courses.

3. The current admission procedures that permit students who graduate in the upper third of their high school class to waive the entrance test battery should be revised for ADN students. Nearly half of the students who were graduated in the upper third of their high school

class did not complete the program. Lacking results from the entrance tests to guide their decisions, neither the students nor the admission counselors can adequately assess potential for success in the program. Revision of the testing requirement may be expected to increase the number of students who will need to complete additional developmental courses. Faculty advisors and admissions counselors believe that many students who could benefit from developmental courses are admitted to the program with these needs undetected because of the testing waiver.

4. Considering the number of students who transferred college credits into the program and the number who had completed many of the related courses in this study, it appears that early commitment to the program is a significant factor to success in the program. The fact that many students who possessed similar credentials were not selected for the program, or were early dropouts, may be considered evidence of the need for better orientation to this demanding program. A first-quarter basic nursing skills course should be developed which would include the essential information now contained in the solutions and dosages course. Other skills could be incorporated in such a course that are now provided on an unscheduled basis such as reading improvement, medical terminology, and study skills.

5. The nursing curriculum sequence and content should be reviewed to determine whether the amount of work required in the first quarter is absolutely necessary. The current curriculum guide specifies twenty credit hours in the first quarter, seventeen lecture hours, and nine hours in clinic and laboratory training. In addition, the students are required to spend at least six hours a week in the nursing learning laboratory for which they receive no course credits. The requirement for thirty-two hours dedicated to classroom effort does not allow much time for preparation outside of the classroom. If the number of hours the student must spend in class and preparation in the first quarter of work could be reduced, the students may feel less pressure to complete as many of the related courses prior to start of the nursing sequence.

It is recommended that the curriculum be revised to reduce the non-credit nursing learning laboratory or establish appropriate course credit hours for this requirement. An increase in the credit hours in the introductory nursing course from eight to nine credits could also help alleviate the administrative problem where more than sixty percent of all students are classified as part time enrolled students. Since financial assistance usually requires full time enrollment, students who need such assistance may feel forced to attempt more

credit hours in the first quarter than they are prepared to complete successfully.

It is also recommended that close attention be given to those students who appear to possess the profile of the non-successful students. The results of this study revealed that the completion of more than twenty-four developmental credits may indicate potential difficulty in the ADN program Such students should be advised of these results and asked to re-evaluate their career objectives to seek additional assistance and should be limited to eleven credits or less in the first quarter to allow sufficient time to adequately prepare for the ADN course requirements.

The heavy workload in the first quarter is no doubt a major reason that many of the students in the program had completed the related requirements prior to the start of ADN. Another contributing factor is that approximately forty percent of all students had enrolled early solely for the purpose of completing the mathematics prerequisite course. Since they were already enrolled, and are aware of the work required in the first quarter, many have taken the opportunity to complete as many of the related curriculum courses as possible. This has resulted in a noticeable trend towards an increase in the number of related courses completed prior to entering the ADN program. This study did not find that this trend was significantly related to success, even though there

appeared to be evidence of a trend toward improved performance in the introductory nursing course. However, the study found that over fifty-nine percent of the students who had completed related courses still failed to successfully complete the program, indicating the completion of related courses did not guarantee success in the ADN program.

Since the demands of various accreditation agencies are involved, it is recognized that a revision of the nursing curriculum may not be possible. Two alternatives are suggested. First, consideration should be given to establishing a "two-step" nursing program, in which students complete the Practical Nursing Education (PNE) program in their first year and continue with the ADN program in the second year. Such a program would be advantageous to many students who would then be able to complete the Licensed Practical Nursing Certification Examination and would then be able to practice as an LPN. Students whose performance and interest were sufficient could then complete the ADN program to prepare for a career as a Registered Nurse. Second, consideration should be given to the creation of a health occupations preparatory curriculum in which the necessary prerequisites and co-requisites would be completed prior to entering the nursing technology sequence. A preparatory program may be feasible at FTI since several of the existing health education curricula already require similar related

courses in the first year of study. Such a program would have the added advantage of providing the student with an option to select any of several programs within the medical career field. Some support for such an approach is suggested by the analysis of the reasons for withdrawal. Forty students who failed to complete the ADN program were dropped for academic failure. Twenty-two of the forty students continued their education in another associate degree program, sixteen of these transferred to the Practical Nursing Education program offered at FTI. These findings raise the question as to whether the students were in the appropriate program initially. The completion of a health occupations preparatory program would have allowed the students time to choose the program most suited to their interests and background. Students who withdrew for other reasons than academic failure were less likely to attempt another associate degree program. The review of the student records found only five of the sixty-nine students indicated they intended to continue their education or transfer. These students would also be served if a health occupation preparatory education provided them with the necessary basic knowledge and skills needed in health related careers. Such a program would be particularly valuable if it were transferable to other institutions. Further study is recommended.

6. The problem addressed at the start of this study was of the need to attack the persistent problems

of oversubscription and a continued high rate of attrition from the Associate Degree Nursing program. These problems are not isolated to the Associate Degree Nursing program of this institution. The rational approach suggested by Moore (1974) to assist in preventing the loss of students must start with information on the current situation. This study was conducted with the full support and assistance of the faculty and administration, but it is not likely that a project of this duration and scope could have been undertaken with existing institutional resources. It is recommended that an institutional research program be established to undertake similar studies. While there may be no substitute for experienced judgment, objective information should improve on judgments. Without a dedicated effort, decisions must necessarily continue to be made which lack a sound objective basis.

Since the study examined only a limited number of the factors that may be related to success, and has generated areas for further study, it is recommended that a similar research project should be replicated in the near future. It can also be expected that some of the characteristics pertaining to students will change as the results of the recommendations of the study, and the most current information available should be used in admission decisions and student counseling.

Dissemination of the Results and Recommendations

The profile comparing the characteristics of successful and non-successful ADN students developed in this study will provide an objective basis to appraise the potential of students interested in the Associate Degree Nursing program at FTI. Information concerning the program requirements must be disseminated to the prospective candidates, changes in the present admission prerequisites and procedures, a critical review of the nursing curriculum structure, and the development of appropriate support programs may all be necessary to address the combined problems of oversubscription and attrition from the ADN program. Implementation of the results and recommendations of the study must start with the dissemination to the appropriate individuals and activities. The recommendations detailed by this study have been presented to the faculty and administration for their information and appropriate action. The following additional steps have been initiated to further disseminate the study results.

1. The study results and the interpretation of the findings will be incorporated into the literature concerning the ADN program that is published by the institution for prospective students.

2. Dissemination of the results and the profile developed in this study to local high school counselors will be made from the office of the Dean for Student

Development. Such action is eventually expected to help improve the pool of qualified applicants for the program.

3. The characteristics of the successful and non-successful students will be included in the Associate Degree Nursing Department orientation bulletin for new ADN students.

4. Students whose educational background and preparation appears to place them at risk to complete the program will be identified to the faculty advisors for closer attention, and indicators will be used within the department to better advise all ADN students.

5. Exit interviews are already being conducted with students who withdraw from the program, but an additional emphasis will be placed on obtaining more specific information as to the reasons for withdrawal, especially from the students who give "personal reasons" for their withdrawal decision.

The worth of a study such as this one may only be accurately determined after the implementation of the recommendations and dissemination of the information obtained has been completed. Dissemination of the study results is only a first step. The greater value may be that in conducting this detailed study, the need and utility of an objective source of information has been added to the administrative and program decision process. Similar studies can be expected to further inform and improve the decisions essential to student retention and

success in other curricular programs offered at Fayetteville Technical Institute.

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APPENDIX

Appendix Table 1

Descriptive Statistics of ADN Students
1980-1982 (N=197)

FACTORS CONSIDERED	GRADUATES (N=88)	NON-GRADS (N=109)
HIGH SCHOOL PREREQUISITE FACTORS:		
Percentile High School Class Rank	67 %	63 %
Mean High School Prerequisite Grades		
Algebra	2.33	2.05
Biology	2.65	2.59
Chemistry	2.52	2.22
Mean Elapsed Years Between:		
High School to Start of ADN	9.23	7.59
Start FTI to Start of ADN	.97	1.04
Finish HS Prerequisites to ADN	9.90	6.12
PRE-ADMISSION FACTORS:		
Mean Number of Transfer Credit Hours	13.6	8.9
Mean Developmental Credit Hrs Attempted	11.0	17.0
Percent of Students in Developmental Courses		
Math (Other than MAT 98)	57.0%	61.0%
Biology	17.0%	32.0%
Chemistry	36.0%	48.0%
English	0.0%	15.0%
Mean Grade in Math 98 Prerequisite	3.67	3.29
Mean Number of FTI Credit Hours Prior to Entry into ADN	22.0	29.4
Mean Grade Point Average in Related Courses	3.28	2.87
FIRST QUARTER PERFORMANCE FACTORS:		
Mean Number of Courses Attempted in First Quarter of ADN	10.8	12.6
Mean Course Grade Attained		
BIO 106	3.10	2.35
NURS 101	3.08	2.08
Mean GPA in First Quarter of ADN	3.17	2.39

Appendix Table 2

Distribution of High School Prerequisite Factors

FACTORS CONSIDERED	NUMBER SUCCESSFUL	NUMBER NOT SUCCESSFUL	TOTAL	DF	X 2
HIGH SCHOOL CLASS RANK					
Upper Third	50	44	94		
Middle Third	26	24	50		
Lower Third	7	17	24		
Other	5	24	29	3	15.863**
HIGH SCHOOL ALGEBRA GRADES					
Over 2.0	43	27	70		
2.0 or Less	35	57	92		
Did Not Take Course	10	25	35	2	13.259***
HIGH SCHOOL BIOLOGY GRADES					
Over 2.0	55	36	91		
2.0 or Less	21	47	68		
Did Not Take Course	12	26	38	2	17.021***
HIGH SCHOOL CHEMISTRY GRADES					
Over 2.0	40	24	64		
2.0 or Less	22	45	67		
Did Not Take Course	26	40	66	2	12.772***
YEARS BETWEEN HS PREREQUISITES AND ADN					
One Year or Less	49	74	123		
2 to 4 Years	10	11	21		
Five or More Years	29	24	53	2	3.401 N.S.
TOTAL SAMPLE	88	109	197		

*p .05
**p .01
***p .001

Appendix Table 3

Distribution of Pre-Admission Factors

FACTORS CONSIDERED	NUMBER SUCCESSFUL	NUMBER NOT SUCCESSFUL	TOTAL	DF	X 2
CREDIT HOURS TRANSFERRED					
None	24	63	87		
1-12 Credit Hours	19	18	37		
13-24 Credit Hours	28	16	44		
Over 24 Credit Hrs	17	12	29	3	19.629***
DEVELOPMENTAL CREDIT HOURS					
Three Credit Hrs (MAT 98)	40	43	83		
4-12 Credit Hours	19	5	24		
13-24 Credit Hours	28	10	38		
Over 24 Credit Hrs	1	51	52	2	63.359***
GRADES RECEIVED IN MATH PREREQUISITE (MAT 98)					
Over 2.0	83	92	175		
2.0 or Less	5	17	22	1	4.825*
CREDIT HOURS EARNED AT FTI PRIOR TO ENTRY INTO ADN					
None	17	9	26		
1-12 Credit Hours	14	19	33		
13-24 Credit Hours	17	17	34		
25-36 Credit Hours	23	28	51		
Over 36 Credit Hrs	17	36	53	4	8.377 N.S.
GRADE POINT AVERAGE PRIOR TO ENTRY INTO ADN					
Over 2.0	49	46	95		
2.0 or Less	22	54	76		
No Prior GPA	17	9	26	2	13.95***
TOTAL SAMPLE	88	109	197		

*p .05
**p .01
***p .001

Appendix Table 4

DISTRIBUTION OF FIRST QUARTER PERFORMANCE FACTORS

FACTORS CONSIDERED	NUMBER SUCCESSFUL	NUMBER NOT SUCCESSFUL	TOTAL	DF	X 2
CREDIT HOURS ATTEMPTED IN FIRST QUARTER OF ADN					
8 Credit Hours	41	41	82		
9-11 Credit Hours	20	19	39		
Over 12 Credit Hrs	27	49	76	2	4.203*
GRADES IN ANATOMY AND PHYSIOLOGY (BIO 106)					
Over 2.0	66	42	108		
2.0 or Less	22	67	89	1	26.145***
GRADES IN INTRODUCTORY NURSING (NUR 101)					
Over 2.0	74	36	110		
2.0 or Less	14	73	87	1	51.485***
FIRST QUARTER GRADE POINT AVERAGE IN ADN					
Over 3.0	59	29	88		
Over 2.0 But Less Than 3.0	29	59	88		
Less than 2.0	0	21	21	2	39.667***
TOTAL SAMPLE	88	109	197		

*p .05
**p .01
***p .001

BIOGRAPHICAL SKETCH

Kenneth E. Digby, son of Mearl H. and Mildred (Baum) Digby, was born July 22, 1936, in Tiffin, Ohio. He attended public schools in Tiffin, and graduated from the Ohio State University, Columbus, Ohio, with a Bachelor of Science degree in Industrial Management in 1958. In 1971 he received the degree of Master of Business Administration from the University of Bridgeport, Bridgeport, Connecticut.

Entering the US Army in 1959, he served in various positions in the United States and overseas, retiring from military service in 1979. While in the military, his duties included the supervision of military and civilian personnel engaged in the repair and maintenance of military equipment and managed the activities involved in the procurement of major items of military equipment, munitions, and spare parts. In his final three-year assignment, he directed the design and development of training material to support the criterion referenced training for the Army's automotive mechanics, welders, and machinists. He was the author of two technical training manuals.

Since leaving military service, he has worked as a management consultant and as purchasing manager for a major manufacturer of power tools. He joined Fayetteville Technical Institute in 1982 as an instructor in industrial

management at which time he enrolled in the NOVA doctorate program.

He married Joanne, daughter of Joseph and Mildred Nolan, Kingsville, Maryland, in October, 1968. They have two children, Lisa and Brian.

I certify that I have read and am willing to sponsor this Major Applied Research Project submitted by Kenneth E. Digby. In my opinion it conforms to acceptable standards and is fully adequate in scope and quality as a Major Applied Research Project for the degree of Doctor of Education at Nova University.

April 2, 1985
(Date)

John Losak
MARP Advisor

I certify that I have read this Major Applied Research Project and in my opinion it conforms to acceptable standards for a Major Applied Research Project for the degree of Doctor of Education at Nova University.

April 6, 1985
(Date)

Boyd Ayers
Boyd Ayers
Local Committee Member

This Major Applied Research Project was submitted to the Central Staff of the Center for Higher Education of Nova University and is acceptable as partial fulfillment of the requirements for the degree of Doctor of Education.

April 9, 1985
(Date)

Phil De Turk
Central Staff Committee Member