The Role of Academic Variables as Predictors of Success or Failure in a Diploma Nursing Program

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VERIFICATION OF THESIS DEFENSE

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Abstract

The purpose of this study was to identify those academic variables which were the best predictors of success or failure in a diploma nursing program located on the rural Eastern Shore of Maryland. Data were collected retrospectively from the records of 87 graduates who were classified as members of the Classes of 1990, 1991, 1992, 1993 and 1994. Selected variables were categorized into preadmission criteria (SAT scores and scores of The Psychological Corporation RN Entrance Examination for Schools of Nursing), grades in 8 college prerequisite courses, college GPA, final grades from 6 nursing courses, and total scores from National League of Nursing Achievement tests in Psychiatric Nursing and Maternity-Child Nursing. The cumulative GPA in nursing and NLN Comprehensive test scores, were used to define success in the nursing program.

Pearson's Correlation and stepwise multiple regression analyses were used to determine the amount of variation explained by the independent variables and the two success variables. Analysis of preadmission scores indicated the usefulness of the RNEE test in this program for identifying applicants who may experience success or failure in the nursing program. Significant positive correlations between Anatomy and Physiology I and II, General Psycology, Basic Concepts of Nursing II, Family Centered Nursing, Adult

Health Nursing I and the Maternal Child Health Achievement test and the success variables were found. The Family Centered Nursing course was the best predictor of Nursing Cumulative GPA and the NLN Maternal Child Health Achievement test of the NLN Comprehensive Exam.

The results of this study indicate that at admission and throughout the program, some readily obtainable data are significant predictors of the student's performance. For a school to minimize attrition, it is necessary to identify high risk students early in a program, in order to initiate interventions to promote success in the nursing program.

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Chapter I

Introduction

Predicting the success of students in a nursing program is a concern to nurse educators. This issue takes on new meaning today with the need for graduates who can function in the present complex role of a professional nurse and in a rapidly changing health care system. A variety of predictors of success in nursing programs have been identified in the past. They generally fall into three categories: preadmission predictors of ability to complete a nursing program, predictors of success within a program or identifying who is at high risk for failure, and predictors of performance on the licensing examination following successful completion of the nursing program.

Horns, O'Sullivan, and Goodman (1991) emphasized the need to look at all categories in a specific nursing program.

> "Predictor variables that are convenient and pertinent to the nursing curriculum should be studied as they sequentially occur and affect selection or retention of students, rather than identifying just those variables which are best predictors. The flaw with the latter strategy is that frequently the best indicators of success are those measured late in the student's academic career. Because of this timing, these factors do not serve well to facilitate selection, retention or intervention for students (Horns et al., 1991, p. 9)."

Pre-entrance criteria are used to determine the abilities of candidates and to predict their success in a nursing program. McClelland (1992) said that "careful admission selection based on valid predictors of academic success conserves educational resources as well as facilitates student's acquisition of the

knowledge and skills required to successfully enter professional practice (p. 349)." Attrition is costly to the institution, the faculty and to the student. For a school to keep a low attrition rate, it is also necessary to identify students early in a program who are at risk of failure. This has been done by determining which courses in a program are the best predictors of success in a nursing program.

Significance to nursing

Since the National Council Licensing Examination for Registered Nurses was instituted as the nationally approved licensing examination for registered nurses in 1982, many studies have used the NCLEX-RN as their criterion variable or measure of success. In nursing, it is imperative that a nursing graduate pass the NCLEX-RN in order to become licensed as a registered nurse. As of January 1988, the test scores were recorded as pass/fail rather than numerical scores. It is possible that predictors of NCLEX-RN after 1988 will be different from those determined in earlier studies. This is another reason for nurse educators to do research on the current curriculum being used by a nursing program.

Purpose

The purpose of this study was to identify those variables which are the best predictors of success or failure in a diploma nursing program located on the rural Eastern Shore of Maryland. Variables were categorized into preadmission criteria, college prerequisites, college GPA, nursing course grades, and National League for Nursing Achievement test. The dependent variables,

nursing GPA and National League for Nursing Comprehensive test scores, were used to define success in the nursing program. Such information will be used to identify students who will be successful in the diploma nursing program. It will also be used to determine a time within the program when students can be identified for patterns that suggest success or failure in the nursing program, so that interventions to promote the success of a student may be initiated.

Chapter II

Review of Literature

Since the NCLEX-RN was instituted as the nationally approved licensing examination for registered nurses in 1982, several researchers have attempted to identify common predictors that demonstrate the strongest correlation with success in a nursing program and on the NCLEX-RN. Their findings have shown inconsistent results. This review of literature starts with data from graduates who took the first NCLEX-RN in July 1982 and continues to 1990 with graduates whose scores were reported as pass/fail on the NCLEX-RN. The majority of the studies were on data from BSN graduates. Only a few studies were on AD and diploma nursing graduates.

Froman and Owen (1989) used the data of 101 BSN students who completed the NCLEX-RN in July 1982 and 1983. This study used a path model of their curriculum to test the direct and indirect influences of student entry characteristics such as student age, SAT math and SAT verbal and transfer status, and achievements in liberal arts and nursing courses on NCLEX-RN performance. A non-nursing score (GPA-GEN), based on grades in supporting courses, and a nursing course index (GPA-NURS), based on grades in lecture courses presenting information on the nursing process and the crisis model, scores were generated from course grades built on objectives exams. GPA- Clinical scores are developed from four course grades, each based on low-inference, behavioral checklist

observations of student performance in clinical settings. Five separate multiple regression analyses were done to derive the path coefficients. Only GPA-Nursing showed a significant path to NCLEX-RN, and its size suggested that with the other variables held constant, a one standard-deviation improvement in GPA-NURS would deliver a .58 standard -deviation increase in NCLEX-RN scores. Entry characteristics, SAT scores, general GPA, and clinical GPA had no direct contribution to NCLEX-RN performance.

The Baron and Norman (1992) study did an analysis of 3816 freshmen students scores, who entered a university in the fall of 1983 and 1984. Nursing majors were included in this group. The purpose of the study was to use admission criteria which included the mean SAT score, mean of three College Entrance Examination Board Achievement tests (ACH) and students high school class rank (CLR), to predict academic performance as represented by the student's cumulative grade point average (CUM) at the university between the time of matriculation and 1988. High school class rank was the best single predictor ($r = .305$; $p < .05$). ACH ($r = .261$) was next with SAT ($r = .199$; $p < .05$) having the lowest correlation with CUM. In a multiple regression of the three variables, SAT was not useful once ACH and CLR were known. These two variables ($R^2 = .266$) explained only 26% of the variability. The authors suggested the need for other considerations of predictive powers besides a standardized test for admission selection. They also expressed that the "use of achievement tests and high school class rank for college admission could provide high school students with

incentive to achieve academically, but that the SAT's are not designed to provide such incentive (p. 1050)."

Keller, Crouse and Trusheim (1994) also looked at preadmission variables including SAT scores, but used an adjusted freshmen GPA as the dependent variable. The data was obtained from the records of 3,265 matriculants in the fall of 1988 at a Mid-Atlantic university. The purpose of the study was to determine how much benefit the university could get from using the SAT in admission decisions over using only the high school record. Adding the SAT to the high school GPA when predicting unadjusted Freshmen GPAs (FGPA) increases R-squared by only 0.040. However when predicting adjusted FGPAs, adding the SAT increases R-squared by 0.087. When using these findings with the subject's data and assuming the university only admits applicants whose predicted adjusted FGPA is above 2.0, only 6.8 percent of admission decisions differed from the admission policy. The authors noted that "even after freshmen grades are adjusted to increase the independent predictive power of SAT, including adding HSGPA to SAT score, little gain would be realized (p. 204)."

The Young and Barrett (1992) study assessed the utility of information in high school course transcripts beyond the usually computed GPA Rank in Class in predicting college performance. A measure of the average academic rigor (AVGRIGOR) was computed from the high school records of one local feeder high school (n = 86) freshmen who entered a Middle Atlantic state university either in 1984 or 1985. The analysis of correlation coefficients showed

AVGRIGOR (r = .52) as the best single predictor of college cumulative GPA. The best predictor of completion of a degree is high school rank in class (r = .38) followed closely by AVGRIGOR (r = .36). The other two predictor variables, SATV (r = .30) and SATM (r = .17) had the lowest correlation of the four variables considered. The level of significance was not identified. Results from a multiple regression analyses for predicting cumulative GPA indicate that the increase in the proportion of variance explained by adding AVGRIGOR to the regression model is .066. an increase of R^2 from .2567 to .3227. With 32% of the variability in Cumulative GPA explained by high school rank in class and AVGRIGOR. SATV and SATM did not contribute to the equation.

Krupa, Quick, and Whitleg (1988) used a larger sample of 384 BSN students who took the NCLEX-RN from 1982 through 1985. The purpose of this study was to investigate the effectiveness of grades in nursing courses as predictors of performance on the NCLEX-RN. The best predictor was the grade in a course entitled "Introduction to the Process of Nursing" (r = .700; $p < .0001$) taken during the sophomore year. The second best predictor was the grade in a Medical- Surgical II course (r = .379; $p < .0001$) taken during the junior year. Since the best predictors are early in the nursing program the author suggested that nursing educators could identify high risk students and provide appropriate counseling to promote success on the NCLEX-RN.

McKenney, Small and O'Dell's (1988) study used data from the same time period. Scores of 136 BSN graduates who took the

NCLEX-RN from July 1983 through 1985 were correlated with pre-admission variables and program variables. They also identified nursing GPA ($r = .547$; $p < .0001$) as a significant predictor of NCLEX-RN performance. However, other variables demonstrated a higher correlation. They included the Mosby Assess Test ($r = .701$; $p < .0001$), SATV ($r = .610$; $p < .0001$), and all college courses GPA ($r = .585$; $p < .0001$). This data indicated that educators could identify early in a program students whose patterns suggested failure on the NCLEX-RN.

Crane, Wright and Michael (1987) used data from 418 diploma graduates who completed their program during the years 1984 and 1985. This study used variables that included preadmission variables, college prerequisite variables, and intermediate variables defined as standardized achievement examinations from the National League for Nursing at the conclusion of each course. Criterion variables were the Nursing GPA (NGPA) and the NCLEX-RN. This study found NGPA ($r = .74$) the most valid predictor of NCLEX-RN. For the White, Hispanic, Black and Asian subsamples, the coefficients of correlation of NGPA with NCLEX-RN were .75, .74, .54, and .57, respectively. Results from a multiple regression analysis not involving the NLN test results showed that only 29% ($R^2 = .29$) of the variability in NGPA could be explained by the variables college prerequisite GPA, CAT Reading Total Score and CAT Mathematics Concepts and Applications. These same variables only explained 23% ($R^2 = .230$) of the variability with NCLEX-RN as the criterion variable. The NLN test scores demonstrated consistently

high validity coefficients across all ethnic groups for both criterion measures with median values of approximately .63, .57, .59, and .52, respectively.

Feldt and Donahue (1989) also found the ACT test to contribute as a predictor of NGPA and NCLEX-RN. This study used the data of 189 BSN graduates for the years 1984-1986. The best set of predictors of NGPA included ACT composite score, anatomy grade, and chemistry grade, (R^2 = .73). The best set of predictors of NCLEX-RN included ACT composite score, high school percentile rank, nursing GPA, and chemistry grade, (R^2 = .68). The researchers suggested that the results of the multiple regression analyses could serve as a useful adjunct for making selection decisions including the ranking of applicants on a predicted nursing GPA when positions are limited.

Jenks, Selekman, Bross and Paquet (1989) studied 407 BSN graduates from 1984-1987. The predictor variables total lower division GPA, science GPA, age, sex , nursing theory course grades and Mosby Assesstest were analyzed for predictive value of success in NCLEX-RN. The Mosby Assesstest demonstrated the strongest relationship of all the independent variables with the dependent variable NCLEX-RN ($r = .730$, $p < .0001$). The first five nursing courses also showed a high correlation with the NCLEX-RN with r ranging from .542 to .616. At the end of the junior year, 81% of the students were correctly classified as success or failure on the NCLEX-RN.

Younger, and Grap (1992) conducted a study using the data of

388 BSN graduates between 1984 and 1987. The variables explored were HS rank, SAT scores, first semester grade point average, percentile score on the NLN composite test, nursing course grades and college GPA and attendance at the State Board Review course. All nursing course grades were entered into a stepwise regression equation to determine how many and which courses would add significantly to NCLEX- RN prediction. The best predictor of NCLEX-RN was the combination of the four nursing courses, Pediatrics, Health Needs of Women and Medical-Surgical Nursing I and II (R^2 = .74). These courses were combined to form the new variable CORE. A regression table that encompassed that information known at the end of a student's HS education, explained 24% of the variance in NCLEX-RN with most of the explanation provided by the SATV score. At completion of the program, the best stepwise prediction identified 62% (R^2= .62) of the variability in NCLEX-RN and was explained by the variables CORE, SAT, and NLN Pct. with CORE (R^2= .55) contributing the most. Whether a student took an NCLEX-RN review course was not a significant predictor of performance.

Horns, O'Sullivan and Goodman (1991) study used data from BSN graduates who completed the NCLEX-RN between February 1985 and July 1986. The purpose of the study was to determine predictors of success on the NCLEX-RN. Preadmission variables were sex, age, race and admission grade point average (GPA). Year 2 variables were numerical grades for the first two clinical nursing courses. Year 3 variables were numerical grades for clinical courses in mental

health, adult health, and maternal child nursing. Year 4 variables were numerical grades in two senior clinical courses, percentile rank on NLN comprehensive exam, and graduate GPA. The author did a forward regression analysis predicting NCLEX-RN scores identified preadmission GPA and race as significant predictors, accounting for 33% (R^2= .33) of the variance in NCLEX-RN. The author identified race as (0 = nonwhite and 1 = white) which makes race a categorical variable and inappropriate to be included in a regression analysis. A final equation included only those variables that were significant at the time they were entered into the analysis. These were admission GPA, race, Nurs 246 which focused on nursing process and practice with clients of various ages in both primary and secondary health care, adult health nursing, Nursing 457 which involved use of the nursing process with clients experiencing complex health stressors and NLN comprehensive examination scores. These six variables accounted for 67% (R^2 = .67) of the variance in NCLEX-RN scores with Adult Health contributing the most (R^2= .31). The authors said that "this study indicates that during every year in the nursing curriculum some readily obtainable data are significant indicators of student performance on the NCLEX-RN (Horns, 1991; p. 13)." If race is not included in the multiple regression, the variance would change, but the significant indicators could still be valid.

Heupel (1994) also identified preadmission GPA and nursing courses as predictors of successful achievement on the NCLEX-RN. Her study included 152 BSN graduates who wrote the NCLEX-RN between

1985 and July 1987. The freshman GPA ($r = .41$; $p < .0001$) was the best preadmission variable. The results of a stepwise multiple regression test showed that 51 per cent ($R^2 = .513$) of the variability in NCLEX-RN scores could be explained by four variables: a junior nursing theory course (N311), junior GPA, a senior nursing theory course (N421) and a sophomore nursing theory course (N205) with N311 ($R^2 = .365$) contributing the most.

McClelland, Yang, and Glick (1992) used a larger population, 1070 BSN graduates from 1985 to 1988, than Heupel. The pre-nursing GPA (all courses completed at the time of admission) was the best correlate of Nursing GPA in the baccalaureate nursing program ($r = .61$; $p < .001$). Nursing GPA was comprised of all nursing courses with a clinical practicum as well as required non-clinical courses such as pharmacology, research, nursing trends and issues, pathophysiology and nutrition. The pre-nursing GPA also had an expected correlation with CUM-GPA ($r = .81$; $p < .001$). This study explored the variables HSGPA, ACT subscores composite scores, pre-nursing GPA, grades from required clinical nursing courses, cumulative nursing GPA, Mosby AssessTest and NCLEX-RN scores. The ACT composite score ($r = .48$; $p < .001$) alone was the strongest correlate of success on the AssessTest and the NCLEX-RN. The study suggested that pre-nursing GPA and ACT test scores can be utilized as predictors of future academic performance in baccalaureate nursing programs and subsequently on the NCLEX-RN.

Lengacher and Keller's study (1990) used data of 146 ADN graduates who wrote the NCLEX-RN examination in July 1987 and 1988.

The best predictors in a regression model for performance on the NCLEX-RN of the selected admission variables, age, perception of role strain, entrance GPA, exit GPA and ACT test scores were exit GPA and ACT composite scores with exit GPA (R^2 = .50) contributing the most. In a regression analysis of theory and clinical grades, Nursing 2712(medical/surgical theory course) was entered first (R^2 = .59) and then Nur 2713 (maternal-child theory course) was entered R^2 = 61). In a third regression analysis of four NLN examinations (Psychiatric Nursing and Basics One, Two and Three) the first variable entered was NLN Basic Two examination (R^2= .44) and then the psychiatric examination (R^2= .50) increasing the R by 6%. A regression model entering all predictors of NCLEX-RN was not done.

Mills, Sampel, Pohlman, and Becher's (1992) study was based on data from 534 BSN graduates who wrote the NCLEX-RN from 1982 to 1990. Success or failure on the NCLEX-RN was the dichotomous dependent variable. Independent variables were nurse candidates' age at the time the NCLEX was taken; sex; high school GPA; subscores of the ACT; and cumulative GPA for nursing courses at the end of each of the four academic years. Five stepwise logistic regression models were developed for different time periods within the program. Each model's sensitivity (i.e. the ability to predict success based on those who actually passed) and specificity (i.e., the ability to predict failure based on those who actually did not pass) were calculated using an 89% cut point (based on the overall student performance). The specificity of the fourth model was the highest of the models tested, indicating that by the completion of

the junior year, 75.4% of the students who failed the NCLEX-RN could have been predicted to fail. Cumulative nursing GPA, the likelihood of predicting success on NCLEX-RN, increased at the end of each academic year.

Waterhouse, Carroll and Beeman's (1993) study used data from 257 BSN graduates from 1988 to 1990. The independent variables were SATV, SATM, HS percentile, physiology grade, pathophysiology grade, second junior nursing grade, first senior nursing grade, last nursing clinical, American Nursing Review course, GPA, probation, years to complete program, change of major, and transfer. Graduation GPA (Pearson's r = .248) showed the highest correlation with NCLEX-RN success, followed by grades in the first senior-level nursing course and pathophysiology. Three separate discriminate analyses were used to determine the influence of predictor variables at different points in time within the curriculum. Seven significant predictor variables (SAT V, SAT M, Physiology grade, Pathophysiology grade, Second junior nursing course grade, current GPA, and Sophomore GPA) were identified leading to successful classification of 86% of students at the end of the junior year. Only 16% of the variance was accounted for by any of the discriminant analyses.

Waterhouse, Bucher, and Beeman (1994) did a cross- validation of the above study using 142 subjects who graduated in 1991 and 1992 to validate the adequacy of the classification procedure. Differences between the original and the latter sample were tested using t-tests for ordinal level variables and chi squares for the

nominal level variables. Scores were significantly lower for the more recent graduates on SATV (t = 2.675; p < .01), SATM (t = 3.004; p < .01), high school percentile (t = 3.069; p < .01), physiology grades (t = 3.243; p < .01), Nur308 (t = 7.780) and Nur408 (t = 3.139). In addition, subjects in the second sample were significantly more likely to have taken the ANR review course, to have been on probation, and to have changed majors. There were no significant differences between the two samples in the percentage of graduates passing the NCLEX- RN. Application of the equation to this more recent sample provided strong cross-validation in which 84 per cent of the students were categorized correctly. The authors said "that though this is somewhat lower than the 91 per cent in the initial study, this ate is actually better than might be expected in a cross-validation based on dichotomous data and with significant differences (p. 258)."

The following four studies looked at some non-academic variables of success in a nursing program. Though this is not the focus of this study, nurse educators should consider the part that non-academic variables play in the retention and success of a student. Poorman and Martin (1991) addressed the relationship between performance on the NCLEX- RN and differences in test anxiety, cognitions related to testing and academic performance among 102 senior bachelor's degree nursing students. Test anxiety was measured by the Test Anxiety Inventory; Cognitions were measured by the Cognitive Assessment Tool; quality point average

and Student Aptitude test scores measured academic aptitude. The Pearson's product moment correlation demonstrated that test anxiety ($r = -.31$; $p < .05$) was inversely related to a passing score on the NCLEX. Thus weakly upholding the author's hypothesis that test anxiety will be inversely related to a passing score on the nursing licensure examination. The t tests performed on the two groups (TAI Total $t = 3.55$; TAI Emotionally $t = 3.91$; TAI Worry $t = 2.63$; $df = 100$) showed a significant difference ($p < .05$) between the group that passed the NCLEX and the group that failed the NCLEX on all three variables, the failing group having the higher anxiety scores. Negative cognitions were not inversely related to a passing score on the NCLEX, with the self-predicted NCLEX score and self-perceived student grades being positively correlated. Quality Point Average (QPA) ($r = .42$; $p <. 05$) and SAT ($r = .30$; $p < .05$) were positively related to passing score. A t test of these variables showed that academic aptitude was not significantly different between the two groups and was not related to whether a subject passed the NCLEX-RN (QPA $t = -1.95$; SAT $t = -1.85$; $p < .05$). A stepwise multiple regression showed the best predictors of NCLEX scores to be student-reported self- perceived grades (not actual QPA but the letter grade that the students believed best described their performance) and self-predicted NCLEX score. The author noted that "the results are different from the usual SAT and QPA identified by research and that based on these research findings, a comprehensive approach by the nurse educator who wishes to identify students at risk for failing the NCLEX would include not

only academic variables but also assessment of nonacademic variables as well (p. 31)."

The focus of the Smith (1990) study was to identify attrition factors. The sample consisted of 227 non-returning freshman and sophomore students who had not continued their enrollment during the previous 18 months. Some of these former students had exposure to the first three basic nursing courses taught in sophomore year. The second group consisted of 24 randomly selected undergraduate nursing faculty members. Both groups were surveyed by a mailed questionnaire to identify attrition factors. A return rate of 51.5% occurred with students and 83.3% for faculty. The foremost results implicated by former students (n = 117; 29%) "dissatisfaction with class scheduling", "not enough money to support self" and "working interfered with studies". The faculty respondents targeted poor study skills (n = 20; 20%) as a primary problem. The statistical analysis between responses of each group revealed that both groups are in agreement with the importance of financial-employment influences on the student's decision not to continue enrollment (Spearman rank correlation rs = .7767; $p < .05$). However, the groups were not in agreement with the influences of academic factors on the attrition factor (rs = - .1829). Based on the findings the author concluded that "a critical examination of the ranked factors chosen by the non returning students as contributing to their decision to discontinue their studies reveals that the top five factors involve time- management problems as well as inadequate financial resources (p. 218)". The author suggested

that students should be made aware of the personal and financial costs of a nursing education prior to admission to help prevent student attrition.

The purpose of the Cameron-Buccheri and Trygstad (1989) study was to explore the experience and needs of freshman nursing students at the University of San Francisco and to determine the outcome of addressing these needs in terms of retention, academic success and satisfaction. The outcome measures of attrition rate and failure rate were used to validate the effectivenesses of the project. The outcomes were compared with the first semester freshmen of the current year who had interventions as: individual advisor meeting during the first six weeks of the semester and again during the middle of the semester, orientation program by nursing faculty in small groups which focused on study skills, stress management, and the use of campus resources, and promotion of socialization and networking among students by a formal introduction of new students to junior and senior nursing students, with the attrition rate of first semester freshmen from the previous year. This comparison revealed that attrition of first-semester freshmen dropped from over 20% to about 13%. The comparison of the failure rate of these two groups revealed that the number of first semester freshmen failing a course dropped by 50% from the previous year. The comparison of satisfaction scores revealed that freshman nursing students from the current year were significantly more satisfied ($p = .03$) with their advising relationships than first semester freshmen from the previous year.

The author did not state what type of statistical analysis were done or include any tables that show the number in the sample. A statement was included that said "the School of Nursing had 400 students, 350 of whom are undergraduates. Only 40 to 50 of the students enter as freshmen (p. 389)". The small size of the group can influence the results. The author's suggestion "that early interventions and frequent follow-up with those students experiencing either personal or academic problems was very important in identifying and attempting to help solve problems before they turned into a crisis (p. 393)," is appropriate even with a small population.

The Nortridge, Mayeux, Anderson and Bell (1992) study determined the relationship between the components of a cognitive map as defined by the Modified Hill Cognitive Style Model (MHCSM) instrument and the diploma student's successful academic completion of the first semester. The sample consisted of 325 subjects who entered a diploma program in the Midwest during the spring semesters of 1986 through 1990. A grade of 77 per cent or above determined success; 90.46% succeeded and 9.54 % were unsuccessful in the first semester. All subjects voluntarily completed the mapping instrument two weeks into the semester. An analysis of the intercorrelation between the 28 elements of the MHCSM and the students' final grade was computed. Among these correlations, seven of them were less than or equal to a .05 level of significance. Three of the seven were positively correlated: a preference for finding meaning from written words (r = .169), a

preference for independent problem solving (r = .191) and a preference for a logical deductive approach in decision making (r = .185). Four negatively correlated predictors were: a preference for finding meaning from the spoken word (r = -.185), a preference for finding meaning from sight (r = -.134), a preference for problem-solving (r = -.163) and a preference for categorical reasoning (r = -.20). A multiple regression equation using these seven predictors (R^2= .134) from the MHCSM accounted for 13.7% of the variance in predicting final first semester grades. The authors cautioned against using cognitive style information to "label" a student who does not fit the predicted successful student map and that this mapping does not consider motivation. However, the results do show that the student cognitive map can provide direction when counseling a student and can be applied to build a personalized program of instruction.

In summary, the review of literature identified a variety of predictors of success in nursing programs and on the NCLEX-RN. Pre-admission and pre-nursing variables such as pre-entrance examination scores on the SAT and ACT, anatomy and physiology grades, chemistry grades, college GPA and counseling were identified as being associated with successful completion of nursing programs. Age was not found to have a significant effect on NCLEX-RN performance. Selected nursing courses, especially those that included the nursing process, and current nursing GPA were the most frequently identified predictors within the nursing curriculum of successful performance on NCLEX-RN. Nursing theory grades were

more highly correlated to NCLEX-RN performance than were clinical practicum grades. Mosby Assesstest scores, NLN achievement test scores, and the comprehensive standardized nursing achievement test, have also been identified as strong indicators of NCLEX-RN performance. Cumulative nursing GPA was most frequently identified as having a strong correlation with performance on the NCLEX-RN.

Chapter III

Methods

A retrospective descriptive design was used to collect data at different points in the nursing program. Data organization was specific to this selected diploma nursing program, though it is like others seen in the review of literature. Admission criteria variables are used by the nursing school as a means to determine acceptance into the program with the belief that an applicant needs to meet these criteria to be successful in the program. These variables are the first in a succession of other variables.

The nursing program is built upon foundation courses in the physical and social sciences, so college prerequisites are the next group of variables. The total college GPA was included as a separate variable since some students have taken college courses along with first level nursing courses and others have completed them prior to entrance in the nursing program. All students must have met the college pre- requisites prior to being promoted to Level II.

The nursing curriculum is a three year program which includes six nursing theory/clinical courses with two taken at each level. Progression in the program is based on successful completion of the two required nursing courses at each level.

Achievement is further monitored by giving an NLN achievement test at the completion of each course in Level II, specifically the NLN Achievement test in Psychiatric Nursing and Maternity-Child

Nursing. Completion of levels are identifiable time periods in the nursing curriculum. Nursing cumulative GPA and the NLN Comprehensive scores are a set of variables that are indicative of success after interventions have occurred during the nursing curriculum. In this study both were used to define success in the total program, since the majority of the graduates of this nursing program passed the NCLEX-RN exam. The Nursing CGPA and NLN Comprehensive scores lead to the last variable of NCLEX-RN performance.

Hypotheses: The hypotheses are stated in the nullform.

1. There is no significant relationship between admission selection variables (SAT subscores and total scores, and Registered Nurse Entrance Examination [RNEE] subscores and total scores) and the Nursing Cumulative GPA.

2. There is no significant relationship between admission selection variables (SAT subscores and total scores, and Registered Nurse Entrance Examination [RNEE] subscores and total scores) and the NLN Comprehensive total score.

3. There is no significant relationship between college prerequisite variables (grades of Anatomy and Physiology I and II, Microbiology, English Composition, Nutrition, Sociology, General Psychology, Growth and Development, and college GPA) and Nursing Cumulative GPA.

4. There is no significant relationship between college prerequisite variables (grades of Anatomy and Physiology I and II, Microbiology, English Composition, Nutrition, Sociology, General

Psychology, Growth and Development, and College GPA) and NLN Comprehensive total score.

5. There is no significant relationship between nursing courses (grades of Basic Concepts for Nursing (BCN)I and II, Family Centered Nursing (FCN), Mental Health Nursing (MHN), Adult Health Nursing (AHN)I and II), and Nursing Cumulative GPA.

6. There is no significant relationship between nursing courses (grades of Basic Concepts for Nursing (BCN)I and II, Family Centered Nursing (FCN), Mental Health Nursing (MHN), Adult Health Nursing (AHN)I and II), and NLN Comprehensive total score.

7. There is no significant relationship between NLN Achievement Tests (Psychiatric Nursing [PSY NUR] and Maternal-Child Nursing [MCN]) and Nursing cumulative GPA.

8. There is no significant relationship between NLN Achievement Tests (Psychiatric Nursing [PSY NUR] and Maternal-Child Nursing [MCN]) and NLN Comprehensive total score.

9. There is no significant relationship between Nursing Cumulative GPA and NLN Comprehensive total score.

The independent variables—included SAT subscores and total scores, Registered Nurse Entrance Examination subscores and total score, final grades from Anatomy and Physiology, Microbiology, General Psychology, Sociology, Nutrition, English Composition, and Human Growth and Development, College GPA, final grades from the nursing courses BCNI, BCNII, FCN, MHN, AHNI and AHNII, scores from NLN achievement tests in Psychiatric Nursing and Maternity-Child Nursing. The nursing cumulative GPA (NCGPA) and NLN Comprehensive

score will be the dependent variables. These have been chosen to measure success in the program rather than the results of the NCLEX-RN. The NCGPA and NLN Comprehensive total score were examined to determine if there was a correlation between these variables and passing or failing the NCLEX-RN.

Operational Definitions

1. Demographic characteristics: Include age at the time of admission, full or part time student during the first level (full time indicated by taking college courses concurrently with nursing courses and a part-time student only taking nursing courses), and day or evening/weekend division. Student was identified if a transfer student or LPN. Data were obtained from the student's record.

2. Pre-entrance test scores: Included SAT scores and the scores of The Psychological Corporation RN Entrance Examination for Schools of Nursing. Many students have taken two pre-entrance examinations and the scores of both tests were included. Scores were obtained from the student's record.

3. Grades in college prerequisites:

Anatomy and Physiology - 8 college credits

English Composition - 3 college credits

General Psychology - 3 college credits

Human Growth & Development - 3 college credits

Sociology - 3 college credits

Microbiology - 4 college credits

Nutrition - 3 college credits

Grades were obtained from the student's record, which includes a transcript of the college courses taken.

4. College course grade point average: Was based on all required college courses taken by the student to be promoted to the second level of the nursing program. GPA was obtained from the student's record by averaging grades in required pre-nursing courses.

5. GPA in Basic Concepts for Nursing I: A Level I nursing theory and clinical course, this course introduces the basic concepts for nursing practice based on a human needs approach. The biological, psychological and social needs and adaptation of adults at all developmental levels are studied. Emphasis is on the nursing process and the role of the nurse when providing basic care to the hospitalized adult. GPA was obtained from the student's record.

6. GPA in Basic Concepts for Nursing II: A Level I nursing theory and clinical course, this course focuses on the illness experience as it pertains to hospitalized adults at all developmental levels. The student incorporates physical assessment techniques and pharmacology in the care of the hospitalized client. Concepts of fluid and electrolyte dynamics, inflammation and repair and immunology are studied. GPA was obtained from the student's record.

7. GPA in Family Centered Nursing: A Level II nursing theory and clinical course, the course focuses on the family unit during childbearing and childrearing years. Emphasis is placed on the normal sequence of growth and development, deviations from the normal, maturation from conception through adolescence, human sexuality, and parenthood. Grades were obtained from the student's

record.

8. GPA in Mental Health Nursing: A Level II nursing theory and clinical course, the course focuses on the basic concepts relative to understanding the emotional/mental health status of man. Emphasis is placed upon the skillful use of communication techniques, appropriate for therapeutic intervention in individual, group and family settings. Study of the developmental stages of life from the wellness-illness viewpoint enables the student to assess, plan, intervene, evaluate and revise the psychosocial component of the nursing care plan. Grades were obtained from the student's record.

9. GPA in Adult Health Nursing I: A Level III nursing theory and clinical course, the focus of this course is on the nursing care of clients with acute and chronic medical- surgical health problems and their related implications for the client and family. The nursing process, the role of the nurse, client teaching and concepts of rehabilitation are stressed as the health problems are discussed. Grades were obtained from the student's record.

10. GPA in Adult Health Nursing II: A Level III nursing theory and clinical course, it is the last course of the nursing program. The focus of this course is on the individual and family who have multiple medical-surgical problems and/or critical care needs. Emphasis is placed on the comprehensive role of the nurse in complex nursing situations and on principles of group management. Grades were obtained from the student's record.

11. Nursing cumulative grade point average: Based on the six

nursing course grades in the program. A minimum grade of "C" (2.0) is required to pass each nursing course. The NCGPA was obtained from the student's record.

12. Total score on The National League for Nursing Achievement Test of Psychiatric Nursing: This exam is taken by students upon completion of the Mental Health Nursing course. A profile of the student's scores are part of the student's record and the total score was obtained from the profile.

13. Total score on The National League for Nursing Achievement Test of Maternity Child Nursing: This exam is taken by students upon completion of the Family Centered Nursing course. A profile of student's scores are part of the student's record and the total score was obtained from the profile.

14. Total score on The National League for Nursing Test of Comprehensive Nursing: The NLN Comp test is given at the completion of Adult Health Nursing II. A profile of student's scores are part of the student's record and the total score was obtained from the profile.

15. National Council Licensure Examination-RN: This is the licensing exam taken by graduates of the nursing program in order to practice nursing. The test results are recorded as either pass or fail.

Study Population and Sample

Data were obtained retrospectively from the official student records of a population of students of a diploma nursing program. The records used to gather data were those of students who were

classified as the members of the Classes of 1990, 1991, 1992, 1993 and 1994 and who had enrolled in the first level I nursing course (BCNI). Due to the small number of students in each class, the classes were considered as one group for the study. The total population was N = 145. Of this population, 87 graduated during this time period and took the NCLEX-RN. The average age of the population was 26 years with the minimum 18 years and the maximum 48 years. Students identified as parttime represented 75 percent of the population and 80 percent were in the day program.

Data Collection

A data collection form was used by the researcher to gather data retrospectively from the students record in a manner to maintain confidentiality of individuals. The proposed study was submitted to the Human Volunteers Committee of the University and was exempt from review.

Data analysis

Academic performance before and during the nursing program was examined retrospectively to identify predictors of achievement. Cases with missing data were excluded from each analysis; this accounts for differences in sample size for individual analysis.

Both descriptive and inferential statistics were used to analyze the data. Simple means and standard deviation were used at the descriptive level. The level of significance used throughout the study was $p = < .05$.

A correlation analysis was done with the interval data using Pearson's Correlation to designate the magnitude of relationships

between the independent variables. Stepwise multiple regression analyses using NCGPA and NLN Comprehensive as dependent variables were generated to obtain a combination of variables that best explain student success in the nursing curriculum. Discriminant analysis was used to distinguish between students who passed or failed the NCLEX- RN on the basis of the predictor variables.

Chapter IV

Results

Description of the sample

The total population for the Classes of 1990, 1991, 1992, 1993, and 1994 was 145. The average number of students in classes 1990, 1991 and 1992 was 24. Classes 1993 and 1994 each had 36 students. This increase was due to the introduction of the evening/weekend program. This program utilized the same curriculum as the day program, but nursing classes were offered in the evening, on weekends, and over a longer semester. Both programs were 3 years and students graduated at the same time as a class.

The majority of the students graduated from high school. Five students met the high school requirement with a G.E.D. certificate. Three students attended high school in a foreign country. The entrance requirement of high school biology was met by most (n = 131) of the students. Several met the requirement with a college level biology course. The high school chemistry pre-entrance requirement was initiated with the class of 1991. As a result 18 students did not have high school chemistry and 53 students met the requirement by completing a high school chemistry course with a certificate or at college.

During the five year period examined in this study the two major entrance tests taken by the students as part of the admission criteria were the SAT's and the RNEE. Only 8 students had ACT test scores. The majority of the students took the RNEE examination. Both the RNEE and SAT examinations were taken by 63 students.

Descriptive statistics of the results of these examinations are displayed in Table 1.

The curriculum was arranged so that college pre- requisite courses could be taken prior to or simultaneously with Level I nursing courses. Some students who failed the nursing course BCNI in the fall semester may not have completed all of the college courses. The data demonstrated this in that there were data for 144 students in Biology 211 and 137 students in Biology 212. The course, Human Growth and Development, had the lowest number with 117 students. This was primarily due to the fact that 17 students met the requirement with a pass on the CLEP examination. The average college GPA was 2.845 with a range from 1.153 to 4.0.

Eight students in the study (n = 145) did not take BCNI. Two were transfer students and six were LPN's who were not required to take BCNI or BCNII. The total number in nursing courses ranged from 87 to 137.

Table I

Descriptive statistics of pre-entrance examinations.

Difficulty	M	SD	Min	Max	n
SAT Math	411.122	86.106	240	630	82
SAT Verb	409.146	89.224	240	670	82
SAT Total	821.707	151.203	510	1250	82
RNEE Verb	63.836	28.859	02	99	122
RNEE Numb	53.631	29.702	01	99	122
RNEE Life	61.885	30.529	01	99	122
RNEE Phy	58.590	27.040	01	99	122
RNEE Read	55.410	31.068	01	99	122
RNEE Total	61.475	29.979	02	99	122

Note. The RNEE test score represents a percentile rank based on the results of the students in the national norm group of registered nursing applicants with 50% being the median.

The grade point scale in this study is based on 2.0 (80%) as passing to 4.0 (100%). The mean for the nursing CGPA was 2.783 with a range from 2.3 to 3.6. The nursing CGPA data included 87 students who graduated from the program and took the NCLEX-RN exam. Of these 87, 85 passed and 2 failed the NCLEX-RN exam.

The percentile score on NLN exams was used for data analysis. The mean for the NLN Psychiatric Nursing exam (n = 42) was 68.952 with a range from 26 to 99 percentile. Missing cases were high for this exam, because the data on students who took a new trial exam was not included. The mean for the NLN Maternity Child Nursing exam (n=76) was 53.263 with a range from 5 to 95%. The NLN Comprehensive exam (n = 81) median was 93.222 with a range from 18 to 99%.

Major findings

All of the RNEE subscores and RNEE total score showed a significant correlation with the SAT total using the Pearson product moment correlation. The highest correlation was with RNEE Total ($r = .7452$, $n = 63$, $p = .000$) and the lowest with the subscore RNEE Life ($r = .5349$, $n = 63$, $p = .000$).

Null hypothesis one, that there is no significant relationship between admission selection variables (SAT subscores and total scores, and RNEE subscores and total scores) and Nursing Cumulative GPA, is rejected since the data supports a significant relationship. A significant correlation is seen with preadmission variables and the Nursing CGPA except SAT Math. (Table 2).

TABLE 2

Intercorrelation analysis of preadmission test scores

with Nursing GPA and NLN Comprehensive scores

	SAT VERB	SAT MATH	SAT TOTAL	RNEE VERB	RNEE NUMB	RNEE LIFE	RNEE PHY	RNEE READ	RNEE TOTAL	NUR GPA	NLN COMP
SAT VERB	1.000										
SAT MATH	0.438*	1.000									
SAT TOTAL	0.832*	0.858*	1.000								
RNEE VERB	0.784*	0.399*	0.688*	1.000							
RNEE NUMB	0.202	0.725*	0.540*	0.218*	1.000						
RNEE LIFE	0.525*	0.387*	0.534*	0.671*	0.311*	1.000					
RNEE PHY	0.375*	0.569*	0.554*	0.479*	0.547*	0.493*	1.000				
RNEE READ	0.642*	0.569*	0.705*	0.704*	0.513*	0.656*	0.537*	1.000			
RNEE TOTAL	0.646*	0.635*	0.745*	0.814*	0.563*	0.759*	0.703*	0.882*	1.000		
NURS GPA	0.499*	0.207	0.390*	0.529*	0.303*	0.447*	0.446*	0.556*	0.521*	1.000	
NLN COMP	0.161	0.115	0.159	0.397*	0.354*	0.392*	0.302*	0.428*	0.447*	0.337*	1.000

*$P < .05$.

Null hypothesis two, that there is no significant relationship between admission selection variables (SAT subscores and total scores, and RNEE subscores and total scores) and NLN Comprehensive total score is accepted with the SAT scores. However the part relevant to RNEE is rejected since RNEE subscores and total score showed a significant correlation with the NLN Comprehensive with RNEE Reading ($r = .4281$, $p = .000$) demonstrating the strongest relationship. (See Table 2).

Null hypothesis three, that there is no significant relationship between college prerequisite variables (grades of Anatomy and Physiology I and II, Microbiology, English Composition, Nutrition, Sociology, General Psychology, Growth and Development, and college GPA) and Nursing Cumulative GPA is rejected except for English. Anatomy and Physiology I ($r = .8186$, $n = 137$, $p = .000$) and Microbiology ($r = .8053$, $n = 131$, $p = .003$) demonstrate the strongest correlation with college GPA. The data demonstrate that there is a significant relationship between Anatomy and Physiology I and nursing Cumulative GPA ($r = .7214$, $n = 86$, $p = .000$), andCollege GPA ($r = .7236$, $n = 86$, $p = .000$) and nursing CGPA. (See Table 3).

Null hypothesis four, that there is no significant relationship between college prerequistie variables (grades of Anatomy and Physiology I and II, Microbiology, English Composition, Nutrition, Sociology, General Psychology, Growth and Development, and college GPA) and NLN Comprehensive total score is partially rejected.

TABLE 3

Intercorrelation analysis of college prerequisites

with Nursing GPA and NLN Comprehensive scores

	A&PI	A&PII	GEN PS	SOC	HGDEV	ENG	MICRO	NUT	COL GPA	NURGP	NLCOMP
A&PI	1.000										
A&PII	0.772*	1.000									
GEN PSY	0.411*	0.427*	1.000								
SOC	0.468*	0.386*	0.370*	1.000							
HG & DEV	0.481*	0.457*	0.315*	0.394*	1.000						
ENG	0.328*	0.437*	0.368*	0.253*	0.466*	1.000					
MICRO	0.666*	0.732*	0.517*	0.339*	0.395*	0.452*	1.000				
NUT	0.600*	0.586*	0.431*	0.406*	0.423*	0.341*	0.607*	1.000			
COL GPA	0.646*	0.818*	0.665*	0.558*	0.679*	0.594*	0.805*	0.733*	1.000		
NURS GPA	0.721*	0.625*	0.392*	0.405*	0.359*	0.1503	0.478*	0.648*	0.723*	1.000	
NLN COMP.	0.356*	0.308*	0.275*	0.150	0.198	0.081	0.135	0.215	0.300*	0.337*	1.000

*$P < .05$.

The variables that showed a significant correlation with the NLN Comprehensive scores were Anatomy and Physiology I and II, General Psychology, and Nursing CGPA with Anatomy and Physiology I ($r = .3562$, $n = 80$, $p = .001$) showing the strongest relationship. Overall there is a stronger significant relationship between colege prerequisites and Nursing CGPA than with NLN comprehensive scores. (See Table 3).

Null hypothesis five, that there is no significant relationship between nursing courses (grades of BCN I and II, FCN, MHN, AHN I and II) and Nursing CGPA is rejected. All nursing courses did correlate significantly with the nursing CGPA. The strongest relationship is between FCN ($r = .8889$, $n = 85$, $p = .0000$) and nursing CGPA. (See Table 4).

Null hypothesis six, that there is no significant relationship between nursing course (grades of BCN I and II, FCN, MHN, AHN I and II), and the NLN Comprehensive total score is supported by the variables MHN and AHN II. The other predictors BCN I and II, FCN and AHN I did correlate significantly with AHN I ($r = .3899$, $n = 80$, $p = .0000$) demonstrating the strongest relationship. (See Table 4).

Null hypothesis seven, that there is no significant relationship between NLN Achievement Tests (Psychiatric Nursing and Maternal-Child Nursing) and Nursing CGPA is rejected. Both tests correlated significantly with NLN MCN ($r = .6583$, $n = 73$, $p = .000$) having the strongest relationship. (See Table 4).

TABLE 4

Intercorrelation analysis of nursing courses and NLN achievement test with Nursing GPA and NLN Comprehensive scores

	BCN I	BCN II	FCN	MHN	AHN I	AHN II	NLN PSYN	NLN MCN	NURS GPA	NLN COMP
BCN I	1.000									
BCN II	0.762*	1.000								
FCN	0.711*	0.779*	1.000							
MHN	0.441*	0.365*	0.380*	1.000						
AHN I	0.539*	0.608*	0.660*	0.379*	1.000					
AHN II	0.121	0.1338	0.332*	0.269*	0.306*	1.000				
NLN PSY NURS	0.299	0.424*	0.473*	0.059	0.510*	0.316*	1.000			
NLN MCN	0.508*	0.543*	0.707*	0.352*	0.562*	0.309*	0.3281	1.000		
NUR GPA	0.813*	0.858*	0.888*	0.589*	0.838*	0.363*	0.445*	0.658*	1.000	
NLN COMP	0.319*	0.353*	0.289*	0.109	0.389*	0.145	0.229	0.403*	0.337*	1.000

* $P < .05$.

Null hypothesis eight, that there is no significant relationship between NLN Achievement Tests (Psychiatric Nursing and Maternal-Child Nursing) and NLN Comprehensive total score is supported by the NLN PSY NURS scores. The NLN MCN did correlate significantly ($r = .4039$, $n = 68$, $p = .001$) with the NLN Comprehensive total score. (See Table 4). Null hypothesis nine, that there is not significant relationship between Nursing CGPA and the NLN Comprehensive total score is rejected. The data supports a statistical significant correlation between them ($r = .3377$, $n = 80$, $p = .002$). (See Table 4).

Additional analyses

To examine the combined influence of predictor variables on the dependent variables, Nursing CGPA and NLN Comprehensive, stepwise multiple regressions were done. Variables entered in as predictors were those whose correlation coefficients had a statistically significant relationship ($p < .05$) with the outcome criterion of Nursing CGPA and NLN Comprehensive, and had the strongest relationship in a category.

When Nursing CGPA was the dependent variable, and RNEE Read, A&PI, College GPA, BCNII, FCN, AHNI and NLN MCH were entered as independent variables, the results of the first step of the regression analysis showed that 81% ($R^2 = .817$) of the variability in Nursing CGPA could be explained by FCN. In step two, by adding BCNII, an additional 5 percent ($R^2 = .8\ 63$) of the variability in Nursing CGPA scores is explained. Adding AHNI in the third step explains another 2% ($R^2 = .888$) of the variability in Nursing CGPA.

The other independent variables were not entered into the equation, since they did not meet criteria for entry.

When NLN Comprehensive was the dependent variable and RNEE Read, A&PI, college GPA, BCNII, FCN, AHNI and NLN MCH were entered as independent variables, the results of the first step of the regression analysis showed that 46% (R^2 = .464) of the variability in NLN Comprehensive could be explained by AHNI. In step two, by adding NLN MCH, an additional 7 percent (R^2 = .543) of the variability in NLN Comprehensive score is explained. None of the other independent variables were entered into the equation, since they did not meet the criteria for entry.

A discriminant analysis was done with NCLEX-RN groups as the dependent variable. The independent variables entered were RNEE Read, A&PI, College GPA, BCNII, FCN, AHNI and NLN MCH, Nursing CGPA and NLN Comprehensive. The Wilk's lambda for the two (pass and fail) groups' means was not significant at the (p = < .05) level. This established the fact that the students who passed and those who failed did not have different means for the variables; therefore, the discriminant functions were not significant due to limited sample size in the fail group.

Chapter V

Summary and Conclusions

The results of this study indicate the role of academic variables in predicting the success or failure of a student in a diploma nursing program. Success was defined in this study by the dependent variables - nursing cumulative GPA and score on the NLN Comprehensive Exam. Independent variables were grouped into three categories for analysis: preadmission test scores, grades in eight college prerequisite courses and factors within the program including grades in nursing courses and scores on the NLN Achievement Tests of Psychiatric Nursing and Maternity Child nursing.

The analysis of the preadmission subscores and composite scores of the SAT scores and The Psychological Corporation RN Entrance Examination for Schools of Nursing scores indicate that only the subscores and composite score of the RNEE test correlated significantly with both dependent variables. The RNEE subscore of reading was the best indicator of success with Nursing CGPA, and the total RNEE score the best indicator of success on the NLN Comprehensive Exam. These results indicate the usefulness of the RNEE test for the diploma nursing school in this study for identifying applicants who may experience success or failure in the nursing program.

The results of the college prerequisite analysis show that Anatomy and Physiology I and II, and General Psychology course grades were significantly correlated with both dependent variables.

Anatomy and Physiology I had the strongest correlation with both dependent variables. The average GPA of the college prerequisites was also significantly correlated with both dependent variables. These findings show that these college courses and the college GPA are early predictors of success or failure in the diploma program and can be used to identify students who are academically at high risk for failure.

When nursing courses and NLN Achievement test scores were analyzed for correlation with the dependent variables an overall higher correlation was obtained with nursing CGPA than with the NLN Comprehensive total test score. This was expected due to the interdependence of Nursing CGPA and the grades of nursing courses. The Family Centered Nursing course was the best predictor of Nursing CGPA and the NLN Maternal Child Health Achievement test of the NLN Comprehensive Exam. Both of these independent variables were significantly correlated with each other. The FCN course is taken in the second level. This is the first course in the curriculum which focused on disease processes and the family. Clinically the student is expected to apply theory from the required college prerequisites that have been completed, the level one fundamental nursing courses, and the theory from FCN. A student must succeed in both theory and clinical to pass the course.

The author of this study also determined predictors of success at each level of the program. Basic Concepts of Nursing II, the second fundamental nursing course in Level I, had the strongest

correlation with both dependent variables. Family Centered Nursing had the strongest correlation in level two with the dependent variables. Adult Health Nursing I, the first medical-surgical course of the program and of Level III, also correlated significantly with the dependent variables. When these significant independent variables of each category were entered in a stepwise multiple regression analysis, FCN was the first to be entered into the equation. These findings allow the author to identify significant predictors of success in each level of the nursing program.

Overall meaning of the findings

The results of this study indicate that at admission and throughout the program, some readily obtainable data are significant predictors of the student's performance. The findings of this study regarding the preadmission data, indicating the limited degree of the predictive power of SAT scores, are consistent with some previous studies (Baron and Norman, 1992; Keller et al., 1994; Young and Barrett, 1992) but are inconsistent with other studies (McKenney et al., 1988: Younger and Grap, 1992; Waterhouse et al.). The RNEE test in this program was given to the applicant who had not taken the SAT test and to the non-traditional student who had been out of high school for awhile. Since most students were over age 21 at the time of admission, the non-traditional students were the majority of the population. The results of this study with the significant correlation of the RNEE test scores to nursing CGPA and the NLN Comprehensive test, support

the use of the RNEE test as a preadmission criteria for this program.

The findings of Anatomy & Physiology I and college GPA as significant predictors of success concur with other studies (Crane et al., 1987; McKenney et al., 1988; Feldt and Donahue, 1989; Horns and Goodman, 1991, Heupel, 1994; McClelland et al., 1992; Lengacher, 1990; Waterhouse et al., 1994). A&P I in this program was often taken concurrently with Basic Concepts for Nursing I. A student having difficulty with A&P I was at risk for failure in the nursing program. Early identification of the student would allow time for appropriate interventions to promote success during level one rather than experience failure. Several studies (Poorman and Martin, 1991; Smith, 1990; Cameron-Buccheri and Trygstad, 1989; Nortridge et al., 1992) suggested that this was an appropriate time in a program to consider non-academic predictors of success and failure as well as academic predictors. Counseling could also be initiated at the completion of college prerequisites using the college GPA to determine high risk students.

The strong correlation between success and nursing courses found in this study is supported by the findings of a number of previous studies (Jenks et al., 1989; Younger and Grap, 1992; Horns et al., 1991; Heupel, 1994; Lengacher, 1990; Waterhouse et al., 1993). The results show that having strong predictors in each level, Basic Concepts for Nursing II, Family Centered Nursing and Adult Health Nursing I allows the nurse educator to identify high risk students at a point in each level.

The stepwise multiple regression analysis added credibility to the predictability of the correlation findings. These results parallel those of other studies (Krupa et al., 1988; McKenney et al., 1991; Jenks et al., 1989; Younger and Grap, 1992; Horns et al., 1991, Heupel, 1994; Waterhouse et al., 1993) in that the data indicates that educators could identify throughout the nursing curriculum significant indicators of student performance. Nurse educators could use the academic grade as one of the factors to identify high risk students. This could be the reason for the initial contact with the student. During a counseling session both academic and non academic variables could be discussed. This could facilitate developing an individual plan of interventions that could promote the student to have success in the program. A long range outcome would be to decrease the attrition rate of the nursing program. This is important to nurse educators since both the financial and emotional cost are significant to students, faculty and the institution when attrition rates are high. In the current environment, these factors are significant and need to be addressed by nurse educators.

Limitations

A limitation of this study in identifying academic predictors of success was the size of the sample. Even when the five classes were grouped as one, the total number of students who completed the program and took the NCLEX-RN was 87. Of these 87 only 2 failed the NCLEX-RN. Comparisons of the two groups in relationship to the variables was not statistically appropriate. The fact that

applicants could take either the SAT or RNEE entrance examintion also decreased the sample size. This was particularly seen when doing a discriminate analysis which eliminates cases with missing data in the anlaysis.

Another limitation was that the review of literature only had a few references that were related to diploma nursing schools. Also the Entrance Examination for Schools of Nursing by the Psychological Corporation was not identified as a variable in the references. Phone calls to the Psychological Corporation were unproductive. They referred the researcher to a list of nursing schools across the country that utilize the examination. It was impossible to identify the diploma nursing schools from the 95 schools listed.

Variables were chosen in this study in part because of their success as predictors in previous studies and in part because they are part of the curriculum of the diploma program from which data was obtained. There may be variables that have not been accounted for that may be related to the dependent variables. Since the design was retrospective, extraneous variables cannot be controlled which means there is no way of ensuring constancy of conditions. External validity may be influenced by the intrinsic characteristics of the students in the study, therefore generalizing results from a diploma program to a BSN program cannot be done.

Recommendations

As a result of these findings, there is a need for further

investigation to determine how the knowledge of these predictive variables can serve the important function of selection of applicants. A combination of these variables or the multiple regression results could serve as a useful tool to rank order applicants when ranking is necessary. Additional research that may prove valuable would be investigation of nonacademic predictors that influence student success in this particular diploma school. A test to identify a student's learning style is being given presently to selected students. If more students were required to take the test to increase the numbers in the sample, the data from this test could be correlated with the academic variables of this group. This investigation could provide a holistic approach to the students' needs.

A further recommendation is to study students during their matriculation through the nursing program. Nurse educators are implementing new teaching strategies to facilitate the development of critical thinking of their students in a variety of clinical settings. Research is needed to determine which interventions contribute significantly to the success of the student.

Summary

Educators need to examine predictors related to success in a nursing program. This study of a diploma nursing school identified a relationship between some admission variables, college prerequisite variables, and nursing course variables that correlate with the nursing GPA and the NLN Comprehensive test. It also indicates that nurse educators can identify students early in the

nursing program by using the significant predictors as a means to identify who would be successful in the nursing program and those who would be at risk for failure. This study supports similar studies on Nursing GPA.

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Education

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1968 Trenton State University: B.A. in Education Major in School Nursing
1965 St. Francis Hospital School of Nursing: Diploma in Nursing

Experience

1975- Instructor of Nursing, Macqueen Gibbs Willis School of Nursing, Easton, Maryland.
1979-1985 ASPO Childbirth Educator
1972-1974 Instructor of Nursing, Harford Community College, Bel Air, Maryland.
1971-1972 Instructor of Nursing, Macqueen Gibbs Willis School of Nursing, Easton, Maryland.
1968-1971 Instructor of Nursing, Washington County Hospital School of Nursing, Hagerstown, Maryland.
1968 Camp nurse, Camp Merrywood, New Hampshire.
1967-1968 Staff nurse, St. Francis Hospital, Trenton, New Jersey.
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Professional Organizations

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