

**ACADEMIC SUCCESS IN  
FIVE PROGRAMS IN ALLIED HEALTH AT  
THE BRITISH COLUMBIA INSTITUTE OF TECHNOLOGY**

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# ACADEMIC SUCCESS IN FIVE PROGRAMS IN ALLIED HEALTH AT THE BRITISH COLUMBIA INSTITUTE OF TECHNOLOGY

## Abstract

This study examined the nature and strength of relationship between specific related high school academic grades and the cumulative graduating average of students in five allied health programs at the British Columbia Institute of Technology.

Lack of scientific studies on selection criteria for determining the cumulative graduating average of allied health professionals at the British Columbia Institute of Technology (B.C.I.T.) was evident. Educators argue that in order to enhance educational opportunities for institute students, there is a professional obligation upon the policy-makers to gather appropriate data to determine which factors contribute to the success of the allied health student. With the high cost of technical education, admission officers and admissions committees are accountable for their selection processes to the institute's administration, decision makers, provincial and federal funding sources, and society. The results of this study may assist admissions officers in selecting academic variables that indicate the cumulative graduating average so that a better match can be made between the students and their performance in allied health programs.

The accessible population of 629 graduates from the allied health technologies in this study were biomedical electronics, medical laboratory, medical radiography, nuclear medicine, and prosthetics and orthotics. The dependent variable measurement of academic achievement for these students was their cumulative graduating average. Single variables consisted of the grade point average of the following: pretechnology academic requirements, high school English, high school algebra, high school biology, high school chemistry, and high school physics. Descriptive statistics, zero-order correlations, and stepwise multiple regression analysis were the statistical methods employed to determine which specific academic variable or multiple of variables exhibited a strong relationship between the cumulative graduating average and academic variables.

The analysis identified certain variables that strongly related to the cumulative graduating average, both singly and in combination with others. Each of the program significant combination of variables are provided here in order of descending influence: **Biomedical Electronics Technology**- high school algebra; **Medical Laboratory Technology**- the pretechnology grade point average, high school chemistry, biology, and algebra; **Medical Radiography Technology**- high school biology and chemistry; **Nuclear Medicine**- the pretechnology grade point average, high school chemistry, and high school biology; **Prosthetics and Orthotics Technology**- the pretechnology grade point average and high school chemistry.

Academic variables did not account for more than 34% of the total variables in any of the programs. The level of significance for individual variables was the convention, 0.05. Clearly, each program had its own character; however, the

performance of students in the natural sciences were significant in four of the five programs.

An attempt was made to investigate which specific high school subjects correlated highly with the cumulative graduating average of students at the B.C.I.T. through a inspection of five programs for five graduating classes. Relevant variables were identified that were indicative of academic achievement in each specific program of study. Investigating the nature and strength of relationship between preprofessional grades and the cumulative graduating average of allied health students at B.C.I.T. could benefit both students and admissions officers by supplying a piece to an educational puzzle that would demystify the selection process. The information presented may assist admissions officers and prospective allied health students make more suitable educational choices.

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**CHAPTER ONE**  
**PURPOSE OF THE STUDY**

## INTRODUCTION

This chapter includes the purpose of this research study, statement of the problem, justification of and limitations of the study, an overview of the history of the British Columbia Institute of Technology, and a summary.

### PURPOSE OF THE STUDY

Traditionally, allied health programs, namely programs that train individuals in a health care related science, at B.C.I.T. have had a greater number of individuals who apply for admission than can be accepted.

Researchers agree that the selection of allied health program candidates should be a shared responsibility among allied health educators, allied health practitioners, office of the registrar, and administration. Investigating academic variables that correlate with the likelihood of allied health program success is the purpose of this study.

In a limited way, this study investigates information provided by the institute applicant in order to determine which academic variables correlate with a student's academic success in a specific program of study. The identification of academic courses may assist admissions officers in selecting applicants most likely to complete their allied health program of studies.

## STATEMENT OF THE PROBLEM

Success in post secondary undertakings, especially at the college level, appears to depend to very large extent upon academic achievement and non-intellective variables. The present study does not attempt to predict allied health achievement, rather to investigate the nature and strength of relationships between specific high school academic subjects and the cumulative graduating average of students in five School of Health Sciences programs at B.C.I.T. over a period of five graduating classes. The assumption operating in this discussion of academic achievement is that many more factors than intelligence contribute to allied health success.

Sullivan theorized that the pursuit of security, prestige, and interpersonal relations appear to be underlying factors in motivating individuals in their personal and professional life (Munroe, 1955). Axelrod (1969) stated that many and varied influences affect students during post secondary education undertakings. The attributes students possess prior to admission become significant determinants in the formula for allied health success. The basic personal and intellectual attributes which students have do not change according to the program of study they choose.

There is a similarity in intellectual abilities and academic achievement in allied health students (Farber, 1989). Non-intellective factors which contribute to student success can include personality characteristics, socioeconomic variables, biographical and demographical circumstances, and vocational interests. Perceptions of allied health professionals, for example, prestige, power, superiority, and mastery heavily influence student's choices of careers in allied health.

Rezler (1983) stated that professional prototype personalities do exist in allied health. Individuals tend to be realistic, practical, sympathetic, and prefer to work in an organized, predictable environment. Health career aspirants rarely acknowledged the congruence between their personality and their chosen profession. Reasons given mainly related to socioeconomic reasons, such as availability of jobs, high earnings, chance for advancement, and the prestige of the occupation. Applicant's previous health care work experience and place of origin appear to be determinants of allied health success, but to a minor degree. Overall, student motivation, that is persistence, is as important as academic achievement in determining allied health success. Traditionally, motivation is demonstrated by maintenance of high school grades over an extended period of time, establishing strong academic work habits, and knowledge of subject matter (Rezler, 1983). The research literature reviewed for this study reinforced the premise that student motivation is an important characteristic in determining student success. It was shown repeatedly that the grade point average from a preprofessional school is the best single indicator of achievement in a professional program (Angus, 1972; Axelrod, 1969; Rezler, 1983; Farber, 1989). The objective of this researcher was to investigate the nature and strength of relationship between specific high school academic subjects and the cumulative graduating average of allied health students in five programs at B.C.I.T. for five consecutive graduating classes. Allied health groups included in this study were: biomedical electronics, medical laboratory, medical radiography, nuclear medicine, and prosthetics and orthotics.

## JUSTIFICATION FOR THE STUDY

The selection of the best students from the applicant pool is perhaps the most important element in the whole process of allied health education. Since the number of applicants outnumber the available educational seats in allied health, admissions officers must strive to select students who will perform well at B.C.I.T., graduate, and become competent professionals. After reviewing the relevant literature regarding selection criteria, there was a lack of scientific studies on correlation between pretechnology academic courses and the cumulative graduating average of students in allied health programs at B.C.I.T. and in Canada.

The determination of selection criteria is becoming more and more vital to the success of allied health institutions. With escalating educational costs, limited clinical placement sites, and attrition, husbanding of human and economic resources is of paramount concern to federal and provincial governments and to educational institutions. Accountability of the selection process to the applicant is also a critical issue. Admission into an allied health program is an extremely competitive process for each applicant. Selection criteria which do not reflect the requirements of a program may result in a student's expectations being dashed by failure, resulting in withdrawal from their program of studies. Non-financial ramifications the student may experience includes loss of self-esteem, disillusionment with allied health programs, and creation of a psychological barrier to further professional development.

Accurate evaluations must be made when selecting students for admission into allied health programs. Specifically, a study describing an equitable and efficient

means of identifying the most promising applicants who were most likely to succeed in allied health at B.C.I.T. has never been conducted. The purpose of this research project is to address this need; that is, identifying which entry academic criteria best correlate with the B.C.I.T. cumulative graduating average.

### LIMITATIONS OF THE STUDY

The aim of this study was to identify which specific variable or multiple of variables best correlate with the cumulative average in a specific allied health program of study at B.C.I.T. Research in this area is non-existent in Canada; therefore, generalizability to the entire allied health community should be done judiciously because of the following limitations.

First, this study is limited to five of the eleven programs of study offered at B.C.I.T. Programs included in this study have a major clinical component. Graduates of these programs have the opportunity to write a national certification examination.

Second, the scope of this study was restricted because there has been very little research on investigating which academic variables correlate with allied health success in Canada. No literature was available for biomedical electronics technologists or prosthetics and orthotics in either Canada or the United States. Few qualitative and quantitative studies were available for medical laboratory, medical radiography, and nuclear medicine.

A third limitation was that the Ministry of Education official transcripts were the only source of data for this study. High school academic transcripts were not



scaled. No biographical or demographical data was utilized. Socioeconomic variables as the education and income of parents, degree of financial aid received, previous employment experience, or marital status would have enhanced this study; however, data were not available from B.C.I.T.

Lastly, the total population of the institute was not sampled. The accessible population was all of the graduates of five allied health programs for five consecutive graduating classes. This group of individuals could represent a cross-section the Canadian allied health community.

## OVERVIEW

A selected literature review is presented in Chapter Two. The research subjects, research design, research procedures, and statistical analysis are described in Chapter Three. The results for each allied health program included in this study are presented in Chapter Four. Discussion, recommendations, and problems for future research are presented in Chapter Five.

## THE BRITISH COLUMBIA INSTITUTE OF TECHNOLOGY

Prior to 1964, there was little development or diversification of post-secondary educational institutions in British Columbia. A masterplan for a comprehensive college system was developed in a thesis, written by Knott in 1932, which included

proposed locations of colleges in British Columbia. This model, based on a California college system, became a reality some thirty-five years later with a college in virtually every location proposed by Knott (Dennison & Gallagher, 1986). A limited number of vocational schools were constructed during the pre-Second World War era, but the scope of educational programs was very narrow. Generally these vocational schools were not regarded as post-secondary institutions.

Socioeconomic changes which accompanied the end of the Second World War included improved high school retention rates, rapid increases in enrolment in grade thirteen classes, and pressure from school boards and other local community agencies to expand educational opportunities for citizens of all ages (Dennison & Gallagher, 1986). During the 1958-61 recession in Canada, the federal government was struggling with rising unemployment while skilled craftsmen and highly trained technicians were immigrating to Canada to fill specialized jobs. Approximately seventy percent of Canadian craftsmen received their training abroad. Clearly, the post-war social changes and imported workers were impacting negatively upon the Canadian economy.

Between 1958 and 1960, provincial and federal governments enacted legislation to help improve educational opportunities. At the provincial level, in 1958, the B.C. Public School Act was amended to allow for the creation of two types of post-secondary institutions, either under school board jurisdiction or government organized. The federal government passed the Technical Education Act of 1960, providing financial encouragement to the provinces to build technical and vocational schools across Canada. In British Columbia, the Chant Commission Report (1960)

recommended that an institute of technology be established in accordance with the recommendations of the Bridge Report (Chant Commission Report, 1960). The cornerstones for the creation of the British Columbia Institute of Technology were in place.

In 1961 the Advisory Council of B.C.I.T. was formed to advise the provincial Minister of Education on the establishment and continuing operation for this new institute of technology. The two main objectives for post-secondary education and employment were:

1. Students were to be served through two year programs leading to a national diploma of technology and to employment in a career of their choice.
2. Industry was to be served by providing well trained graduates to take their place in the workforce as technicians or technologists and to provide extension classes when updating of knowledge and skills were required.

The report entitled Higher Education in British Columbia and Plan for the Future (1962), prepared by Dr. J.B. Macdonald, developed a framework for today's decentralized college and institute system in British Columbia. The mandate of B.C.I.T. was to have provincial jurisdiction and to provide specialized instruction in technologies and trades in various fields. In 1974, to further the distinctiveness of B.C.I.T., the provincial government awarded the institute a new status by providing it a corporate structure, including a Board of Governors. This position allowed the institute to explore new curricula, to explore new incentives, and to introduce new technological programs. The Colleges and Provincial Institutes Act (1977) initiated other major organizational changes which impacted the institute. Province-wide needs

were more narrowly defined in many programs, resulting in further centralization of specialized instruction. The amalgamation of B.C.I.T. and the Pacific Vocational Institute in 1985 finally centralized post-secondary technological and trades educational programs in British Columbia. This "New British Columbia Institute of Technology" in Burnaby is the only institute of technology and trades offering over one hundred practical, career-related programs in business management, engineering, health sciences, and trades training in British Columbia.

In 1964, the institute's first intake of students was in three major divisions: business, engineering, and health. The health division had two programs, medical laboratory and medical radiography. The remaining eleven of thirteen programs were introduced into this division during the following two decades. Each diploma program now includes technical-clinical courses, basic sciences courses, and general education courses. In every program the student receives clinical experience of varying types, lengths, and locations before being eligible for their Diploma of Technology and eligible to write their program's national certification examination. The School of Health Sciences programs are exclusionary; that is, there is limited access to these educational opportunities due to the high cost ratio of the number of students for each instructor, the specialty curricula, and the specific selection criteria for screening many applicants that apply for admission to a health program. For example, in medical radiography the ratio was four applicants per seat in 1988. One purpose of B.C.I.T. is to provide high quality post-secondary education for residents of British Columbia and Canada. Each program of the School of Health Sciences has specific requirements in addition to English 12 for admission to their

program of studies. All of the programs are oversubscribed with applicants for the educational seats available. Selection criteria must be specific enough to identify the qualified applicant, broad enough to allow for choices for applicants, while maintaining educational standards.

## SUMMARY

Academic criteria have been the traditional pillars for admitting students into allied health programs. Admission criteria should provide an exclusionary environment for applicants to B.C.I.T. because the criteria are deemed to be influential and important in successful completion of an allied health program. High enrolment demands, limited educational seats, and the high cost of programs require more than "educated guesses" or intuitive selection of candidates who are likely to successfully complete their programs of study. Also, the graduate is a reflection of the entry selection criteria to a health care program. Inappropriate selection criteria could result in poorly qualified allied health care practitioners.

Little has been published in Canada about which factors strongly correlate with allied health academic success. The purpose of this study was to gather appropriate data concerning academic factors that contribute to the achievement of allied health students. The results of this research study may help demystify the selection of prospective students who will each successfully complete their allied health programs.

## **CHAPTER TWO**

### **REVIEW OF THE LITERATURE**

## INTRODUCTION

The intent of this study was to examine the nature and strength of relationships between selected high school academic grades and the cumulative graduating average of students in five allied health programs at B.C.I.T.

Specifically, chapter two focuses on a review of relevant literature pertinent to allied health success in the United States. Canadian research literature on allied health success was nonexistent. Discussion of the results of the research studies, discussion of variables which correlate with success, and a summary complete this second chapter.

## REVIEW OF THE LITERATURE

Angus (1972) investigated the relationship between four classes of variables and performance in academic and clinical areas at Ohio State University on 548 subjects from 1969 to 1971. The four classes of variables (totalling 81 variables) which were investigated included both non-cognitive and cognitive measures. Two inventories designed by Ohio State University were used to obtain background information. Personality traits were measured using the Meyer-Briggs Type Indicator and Sixteen Personality Factor Questionnaire.

Cognitive measures included preprofessional academic grades and the American College Test (ACT Composite, ACT English, ACT Social Studies, ACT

Mathematics, ACT Natural Sciences) scores for each student. Academic and clinical performance ranking was obtained from the Academic and Clinical Rating Form.

For both academic and clinical success, the most significant variable was the previous grade point average. Other significant indicators of academic success were chemistry and anatomy grade point averages and the five ACT subtest scores. Non-cognitive assessments were not reported. Ballinger (1976) conducted a study to identify variables most closely related to success of radiologic technologist students on the American Registry of Radiologic Technologists (ARRT) examination. Independent variables in this study were, rank in the high school graduating class, high school English grades, natural sciences and mathematics grades and number of courses, and the ACT Composite and subtests scores. From the School of Allied Medical Professions, Ohio State University, 112 radiologic technology students participated in the study.

The reported Pearson correlation coefficients of variables (see Table 1 in the Appendix) indicate that the variables which correlated significantly with the ARRT scaled score were the high school rank, ACT composite score, and both high school and ACT English.

A regression equation was applied to the total number of research subjects. The variables which contributed significantly to the equation were the high school graduating percentile, the ACT composite score and high school English and ACT English scores.

Lance and Harp (1987) selected 42 nuclear medicine students from the Medical College of Georgia (MCG) to determine which independent variables best



predicted examinee performance in the ARRT Registry examination. Each student was evaluated according to three independent variables, Scholastic Aptitude Test-Math (SAT-M), Scholastic Aptitude Test-Verbal (SAT-V), and MCG cumulative GPA (MCG GPA).

Pearson correlations were calculated between each variable and the ARRT Registry examination, but not reported. Using stepwise multiple regression, the researchers reported that the strongest independent variables were respectively, the MCG GPA ( $r=0.62$ ) and SAT-M ( $R=0.51$ ). When MCG GPA, SAT-M, and SAT-V were used for further regression analysis, the multiple correlation coefficient for MCG GPA and SAT-M increased to 0.70 at a level of significance of 0.05. Complete data were not presented by the researchers.

Winkler and Bender (1989) evaluated the entrance criteria established in 1982 by a selection committee and the Joint Review Committee on Education in Radiologic Technology (1983). From the Mayo School of Health-Related Sciences, 251 applicants from admissions years of 1982 to 1985 were considered. One hundred candidates were admitted to the program, and 74 graduated and were certified by the ARRT. Acceptance of an applicant into the program was determined by an admissions committee using a weighted score. The score was determined by an interview, application form, high school and college academic transcripts, and other non-academic variables (work experience, experience with patients, statement of goals).

Spearman's rank correlation between the individual admission variables and student academic success in the radiography program were calculated for the

graduates (see Table 2 in the Appendix). College GPA, college math and sciences credit hours, Iowa Test of Educational Development (ITED) score, and ACT composite score were significant predictors of program GPA. High school class rank, GPA, mathematics and science GPA, number of semesters of math and sciences, and Preliminary Scholarship Aptitude Test and non-academic variables were not significant predictors of program success.

Katzell (1977) reported on the development of the Allied Health Professions Admissions Test (AHPAT) after gathering data for four years. Several hundred questions were pretested with entering upper division allied health students at three major universities in the fall of 1973. Following analysis and revision, the AHPAT included five multiple choice question format subtests: Verbal Ability, Quantitative Ability, Biology, Chemistry, and Reading Comprehension.

In 1974-75 approximately 2700 applicants from 185 allied health programs representing 33 different allied health specialties took the AHPAT. From this population, the applicants of special interest for this research study were 708 medical laboratory technologists, 15 radiologic technologists, 7 nuclear medicine technologists, and 4 biomedical electronics technologists. Norms for the AHPAT were based on this 1974-75 population who entered 17 upper division programs throughout the U.S.A. The unique nature of the norm group is that it was the entrant population, not the total applicant population.

The reliability coefficient for the five subtest scores of the AHPAT, using the Kuder-Richardson formula 20, ranged from 0.83 to 0.91 showing acceptable levels of consistency. Multiple correlations between 0.31 and 0.84 were obtained between the

AHPAT scores and student grade point averages (GPA) in the first year of different division students at fifteen colleges (n=614). Where insufficient or outdated information was presented on applicants, the AHPAT appeared to a useful tool for assessment of prior knowledge.

Schimpfhauser and Broski (1976) reported the relative strengths of relationship between 11 cognitive measures and the first year allied health program GPA at the School of Medical Professions, Ohio State University. From the fall of 1973, records of 205 students who were admitted to allied health programs were examined. The four selected groups were total of all admissions (n=205), occupational therapy (n=48), physical therapy (n=71), and all other smaller divisions combined (n=86). Independent variables included were the preprofessional GPA, the ACT composite and 4 subtest scores, and the scores of the 5 AHPAT subtests.

Correlations between each first year GPA and variables for all admissions were significant (see Table 3 in the Appendix). The ACT Composite score entered the equation at step 2 ( $R=0.50$ ), and AHPAT Biology ( $R=0.52$ ) at step 3 ( see Table 4 in the Appendix).

Broski, Schimpfhauser, and Cook (1977) investigated the strength of the preprofessional GPA, ACT, and AHPAT to predict the first year grades in the upper division of four selected groups of students.

Research subjects included in the study were physical therapy, occupational therapy, medical dietetics, and all admissions at the School of Allied Medical Professions at Ohio State University. All students that had scores on both ACT and AHPAT were included in the study.

The admissions (n=435) from fall 1975 to 1977 included in the research group successfully completed at least one year, and in most cases, two years of preprofessional college preparation prior to admission.

Eleven independent variables included in the study were preprofessional GPA, 5 ACT scores, and the scores of 5 AHPAT subtests. Pearson correlations were calculated between the first year GPA and each variable. The correlation between each variable and the first year GPA for all admissions (n=435) was significant at the 0.05 level (see Table 5 in the Appendix).

Stepwise multiple regression analysis was performed on the 11 independent variables. The preprofessional GPA entered the equation at step 1 ( $r=0.48$ ). ACT Math ( $R^2=0.26$ ) followed at step 2 and AHPAT Verbal ( $R^2=0.27$ ) at step 3.

Leiken and Cunningham (1980) attempted to reconcile the differences in the usefulness of the AHPAT to determine if the AHPAT was a predictor of success in allied health programs (Katzell, 1977; Broski, Schimpfhauser, & Cook, 1977). In 1977-78 data were gathered from four baccalaureate programs in the School of Allied Health, State University of interest to this study were 41 medical laboratory New York, Stony Brook (n=152). Research subjects of particular interest to this study were 41 medical laboratory technologists.

Independent variables used were preprofessional GPA, type of school previously attended, and AHPAT subtest and total scores. The dependent variable was the graduating GPA. None of the variables for medical laboratory technologists appeared to be significant in predicting the graduating GPA. For the total group (n=152) each of the AHPAT subtest and total scores were significant predictors at

the 0.01 level of significance. Major problems in interpreting the results were experienced because of the incomplete data presented.

Bistreich (1977) conducted a study at Miami-Dade Community College Medical Centre Campus to assess the validity of selection criteria for four allied health programs. Research subjects were 91 entering students in the fall term of 1974. Subjects included 25 dental hygienists, 23 medical laboratory technologists, 25 medical records technologists, and 15 radiologic technologists. Variables studied were the Miami-Dade GPA at the time of selection, high school GPA, high school English and mathematics grades, number of high school natural sciences courses taken, and percentile rank in high school. The dependent variables were the Miami-Dade Community College GPA, and withdrawal and graduation from the allied health program.

Bistreich found that the Miami-Dade Community College GPA at the time of selection proved significant at the 0.05 level for predicting the dental hygiene students final college GPA. The only significant predictors of graduation for the medical laboratory technologists were the high school GPA in English and the natural sciences. No significant academic variables were reported for radiologic technologists or medical records technologists.

## SELECTION OF VARIABLES

There is a common thread running through this study and those reviewed. The assumption operating in this discussion of academic achievement is that many more factors than intelligence contribute to allied health success. It seems that the program of study has little influence in changing the basic personal and intellectual attributes of students. The attributes the student possesses prior to admission become significant determinants in the formula for allied health success.

The aim of this study was to determine, by program of study, the strength of relationship between the allied health cumulative graduating average and each of the program's individual academic prerequisites. Due to limited access of student data, only academic variables were available from the Ministry of Education official transcripts were selected. The dependent variable chosen was the research subject's cumulative graduating average. Independent variables were the pretechnology prerequisite GPA, high school English GPA, high school algebra GPA, and the high school natural sciences GPA's in biology, chemistry, and physics.

## SUMMARY OF THE LITERATURE

In the studies reviewed, the findings indicate that preprofessional grades correlate highly with allied health success. Pearson correlations between standardized college entrance examinations, allied health entrance examinations, high school grades

and allied health success improved the prediction of the candidates graduating average (see Table 6 in the Appendix).

Two major research concerns were the limited number of research subjects and the academic homogeneity of the subjects. Representativeness of the population was questionable. Interpretation of reported findings were difficult because of the incomplete statistical analyses presented by the researchers. Correlational techniques used to analyze the data were both Pearson correlations and stepwise multiple regression. Regression equations were suspect due to the collinearity of the variables that is, shared variances among the variables.

This researcher concentrated on determining which variables correlated significantly with the allied health graduating average. Variables selected were restricted to the data available from the research subjects transcripts. The dependent variable chosen was the B.C.I.T. allied health program graduating average. Independent variables selected were pretechnology prerequisite GPA, high school English 12 GPA, high school algebra GPA, high school biology GPA, high school chemistry GPA, and high school physics GPA.

In chapter two, a review of relevant literature pertinent to allied health achievement, discussion of the research studies, and discussion of variables which correlate with allied health success was presented.

# **CHAPTER THREE**

## **RESEARCH DESIGN AND METHODOLOGY**



## INTRODUCTION

The intention of this study was to examine the nature and strength of relationships between selected high school academic grades and the cumulative graduating average of students in five allied health programs at the British Columbia Institute of Technology. The specific research question was "What is the relationship between selected variables and the academic performance of each student in each program of study?"

Specifically, this chapter focuses on a description of the research subjects, the research design and methodology, and a description of the statistical procedures of the study.

## DESCRIPTION OF THE RESEARCH SUBJECTS

The research subjects for the purpose of this study was not drawn from the target population, the total admissions from B.C.I.T. The accessible population for this study were graduates from five consecutive graduating classes from five allied health programs in the School of Health Sciences at B.C.I.T. These programs were biomedical electronics, medical laboratory, medical radiography, nuclear medicine, and prosthetics and orthotics. The group was a sample of convenience of the five allied health groups in the allied health community, not the total admissions of B.C.I.T.

The only general admission requirement to B.C.I.T. for all programs was high school English 12. Specific program prerequisites from high school varied for admission into each allied health program. Preadmission interviews were conducted in all five programs. Letters of recommendation, the applicant's written statement of goals, work experience, and hospital experience were some of the non-academic selection criteria used for selection of applicants.

An integral component of each of the five allied health programs is a clinical practicum. Students who successfully complete their allied health program receive a Diploma of Technology and are considered a graduate of B.C.I.T.

Each of the five full-time programs in this study were unique with respect to academic and non-academic prerequisites. The time-frame required to complete each programs is two years. A description of each individual program follows:

1. Biomedical Electronics Technology - This two year program prepares students to accept responsibility for scheduled and corrective maintenance and safety inspection of electromedical equipment. Selection criteria include English 12 and a minimum H.S. GPA of 2.3 (based on a GPA of 4.3) in each of algebra 12, physics 12, and chemistry 11 or their equivalent. Graduates are eligible for registration after two years of relevant work experience with both the Applied Technologists and Technicians of British Columbia and the Canadian Medical and Biological Engineers Society. The research subjects in this study (n=88) were graduates from five consecutive graduating classes, from 1984 to 1989.
2. Medical Laboratory Technology - This program provides students with the knowledge required to perform various complex laboratory procedures on

blood samples, tissue specimens, and body fluids. Academic prerequisites are university entrance, which include English 12, algebra 12, biology 12, chemistry 12, and physics 11 or their equivalent. After completion of this two year program, graduates were eligible to write the national certification examination offered by the Canadian Society of Laboratory Technologists. The research subjects included in this study were five consecutive graduating classes (n=270) from 1983 to 1987.

3. Medical Radiation Technology - The program provides a broad base of didactic and clinical experience in all aspects of diagnostic radiation technology, taking and processing of routine x-ray films and performing specialized radiographic procedures for patients. Academic prerequisites include English 12, algebra 12, biology 11, and physics 11 or biology 12 or their equivalent, each with an overall H.S. GPA of 2.3. Graduates of this program are eligible to write the national certification examination offered by the Canadian Association of Medical Radiation Technologists (CAMRT). One hundred seventy-eight students from the graduating classes of 1984 to 1988 were included in this study.
4. Nuclear Medicine - This program prepares students to perform diagnostic imaging procedures and tests on patients, to prepare and inject radiopharmaceuticals, and to be accountable for radioactive materials and quality control procedures. Academic prerequisites include English 12, algebra 12, biology 11, and physics 11 or biology 12, or their equivalent, each with an overall 2.3 H.S. GPA. On successful completion of this two year program,

graduates are eligible to write the national certification examination offered by the CAMRT. The research subjects in this study (n=103) were graduates from 1984 to 1988.

5. **Prosthetics and Orthotics** - This two year program prepares students to design, construct, and fit artificial limbs and orthopaedic braces and supports. Selection criteria include high school English 12, algebra 12, and physics 11 or their equivalent, each with an overall 2.3 GPA. Courses in metalwork and woodwork are recommended. Upon completion of a practicum, students are eligible to write a national certification examination sponsored by the Canadian Board of Certification for Prosthetists and Orthotists. Five consecutive biennial graduating classes, from 1979 to 1989, totalling 32 graduates, were the research subjects.

## RESEARCH DESIGN OF THE STUDY

The research design employed in this study was correlational in nature. Linear multiple regression was used to investigate the relationship among multiple variables and one dependent variable.

The dependent variable for this study was the cumulative grade point average of a student upon graduation from an allied health program from B.C.I.T. Variables included in this study varied with each program's prerequisites.

Variables which correlated with the cumulative allied health graduating average were pretechnology GPA (PTECHGPA), English 12 (H.S.E.), mathematics

prerequisite (H.S.M.), and selected sciences, biology (H.S.B.), chemistry (H.S.C.), physics (H.S.P.). The pretechnology GPA was a composite of English 12 and the technology prerequisites for entry into each allied health program. Mathematics and the specific science courses prerequisites varied with each program. Non-cognitive measures were not included in this study.

Information for each student was obtained from the student's permanent file at B.C.I.T., which included their official high school transcript. To access the data for this study, the following protocol was implemented.

Preliminary meetings with both the Registrar and Dean of School of Health Sciences were held to discuss the collection of data. Permission was granted to access the student's permanent record file for the following programs at B.C.I.T.: biomedical electronics, medical laboratory, medical radiography, nuclear medicine, and prosthetics and orthotics.

Ministry of Education official high school graduation transcripts were used to record the high school performance grades in English 12, algebra 12, and the natural sciences. Student transcripts from the British Columbia Ministry of Education grades were recorded in alphabetical symbols. Other provincial transcripts recorded student grades in numerical percentages and grade point average. To facilitate analysis, the high school grades were assigned grade point values (see Table 7 in the Appendix).

Data from each student's permanent academic file were entered on a computer spread sheet, entered into the mainframe computer, and verified.

## RESEARCH PROCEDURES OF THE STUDY

Due to the nature of the continuous scores of the variables used in this study, zero-order correlations were calculated between the B.C.I.T. cumulative graduating average and each academic variable. These correlations determine the degree with which two variables are linearly related.

Stepwise multiple regression analysis was also used to determine the magnitude of relationship and statistical significance of the relationship between the dependent and independent variables. Stepwise regression was used to determine the 'best' variables in the regression equation, introducing the highest zero-order correlate first, then the 'best' predictor variables in terms of the size of the partial correlation between the criterion variable and the predictor variables not in the equation. Analyses were performed at each step of selection to determine the contribution of each existing variable's potential in the equation as if it were the last to enter. The criteria for entry of variables into the equation were the default values for entry and deletion of variables of the statistical analysis program. The statistical package used to analyze the data for this study was the Statistical Package For the Social Sciences, Version 3.1 (SPSS-X).

## SUMMARY

The essence of chapter three was a description of the research subjects in the allied health programs, the research design and methodology, and a description of the

statistical procedures used to analyses the data. The objective of this study was to investigate the strength of relationship between the cumulative allied health graduating average, and selected high school academic courses which were useful in explaining successful completion of a specific allied health program.

## **CHAPTER FOUR**

### **SUMMARY OF THE RESULTS**



## INTRODUCTION

The findings from each of the five allied health programs are presented in a separate section of this chapter. A short paragraph is used to introduce each research group. Descriptive statistics and stepwise regression analysis complete the statistical procedures for each program of study. The five allied health programs are presented in the following order: biomedical electronics, medical laboratory, medical radiography, nuclear medicine, and prosthetics and orthotics.

### BIOMEDICAL ELECTRONICS TECHNOLOGY

The research subjects in this group were graduates from five consecutive graduating classes, from 1984 to 1989. Eighty-eight students were included in this study.

The descriptive statistics in Table 8 (see Table 8 in the Appendix) revealed that the scores of the variables were all distributed fairly symmetrically, only slightly skewed and platykurtic.

Results of the Pearson correlations between the B.C.I.T. graduating average, and all the variables, except high school English, were significant at the 0.05 level of significance as shown in Table 9 (see Table 9 in the Appendix).

Stepwise multiple regression analysis of the six variables and the B.C.I.T. graduating GPA revealed that the only significant variable was high school algebra

with  $R^2$  of 0.09 ( $p < 0.05$ ). The F ratio of 8.66, was significant ( $F_{1,80} = 3.96$ ). Using all the independent variables except the pretechnology GPA, the analysis yielded the identical results as with using all the variables.

## MEDICAL LABORATORY TECHNOLOGY

The research subjects in this technology included five consecutive graduating classes from 1983 to 1987. A total of 269 student records were reviewed and included in the analysis.

The descriptive statistics presented in Table 10 (see Table 10 in the Appendix) revealed that all of the variables were somewhat negatively skewed and platykurtic.

Pearson correlations between each variable and the B.C.I.T. cumulative GPA were all significant at the 0.05 level of significance as shown in Table 11 (see Table 11 in the Appendix). The pretechnology GPA was the highest correlate ( $r = 0.50$ ) with the graduating average, which was consistent with the literature.

Stepwise multiple regression results indicated that when all six variables were entered into the equation in a stepwise way, only the pretechnology GPA was significant with  $R^2$  of 0.25 ( $p < 0.05$ ). The F ratio of 90.4 was significant ( $F_{2,200} = 2.65$ ). Omitting the pretechnology GPA resulted in the HSCGPA, HSAGPA, and HSAGPA, accounting for 26% of the variance (see Table 12 in the Appendix).

## MEDICAL RADIATION TECHNOLOGY

One hundred seventy-six research subjects from five consecutive graduating classes (1984-1988) were included in this study.

The descriptive statistics presented in Table 13 (see Table 13 in the Appendix) revealed that the variables were somewhat positively skewed and platykurtic.

Zero-order correlation between each the cumulative B.C.I.T. graduating average, and each variable are listed in Table 14 (see Table 14 in the Appendix). All of the variables except high school English and physics were significant at the 0.05 level.

In the stepwise multiple regression findings for both equations, with or without the pretechnology GPA, the strongest independent variables were high school biology, then high school chemistry respectively (see Table 15 in the Appendix). High school biology and high school chemistry accounted for 15% of the total variance.

## NUCLEAR MEDICINE TECHNOLOGY

Research subjects from nuclear medicine technology ( $n=63$ ) who graduated in five consecutive classes, 1984 to 1988, were included in this study.

The descriptive statistics presented in Table 16 (see Table 16 in the Appendix) revealed that the scores for high school English and algebra were somewhat negatively skewed; whereas, the high school sciences were somewhat positively

skewed. The distribution of the student's sciences grades were more symmetrical than English or algebra. All of the variables characteristic curves were somewhat platykurtic.

The findings show that zero-order correlations between the B.C.I.T. graduating average and the pretechnology GPA, high school chemistry GPA, high school biology GPA, and high school algebra GPA were significant at the 0.05 level. High school English and high school physics were not significant variables as shown in Table 17 (see Table 17 in the Appendix).

Stepwise multiple regression analysis using the six independent variables and the B.C.I.T. graduating average revealed that the only significant variable was the pretechnology GPA with  $R^2$  of 0.28 ( $p < 0.05$ ). The F ratio of 23.1, was significant ( $F_{1,60} = 4.0$ ). Using all the independent variables except the pretechnology GPA, stepwise regression analysis revealed that high school chemistry, high school biology accounted for 34% of the total variance as shown in Table 18 (see Table 18 in the Appendix).

## PROSTHETICS AND ORTHOTICS TECHNOLOGY

The research subjects in this technology were graduates from five consecutive biennial classes from 1979 to 1989. The total number of graduates from the inception of the program, 32, were the subjects.

The descriptive statistics presented in Table 19 (see Table 19 in the Appendix) revealed that the scores on the variables were somewhat positively skewed except high school physics (-1.01). This value should be cautiously viewed due to the small number of students included in the data (n=19). High school chemistry and physics tend to be leptokurtic. High school English, algebra, and biology were somewhat platykurtic.

Pearson correlations between each variable and the graduating average were all significant ( $p < 0.05$ ) except high school physics (see Table 20 in the Appendix).

Stepwise multiple regression results indicated that when all six independent variables were entered into the equation, only the pretechnology GPA was significant with  $R^2$  of 0.27 ( $p < 0.05$ ). The F ratio of 10.5 was significant ( $F_{1,29} = 4.81$ ). Omitting the pretechnology GPA resulted in high school chemistry being the sole significant variable contributing 17% ( $R^2 = 0.17$  with  $p < 0.05$ ). The ratio of F 5.76 was significant ( $F_{1,29} = 4.81$ ) as shown in Table 21 (see Table 21 in the Appendix).

The following chapter will present a discussion, conclusions, and research problems based on the findings in chapter four.

**CHAPTER FIVE**

**DISCUSSION, RECOMMENDATIONS, AND**

**PROBLEMS FOR FUTURE RESEARCH**

## INTRODUCTION

The assumption operating in this discussion of academic achievement was that many more factors than intelligence contribute significantly to allied health program success. Success in post secondary undertakings, especially at the college level, appear to depend to a very great extent upon previous academic achievement, personality characteristics, and socioeconomic variables. The present study does not attempt to predict allied health program success. This study investigated the strength of relationship between the cumulative graduating average and various academic subjects.

Selection criteria is becoming more vital to success of allied health institutions. Accountability of the selection process to the applicant is of paramount importance. A study describing an equitable and efficient means of identifying the most promising applicants who were most likely to succeed in allied health at B.C.I.T. has never been conducted. The purpose of this research project was to address this need: that is, identify which entry academic criteria best correlate with the B.C.I.T. cumulative graduating average.

The research literature reviewed for this study reinforces my premise that prior academic success is an important characteristic in determining future academic success. In comparing the results of this study with the literature reviewed, my results paralleled and digressed from the research literature. Similarities were evident between allied health program success and specific subject knowledge in both the

research literature and this study. Differences were evident between B.C.I.T. and the U.S. colleges applicant pool, admission policies, and sources of funding. A discussion of the results of this study and the research literature follows.

## DISCUSSION

Comparing the research literature with this study revealed that all single correlations between the allied health program graduating average and pretechnology grade point average of selected academic variables were significant in both. The preprofessional or pretechnology grade point average was significant in the research literature and in three of five allied health programs when stepwise multiple regression analysis was utilized. Mathematics or algebra were significant variables in explaining the allied health graduating average in the research literature. Consistent with these findings, there was a strong relationship between high school algebra and the cumulative graduating average of students in two of the five programs in this study. The natural sciences were strong correlates of allied health success in both the research literature and four of the five programs in this study. Contrary to the literature, high school English was not significant in any of the five programs. Factors accounting for these differences are varied and can be explained.

The total absence of high school English as a correlate in this study was not consistent with the American literature. Standardized college admission tests were used to evaluate verbal/qualitative skills at a pre-college level. High school English scores used in this study were transcribed directly from Ministry academic records.



English proficiency in this study was evaluated using different criteria from the literature.

Quantitative skills, math and algebra, were assessed in the literature using standardized college or health admissions tests. As with English, high school grades were used in this study.

The natural sciences, biology and chemistry, were evaluated using standardized tests in the U.S. Physics was not included in the battery of tests for the natural sciences. High school physics was included as a variable in this study. No data on the significance of physics was noted in the research literature.

The pretechnology grade point average is an important characteristic that reflects motivation, persistence, and work habits (Rezler,1983). There is a tremendous difference in the significance of the pretechnology grade point average between American colleges criteria and B.C.I.T. policies for admission. Each college entrance battery of tests included a composite of the subtest scores. The scores were then scaled or ranked according to norms. These scores are not a reflection of motivation/persistence and may not accurately represent a student's subject knowledge. American students may qualify for entry into a college on the basis of test wiseness instead of prior subject knowledge. The pretechnology grade point average used in this study were the student's high school grades, not standardized test scores. Pretechnology grade point averages could be different from the standardized test score composite due to the possibility of the effect of teachers and schools attended (Leiken & Cunningham, 1980). B.C.I.T. does not include the pretechnology grade point average in it's admission criteria in any of the five programs surveyed. I

question the significance and value of the college criteria of the standardized test score and as compared to high school grades regarding the completion of an allied health program.

From the literature reviewed, there was no college that was similar to B.C.I.T. with regard to population, admission policies, or sources of funding. B.C.I.T. does not have a diverse group of minorities which could influence the graduating averages of students in allied health programs. The population of the institute is relatively homogeneous. B.C.I.T. does not have an "open door" policy; that is, universal accessibility to all individuals. Allied health prerequisites are clearly defined for each program. Non-academic criteria are incorporated into the selection process. Applicants are accepted directly into their allied health program. Financially, students are self-supporting during their entire training period.

In the U.S. there are no barriers for students who choose to enter college. There is no minimum academic requirement. However, to enter some allied health programs, student's must successfully meet the allied health program entry requirements after the first year of college. Entry into allied health programs is not direct in all colleges, as with B.C.I.T. Another factor that could contribute to motivation and completion of an allied health program in U.S. colleges is federal funding for disadvantaged individuals. Self-supporting students tend to have higher levels of motivation and perseverance.

Results of this study were comparable with the research literature (see Table 22 in the Appendix). The knowledge in a limited number of academic subject areas used in this study can explain academic achievement in allied health professions as

well as the more comprehensive studies conducted in the U.S. The cumulative graduating average of allied health students at B.C.I.T. can be accounted for by using a composite average of prerequisite academic subjects or the grades of a small number prerequisite of high school courses.

## RECOMMENDATIONS

This study attempted to explain the relationship between specific and multiple variables on academic performance in each of five programs in the allied health sciences. The order in which each variable entered into the stepwise multiple regression analysis was not consistent for each program of study. Each program had its own individual character. From the literature reviewed, verbal skills were significant; however, this study did not support this premise. High school physics was not a significant variable in any of the five programs. Those who emphasize the importance of these subjects clearly do not base their decision on empirical studies. Interestingly, high school English is the sole B.C.I.T. prerequisite and high school physics is required in all five programs.

The search for variables, both academic and non-academic that reduce the unexplained variance in the graduating average of allied health students should be continued. Research studies such as this have a narrow perspective, but the issue of appropriate selection criteria requires constant attention and verification.

A factor worthy of consideration in the unexplained variance was multicollinearity among the variables in regression analysis. The increase in the

contribution of each variable in regression analysis was marginal. A certain circularity exists, in that, previous GPA's are used to forecast future GPA's.

Due to the accessible population for each technology being limited to one institution, cross validation studies were not done. Generalization to another institute or college population should be done cautiously, considering all of the selection criteria, not only the academic variables.

### PROBLEMS FOR FUTURE RESEARCH

Valid decision making procedures in the admission of candidates to allied health programs requires more than "educated guessing" or intuition. The selection of the best students from the applicant pool is perhaps the most important element in the whole process of allied health education. Wise selection of candidates into allied health programs includes not only intellectual ability, but also specific personality characteristics, biographical data, and psychomotor skills.

It would be extremely interesting to know if the selection variables used at B.C.I.T. held true in similar colleges or institutes elsewhere in Canada. An in depth study, particularly in biomedical electronics technology and prosthetics and orthotics, would be in order, due to the fact that no previous documented empirical studies were conducted in Canada or the U.S.

Cross validation studies should be conducted to determine the validity and generalizability of the specific academic variables relationship to the allied health graduating average.

Additional studies should be undertaken to review which other significant variables could be included in the selection criteria for allied health candidates. Biographical and demographical data, socioeconomic status, personality factors, and vocational interests should be scrutinized to determine the effect of these variables on the cumulative graduating average of allied health students.

Deserving of careful examination is the presumed importance of high school English and physics as selection criteria. By including these two variables in the selecting criteria, academically sound candidates that may have the potential to become successful allied health professional may be overlooked.

One of the main objectives for establishing B.C.I.T. was to serve industry by providing well trained graduates to take their place in the workforce as technologists. It is hoped that B.C.I.T. policy-makers consider implementing an institute system use of the statistical techniques used in this study in order to increase their knowledge of the selection process of future allied health professionals. Investigating the nature and strength of relationship between the cumulative graduating average of allied health students at B.C.I.T. and preprofessional grades would benefit both students and admissions officers by supplying a piece to an educational puzzle that would help demystify the selection process.

## **Appendix**

Table 1

**Correlation Coefficients of Variables with ARRT Registry Scaled Scores\***

Variables	Correlation**
H.S.'tile Grad. Class Average	0.45
High School English	0.40
High School Math	0.34
High School Natural Sciences	0.32
A C T Composite	0.40
A C T English	0.36
A C T Math	0.29
A C T Social Studies	0.26
A C T Natural Sciences	0.29
<p><b><u>Note.</u></b> *all correlations significant at <math>p &lt; 0.05</math></p> <p>**n=90</p>	

Table 2

**Spearman Correlation Coefficients for Academic Variables With Student****Academic Success (GPA) \***

Variable	Correlation **
College GPA	0.67
College M & S ***	0.46
ITED ****	0.43
A C T Composite	0.34
<p><u>Note.</u> * <math>p &lt; 0.05</math></p> <p>** <math>n = 74</math></p> <p>*** College Math and Science</p> <p>**** Iowa Test of Educational Development</p>	



Table 3

**Pearson Correlations Between Variables With ACT and AHPAT Scores for All Admissions\***

A C T Subtest	Correlation**
English	0.33
Mathematics	0.33
Social Studies	0.27
Natural Sciences	0.33
A C T Composite	0.41
<b>Note</b> *significant at $p < 0.05$ **n=160	

A H P A T Subtests	Correlation**
Verbal	0.29
Quantitative	0.25
Chemistry	0.30
Biology	0.31
Reading Comprehension	0.26
Preprofessional GPA	0.44
<b>Note</b> *significant at $p < 0.05$ **n=205	

Table 4

**Stepwise Regression Results of the First Year GPA With Significant  
Independent Variables\***

Independent Variables	Pre-SAMP, ACT, AHPAT R Square	Pre-SAMP, AHPAT R Square
Pre-SAMP GPA	0.19	0.19
ACT Composite	0.25	n.s.
AHPAT Biology	0.27	0.25
AHPAT Chemistry	n.s.	0.26
Note *significant at $p < 0.001$		

Table 5

**Pearson Correlations Between the First Year GPA and Variables\***

Variable	Correlation**
Preprofessional GPA	0.48
A C T Composite	0.36
A C T Mathematics	0.34
A C T English	0.29
A H P A T Quantitative	0.29
A C T Natural Sciences	0.26
A H P A T Biology	0.25
A C T Social Studies	0.22
A H P A T Verbal	0.21
A H P A T Chemistry	0.20
AHPAT Reading Comprehension	0.18
<b>Note</b> *n=435 **all significant at $p < 0.05$	

Table 6

**Summary of the Literature**

Author	Aim of Study	Variables	Limitations	Findings
Angus	Prediction of academic and clinical success in Allied Health.	Preprofessional Grades, ACT Scores.	Accessible population from one college only.	All Variables Significant.
Ballinger	Prediction of certification exam success for Radiologic Technologists.	High School subjects, ACT Scores.	One group assessed. Small accessible population (n=112). Cross-validation unclear.	All Single Correlations significant. S.M.R. variables significant were H.S.Rank, ACT Composite, H.S. & ACT English.
Lance & Harp	Prediction of success of Nuclear Medicine Technologist on the ARRT certification examination.	SAT-V, SAT-M, & MCG GPA.	Small population(n=42) accessible. Only 3 variables used.	S.M.R. predictors significant were MCG GPA, SAT-M, & SAT-V.
Winkler & Bender	Prediction of ARRT certification success for Radiologic Technologists.	College GPA, College M&S, ITED, ACT scores.	Med. Rad. were accessible population. Limited number of n's (74). One college only.	Spearman Correlations significant College GPA, College M & S, ITED, ACT Composite.
Katzell	Prediction of success for 33 allied health specialties.	Subtests in 5 relevant academic areas.	Accessible population were college students. Small n's for some groups. S. M.R. results not reported.	Single & multiple correlation were significant between AHPAT scores & 1st year GPA's.
Schimpfhauser & Broski	Correlation between 4 groups of student's scores and ACT & AHPAT scores.	Pre-SAMP, ACT & AHPAT scores.	Accessible population for 4 groups limited (n=205). Single year of college admissions only.	All single cor. significant. S.M.R. variables were pre-SAMP GPA, ACT comp. & AHPAT Bio. & Chem.
Broski, Schimpfhauser, & Cook	Prediction of 1st year GPA from pre-prof. GPA, ACT & AHPAT scores of 4 groups of students.	Pre-prof. GPA, ACT & AHPAT scores.	Small accessible population Data was incomplete and difficult to interpret.	All single correl. significant. S.M.R. variables significant were Pre-prof GPA, ACT Math & AHPAT Verbal.
Leiken & Cunningham	Usefulness of AHPAT in predicting allied health success for Med Lab technologists.	Pre-prof. GPA, previous school attended, AHPAT scores.	Limited accessible population for 4 groups (n=152). One institution used only.	None of the variables were significant.
Bistreich	Assess validity of selection criteria in four allied health programs.	Miami Dade GPA, H.S. English, algebra, & math, number of high school sciences, percentile rank in high school.	Ex-post facto model used. Small number of n's for 4 groups. Collinearity of variables.	Significant variables were: Dental Hygienist M.D.GPA; Med. Lab. H.S Eng. & Sc.; none for Med. Rad.

Table 7

**Grade Point Assignments for the Academic Variables**

Grade Point Assignments	Student Course Grades	
	Per Cent	Letter Grades
4.3	90 - 100	A+
4.0	86 - 89	A
3.7	83 - 85	A-
3.3	80 - 82	B+
3.0	73 - 79	B
2.7	70 - 72	B-
2.3	67 - 69	C+
2.0	64 - 66	C
1.7	60 - 63	C-
1.3	58 - 59	D+
1.0	54 - 57	D
0.7	< 54	D-

Table 8

**Descriptive Statistics for Biomedical Electronics Graduates**

Variables	Mean	Std.Dev.	Skewness	Kurtosis	n's
Pretechnology GPA	2.43	0.65	0.58	0.27	87
High School English	2.42	0.76	0.63	-0.08	81
High School Algebra	2.41	0.79	0.23	-0.20	83
High School Biology	2.60	0.83	0.17	-0.62	46
High School Chemistry	2.49	0.81	0.42	-0.12	75
High School Physics	2.31	0.81	0.45	0.15	74
B.C.I.T. Graduating Average	72.3	7.24	0.15	-0.61	87

Table 9

**Zero-Order Correlations Between the Graduating Average and Each Variable for Biomedical Electronics Students**

Variable	Correlation	Number of Students
High School Biology	0.36	46
High School Algebra	0.32	83
High School Physics	0.30	74
Pretechnology G P A	0.28	87
High School Chemistry	0.25	75
High School English	0.09*	75
<b><u>Note.</u></b> * not significant at $p < 0.05$		

Table 10

**Descriptive Statistics for Medical Laboratory Graduates**

Variables	Mean	Std.Dev.	Skewness	Kurtosis	n's
Pretechnology GPA	3.08	0.52	-0.32	-0.10	269
High School English	3.02	0.66	-0.11	-0.24	267
High School Algebra	3.16	0.78	-0.42	-0.89	268
High School Biology	3.22	0.69	-0.44	-0.44	264
High School Chemistry	3.04	0.74	-0.13	-0.85	265
High School Physics	2.92	0.78	-0.06	-0.86	228
B.C.I.T. Graduating Average	71.39	6.87	0.42	-0.58	269



Table 11

**Single Correlations Between the Medical Laboratory Student's  
Cumulative Graduating Average and Each Variable\***

Variable	Correlation	Number of Students
Pretechnology GPA	0.50	269
High School Physics	0.42	228
High School Biology	0.39	264
High School Algebra	0.38	268
High School Chemistry	0.35	265
High School English	0.34	267
<b>Note.</b> * all significant at $p < 0.05$		

Table 12

**Stepwise Multiple Regression Results of the Medical Laboratory Graduates Without the Pretechnology Graduating Average**

Variable	R Square	F Ratio*	Number of Students
High School Chemistry	0.16	16.8	228
High School Biology	0.23	12.2	254
High School Algebra	0.26	9.7	268
<u>Note.</u> *all significant at $p < 0.05$			

Table 13

**Descriptive Statistics for the Medical Radiation Technologists**

Variable	Mean	Std. Dev.	Skewness	Kurtosis	n's
Pretechnology GPA	2.67	0.52	0.36	-0.06	176
High School English	2.81	0.69	0.06	-0.06	176
High School Algebra	2.59	0.72	0.53	-0.16	176
High School Biology	2.86	0.73	0.09	-0.47	152
High School Chemistry	2.50	0.69	0.40	-0.09	154
High School Physics	2.59	0.71	0.47	-0.25	125
B.C.I.T. Graduating Average	72.6	6.39	0.27	-0.78	176

Table 14

**Zero-Order Correlations for Medical Radiation Technologists Between the  
Graduating Average and Each Variable**

Variable	Correlation	Number of Subjects
High School Biology	0.38	152
Pretechnology GPA	0.34	176
High School Chemistry	0.31	154
High School Algebra	0.25	176
High School English	0.15*	176
High School Physics	0.15*	125
<u>Note.</u> * not significant at $p < 0.05$		

Table 15

**Stepwise Multiple Regression Results for Medical Radiation Technologists With and Without the Pretechnology Graduating Average \***

Variable	R Square	F Ratio	No.of Students
High School Biology	0.13	15.0	152
High School Chemistry	0.15	5.6	154
<u>Note.</u> *all significant at $p < .05$			

Table 16

**Descriptive Statistics for Nuclear Medicine Graduates**

Variable	Mean	Std.Dev.	Skewness	Kurtosis	n's
Pretechnology GPA	2.96	0.56	0.08	-0.68	63
High School English	2.92	0.74	-0.23	-0.38	60
High School Algebra	2.96	0.79	-0.13	-0.73	63
High School Biology	3.10	0.68	0.09	-1.07	55
High School Chemistry	2.95	0.80	0.05	-1.08	60
High School Physics	2.79	0.71	0.36	-0.73	50
B.C.I.T. Grad. Avg.	77.65	0.56	0.11	-0.37	63

Table 17

**Pearson Correlations Between the Graduating Average and Each Variable for  
Nuclear Medicine Technologists**

Variable	Correlation	Number of Students
Pretechnology GPA	0.52*	63
High School Chemistry	0.52*	60
High School Biology	0.45*	55
High School Algebra	0.44*	53
High School English	0.23	60
High School Physics	0.22	50
<b><u>Note.</u></b> * significant at $p < 0.05$		

Table 18

**Stepwise Regression Results of the Nuclear Medicine Technologists Graduating  
Average Without the Pretechnology GPA**

Variable	R Square	F*	Number of Students
High School Chemistry	0.26	15.0	60
High School Biology	0.34	6.8	55
<u>Note.</u> * F significant at $p < 0.05$			



Table 19

**Descriptive Statistics for the Prosthetics and Orthotics Graduates**

Variable	Mean	Std. Dev.	Skewness	Kurtosis	n's
Pretechnology GPA	2.42	0.68	0.44	-0.44	33
High School English	2.51	0.80	0.61	-0.69	30
High School Algebra	2.38	0.83	0.22	-0.43	29
High School Biology	2.41	0.90	0.36	-0.72	26
High School Chemistry	2.55	0.80	0.18	0.72	21
High School Physics	2.38	1.17	-1.01	0.12	19
B.C.I.T. Graduating Average	76.7	5.79	0.13	-0.31	31

Table 20

**Pearson Correlations Between the Graduating Average and Each Variable for  
Prosthetics and Orthotics**

Variable	Correlation	No. of Students
Pretechnology GPA	0.52	31
High School Chemistry	0.47	21*
High School English	0.44	30
High School Biology	0.40	26
High School Physics	0.38**	19
High School Algebra	0.37	29
<p><u>Note.</u> * not a prerequisite subject</p> <p>** not significant at <math>p &lt; 0.05</math></p>		

Table 21

**Stepwise Regression Results for Prosthetics and Orthotics**

Variable	R <sup>2</sup> with PTGPA	R <sup>2</sup> without PTGPA	F Ratio*	n's
Pretechnology GPA	0.27	not sig.	10.5	31
High School Chemistry	not sig.	0.17	5.76	31
<u>Note.</u> * significant at $p < 0.05$				

Table 22

Summary of the Research Literature

Author	Aim of Study	Variables	Limitations	Findings
Angus	Prediction of academic and clinical success in Allied Health.	Preprofessional Grades, ACT Scores.	Accessible population from one college only.	All Variables Significant.
Ballinger	Prediction of certification exam success for Radiologic Technologists.	High School subjects, ACT Scores.	One group assessed. Small accessible population (n=112). Cross-validation unclear.	All Single Correlations significant. S.M.R. variables significant were H.S.Rank, ACT Composite, H.S. & ACT English.
Lance & Harp	Prediction of success of Nuclear Medicine Technologist on the ARRT certification examination.	SAT-V, SAT-M, & MCG GPA.	Small population(n=42) accessible. Only 3 variables used.	S.M.R. predictors significant were MCG GPA, SAT-M, & SAT-V.
Winkler & Bender	Prediction of ARRT certification success for Radiologic Technologists.	College GPA, College M&S, ITED, ACT scores.	Med. Rad. were accessible population. Limited number of n's (74). One college only.	Spearman Correlations significant College GPA, College M & S, ITED, ACT Composite.
Katzell	Prediction of success for 33 allied health specialties.	Subtests in 5 relevant academic areas.	Accessible population were college students. Small n's for some groups. S. M.R. results not reported.	Single & multiple correlation were significant between AHPAT scores & 1st year GPA's.
Schimpfhauser & Broski	Correlation between 4 groups of student's scores and ACT & AHPAT scores.	Pre-SAMP, ACT & AHPAT scores.	Accessible population for 4 groups limited (n=205). Single year of college admissions only.	All single cor. significant. S.M.R. variables were pre-SAMP GPA, ACT comp. & AHPAT Bio. & Chem.
Broski, Schimpfhauser, & Cook	Prediction of 1st year GPA from pre-prof. GPA, ACT & AHPAT scores of 4 groups of students.	Pre-prof. GPA, ACT & AHPAT scores.	Small accessible population Data was incomplete and difficult to interpret.	All single correl. significant. S.M.R. variables significant were Pre-prof GPA, ACT Math & AHPAT Verbal.
Leiken & Cunningham	Usefulness of AHPAT in predicting allied health success for Med Lab technologists.	Pre-prof. GPA, previous school attended, AHPAT scores.	Limited accessible population for 4 groups (n=152). One institution used only.	None of the variables were significant.
Bistreich	Assess validity of selection criteria in four allied health programs.	Miami Dade GPA, H.S. English, algebra, & math, number of high school sciences, percentile rank in high school.	Ex-post facto model used. Small number of n's for 4 groups. Collinearity of variables.	Significant variables were: Dental Hygienists-M.D. GPA; Med. Lab.-H.S.Eng. & Sc.; none for Med.Rad.
Triska	Correlation between six variables and CGA in five programs at B.C.I.T	Pretechnology GPA, H.S. Eng., algebra, biology, chemistry, & physics	Accessible population from B.C.I.T. Five groups only. Small number of n's for three groups.	Significant variables were: PTGPA, H.S. algebra, & H.S. sciences. H.S. Eng. not significant.

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