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A comparison of the predictive ability of selected variables upon success on the American Society of Clinical Pathologists Medical Technology Registry Exam

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"A COMPARISON OF THE PREDICTIVE ABILITY OF SELECTED VARIABLES UPON SUCCESS ON THE AMERICAN SOCIETY OF CLINICAL PATHOLOGISTS MEDICAL TECHNOLOGY REGISTRY EXAM."

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by

Carmine Thomas Somma, Jr.

November 8, 1988

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CHAPTER 1

INTRODUCTION

A) Justification for the Study

Students majoring in Medical Technology take two years of pre-professional courses before applying to Medical Technology programs for their final two years of college. Upon receiving their baccalaureate degree, they then qualify to take the national registry exam given by the American Society of Clinical Pathologists. Once they pass this exam they are then certified to work in hospital laboratories as registered Medical Technologists.

The most commonly used criteria for admission into upper division schools of Medical Technology are the overall grade point average and the science grade point average. A minimum of 2.5 in each of the averages is the accepted standard to even qualify for an interview. There are several inequities in accepting this as an absolute standard since it fails to take into account the following:

1. The quality of the institution where the pre-professional course work was taken.
2. How long ago the pre-professional work was completed.
3. Recent motivation, interest or aptitude for the profession which may not be reflected in past

grades.

4. The effects of grade inflation among institutions or individual instructors.
5. Any detrimental personal circumstances that could have hampered the student's past academic performance, i.e. financial or family hardships.
6. The age and present maturity of the applicant.
7. The positive effects of previous laboratory experience.
8. Course load or job commitments while attending school.
9. The negative influence of former language barriers, weak reading skills, or limited vocabulary that may have since been corrected.

Thus an admission process based strictly upon a cumulative grade point average may indeed be eliminating many otherwise qualified candidates. Since most schools have reported declines in enrollments trends, consideration of other criteria is certainly warranted.

Criteria which have been suggested and occasionally used are the ACT and the SAT scores. There are generally several problems with their use. The first is that these scores are usually not available on transfer students. Most allied health programs are junior and senior level programs thus one can expect a high percentage of transfer students. Second, as either aptitude or

achievement predictors, the ACT and SAT are limited in what they are testing, i.e., generally math and verbal ability. Also since they are in the senior year of high school, the data are not recent and may not accurately reflect the applicants' present background, motivation, or maturity. This would especially be true of older students returning to college.

The Allied Health Professions Admissions Test (AHPAT) was developed in 1972 in order to alleviate some of the problems encountered during the admission processes that depended upon the grade point average and aptitude exams such as the SAT and ACT. The AHPAT tests five areas: verbal ability, quantitative ability, biology, chemistry, and reading comprehension and was first tested during the Fall of 1973.

The present study determined, among other things, whether the AHPAT can be used to predict success on the ASCP exam in comparison to the commonly accepted predictors of grade point average and science grade point average. The data provided the justification to allow alternative criteria for admission in order to enhance access and increase enrollments into medical technology programs.

B) Statement of the Problem (Research Questions)

The purpose of this study was to examine the relationship of the overall grade point average, science

grade point average, and the scores on the Allied Health Professions Admission Test among a group of medical technology students at the time of admission, to their scores on the ASCP Board of Registry exam taken after graduation.

Specific questions to be answered were:

1. Does previous laboratory training and certification exam experience affect ASCP scores in a positive manner?
2. Is there a significant and positive correlation between a student's overall GPA, their science GPA and the ASCP Board of Registry Exam?
3. Is there a significant and positive correlation between the Allied Health Professions Admission Test and its subscores and the ASCP Board of Registry Exam?
4. Is there a significant and positive correlation between the overall GPA, the science GPA, and the AHPAT and its subscores? Which, of the three, overall correlates best with the ASCP Board of Registry Exam?
5. Is there a significant and positive correlation between the science GPA and the biology and chemistry subscores on the AHPAT. If so, can one be substituted for the other?
6. Is the predictive ability of the previous OV/GPA,

BC/AHPAT and subscores related to:

a) Age

b) Sex

c) Ethnic background

d) College background (2 yr. or 4 yr. institution)

e) Previous B.S. degree or none

7. Has there been a decline in the applicant pool, a trend generally accepted nationally, over the past five years based on performance of AHPAT test and the ASCP exam on the sample population.

8. Is there a significant difference in the AHPAT, ASCP, SG and OG in those passing and failing the ASCP exam upon first attempt.

C) Theoretical Rationale

The study re-evaluated currently accepted predictors in the medical technology admission processes. It was assumed that if the AHPAT test or its subscores proved to be better than the commonly accepted predictors, the study would provide for a more current entrance criteria due to its closer proximity to the time of admission than grades received years before.

Finally, an understanding of which of the subscores on the AHPAT served as the best predictors allows the opportunity to better direct remediation efforts at those that are marginal or do not qualify for admission.

Potentially alternative criteria for admission

would enhance access and increase enrollments into medical technology programs without lowering standards.

D) Definition of Terms

OV/GPA - Overall grade point average at the time of admission.

S/GPA - Science grade point average at the time of admission. Only courses designated as biology or chemistry are included, since these comprise the only required pre-requisites prior to admission, and also because the AHPAT has biology and chemistry as part of its subscores.

Certified MLT - Medical Laboratory Technician. These are non-degreed certified laboratory workers who have gone through two years of lab training or associate degree programs. After completion of their program they take a different certification exam by the ASCP. Individuals that are MLT certified and have graduated with their B.S. will be included in the study, but their results interpreted separately if their scores are significantly different due to sensitization from previous exposure to the MLT ASCP certification exam.

Certified MT - Medical Technologist. A baccalaureate degree trained laboratory worker who has successfully passed the ASCP Board of Registry Exam.

ASCP - American Society of Clinical Pathologists. The division of the AMA that directly regulates the certification exam for medical technologists referred to as the Board of Registry, and administered since 1928.

AHPAT - Allied Health Professions Admission Test. Administered first in the Fall of 1973, this test was designed to assess the first two years of college work of applicants applying to upper level health programs. It tests specifically in the areas of verbal ability (VA), math (MA), biology (BL), chemistry (CH), and reading comprehension (RC).

E) Sample Description and Data Gathering Procedures

Data from student admission records from the Medical Technology Program at Old Dominion University dating back to 1980 were utilized. Records prior to this time did not include the AHPAT scores, therefore, served no purpose to this study.

The records were sorted and entered into the

computer for each subject by age, sex, ethnic background, previous college and laboratory training, grade point average, science grade point average, AHPAT scores, and ASCP Registry scores.

F) Limitations of the Study

Correlations and the strength of such correlations were shown by the study between the tested variables and their contribution to success on the ASCP exam. However, since their was no intervention involved in the design, there was no way to prove absolute cause and effect through this study.

Due to the legal protection of the confidentiality and corresponding unavailability of the data, the study was limited to student records from only one institution. Finally, while this study validated the use of predictors of academic success in medical technology programs, this does not necessarily translate into, nor imply, success in the profession.

G) Ethical Considerations

Confidentiality of student records was insured by random assignment of numbers to identify each record. No names or social security numbers were used in the input of the data. All records utilized were locked and maintained within the Records Office of the School of Medical Laboratory Sciences at Old Dominion University. The data were transcribed from the records, without

identification, to standardized work sheets for computer entry and then returned to the locked file. All transcribing was done in the Records Office, Room 209A-Old Science, so no file ever left the room.

The study required review and approval by the School of Medical Laboratory Sciences' Human Subjects Committee, with approval forwarded to the Human Subjects Committee of the College of Health Sciences at Old Dominion University, and to the Human Subjects Review Committee of the School of Education of the College of William and Mary.

CHAPTER 2

CRITICAL REVIEW OF THE LITERATURE

A) Introduction

The purpose of this chapter is to review all current practices and the use of predictors of student success in university based Allied Health Programs, and those specifically in medical technology. The outcome of this search might provide the background for an experimental design that would evaluate the predictive abilities of the Allied Health Professions Admissions Test (AHPAT), its overall score, as well as its five composite scores (Verbal Ability, Biology, Chemistry, Math, and Reading Comprehension) - to the American Society of Clinical Pathologists National Registry Exam in Medical Technology (MT ASCP). Passing grades on this latter exam constituted the dependent variable upon which this study was based, since it is upon this variable that a school's success and those of its graduates are measured.

B) Importance

With the tremendous decline in the enrollments of allied health programs, education institutions are faced with only three choices: increase recruitment, increase retention, or lower admission standards. Increasing recruitment efforts may only provide marginal relief from the problem, because it is increasingly more difficult to

lure potential applicants into allied health--a field whose future job outlook is currently dismal. Increasing efforts at retention may keep the enrollments and the number of graduates stable; however, this stability would be short-lived without new applicants. While few schools have, as yet, lowered admission standards, all have noticed a drop in the quality of those that do qualify for admission. Lower standards may eventually be utilized to maintain enrollments necessary to provide the critical mass needed to keep programs solvent.

This author does not advocate the lowering of admission standards, but he does challenge the standards currently utilized in the profession as being arbitrary, subjective, and even discriminatory. Holter (1) showed that nationally the accepted standard for admission into junior level medical technology programs is an overall QPA of 2.5 and an overall QPA of 2.5 in all science courses. The problems with such cut and dried criteria are that they fail to take into account the following:

1. The quality of the institution where the pre-professional course work was taken. Should an individual with a 2.0 from a high ranking institution be eliminated in place of one with a 2.5 from a weak institution?
2. How long ago the pre-professional work was done.

3. Recent motivation, interest or aptitude from the profession.
4. The effects of quality or grade inflation among institutions or individual instructors.
5. Any extraneous circumstances that could have hampered the student's past academic performance, i.e. financial or family hardships, or part-time job commitments.
6. The age and present maturity of the applicant.
7. The positive effects of previous lab experience or hospital exposure in some other job capacity that could add to an individual's motivation and commitment.
8. The negative influence of former language barriers, weak reading skills, or limited vocabulary that may have since been corrected.

While interviews and well constructed application forms will access some of these non-cognitive variables, most often the student that does not meet the minimally established academic standard is denied the interview and any further consideration from enrolling.

Thus declining enrollments may best be offset by a new evaluation of our current admission practices, as well as a look at other variables that may adequately serve as predictors of academic success. The ultimate hope is that schools will not have to lower academic

standards nor arbitrarily deny admission to otherwise qualified applicants.

C) Organization

The researcher surveyed the literature in five primary areas that related to the study. The results of the survey are presented in the following sections of this paper:

1. Background and status of allied health professions.
2. Current enrollment trends in medical technology programs nationwide.
3. Current admission practices in medical technology programs.
4. Use of cognitive and non-cognitive tools are predictors of success in allied health programs, and specifically in medical technology.
5. History, validity and reliability of the AHPAT.

D) Background and Status of Allied Health Professions

The health sciences, in both the clinic and academic setting, are still recovering from the impact of the government's Diagnostic Related Groups (DRG's) which was mandated by law in October of 1983. With few exceptions, all hospitals, as of that date, were to be reimbursed by the federal government with specific

allotments determined by diagnosis. In other words, if a patient were diagnosed as having pleural pneumonia, the hospital would be reimbursed the exact amount allowed by that DRG, regardless of the patient's total bill. The federal government's intent was to curtail any hospital from deliberately increasing a patient's bill with additional and often unwarranted diagnostic tests in order to receive a larger medicare reimbursement (previously based on a percentage of the total patient's bill). Since hospitals would now only receive a set amount for each diagnosis, it became judicious to diagnose, treat and then discharge each patient as soon as possible. This led to a tremendous decrease in the number of diagnostic tests that a hospital could allow and in turn drastically reduced the profits received from departments such as laboratory and x-ray, a situation which subsequently led to a reduction in the number of people employed in those fields. Eventually, as a result of shortened patient stays, the jobs of direct health care providers, e.g. nurses, physical therapists, x-ray technicians and laboratory staff were also reduced. This led to an almost immediate oversupply of health care workers.

Due to a disappearing job market, health science faculty braced themselves for the inevitable: a drastic decline in enrollments nationwide in all health programs.

They are currently experiencing a decline in both the quality and quantity of allied health enrollments. Whereas clinical laboratory science attracted sufficient numbers of students in the past, this is not true today. Persons who were drawn to the "sciences" are now going into areas such as medicine, pharmacy, engineering, and computer science. The applicant pool has definitely decreased.

While some areas were impacted more than others, all were greatly affected, which in turn forced new challenges in marketing and recruitment by health science educators. The situation was further compounded by the federal government when it stopped funding federal grants for the health sciences because of the manpower surplus it had helped to create. In a last ditch effort to maintain financial solvency, the hospital forsook their role as educators in the training of health care providers and closed out not only their own institutionally based schools, but also abrogated all ties with academic programs that depended upon these clinical sites for their students' practical training--training that is both vital as well as mandated by accrediting organizations.

E) Enrollment Trends

Ruth French (2) was one of the first to document the decline in enrollments in medical technology

programs. Her study, which covered the years 1979 to 1981 and preceded the DRG's impact upon enrollments, showed a drop in enrollments from 6400 in 1979-80 to 6025 in 1980-81, a loss of 375 students. Her data show that during the same time period there was a corresponding decrease in the total number of medical technology programs, dropping from 652 (1979-80) to 640 (1980-81). One has to question whether these drops in enrollment were due in part to the loss of the 12 schools she documented. This enrollment drop could have reflected the 53.9% drop in applications which she states the nation's colleges and universities experienced between February 1981 and February, 1982. Since her study precedes this fact, it, is questionable to make such a comparison. Furthermore, this drop among the colleges and universities represented a percentage change in the mean number of applicants of only 2.0%; her data reflects a drop of nearly three times this figure--close to 6%.

While enrollment declines nationwide did have some effect on the decline, the major cause may have been the shift of science oriented students from the health sciences to the more lucrative fields of computer science and engineering at the same time. She did mention the trend that more people 25 and older seem to be entering the health professions. Thus age may be used as an additional predictor (independent variable) in this

study. Finally, she called for a more "careful scrutiny of admission standards to admit more students whose potential are good, but who may not have superior academic achievement records." Thus she called for a re-evaluation of the commonly accepted predictors: the purpose of the proposed study.

Karni, et.al (2) also cite, but without data, a decline in the quality and quantity of applicants to the profession. They list as a cause the reason mentioned above, namely that science oriented individuals are going into more financially lucrative areas such as medicine, pharmacy, engineering, and computer science. Aside from this, the authors state that fewer opportunities exist for employment in the health fields for reasons cited earlier. They also state that because of high costs, hospital based teaching programs are phasing themselves out for they can no longer afford to have clinical instructors who must also provide patient care. While this may limit the availability of future sites for university based students to do their internships, the closing of the hospital based schools should enhance enrollments of the university based programs.

Janet Brown, et.al. (4) mentions trends occurring at her institution, Wayne State University, by stating that a greater number of academically weaker students are applying, and attributes this to the rapidly rising rate

of attrition at her institution. Her institution has not lowered entrance grade point average requirements but has attempted to test the effects of remediation through a workshop designed to strengthen study skills and motivation. Although the authors claim that the workshop proved worthwhile, there was no comparative data to substantiate the conclusion. Two out of seven participants were eventually dismissed for academic reasons. If this retention rate of 71% is deemed a success by them, what was the retention rate prior to the time of the study? There was also no control group for the research nor random selection of candidates. All students with a GPA of less than 3.0, which seemed high, were required to attend the workshop. The article is replete with statements that due to lack of any substantiating data imply pure conjecture.

The article's only real value is its outline of the topic areas in the workshop. Such proficiencies as listening skills, note taking skills, library skills, time management, test taking methods, and reading skills could conceivably be important variables and possible predictors of academic success and should warrant further study.

One final point about the paper by Brown, et.al. is that the authors attribute the poor retention of these students to a lack in the basic skills in science and

mathematics which they state are crucial to academic success. They cite no literature to substantiate their statement that skills in math and science are predictors of academic success, even though such does exist. Moreover, despite their assertion, their workshop in no way addresses remediation in the areas of math or science.

Newer data on enrollment trends is available. Harriet Rolen - Mark (5) supplies survey data on several health programs from the height of the aftermath of DRG's in 1984 and 1985. With a survey return rate of 83% for schools of medical technology, she shows that 9% of medical technology programs have been closed or are on an inactive status. Total enrollment for 1985 declined by 18% over 1984, and more than 50% of the respondents commented on the decreased quality as well as quantity of the applicants.

The annual report of the accrediting organization of medical technology programs (6) also provides information about enrollment trends. It represents the most accurate accounting of programs, enrollment trends and program closings by geographic location. Since all schools must submit such data annually to The National Accrediting Agency for Clinical Laboratory Sciences (N.A.A.C.L.S.) in order to maintain accreditation, this data is not based on surveys and thus unaffected by

respondent response rate.

As of April, 1986 there were 550 schools of medical technology of which 436 or 74% were hospital based. The remainder, or 114, were university based and represented the remaining 26%. This represents a drop of 4.4% from the 575 total programs that existed a year ago, and nearly a 18% drop in the number of programs (670) that existed in 1982. What is of particular interest is the fact that out of the 119 schools that have been phased out, 113 of these, representing 95% of the total, were hospital based programs. Only 6 or 5% of the schools closed were university based. This represents a close ratio of nearly 20:1 of hospital based to university based programs. Thus the data supports the conclusion that it is mainly the hospital based programs that were most directly affected by the DRG's.

As for the reasons cited by the institution for closing, 57 hospital based schools closed due to budget restrictions, 24 cited the negative impact of the DRG's, 23 closed due to declining enrollments and inability to find quality students, and the rest gave no reason. Of the university based programs, 4 closed for financial reasons, 1 as a direct result of the DRG's, and 1 due to insufficient clinical sites, no doubt due to hospital cut backs.

Thus is the present state of hospital and

university based schools of medical technology. The data, though grim, calls for a rigorous look at recruitment methods, retention intervention, and a re-evaluation of present admission standards.

F) Current Admission Practices in Medical Technology

The accrediting agency for medical technology programs, NAACLS (7), has dictated some guidelines concerning admission policies and procedures for medical technology programs. They state "quantitative admission criteria may include such components as grade point average, completion of courses in specified subjects, and standardized aptitude tests. Qualitative criteria may include assessments of interviews, recommendations, statement of career goals written by the applicant and health status." As one can note, these criteria are general enough to allow programs a great deal of flexibility in establishing specific standards of admissions.

The latest and most comprehensive data on admission standards in medical technology programs is found in the Holter text (8) published in 1984. With a return rate of 70%, her survey shows that most educators believe that the best predictors of academic success in medical technology are grade point average, aptitude test scores, the interview, and letters of recommendation. She states the strongest predictor for success in professional

programs appears to be the grade point average, but cites no data to support this. She then goes on to note that as a consequence of grade inflation, admission committees find this criteria an increasingly unreliable tool for determining differences between students. Her survey showed that for all types of programs the minimum grade point average ranged from 2.0 to 3.5 on a 4.0 scale, with the mean cumulative grade point average for all geographic district surveyed as 2.5. Of all programs surveyed, 87% use the cumulative grade point average in admission and, in addition, 82% use the science grade point average. The values for the science grade point average range from 2.0 to 3.5 also on a 4.0 scale for all programs surveyed. It was interesting to note that 2% of the programs required a different grade point average for out-of-state students than they did for in-state students. As might be expected, the out-of-state applicant was required to have a higher grade point average. She states "a minimum cumulative and science grade point average of 2.5 on a 4.0 scale for student selection is recommended. This value appears to be the level for selecting an adequate number of applicants who are capable of successfully completing the program." This statement is totally unsupported experimentally and cannot be deducted from the data she acquired.

Concerning the use of aptitude or admission tests,

her data shows that most medical technology programs do not use either as an evaluation tools or as a standard in the admission process. Only 16% use college entrance examinations, such as the SAT or ACT. This low percentage is no doubt due to the fact that the data would be several years old by the time a student applies for admission to an upper division allied health program. Four percent of the programs use other tests, such as the Graduate Record Examination and the test of English as a foreign language TOEFL, as well as the Stromberg Manual Dexterity Test. It was of interest to note that only 7% of the medical technology programs surveyed use the Allied Health Professions Admission Test (AHPAT). In spite of this low number, she recommends that such programs should considered adding the AHPAT to their admission criteria since it was designed specifically for that purpose.

The interview is the primary opportunity for the assessment of motivation according to Holter, yet only 49% of the medical technology programs surveyed interview all applicants, while 50% screen the applicants first by grade point average. Those that fail to meet the minimum standard are thus denied an interview and, therefore, excluded from any further consideration for admission. Thus, we can see that in at least 50% of the programs the minimum grade point average out-weighs all other

considerations in an applicant's credentials. Using such rigid standards, programs may indeed be excluding applicants that have the abilities to achieve success. Niebuhr et.al. (9) did a study of medical students and demonstrated that students who had more maturity and non-academic achievement performed better clinically than those with higher grade point averages. Shepard (10) indicated that several studies showed pre-admission interviews to be better predictors for clinical year performance than traditional academic pre-admission predictors. Murden, et.al. (11) in their investigation of 458 medical students showed a stronger association between clinical success and non-academic measures than between clinical success and grade point average. This combined data seems to indicate the need for assessing predictors other than grade point average.

The fact that some programs don't require the interview for all applicants is due not only to time considerations, but also to the fact that most perceive the interview to be too subjective in nature. In an attempt to reduce some of this subjectivity Vojir et.al. (12) applied the ICARE model of performance evaluation in their interview process. In the ICARE model two major components of performance evaluation are developed: (a) a behaviorally anchored measurement instrument that is derived from a set of defined non-cognitive criteria and

(b) interrator uniformity that results from rater training. The faculty identified seventeen behaviors considered essential for academic success in the medical technology program. This new method of interviewing was compared with the older method against various success variables such as total clinical grade point average, final comprehensive scores on a test designed by their institution, and the ASCP Exam. The correlation coefficient between the old interview method and the success variables ($n = 25$) was 0.32 ($p > .05$) while the ICARE system students ($n = 17$) showed a correlation coefficient of 0.95 ($p < .049$) against those same variables. While this shows an approximately nine-fold increase between the old method and the ICARE based interview system, one has to be cautious in the interpretation of this data due to the small numbers of students used in the study. There were 25 using the old interview method and seventeen using the new ICARE system. In spite of the small numbers it is encouraging to see an attempt to take a largely subjective process and try to convert it into something that is competitive with academic performance variables as an indicator of successful student performance.

Bobek, et.al. (13) describe a pre-interview rating form used to determine whether an applicant should be interviewed. The pre-interview score was calculated on

the basis of the science score and other factors. Points were given for these other factors which included letters of reference, college entrance examination results, overall cumulative average, college background and other information derived from the application form, e.g. academic honors, offices held, or leadership functions in high school activities. Points were even assigned on the basis of the kind of college attended.

While several more criteria were utilized in their admission process, all criteria were given arbitrary designations and limits. The entire paper totally lacks any justification as to how these limits were established. For instance, the authors state the overall cumulative average and the cumulative average for science courses must be at least a 2.5 on a 4.0 scale, also without any justification as to how they arrived at that numerical average. The science score and the other factor scores must total a minimum of 20 in order for the applicant to be interviewed. This minimum score of twenty was based on a retrospective review of the previous class minimum. The entire paper presents a very complex and arbitrary approach to the admission system. It seems as though it would be an extremely time consuming process and one not warranted in a program that only takes six students annually as does theirs.

An equally subjective approach was detailed by K.

Welch (14). Her system consists of two sets of entrance requirements. One was cognitive, listing the minimum academic qualification, while the other was affective. She attempted to factor in such considerations as whether or not the students worked part-time, any family responsibilities the person may have had, the number of hours carried each semester as well as the quality of the institution they were coming from. She attempted to gauge such subjective criteria as attitude, appearance, self confidence, maturity, etc. The paper is totally without any validity and lacked any data to substantiate the criteria utilized in trying to measure the affective domain.

These past two approaches, though falling far short of their purpose, did indeed attempt to base the admission process upon something other than grade point average. They at least recognized and signaled a need to look for more accurate predictors of academic success.

G) Predictors of Success in Allied Health Professions

Lanier (15) studied the relative contribution of two achievement measures and five aptitude measures in determining three measures of academic performance. The two achievement measures were the entering overall grade point average and the entering science grade point average. The five aptitude measures included the Otis Quick Scoring Mental Ability Test and the Nelson-Denny

Reading Test, which was further divided into its vocabulary subscore, comprehensive subscore, combination subscore and reading rate subscore. These are compared with three dependent variables which included the overall grade point average on graduation, the ASCP Board of Registry Examination score and a comprehensive institutional examination, which was similar in content to the ASCP Exam.

Their data showed that the most efficient single predictor of national certification examination performance was the Otis Test score and the most efficient combination was the Otis Test score which accounted for 13% of the variance and the science grade point average which accounted for an additional 12% of the variance. Thus they were able to show that a combination of achievement as well as aptitude measures provided the best prediction of certification examination performance, with both accounting for approximately 25% of the variance. It was interesting to note that the contribution of overall grade point average to the certification examination performance was negative.

The most efficient single predictor of their certification ASCP examination performance was the science grade point average, and the most efficient combination was the science grade point average which accounted for 15% of the variance and the Otis Test score

which accounted for additional 12% of the variance. One has to interpret this final data with caution because this comprehensive examination was made by the institution and there was no data indicating its validity or reliability.

Love et.al. (16) in 1982 attempted to test the validity of grade point average as a predictor of student success on the ASCP exam and upon a comprehensive exam developed by the researchers. Their data shows a correlation of r = 0.44 of the entering grade point average when compared to the Registry Exam and then r = 0.43 of the science grade point average when compared to the Registry Exam. The correlation coefficients were slightly less for those same grade point averages when compared to their comprehensive final exam. The authors interpreted their data by saying the GPA appears to be a significant predictor of the student success on both their comprehensive examination and the Board of Registry Examination. Yet, they go on to say that the student's score on the comprehensive examination did not correlate highly with his or her success on the Board of Registry Examination and cited a correlation coefficient of r = 0.41. It is unclear how such an conclusion could be derived since there is basically very little difference in any of the correlation coefficients. The authors then go on to compare the grade point averages upon graduation

versus the comprehensive exam and the Board of Registry Examination and obtain r values equal to 0.62 and 0.59 respectively. While this may show a higher correlation, this data does not seem significant because if the purpose of the study is to try to produce a predictor, a grade point average upon graduation cannot be a predictor for program applicants. Thus to use their logic, it appears that this research indicated just the opposite: i.e., that basically the grade point average overall as well as science grade point average were not significant predictors of success on the Board of Registry Exam.

Another problem is the deletion from the final data of the 23 students who did not complete the program. Of these 23, 10 failed scholastically; therefore, they did not take the final comprehensive ASCP Exam. Yet all had the required 2.5 point grade average upon admission. Deletion of these 10 student would have to throw a positive bias into data based only on a total population of 179. These 10 would have represented over 5% of the total population studied.

In an earlier study Aldag and Martin (17) worked with the ACT Exam as a predictor. They studied a sample of physical therapy assistants and reported that the composite score on the ACT was higher for graduates than for dropouts. They found that 20% of the graduates had ACT composite scores of 22 or above, while 20% of the

dropout group had composite scores of 15 or lower.

Aldag (18) went on to study what correlates existed, if any, between the medical laboratory technician ASCP Registry Exam, ACT scores and its composites: age and high school rank. The ACT exam is similar to the SAT and is comprised of 4 sections as well as a composite score. The 4 sections are english, mathematics, social science and natural science. His results showed that the college grade point average and the ACT natural science scores entered into the regression equation significantly to yield a multi-correlation of 0.53 which predicted 28% of the total variance. Age did not emerge in the study as a significant variable and neither did high school rank.

Kling (19) studied the relationship between college grade point average and the ASCP-MLT Registry Examination scores and found a significant correlation between them. Miller and colleagues (20), in turn using the SAT exam, found that the SAT variable scores, age and college GPA correlated significantly with the ASCP-MLT exam. Reid and Feldhausen (21) found a significant correlation between the SAT, age and the examination scores on nursing licensure exams.

The previous demonstrates the value of aptitude exams as predictors of success in health programs. The predictive ability of these measures is enhanced with the

use of other variables or in combination with other variables such as age and grade point average. Blagg et.al. (22) went on to look at non-academic predictors. Their study was designed to determine whether two personality variables, cognitive style and leadership style, contributed significantly to the ability to predict clinical grade point average as well as ASCP Board of Registry scores for medical technology students. Their test of the personality variables included Tuckman's Interpersonal Topical Inventory, the Rokeach Dogmatism Scale, the Hidden Figures Test, and the Leadership Behavior Description Questionnaire. The independent variables included:

(a) Integrative Complexity

(b) Dogmatism

(c) Field-Independence-Dependence

(d) Initiating Structure

(e) Consideration

(f) Cumulative Grade Point Average

(g) Science Grade Point Average

The dependent variables included:

(a) Clinical Grade Point Average

(b) ASCP Board of Registry Scores

Their data showed that only two of the independent variables were significant predictors of the ASCP Board of Registry Exam course. They were the cumulative grade

point average which explained 24.48% of the variance in the Registry scores while consideration explained an additional 36.28% of the variables.

There were two problems with their approach. They showed a strong correlation between the science grade point average and the cumulative grade point average, r = 0.88. Based upon this they dropped the science grade point average from further consideration. It would have been important to have kept them both separate and independent to see which one correlated the highest. They also gave no explanation as to why they favored the overall grade point average over the science grade point average. The second problem was that they made several conclusions in data based upon a sample population of only 24 students. Despite these drawbacks the results indicated that while cumulative grade point average seemed to be the strongest predictor of success in both clinical course work and the ASCP Board of Registry examination, personality variables were also predictive of success and, therefore, should also be taken into consideration.

In an earlier paper Blagg (23) tried to determine whether learning style variables as well as cognitive style were predictive of success in graduate allied health education programs. Three cognitive style measures were used: integrated complexity, dogmatism,

and field-independence-dependence. Learning style preferences were measured by Canfield's Learning Styles Inventory. Academic success was measured by scores on the Master's Comprehensive Examination (MCE). His results indicated that there was no significant relationship between academic success and the cognitive style variables. However, a stepwise multiple regression indicated that 20.44% of the variance on the multiple choice section of the MCE and 41.36% of the variance on the assay portion of the MCE were explained by learning style variables. Thus, learning preference may indeed be also a predictor of academic success in certain types of allied health programs.

Thus, we can see that applicants who are borderline academically, but have the motivation, discipline and other non-cognitive characteristics may indeed successfully complete a program. With the nationwide drop in the applicant pool, it may be to the advantage of allied health programs to consider such alternatives in their selection process.

Tracey and Sedlecek (24) studied the relationship of non-cognitive variables to academic success among blacks versus whites by comparing them to the SAT scores. They utilized seven cognitive dimensions:

(a) Positive Self Concept

(b) Realistic Self Appraisal

(c) Ability to Deal with Racism

(d) Preference for Long Term Goals over More Immediate Needs

(e) Availability of a Strong Support Person

(f) Successful Leadership Experience

(g) Demonstrated Community Service

They developed a non-cognitive dimension test (NCQ) consisting of 23 items. They tested the validity of the NCQ over four years.

Correlation coefficients for each discriminate analysis performed show that all eight factors assessed by the NCQ were predictive of GPAs for both races, especially when used in conjunction with SAT scores for the entire four years. The authors concluded that the NCQ yielded consistent predictions over four years and could be useful in admissions in identifying both white and minority students who are not likely to do well academically.

Some immediate problems that became apparent with the study centered around the sample size of the population: approximately five times as many whites were sampled as were blacks. The samples were all obtained from one large eastern state university. Their conclusions should then have been addressed specifically to the institution they studied and not generalized to all systems of higher education.

Quality point average was the main factor upon which they defined success. No consideration as to major was addressed nor was inclusion of those who dropped out for academic reasons. Only those who succeeded to get through all four years were included in the study. The main value of the study proved to be that within that institution and population studied, the NCQ could provide accurate predictions of grades for both blacks and whites. In fact, these predictors were equal to or better than those utilized in the SAT scores alone. This conclusion needs to be qualified because the study was based only upon those students admitted to the institution; therefore, it was based upon those who had average or above scores on the SAT and consequently a more reasonable chance for academic success anyway. A good follow-up study would have been to have acquired NCQ scores on those whose SATs were too low for admission into that institution. This would have provided more effective data on the validity of the NCQ exam in contrast to the SAT.

While we have seen attempts to utilize grade point average and science grade point average to try to predict success on the Registry Exam, Wise (25) studied the correlation between the chemistry grade point average upon entering a program, that would include inorganic and organic chemistry, and compared it with the chemistry

score on the ASCP Registry Exam. She showed that a significant positive correlation of $r = 0.489$ existed between academic achievement, measured by grade point average, and pre-chemistry courses and achievement on the Chemistry Board of Registry Exam. Thus, she concluded that grade point average and pre-chemistry grades were highly predictive of success on the chemistry section of the Registry Exam. Since the chemistry portion of the Registry Exam comprises only 20% of the entire examination score, this study is without merit, for one would not in any admission process utilize only the chemistry scores since they would predict only 20% of what one expects students to be able to produce.

Hospital-based medical technology programs can accept students after three years of college or after four years of college when they have already earned their baccalaureate degree. The effect on the ASCP Registry Examination scores of this extra year of college was studied by Downing, et.al (26). An ANOVA of these differences ($F = 1.525$) is not significant at $p < .05$, therefore, indicates no statistical difference in the average scores between the shorter and longer programs and their effect on the ASCP Registry Exam. They then went on to show that females in their sample performed slightly better than males, but also concluded that this mean difference was insignificant. What's ironic is that

in their conclusions they claim, on the basis of their data, the length of the academic program has little effect on Registry scores and the data seems to substantiate this; but they go on to say that female medical technology graduates perform better academically than males while their data shows that their results were not statistically significant. One would also have to question their unequal sample sizes: they had 116 females in the study and only 15 males. One would also add that the sample of subjects they studied were just those students that applied at the schools. This retrospect study did not randomly sample population of students or colleges; therefore, these results cannot be generalized to other settings.

In conclusion several papers and authors cited significant correlations with r values of 0.4 and even less. An article by Levine (27) who, despite having r values of 0.54 and 0.50, interprets it as having no correlation at all. She correlated the preprofessional science and cumulative grade point averages with the final grade point averages upon graduation of students in her physical therapy program. Despite relatively high r values as mentioned previously, she concludes that there were no strong predictors of performance in her physical therapy program.

Frierson (28) proved the positive effect that test

taking intervention can have upon the performance of the ASCP Board of Registry Exam utilizing 96 medical technology students which were divided into two groups: those receiving intervention and those that did not. The intervention group received a set of six one-hour intervention sessions which incorporated the teaching of effective test taking methods as well as specific subject matter in medical technology. The intervention group had a mean registry examination score that was 80 points higher than the non-intervention group. This difference in the group mean score gave an f value equal to 7.42 which was significant at the $p < .001$ level.

Thus we have seen several attempts at the use of predictors in student selection, allied health, and in medical technology programs, with major emphasis on the academic predictors and some consideration given to those less considered non-cognitive variables, as well as age and race.

H) Allied Health Professions Admission Test

The (AHPAT) was developed, according to Katzell (29), in order to alleviate some of the problems encountered during the admission process by allied health programs. Some of the problems that this test attempted to alleviate concerned the use of SAT and ACT exams. These did not always accurately reflect aptitude for students entering an upper level allied health program in

their junior year since these tests were taken primarily in the senior year of high school. Furthermore, they were often unavailable, especially for transfer students. She goes on to claim that the longer the elapsed time from the predictor to the criteria for admission, the greater the potential for inaccuracy. While there is no proof nor data to substantiate this statement, it does seem logical that those additional two years would have an effect on a student's maturity and study skills, therefore, an aptitude test taken at that time might provide a better indicator of academic success.

Another problem this test was designed to alleviate is the total reliance upon the grade point average which Katzell claims can be inflated and thereby of no significance when comparing it to students coming from different academic institutions. The AHPAT, therefore, was designed to eliminate the effect of grade inflation and thereby provide a more accurate indicator of a student's aptitude, regardless of the quality of their academic institution.

The AHPAT consist of 5 areas: (1) verbal ability, (2) quantitative ability, (3) biology, (4) chemistry, and (5) reading comprehension. Several hundred questions were pre-tested on entering upper division allied health students at 3 major universities during the Fall of 1973. Following item analysis, these questions were then

selected for inclusion in the first form of the AHPAT which was given in 1974. During 1974-75 approximately 2,700 applicants took the test. The largest numbers were applying to medical technology, physical therapy, and physician assistant programs. By 1977 over 6,000 students were taking the test. Most of those tested were either sophomores or juniors in college.

The reliability of any test pertains to the consistency with which it tests. The validity of a test is the extent to which those results provide a valid measure of what they are being used to measure. The reliability coefficients for the five parts of the AHPAT obtained by the use of the Kuder-Richardson Formula 20, ranged from 0.91 to 0.83, thereby showing satisfactory levels of consistency. The validity of the AHPAT was determined by continued follow-up on programs that used it and by analyzing information on their students. Multiple correlations ranged between 0.84 and 0.31 between AHPAT scores and the grade point average at 15 colleges for students who entered in 1975. In all instances the multiple correlations were significant beyond the 0.01 level (thus, showing some validity of the AHPAT in regards to its comparison to grade point average). The author goes on to point out though that where the correlation between pre-grade point average and allied health point average exceed 0.80 the AHPAT will

not make a significant improvement in the accuracy of the prediction. However, in those programs, and there were eight overall, where correlation between the GPA and allied health GPA was 0.6 or less, the addition of the AHPAT made a distinct impact on the prediction of academic success. It was interesting to note that medical technology was included in this group.

One interesting aspect of this paper was the follow-up of students who were dropped from programs for academic reasons. Taking the three largest specialties which included medical technology, physical therapy, and physicians assistant, the mean AHPAT scores of those who were dropped for academic reasons were significantly lower than those of students who remained in the programs. While it would have been useful to have a regression equation involving the variables studied included, overall the paper made a strong case for the use of the AHPAT or at least as a logical alternative to some of the other predictors.

Schimpfhauser and Broski (30) provided data that seemed to negate the influence of the AHPAT as a predictor of academic success when compared with other predictors. They investigated the relative strengths and predictive relationship between three cognitive measures. These were the five ACT subscores, the preprofessional grade point average and the five subscores of the AHPAT,

using as their dependent variable the first year grade point average of students in an upper division health program. The students sampled were divided into subgroups that included all allied health admissions, occupational therapy admissions, physical therapy admissions, and another subgroup they called smaller divisions combined. This division consisted of nine departments which included medical technology.

They stated the predictors, should be (a) reliable, (b) valid, (c) acceptable, which concerns itself with the administrative practicality of using the measure, and finally (d) timely, which implies that the measures are comparable among the applicants due to the administration at a common reference point in an applicant's career. They then stated that student grades from different programs posed problems and that standardized tests scores, which are often used, may be unavailable or out of data. This is especially true of transfer students.

Utilizing a total sample size of 205 students, they used the results of the experimental edition of the AHPAT which was administered in September, 1973. Their results showed that when ACT scores were available, the preprofessional grade point average and ACT subtest were stronger predictors than were the AHPAT tests in all cases but one. The one exception was the physical therapy program where the ACT score was a stronger

predictor than the pre-GPA. Overall preprofessional grade point average appeared to the best single predictor when ACT scores were not included. Of particular interest was the fact that the AHPAT biology subtest was a significant contributor in all but three of the eight equations generated. Overall it appeared that ACT subtest scores were more effective as single predictors than the AHPAT subscore in all of the remaining groupings with the exception of the division that included medical technology. In that division while the preprofessional GPA was the most significant predictor the AHPAT biology also contributed significantly.

It is difficult from this data to make any type of conclusions concerning medical technology since it was combined with nine other divisions. This may argue well for a division specific regression equation. Of all the variables studied, there was not one that contributed significantly to all the division groupings. The AHPAT subtest that appeared as a significant predictor most frequently was biology. However, when the ACT scores were not available, the strongest AHPAT test reflected by a partial $r = 0.44$ was the verbal score.

The other problem with the paper was their choice of a dependent variable. The first year grade point average in allied health programs is dependent upon many factors. Students in different programs will have

different courses and teachers and are in such courses over a long span and thus subject to many other influences that can affect their success. I feel these external influences should preclude the use of this as a dependent variable.

Their implications for future research were of interest. They stressed the importance of non-academic factors as part of the selection process, including personality variables. They also suggested longitudinal studies should be undertaken which utilize larger sample and follow-up procedures and that research should be based upon measures of success other than academic performance (i.e. certification, or licensure examinations, professional practice, and technical proficiency).

Thus, as early as 1976 the idea of a dependent variable based upon a certification examination was expressed. It was upon such a dependent variable, that of the ASCP Registry Exam, that this study was based. This test is given twice a year nationally, and a pass rate score is based upon a national average. This provided a far more consistent dependent variable than some of the previous ones that were discussed. This, in turn, would provide a stronger basis upon which to make conclusions about various predictors.

The use of AHPAT test at Ohio State University was

dropped when the same authors in a follow-up publication (31) in 1977 proved its low predictive ability. Here the purpose of their study was directly to determine the relative strength of AHPAT in predicting first year grades in upper divisions of selected allied health BS programs at Ohio State University. The same 11 predictors variables were employed as those utilized in the previous paper. They included the five subtest scores of the ACT, the five subscores of the AHPAT, and the preprofessional grade point average. The student subgroups this time were the (a) physical therapy, (b) occupational therapy, (c) medical dietetics and (d) all total admissions to the allied health schools. They utilized data from the AHPAT exam given in 1973, 74, and 75, giving them a total of 435 complete student records to use in their study. This time in the physical therapy program, the ACT math subscore proved to be a better predictor than the preprofessional grade point average. In the occupational therapy and medical dietetics programs only the preprofessional grade point average was a significant predictor of academic success. The combined data from all undergraduate health programs showed that the preprofessional grade point average was again the strongest predictor variable followed by ACT math and AHPAT verbal respectively. The preprofessional grade point average accounted for approximately 23% of

the variance in predicting first year allied health grades. The ACT math subscore explained only 3% and AHPAT verbal accounted for only 1% of the variance.

Based upon this data their school discontinued the use of the AHPAT examination as an admission requirement. It is because of the wide influence of this study that such a small percentage of allied health and medical technology schools today use the AHPAT. This present study provided a new consideration of this aptitude exam: one that utilized a more reliable and consistent dependent variable, that of the ASCP Registry exam.

CHAPTER 3

METHODOLOGY

A) Population and the Sample

Data were retrieved from the admissions records of the Medical Technology Program at Old Dominion University dating back to 1980 when the use of the AHPAT was first instituted. This provided a sample size of 129 individuals containing the complete data necessary for this study.

Data were sorted into the variables being tested as predictors of success on the ASCP exam. This included such variables as: age, sex, previous college or laboratory training, ethnic background, overall and science grade point average, and results of AHPAT and ASCP scores.

B) Procedures

1. Data gathering methods: Data from the records were transferred to worksheets, randomly assigned a number to insure confidentiality, and entered into the computer from these sheets.
2. Interventions - This was a descriptive study and included no interventions.
3. Ethical Safeguards - This issue was previously addressed in Section I, Part H.

C) Instrumentation

1) Description -

The AHPAT was the instrument studied as to its predictive ability regarding success on the ASCP exam in comparison to the widely used overall GPA and science GPA. The following five areas are tested by the AHPAT.

Verbal Ability: Vocabulary strength, indicative of general ability to handle collegiate studies.

Quantitative Ability: Ability to understand and apply quantitative concepts and relationships; along with verbal ability, indicative of general academic aptitude.

Biology: Principles and concepts in basic biology with major emphasis on human biology.

Chemistry: Problems and principles in elementary inorganic and organic college chemistry.

Reading Comprehension: Ability to read and understand written materials of college textbook style; reading passages and questions are primarily science-oriented.

The five scores are reported in terms of percentiles which compare the applicant's performance with that of entering students who have been admitted to upper division allied health programs throughout the country. The percentiles indicate the percent of entering students whose scores were equaled or exceeded

by those of the applicant in each of the measured areas. Thus, for example, if the number 35 appears above "VA", it means that in the verbal ability section of the AHPAT, the applicant gave the correct answers to more questions than did 35 percent of admitted upper division allied health students, and 65 percent gave more correct answers than did the applicant.

The purpose of the AHPAT is to help predict success in upper division allied health programs to assist admissions officers in their complex task of selecting students. It provides a common yardstick that permits comparison of the educational preparation of the applicants coming from a variety of backgrounds, including various lower division institutions whose grading standards may be unknown.

The information provided by the AHPAT Test Report can and should raise as many questions as it answers. At the very least, the AHPAT makes it possible to see how an applicant compares with peer groups on a standard measure, rather than attempting to equate grade transcripts from varying schools and colleges.

2) Reliability Evidence -

Reliability coefficients for the five parts of AHPAT, obtained by the use of the Kuder--Richardson formula 20, ranged from 0.91 to 0.83, showing satisfactory levels of consistency.

3) Validity Evidence -

The Psychological Testing Corporation reported in 1975 multiple correlations ranging between 0.84 and 0.31 when comparing AHPAT scores and grade point averages in the first year of different upper division majors at 15 colleges. In every instance, the multiple correlations involving the AHPAT were significantly well beyond the 0.01 level, documenting substantial validity.

D) Research Design

Data for the study were retrieved from admissions records on applicants admitted into the Medical Technology Program at Old Dominion University from 1980 to the present. Data on the graduates' scores on the ASCP were also on record. The total sample population was 129.

Instrumentation included the standardized Allied Health Professions Admissions Test administered by the Psychological Testing Corporation and the Board of Registry Exam administered by the American Society of Clinical Pathologists. Grade point averages and personal data were transferred from data sheets that were generated at the time of admissions. ASCP scores of all MLT students, whose results might prove higher due to sensitization from taking a similar exam, were compared with all non-MLT scores to see if there was a significant difference. If the MLT scores had proved to be

significantly higher, then these students would have been excluded from the study. A year by year evaluation of the AHPAT scores was compared to test the widely held belief that there has been a drop in the quality of the applicant pool in students applying to medical technology programs nationally.

Correlations -

	OV/GPA	S/GPA	AHPAT	VA	MA	BI	CH	RC	ASCP
OV/GPA	-								
S/GPA		-							
AHPAT			-						
VA				-					
MA					-				
BI						-			
CH							-		
RC								-	
ASCP									-

*Run above: Male vs Female
Age Groups
College Background (4 yr. vs Community College)
BS degree vs no degree
Ethnic Background (W, B, O, H)
MLT vs non-MLT

E) Specific Null Hypotheses

1. The review of literature (30) showed there was no significant relationship between the scores on the AHPAT exam and the third year grade point average of students in physical therapy,

occupational therapy, and allied health which included medical technology and nine other health programs. Since medical technology was not studied as a separate program, nor was it compared with success of its ASCP Registry Exam scores, this study tested the null hypothesis:

> "There are no significant and positive relationships between the AHPAT in the tested population and their scores on the ASCP exam."

2. Since the population included students already certified as Medical Laboratory Technicians (M.L.T. ASCP), the question as to whether these students in our population would bias our dependent variable in a positive way, was investigated. These students take an exam similar in content and type, but not level, as the M.T. (ASCP). This was investigated by the specific null hypothesis:

> "Previous laboratory training does not significantly affect ASCP test results"

3. Since the overall grade point average and science grade point are overwhelming the most commonly accepted criteria for admissions to programs in medical technology, due to their

predictive ability for success in such programs, the AHPAT and was compared to them, and tested the null hypothesis:

> "The AHPAT does not predict success on the ASCP exam, as does the overall GPA and the Science GPA."

4. Since applicants to 3rd year programs in medical technology have widely different backgrounds in relation to age, previous college experience and type, previous laboratory training, and ethnic background, with some already in possession of their baccalaureate degrees, the influence of these variables on the predictive ability of the AHPAT was studied in testing the specific null hypothesis:

> "Variables such as sex, age, ethnic background, laboratory training, and college experience do not significantly influence the predictive ability of the AHPAT."

5. The nationally accepted hypothesis that there has been a dramatic decline in the quality of the applicant pool into medical technology programs since 1983 has never been proven nor challanged by actual data. Using the AHPAT

scores of applicants to the Old Dominion University's Medical Technology Program, since 1981, this belief was tested by generating the following null hypothesis:

> "There has been no significant decline in the quality of the applicant pool for medical technology programs during the past 5 years as measured by the AHPAT scores."

6. There is a also an accepted belief that males do better on the AHPAT and the ASCP. This belief has never been proven nor challenged by actual data. This study contrasted the AHPAT, ASCP as well as SG ad OG in males and females, in generating the following null hypothesis:

> "There is no significant difference in the scores on the AHPAT, ASCP, and the SG and OG averages between males and females in the population studied."

7. No one has ever defined the lowest numerical value on the OG, SG, or AHPAT obtained that would still predict a student's passing the ASCP exam. In other words, there is no statistical rationale for the commonly accepted 2.5 grade point average and science grade point average required by nearly all

schools of medical technology nationwide. There is even less known about the AHPAT exam in relation to the minimum passing score that would insure success on the ASCP exam. This study tested the following null hypothesis:

"There is no significant difference in the AHPAT, ASCP, SG and OG in those passing or failing the ASCP exam on the first attempt in the population studied."

8. Although limited by sample size, the study investigated if any significant differences existed in the scores on the AHPAT, ASCP, SG and OG among the five races included in the sample population. This tested the specific null hypothesis:

"There is no significant difference in the AHPAT, ASCP, SG and OG among the five races of applicants in the population studied."

F) Statistical Analysis Technique

The hypotheses were tested using the multiple regression analysis, entering the variables in a stepwise fashion as well as Analysis of Variance (ANOVA). The $SPSS_X$ statistical package was utilized.

G) Summary of Methodology

Records on 129 applicants to the Medical Technology

Program at Old Dominion University from 1980 to the present were utilized. Data were categorized by age, sex, ethnic background, previous lab and college experience, overall GPA, Science GPA, AHPAT and ASCP test scores. Specific hypotheses were tested using Analysis of Variance (ANOVA) and step-wise multiple regression analysis to determine the best predictors of success on the ASCP exam (dependent variable). The effects of other variables such as age, sex, etc. were also included.

The Statistical Package for the Social Science ($SPSS_X$), Program Multiple Regression (32) was used. This program computes a multiple regression equation in a stepwise manner, that is, at each step one predictor variable is added to the regression equation. The variable selected is the one which will remove a maximum amount of residual variability from the dependent or criterion variable. Equivalently, it is the independent variable having the highest partial correlation with the dependent variable. The minimum level of significance for including a predictor variable was set at the 0.5 level.

The stepwise regression procedure selects out these variables in the order of their contribution to predicting the dependent variable and provides an index of multiple correlation (R) to show their additive effect. The square of these coefficients indicates the

extent to which the variance in the dependent variable can be accounted for by a number of predictor variables when optimally weighted. In other words, a multiple correlation of .60 can be interpreted as the index for the combination of predictor variables which accounts for 36% of the variance or contribution these variables had in effectively predicting the dependent variable (i.e., ASCP scores).

The r, or partial r, is the resulting individual correlation that a specific predictor variable alone has with the dependent variable after the effects of previous variables are removed. This correlation coefficient generally decreases with each additional predictor since the more highly correlated variables are again, in a stepwise fashion, removed from the total number of variables for inclusion in the equation.

CHAPTER 4

ANALYSIS OF RESULTS

The purpose of this study was to evaluate the predictive ability of the AHPAT Exam to success on the ASCP Board of Registry Exam for Medical Technology students after admission to the junior and senior year program at Old Dominion University. A comparison of the AHPAT to the two most widely used admission criteria, overall grade point average and science grade point average, was also examined as to success on the ASCP exam. Finally, a study was made to test the widely held belief that the quality of applicants to Medical Technology Programs has dramatically decreased over the past 5 years nationwide.

This chapter is divided into five sections:

A. Sample Source and Characteristics;

B. Demographics of Sample Population;

C. Validation for Use of Parametric Statistics;

D. Qualification of the Sample Population;

   1) Applicants from four year institutions vs community colleges

   2) MLT vs non-MLT

5. Discussion of the research questions.

A) Sample Source and Characteristics

Data was retrived from records of students who graduated from the Medical Technology Program at Old

Dominion University from 1980 to 1986. The AHPAT was required of all applicants for admission to the junior year program in 1978. Thus data on graduates prior to 1980 would not include scores of the AHPAT which would be necessary to this study. This produced a sampling frame of 129.

Student records were randomly assigned numbers, entered into a computer data base, and sorted by variables upon admission as to sex, age, institutional background, previous lab training as an MLT, race, whether they already possessed a baccalaureate degree, their overall (OG) and science grade (SG) point average, and the results of their AHPAT and ASCP scores. The variable code list is included in Appendix A.

B) Demographics of Sample Population

The sample population of 129 consisted of 107 females (83.0%) and 22 males (17.0%). This included 15 (11.6%) that were MLT certified and 114 (88.4%) that had no previous laboratory training. Of the total population only 11 (8.5%) possessed a baccalaureate degree upon application, while 118 (91.5%) did not. Ninety six (74.4%) of the applicants applied from four year institutions, including Old Dominion University, while only 33 (25.6%) applied from a two year community college. Their ages ranged from 19 to 41, with a mean age of 22.8. The largest age group represented was 20,

which comprised 46 indivlduals (35.7%) of the entire sample population. The sample population included 105 whites (81.4%), 10 blacks (7.8%), 9 orientals (7.0%), 4 hispanics (3.1%) and 1 student from the mid-east (0.8%). The largest number, 81, were May graduates (62.8%), 39 were December graduates (30.2%) and only 9 August graduates (7.0%). The largest graduating academic year was 1986, which included 23 (17.8%) and the smallest was in 1983 which totalled 14 (10.9%). The average size of a graduating class for the 1980-86 time period was 18.4. Of the 129 subjects graduated, 113 passsed the ASCP exam (87.6%) in their first attempt, while 16 failed it (12.4%). These data are summarized in Appendix B.

A cross-tabulation of race by sex of the sample population (Table 1) demonstrated that of the 105 white students (81.4%), 88 were female (68.2%) and 17 were male (13.2%). The 10 black students (7.8%) were comprised of 7 females (5.4%) and 3 males (2.3%). Of the 9 orientals (7.0%), 8 were females (6.2%) and only 1 was male (0.8%). The population 4 hispanics (3.1%), included 3 females (2.3%) and 1 male (0.8%). There was only 1 male student from the mid-east (0.8%) and no females.

A cross-tabulation of race by whether an applicant had a degree or not upon admission (Table 2), showed 11 applicants with degrees (8.5%), 10 were white students (7.8%), and 1 was oriental (0.8%). Of these, 10 were

female (7.8%) and 1 was male (0.8%), (Table 3).

A cross-tabulation of race by sex for those 113 graduates that passed the ASCP Board of Registry Exam (Table 4) in their intitial attempt revealed that of the 94 white graduates (83.2%), 78 were female (69.0%) and 16 were male (14.2%). The 8 black students (7.1%) that passed consisted of 6 females (5.3%) and 2 males (1.8%). Of the 2 hispanic students that passed (1.8%), 1 was female (0.9%) and 1 was male (0.9%). The only mid-east student in the study passed and was female (0.9%). Overall 93 females (82.3%) passed and 20 males (17.7%).

A cross-tabulation of race by sex of those 16 students who failed the ASCP Board of Registry Exam on their initial attempt (Table 5) revealed 11 white students (68.8%) failed of which 10 were female (62.5%) and 1 was male (6.3%); of the 2 black students (12.5%), there was one female (6.3%) and one male (6.3%). The only oriental student failing was female (6.3%), and both hispanic students (12.3%) were female. Overall, of 16 students that failed, 14 were female (87.5%) and 2 were male (12.5%).

C) Test for the Applicability of Parametric Statistics

In order to determine the applicability of using parametric statistics on the data, a determination of normal distribution was obtained by dividing the skewness by the standard error of the skew, obtained from the

frequency distribution of all variables. If a value less than 2.58 was obtained, then the variable was considered to project a normal distribution. The results of the frequency distribution on this test for skewness are presented in Table 6. All grade point averages, the AHPAT and its subscores, as well as the ASCP, the dependent variable, were normally distributed. Thus the case for utilizing parametric statistics was validated.

D) Qualification of the Sample Population

1) Community college vs four year institution transfers.

The means of the overall grade point averages and science grade point averages from applicants coming from four year institutions and community colleges showed little differences, ($\underline{M}$ = 3.103 and $\underline{M}$ = 3.109, and $\underline{M}$ = 3.047 and $\underline{M}$ = 2.985) respectively. A test for the significance of those differences was determined by dividing the difference of means of the overall grade point average from both types of schools and the difference of the means of the science grade point averages by the average standard error of the means of both sub-groups. Since the results were less than $\underline{F}$ = 1.96, the difference was not found to be significant at the $\underline{p}$>.05 level (Table 7).

Since there was no significant statistical difference in their means, all data from applicants from community

colleges (n=33) and four year institutions (n=96) were combined in order to increase our sample population to 129. The collapsed data of the overall grade point averages of the community college students and those from four year institutions generated a new variable, the overall grade point average (OG). The collapsed data of their science grade point averages generated the new variable, the science grade point average (SG).

2) MLT vs Non-MLT

Of the 129 in our total sample population, 15 were formally trained and certified as Medical Laboratory Technicians (MLT's). These individuals, after a two year training program, take a certification exam (MLT-ASCP) similiar in content, but not level, as the MT graduates take. In order to include these 15 into our data group it was necessary to rule out the possibility that this test taking experience would positively bias our dependent variable, the ASCP exam.

Means on all numeric variables were compared and that data is summarized in Table 8. The means of the MLT (n=15) vs non-MLT's on the ASCP exam (n=114) were 151.2 vs 142.5 respectively. This almost nine point difference proved not to be significantly different [F (1,127) = 2.53, $p>.05$].

Since the higher ASCP scores for the MLT's was not statistically significant to warrant their deletion from

the study, they are included as part of the sample population (n=129) since they would not bias the dependent variable (ASCP) in a significant manner.

While the previous higher ASCP scores on the part of the MLT subjects may be attributed to their previous lab training and certification exam taking experience, the data also showed that, as a group, their AHPAT scores upon admission were higher (331 vs 316). While this could have represented a more qualified student overall, this 15 point difference also did not prove to be statistically significant [F (1,127) = 0.29, p>.05].

The MLT students had science grade point averages that were slightly lower than the non-MLT students (M=2.96 vs M=3.04) respectively. This difference was also found not to be significant [F, (1,127) = 0.28, p>.05].

The MLT students also had overall grade point averages that were slightly lower than the non-MLT students (M=3.03 vs M=3.11) respectively. This difference was also found not to be significant [F (1,127) = 0.47, p>.05].

The results of these data are summarized in Table 9.

E) Discussion of Research Questions

This section states the research question and its respective results.

1. Previous laboratory training does not significantly affect ASCP results.

A analysis of variance (ANOVA) was run on all numerical means for the MLT (n=15) and non-MLT (n=114) applicants. The critical mean, that of our dependent variable the ASCP exam, did show a nine point difference. This difference, M=151.2 vs M=142.5 respectively, proved not to be significantly different [F (1,127) = 2.53, p>.05]. This allowed us to include the MLT graduates into our sample population.

We, therefore, accept the null hypothesis in stating that previous lab training does not significantly affect ASCP results.

2. There is no significant positive relationship between the AHPAT in the tested population and their scores on the ASCP exam.

Using stepwise regression analysis on all numerical variables versus the dependent variable ASCP, the AHPAT was the first variable to enter [F (1,128) = 47.33, p < 0.0001] and explained 27.3 percent of the variance (r^2 = 0.2730). We, therefore, reject the null hypothesis (H_o) in stating that the the AHPAT is the best numerical predictor of success on the ASCP Registry Exam in our study.

3. The AHPAT is not as significant a predictor of the ASCP exam as are the overall GPA and the Science

GPA.

Using stepwise regression analysis, all numerical variables were run by the independent variable, ASCP. These variables included, SG, OG, AHPAT, VA, BIO, CHEM, RC, QA, and age. The first variable to enter was the AHPAT and explained 27.3 percent of the variance (r^2 = 0.2730). The second variable to enter was the SG which explained an additional 14 percent of the total variance. Combined, the two variables explained 41 percent of the total variance (r^2=0.4088.) No other variable met the 0.0500 significance level for entry into the model. We, therefore, reject the null hypothesis (Ho) in stating that the AHPAT proved to be a better predictor than the SG, while OG did not add to the regression equation at all. Since both the AHPAT and the SG proved to be such strong predictors, the AHPAT cannot be used in place of the SG as hoped. These data are summarized in Table 10.

4. Predictors of the ASCP exam do not differ by sex, previous college degree, or ethnic background.

Stepwise regression analysis was run using 8 numerical variables (SG, OG, AHPAT, VA, BIO, CHEM, RC, and QA) versus the dependent variable ASCP, while controlling for race. For the white population (n=105) in the sample (81.4%), the AHPAT entered first and explained nearly 32 percent of the variance (r^2 = 0.3179), with the SG adding second and accounting for an

additional 10.0 percent of the variance (r^2 = 0.4246) with no other variables meeting the 0.0500 significance level for entry into the equation.

These data correlated well when compared to these variables on the total population (N=129) which gave a similar result (r^2 = 0.4088), and also entered into the equation in the same order (r^2 = 0.2730 and 0.4088). These data are summarized in Table 11.

While regression analysis was run on the remaining four ethnic groups, the population sizes of each were too small for the number of variables Black (n=20) (7.8%), Oriental (n=9) (7.0%), Hispanic (n=4) (3.1%), Mid-East (n=1) (0.8%) to lend any meaningful results.

Stepwise regression analysis was next run using the 8 numerical variables (SG, OG, AHPAT, VA, BIO, CHEM, RC, and QA) versus the dependent variable ASCP while controlling for sex. For the female population (n=107) in the sample (83.0%), the SG entered first and explained 27.4 percent of the variance (r^2 = 0.2739), with the AHPAT entering second and accounting for an additional 11.6 percent of the variance (r^2 = 0.3898), with no other variables meeting the 0.0500 significance level for entry into the equation.

These data, despite the reversed entry into the equation, still correlated well when compared to these variables on the total population (N=129) whose r^2

equaled 0.4246. These data are summarized in Table 12. While regression analysis was run on the male population (n=22), the sample size (17.0%) was too small to derive any meaningful results.

Stepwise regression analysis was next run using the eight numerical variables (SG, OG, AHPAT, VA, BIO, CHEM, RC and QA) versus the dependent variable ASCP, while controlling for degreed versus non-degreed individuals upon admission. For the non-degreed individuals (n=118) in the sample (91.5%) the AHPAT entered first and explained nearly 29 percent of the variance (r^2 = 0.2827), with the SG adding next and accounting for an additional 14.0 percent of the variance (r^2 = 0.4250) with no other variables meeting the 0.0500 significance level for entry into the equation.

These data correlated well when compared to these variables on the total population (n=129) which gave a similar result (r^2 = 0.4088), and also entered the equation in the same order (r^2 = 0.2730 and 0.4088). These data are summarized in Table 13.

While regression analysis was run on the applicants who already had baccalaurate degrees (n=11) upon admission, the sample size (8.5%) was too small to derive any meaningful results. We, therefore, accept the null hypothesis (Ho) in stating that the predictors of success on the ASCP Registry Exam do not differ for individuals

who are white, female and possessed no baccalaureate degree upon admission.

5. There has been no significant decline in the quality of the applicant pool in the Old Dominion University Medical Technology Program during the past 7 years as measured by the AHPAT exam upon entrance.

Since regression analysis showed the variables AHPAT and SG to be the best predictors of ASCP scores, $r^2 = 0.3179$ and $r^2 = 0.4246$, respectively the means of each of these variables along with OG were compared by the nominal categories, (BS, sex, race, year and month of graduation, and pass/fail status) with results summarized in Table 14.

The data on the means of the AHPAT scores upon entry into the program were later tested for significance. It was proved that there was no significance difference [F (1,128) = 0.65, p>.05] in the mean scores on the AHPAT exam for those entering from 1980 to 1986, which spans the entire scope of this study. Duncan groupings showed no significant difference in any of the years spanning this study. These data are summarized in Table 15.

We, therefore, accept the null hypothesis (Ho) in stating that there has been no significant decline in the quality of the applicant pool in the Old Dominion

University Medical Technology Program during the past 7 years as measured by the AHPAT upon entrance.

Analysis of Variance (ANOVA) was also run on the ASCP scores by year. These scores did prove to be significantly different, [F (1,128) = 3.93 p<.0013]. Duncan groupings showed significant differences in all years spanning the scope of this study (1980-86). There seemed to be a gradual decline, with the exception of 1984, since 1983. These results are summarized in Table 16.

An analysis of variance was also run on the significance of the means of SG by year of graduation. The SG averages did prove to be significantly different [F (1,128) = 2.21, p> .05] Duncan groupings showed no significance difference in the years 1982, 1985, and 1986 and a gradual decline in SG averages since 1983. These data are summarized in Table 17.

An analysis of variance was run on the means of the OG versus year of graduation. The OG averages did prove to be significantly different [F (1,128) = 2.65, p<.0191], for all the years spanning the scope of this study. A gradual decline in OG begins in 1985. These data are summarized in Table 18.

6. There is no significant difference in scores on the AHPAT, ASCP, SG and OG between males and females in the population studied.

The mean score of males on the AHPAT (M=329.9) versus females (M=315.4) was compared, and 14.5 point difference proved not to be statistically significant [F (1,128) = 0.38, p>.05].

The mean score for males on the ASCP (M=146.8) and females (M=142.8) was also compared. This 4 point difference proved not to be statistically significant [F (1,128) = 0.73, p>.05].

The mean average for males on their SG was M=3.08 versus M=3.02 for females. This difference of 0.06 proved not to be significant [F (1,128) = 0.26, p>.05].

The mean average for the males on their OG was M=3.12 versus M=3.10 for females. This 0.02 difference also proved not to be statistically significant [F (1,28) = 0.02, p>.05].

Duncan groupings showed no significant difference between males and females on any of the variables. We, therefore, accept the null hypothesis (Ho) in stating that there is no significant difference in the scores on the AHPAT and ASCP and the SG and OG averages between males and females included in this study. These data are summarized in Table 19.

7. There is no significant difference in the AHPAT, ASCP, SG and OG in those passing or failing the ASCP exam on first attempt in the population studied.

The mean AHPAT score of those passing the ASCP on first attempt was M=329, while those failing was M=239.6. Analysis of variance (ANOVA) on the means proved that this 89.4 point difference to be statistically significant [F (1,128) = 12.33, p<.0006].

The mean score on the ASCP for those passing was M=148.21 while for those failing was M=110.1. This 38 point difference was significantly different [F (1,128) = 81.91, p<.0001].

The mean SG average for those passing the ASCP was M=3.07, while those failing averaged M=2.70. This difference of 0.37 proved significant [F (1,128) = 7.79, p<.0061].

The mean OG average for those passing the ASCP was M=3.14, while those failing averaged M=2.81. This difference of 0.33 was significant [F (1,128) = 8.77, p<.0037].

Duncan groupings showed significant difference between all variables among those passing and failing the ASCP upon first attempt. We, therefore, reject the null hypothesis (Ho) in stating that there is a significant difference in scores on the AHPAT and ASCP and in SG and OG averages between those passing and failing the ASCP exam upon first attempt. These data are summarized in Table 20.

8. There is no significant difference in the AHPAT,

ASCP, SG and OG among the 5 races of applicants in the population studied.

The mean AHPAT scores for the 5 races included in this study were run by analysis of variance (ANOVA). The differences proved not to be significant [F (1,128) = 2.32, p>.05]. ASCP scores did prove to be significant [F (1,128) = 2.71, p<.0332]. SG averages proved not to be significantly different [F (1,128) = 0.57, p>.05], as did the OG average [F (1,128) = 0.76, p>.05]. Duncan groupings showed no significant difference between any of the races on the four variables run. Concerning the statistically significant ANOVA differences in the ASCP scores by race and the statistically nonsignificant differences based upon the Duncan groupings, this phenomona is possibly a spurious relationship resulting from disproportionate group sample sizes and the statistical manipulation of missing values.

We, therefore, accept the null hypothesis (Ho) in stating that there is no significant difference by race in their scores on the AHPAT, ASCP, and their SG and OG averages. These data are summarized in Tables 21,22,23, and 24.

CHAPTER 5

SUMMARY

The following discussion presents a summary and recommendations for the study. This Chapter is divided into four parts: Summary, Interpretation and Implications, Conclusions, and Recommendations.

Introduction

The purpose of the study was to compare the predictive ability of the Allied Health Professions Admissions Test (AHPAT) against the overall grade point average (OG) and the science grade point average (SG) as a predictor of success on the ASCP Registry Exam. The study was designed to validate the use of the AHPAT as a criteria for admissions in the upper division Medical Technology Program at Old Dominion University in the hope of decreasing the program's total dependence upon the latter two criteria (SG and OG). They are, at best, difficult to evaluate with transfer students coming from four year institutions as well as the community colleges. The AHPAT was designed to act as an equalizer in providing a more recent and reliable measure of background in the areas of quantitative ability (QA), biology (BIO), chemistry (CHEM), verbal ability (VA), and reading comprehension (RC). In addition, this investigation studied the effects of sex, ethnic background, previous lab training, whether an individual

already had a baccalaureate degree upon the AHPAT, SG and OG. The attempt was to see if admission criteria should be interpreted in terms of these variables. Finally, a correlation of the AHPAT, ASCP, SG and OG was made with those passing or failing the ASCP exam on their first attempt. This in turn would give some minimum criteria upon which to judge these measures. The following specific research questions were generated from this purpose:

1. Do individuals that have had previous laboratory training as medical technicians (MLT) achieve significantly higher scores on the ASCP Registry Exam?
2. Do scores on the AHPAT correlate with scores on the ASCP Exam?
3. Is the AHPAT as good a predictor of the ASCP Exam as are the overall grade point average and science grade point averages?
4. Is this predictive ability influenced to any extent by the sex of the individual, their ethnic background, or previous college experience?
5. Has there been a significant decline in the quality of the applicants in the ODU Medical Technology Program during the past seven years as measured by the AHPAT? Is this trend

similar to what other programs are claiming nationally since 1983?

6. Do males and females differ significantly in their scores on the AHPAT, SG, OG, and ASCP?
7. Is there a significant difference in the scores of the AHPAT, ASCP, SG, and OG on those individuals passing or failing the ASCP Exam on their first attempt?
8. Is there a significant difference in the AHPAT, ASCP, SG, and OG according to the race of the applicants?

The sample for the study was 129 graduates from the Medical Technology Program at Old Dominion University, spanning the years 1980 through 1986. The records were randomly entered into a data base that included the individuals sex, age, whether or not they already had a BS degree, their ethnic background, whether they were MLT trained or not, and whether they transferred from a four year institution or a community college. In addition, their science grade point averages (SG) and overall grade point averages (OG) upon entrance were recorded as well as their AHPAT scores and subscores. Finally, their first attempt at the ASCP Exam scores were entered with rotation being made as to whether or not they had passed or failed.

Frequency distributions were run on all variables

and then the data were tested to determine the applicability of using parametric statistics. A determination of normal distribution validated the use of parametic statistica. The next step involved qualifying the sample population, in that there was some question as to whether the MLT's should be used in this study. Since they are certified by the ASCP and take a similar examination, they may indeed have been sensitized towards the MT(ASCP) Registry Exam. Although they scored approximately nine points higher than the non-MLT population, this difference proved not to be statistically significant so their records were added to the study. The data also showed that their AHPAT scores were 15 points higher upon admission. This difference could have accounted for why they placed higher on the ASCP Exam. The fact that these MLT students had lower SG and OG averages seems to support this conclusion.

The OG and SG grade point averages for those transferring from four year institutions and those transferring from community colleges were compared and the differences proved not to be statistically significant; therefore, both populations were combined and this resulted in the 129 total population utilized in this study.

In addressing these specific research questions it was shown that previous lab training did not

significantly affect the ASCP test results. The stepwise regression analysis indicated that the AHPAT was the best numerical predictor of success on the ASCP Registry Exam with the SG for the remainder of the explained variance. The other commonly used admission criteria, the OG, did not add significantly to the regression equation. It was, therefore, shown that the AHPAT was the best predictor of success on the ASCP Registry Exam, over the other more commonly accepted criteria for admissions, i.e., the SG and OG.

The next analysis showed that the order of prediction as well as the explained variance did not differ by sex, ethnic background or in individuals who already had baccalaureate degrees. The study also seemed to refute what is claimed to be occurring nationally: a non-documented belief in the decline of the quality of applicants to medical technology programs. Our study indicated that there was no statistically significant difference in the AHPAT scores in the population study upon entrance into the Medical Technology Program at Old Dominion Univeristy from 1980 through 1986.

While males do score higher on all the admission variables studied, this difference was found not to be statistically significant on those variables or on the ASCP Exam. Furthermore, there was no significant difference in the same variables according to the race of

the applicants, although this study must be interpreted with respect to the low population numbers in some of the race categories.

The study concluded with an analysis of the average mean of those passing the ASCP exam upon first attempt and those failing the exam. There was nearly a 90 point difference in these AHPAT scores. This may generate a minimum criteria for admission into the Medical Technology Program based upon this AHPAT Exam. The differences in the SG and OG averages upon those passing and failing the ASCP exam, although significant, amounted to only a difference of 0.37 for the SG and 0.33 for the OG. This small difference, though significant, is much harder to distinguish among applicants than is the AHPAT. This lends further support to its use in the admission process.

Conclusions

The following review of findings is based upon research questions and methodologies outlined in Chapter 3 and data provided in Chapter 4.

1. Previous laboratory training as an MLT did not significantly correlate with scores on the ASCP Exam.
2. The AHPAT proved to be a significant predictor of success on the ASCP Exam.
3. The AHPAT proved to be the best predictor of

success on the ASCP Exam over the SG which placed second and the OG which did not enter at all into the regression equation.

4. Scores of the AHPAT and ASCP as well as SG and OG averages are not significantly different in those applicants who already possess a baccalaureate degree.

5. There has been no significant decline in the quality of the applicant pool in the Old Dominion University Medical Technology Program as measured by the AHPAT.

6. There is no significant difference in how males and females score on the AHPAT, ASCP, and place on their SG and OG averages.

7. There is a significant difference in the scores of AHPAT and ASCP as well as the SG and OG averages in those applicants who passed or failed the ASCP exam upon first attempt.

8. In the limited population studied, there was no significant difference by race in terms of their means on the AHPAT, ASCP, SG and OG.

Interpretation and Implications

1) Despite previously quoted studies to the contrary, the AHPAT proved to be the best predictor of success on the ASCP exam, the criteria with which all medical technology programs are judged by our

accrediting body. All previous studies combined several health programs together and used as their dependent variable the grade point average of health science majors at the end of their junior year. It is difficult and unwarranted to make judgements about the specific health programs included since the data on the medical technology programs were combined with other unrelated health sciences. In addition, the use of a dependent variable as broad as the junior year average, which is subject to many non-academic influences over the course of an academic year, is equally invalid.

The only measure of the success of any health science program rests on the success of these students on their certification and licensure exams after graduation. This study limited itself to one health science program and included seven years of applicant data. In addition, this study utilized a common dependent variable, the ASCP exam, which in the entire population studied was taken after graduation from the program. This four hour examination constituted a tight dependent variable not subject to the varied influences of time, outside commitments, motivation, personal problems, and capricious grading systems, and other spurious influences to which the junior year grade point

average would be subject. Its use is further warranted by the fact that all states require certification while only 11 require certification and licensure for medical technologists.

The study strongly supports the idea that the AHPAT should be used as an additional admission tool in medical technology programs. The examinations subscores survey an individual's mathematics and science backgrounds, criteria that may be more important in a specialty such as medical technology whose curriculum is more dependent on the "hard" sciences than other specialities which may be more dependent on the social sciences, such as Nursing for instance.

2) The American Psychological Corporation, which authors and administers the AHPAT, presented data without statistical support that males generally do better than females. Data presented in this study indicated that although males did score higher, that difference was not significant. This allows admission committees to view AHPAT on males and females in an equal light and not discount high scores in males and low scores in females as the national norm.

3) The study indicates that individuals applying with baccalaureate degrees score no better on the AHPAT

than those without degrees. This allows admission committees to view the AHPAT scores of applicants with degrees and without degrees equally. This forces a more equitable situation since individuals with degrees are often given preference by admission committees because they assume these individuals have already "proven" their success.

4) Another area where preferential treatment is often given is with the applicant who is laboratory trained and certified as a Medical Laboratory Technician (MLT-ASCP). The present study provided data that indicate that these individuals did not score significantly higher on the MT ASCP Registry Exam, an examination similar in content and scope, but not level, as the one they take upon graduation from their two year programs (MLT-ASCP). While this study suggested that these individuals should be reviewed in the same light as their non-MLT counterparts, further investigation may be warranted in light of the fact that the MLT's scored higher on the AHPAT (331) than the non-MLT (316) applicants.

5) The fact that the data showed no significant difference in the quality of the applicant pool, as measured by the AHPAT exam during the seven years spanning 1980 to 1986, runs counter to the

generally accepted, though never proven, common belief among medical technology programs nationally that such a decline in quality exists. Some programs have explained the poor performance of their graduates on the fact that the better students are entering the more lucrative fields of business, computer science and engineering. Some programs have lowered grade point average entrance requirements in order to maintain faltering enrollments.

While ASCP scores and SG and OG averages did differ significantly by year of graduation, these differences were basically trendless and did not relate to the AHPAT scores which remained stable over the course of this study. One has to consider if this supposed decline in quality is not being used to cover up poor performance on the ASCP exam by the graduates of these programs and also provide a rationale to lower academic standards in order to maintain enrollments. It seems almost contradictory to complain about the poor academic quality of the applicant pool on the one hand and then lower admission standards to accommodate them in order to bolster enrollments. The AHPAT, in providing an additional and much needed alternative to the SG and OG, may obviate the need of these

institutions to lower admission standards.

6) The significantly lower mean scores on the AHPAT and SG and OG on those failing the ASCP exam upon first attempt suggest some bottom minimal acceptable criteria for admission. This variable, when utilized with discriminate analysis, would indicate the pass/fail potential of any candidate. Even this must be interpreted with caution, for these numbers do not always reflect present motivation and commitment to the profession. Of the three, at least the AHPAT provides the most recent evaluation of an applicant's background and aptitude.

7) The factor of race, although limited by the low sample population in some categories, should not be overlooked. The data suggested that futher research into what may be an important variable is certainly warranted. The fact that the verbal ability subscore of the AHPAT proved to be not only the most important predictor of success on the ASCP exam for blacks, it also proved to be the only numerical predictor that entered. This could have far reaching consequences if this outcome is validated in a larger study on minority populations. It could cause a re-evaluation of present numerical criteria and place more emphasis

on the importance of communciation skills in minorities and less reliance upon their mathematic and science backgrounds. It could help redirect efforts at remediation in those marginally qualified or those unqualified who would reapply at some future time. For the problem may be not in their science or mathematic backgrounds, but a deficiency in communication skills. This, in turn, would increase access to minorities, who are greatly underrepresented in medical technology and the health professions in general. This could lead to higher enrollments and increased retention in these programs and thus benefit all.

Recommendations for Further Study

While answering the research questions outlined previously, several additional questions and implications for further research were generated by the study. The following 7 recommendations are suggested:

1) The MLT students scored nine points higher on the ASCP than did the non-MLT applicants. While the point difference proved not to be significantly different, it was of interest to note that this same population (MLT) scored 15 points higher on the AHPAT as well, yet entered the program with lower OG and SG point averages. While this seems to lend even further support to the use of the

AHPAT, the question is whether previous lab training influence scores on the AHPAT in a significant manner. If so, then any minimum AHPAT score required of applicants may need to be interpreted in a different fashion whne applied to those who are not laboratory trained.

2) It was noted that SG and OG averages from applicants from four year institutions and community colleges were not significantly different. In fact, the averages were nearly the same. In actual experience, those that come from the community colleges perform poorly academically during their junior and senior years at Old Dominion University. In fact, the attrition rate due to academic failure is highest among the transfers from the community colleges. It would be of interest to compare the AHPAT scores and its sub-scores from both these populations as well as how well they perform on the ASCP exam. If the AHPAT is significantly different, then more weight should be given to it on transfers from the community colleges, especially if they score appreciably lower on it while demonstrating comparable OG and SG averages. A look at how they compare on the ASCP would also lend more support for added emphasizes on the AHPAT if they score

appreciably different.

3) Evaluation is one purpose of the admission process; a second purpose often involves the recommendations for remediation to those unqualified or marginally qualified. As an extension of the previous study, a closer look at the AHPAT subscores (verbal ability, math, biology, chemistry, and reading comprehension) would provide clues as to where to direct the remediation. Since it was shown that the AHPAT was the overall best predictor of success on the ASCP exam, a rise in any of the subscores would raise the composite score. This study would show in which of the subscores the transfers are scoring the poorest and remediation efforts could then be specifically tailored to and concentrated in a more specific fashion.

A study comparing the means of the subscores on those from the community colleges and the four year institutions would provide the data to support this valuable attempt to reduce attrition in those marginal students and direct remediation for those academically unqualified but who wish to reapply.

4) A study of the difference in the variables studied, by age, would lend useful information. While the mean age of applicants in this study was 22.8, the range extended from 19-41. Since older applicants

are often viewed in a more negative light by admission committees, data supporting no significant difference in the means of numerical variables by age would provide greater support to older applicants or prove that a different interpretation of the AHPAT subscores was warranted.

5) While the study demonstrated that there was no significant difference in the AHPAT, ASCP, SG and OG in the five classes of race studied, this conclusion must be interpreted with caution due to the low population numbers in every race category except the white population. The second largest race population studied, that of blacks, generated data which demands further study in a larger population. Regression analysis on the numerical variables in this population (n=10) indicated that the verbal ability subscore of the AHPAT entered first and explained nearly 67 percent of the variance (r^2 = 0.06665), with no other variable entering at all.

If this could be reproduced in a larger population, then support for remediation in the areas of communication skills could be validated in contrast to the mathematics and sciences, where it is currently being directed. In turn, admission

committees could lend more weight to communciation skills background than strictly to the mathematics and sciences. This may indeed provide the key to decreasing the attrition rate of blacks, the highest of any race, of the Old Dominion University Medical Technology Program, and the most under-represented race in any of the health sciences. For instance, the black population in this study scored 60 points below the white race on the AHPAT who, in turn, scored highest. They also scored lowest on the ASCP, nearly 17 points lower than the white race, and had the highest failure rate of any of the five races studied (20%). It is upon this group that this study could have far reaching effects not only in relation to admission criteria, but also within the areas of remediation and retention.

6) In order to establish bottom line, minimum criteria, on the AHPAT, SG and OG, a formula using discriminate analysis with these variables should be established. This would allow admission committees to utilize these values from each applicant to predict whether they would pass or fail the ASCP Registry Exam. Such results would have to be interpreted with caution since the influence of race has not as yet been clearly

delineated. Once it has been, then an individual's race could be factored in, as in the case for blacks, with more weight given to the verbal ability subscore of the AHPAT, as indicated by the limited study on this population.

7) Finally, the ideal would be to develop an admission composite formula that utilized all numerical data on the applicant. While it may be argued that all individuals should be judged on the same criteria and standards, this would not obviate those criteria, but merely interpret them in a more equitable fashion in terms of the student's cultural and academic background. This appears to be more equitable than the present system which wantonly excludes those who are academically compromised due to poor preparation by their secondary schools and who might otherwise be remediated into achieving all their academic goals, if not discouraged by hard, inflexible, and often unfounded admission criteria on the part of our health science programs.

To counsel, direct, and remediate properly will eventually allow greater access to our miniority population and at the same time increase enrollments and retention within the health sciences at a time when it is most critically

needed. In so doing, we allow those students as well as our academic and medical institutions to reach their full potential in providing the qualified manpower to serve our patients and our profession.

APPENDIX A

APPENDIX A

Variables Code List

Variable	Code	Description
RACE	1	White
	2	Black
	3	Oriental
	4	Hispanic
	5	Mid-East
	6	Other
SEX	1	Male
	0	Female
UOG		Overall grade point average at time of admission, from applicants from four year institutions.
USG		Science grade point average (Biology/Chemistry) at the time of admission, from applicants from four year institutions.

CCO		Overall grade point average from applicants from community colleges at the time of admission.
CCS		Science grade point average from applicants from community colleges at the time of admission.
AGE		Student age at time of admission.
BS	1	Students with baccalaurate degree at time of admission.
	0	Students without baccalaureate degrees at time of admission.
MLT	1	Students certified as Medical Laboratory Technicians at time of admission.
	0	Students with no previous laboratory training at the time of admission.

VA	The Verbal Ability section of the AHPAT.
QA	The Quantitative Ability section of the AHPAT.
BIO	The Biology section of the AHPAT.
CHEM	The Chemistry section of the AHPAT.
RC	The Reading Comprehensive section of the AHPAT.
AHPAT	The composite score of the Allied Health Professions Admission Test, required of all applicants at the time of admission.
ASCP	The Board of Registry Exam of the American Society of Clinical Pathologists. This is the certifying exam all the students in this study took after graduation. It was also

		the dependent variable used in this study.
MOG	5	Those students graduating in May.
	8	Those students graduating in August.
	12	Those students graduating in December.
YRG	80-86	Students year of graduation.
P/F	1	Those students passing the ASCP Registry Exam.
	0	Those students failing the ASCP Registry Exam.
OG		The overall grade point average of all applicants combined from four year institutions and community colleges.

SG	The Science grade point average of all applicants combined from four year institutions and community colleges.

APPENDIX B

APPENDIX B

Demographics of Student Population

		n	
Total Sample Population:		129	
Applicants from 2 Year Colleges:		33	(25.6%)
Applicants from 4 Year Colleges:		96	(74.4%)
MLT'S:		15	(11.6%)
Non-MLT'S:		114	(88.4%)
Female:		107	(83.0%)
Male:		22	(17.0%)
RACE:	White	105	(81.4%)
	Black	10	(7.8%)
	Oriental	9	(7.0%)
	Hispanic	4	(3.1%)
	Mid-East	1	(0.8%)
Number with B.S. Degree:		11	(8.5%)
Number without B.S. Degree:		118	(91.5%)

AGE:	19	5
	20	46
	21	19
	22	9
	23	15
	24	5
	25	7
	26	4
	27	5
	28	3
	29	1
	30	1
	31	2
	32	1
	33	1
	34	1
	35	1
	36	1
	39	1
	41	1

MEAN AGE: 22.8

YEAR GRADUATED:	1980 -	18
	1981 -	18
	1982 -	16
	1983 -	14
	1984 -	20
	1985 -	20
	1986 -	23
AVERAGE CLASS -		18.4

MONTH OF GRADUATION (1980-86):

MAY	81	(62.8%)
AUG	9	(7.0%)
DEC	39	(30.2%)

Number Passed ASCP EXAM	113	(87.6%)
Number Failed ASCP EXAM	16	(12.4%)

TABLES 1-24

TABLE 1

A Cross Tabulation of Race by Sex of Student Population

RACE	FEMALE	MALE	TOTAL
White	88 (68.2%)	17 (13.2%)	105 (81.4%)
Black	7 (5.4%)	3 (2.3%)	10 (7.8%)
Oriental	8 (6.2%)	1 (0.8%)	9 (7.0%)
Hispanic	3 (2.3%)	1 (0.8%)	4 (3.1%)
Mid-East	1 (0.8%)	0 (0.0%)	1 (0.8%)
TOTAL	107 (83.0%)	22 (17.0%)	129 (100.0%)

TABLE 2

A Cross Tabulation of Race By Degreed and Non-Degreed Applicants

RACE	NON-DEGREED	DEGREED	TOTAL
White	95 (73.6%)	10 (7.8%)	105 (81.4%)
Black	10 (7.8%)	0 (0.0%)	10 (7.8%)
Oriental	8 (6.2%)	1 (0.8%)	9 (7.0%)
Hispanic	4 (3.1%)	0 (0.0%)	4 (3.1%)
Mid-East	1 (0.8%)	0 (0.0%)	1 (0.8%)
TOTAL	118 (91.5%)	11 (8.5%)	129 (100.0%)

TABLE 3

A Cross Tabulation of Degreed and Non-Degree Applicants by Sex

VARIABLE	FEMALE	MALE	TOTAL
Non-Degreed	97 (75.2%)	21 (16.3%)	118 (91.5%)
Degreed	10	1	11
TOTAL	107 (83.0%)	22 (17.0%)	129 (100.0%)

TABLE 4

A Cross Tabulation of Race by Sex on Those Graduates Who Passed the ASCP Exam

RACE	FEMALE	MALE	TOTAL
White	78 (69.0%)	16 (14.2%)	94 (83.2%)
Black	6 (5.3%)	2 (1.8%)	8 (7.1%)
Oriental	7 (6.2%)	1 (0.9%)	8 (1.8%)
Hispanic	1 (0.9%)	1 (0.9%)	2 (1.8%)
Mid-East	1 (0.9%)	0 (0.0%)	1 (0.9%)
TOTAL	93 (82.3%)	20 (17.7%)	113 (100.0%)

TABLE 5

A Cross Tabulation of Race by Sex of Those Graduates who failed the ASCP Exam

RACE	FEMALE	MALE	TOTAL
White	10 (62.5%)	1 (6.3%)	11 (68.8%)
Black	1 (6.3%)	1 (6.3%)	2 (12.5%)
Oriental	1 (6.3%)	0 (0.0%)	1 (6.3%)
Hispanic	2 (12.3%)	0 (0.0%)	2 (12.3%)
Mid-East	0 (0.0%)	0 (0.0%)	0 (0.0%)
TOTAL	14 (87.5%)	2 (12.5%)	16 (100.0%)

TABLE 6

Skewness Data From Frequency Distribution

VARIABLE	SKEWNESS	S.E. SKEW	SKEW/ S.E. SKEW	RESULTS*
Race	2.492	.213	11.7	S
Sex	1.773	.213	8.3	S
UOG	.266	.246	1.08	N
USG	.241	.246	0.9	N
CCO	.343	.414	0.8	N
CCS	.503	.409	1.23	N
AGE	2.074	.213	9.7	S
BS	3.005	.213	14.0	S
MLT	2.422	.213	11.3	S
VA	- .171	.213	0.8	N
QA	- .191	.213	0.89	N
BIO	- .756	.213	3.59	S
CHEM	.368	.213	4.08	S
RC	.323	.213	1.52	N
AHPAT	- .447	.213	2.09	N
ASCP	- .487	.213	2.28	N

*S - Skewed
N - Normal Distribution

$$\text{If } \frac{\text{Skewness}}{\text{S.E. Skew}} = > 2.58$$

then the data is too skewed for parametric statistics.

TABLE 7

Significance of the Means On Overall Grade Point Average (OG) and Science Grade (SG) Point Average on Applicants from Four Year Instititions and Community Colleges

VARIABLE	X	S.E.	DIFF. MEANS	AVER. S.E.	AVER.S.E. MEAN	RESULTS
UOG	3.103	.047	.0006	.026	.023	N.S.
COG	3.109	.060				
USG	3.05	.050	.0620	.070	.8857	N.S.
CCS	2.99	.090				

$p = < .05$

TABLE 8

A Comparison of Variable Means on MLT and Non-MLT Subjects

VARIABLE	NON-MLT	MLT
UOG	3.12	2.91
USG	3.07	2.83
CCO	3.09	3.20
CCS	2.95	3.14
AGE	22.38	26.3
VA	53.69	59.80
QA	62.06	56.00
BIO	72.77	69.47
CHEM	72.15	72.13
RC	56.31	73.60
AHPAT	316.18	331.00
ASCP	142.47	151.20
OG	3.11	3.03
SG	3.04	2.96
PASS	98.00	14.00
FAIL	15.00	1.00

TABLE 9

Significance of the Means MLT and Non-MLT vs ASCP, AHPAT, OG, SG

CLASS	VARIABLE	N	M ASCP	F	df	PR>F
MLT	ASCP	15	151.20	2.53	1	0.114
Non-MLT		114	142.50			
MLT	AHPAT	15	331.00	0.29	1	0.0589
Non-MLT		114	316.00			
MLT	SG	15	2.96	0.28	1	0.5979
Non-MLT		114	3.04			
MLT	OG	15	3.03	0.47	1	0.4954
Non-MLT		114	3.11			

TABLE 10

Stepwise Regression of ASCP onto all Numerical Variables

VARIABLE ENTERED*	R	R^2	df	F	PROB.
STEP 1 AHPAT	.5225	.2730	1,126	47.33	0.0001
STEP 2 SG	.6393	.4088	2,125	43.23	0.0001

*No other variables met the 0.0500 significance level for entry into the model.

TABLE 11

Stepwise Regression of ASCP onto all Numerical Variables Controlling for White Race

VARIABLE*	R	R^2	df	F	PROB.
STEP 1					
AHPAT	0.5639	0.3179	1,102	47.55	0.0001
STEP 2					
SG	0.6517	0.4246	2,101	37.27	0.000

*No other variable met the 0.0500 significant level for entry into the model.

TABLE 12

Stepwise Regression of ASCP onto all Numerical Variables Controlling for Female Sex

VARIABLE*	R	R^2	df	F	PROB.
STEP 1					
SG	0.5234	0.2739	1,104	39.23	0.0001
STEP 2					
AHPAT	0.6244	0.3898	2,103	32.91	0.0001

*No other variable met the 0.0500 significance level for entry into the model.

TABLE 13

Stepwise Regression of ASCP onto all Numerical Variables Controlling for Non-degreed Applicants

VARIABLE*	R	R^2	df	F	PROB.
STEP 1					
AHPAT	0.5317	0.2827	1,115	45.32	0.0001
STEP 2					
SG	0.6521	0.4250	2,114	42.16	0.0001

*No other variable met the 0.0500 significance level for entry into the model.

TABLE 14

A Comparison of the Means on the OG, SG, AHPAT, and ASCP by the Independent Nominal Variables

VARIABLE	N	M OG	M SG	M AHPAT	M ASCP
BS	11	2.85	2.79	303.8	137.8
non-BS	118	3.13	3.05	319.2	144.0
Males	22	3.12	3.08	329.9	146.8
Females	107	3.10	3.01	315.4	142.8
RACE: White	105	3.14	3.06	330.0	146.2
Black	10	3.10	2.88	270.3	129.7
Oriental	9	2.95	2.86	255.6	134.4
Hispanic	4	2.96	3.04	283.8	130.0
Mid-East	1	2.84	3.00	216.0	136.0
YEAR GRAD					
1980	18	3.29	3.29	328.6	138.1
1981	18	3.21	3.17	307.8	150.2
1982	16	3.06	2.92	323.0	155.8
1983	14	3.21	3.07	344.7	141.0
1984	20	3.20	3.10	337.2	152.0
1985	20	2.97	2.87	294.5	136.7
1986	23	2.88	2.85	301.2	133.7
MAY GRADS	81	3.19	3.09	324.1	146.0
AUG GRADS	9	2.93	2.97	289.9	137.9
DEC GRADS	39	2.97	2.91	311.6	139.5
ASCP Pass	113	3.14	3.07	329.0	148.2
ASCP Fail	16	2.80	2.70	239.6	110.1

TABLE 15

Significance of the Means AHPAT vs Year of Graduation

VARIABLE*	N	M AHPAT	F	df	PR>F
1980	18	328.61	0.65	6	0.6888
1981	18	307.78			
1982	16	323.00			
1983	14	344.71			
1984	20	337.20			
1985	20	294.45			
1986	23	301.17			
TOTAL POPULATION	129	317.90			

*Duncan Groupings showed no significant difference for any of the years.

TABLE 16

Significance of the Means ASCP vs Year of Graduation

VARIABLE*	N	M ASCP	F	df	PR>F
1980	18	138.1	3.93	6	0.0013
1981	18	150.2			
1982	16	155.8			
1983	14	141.5			
1984	20	152.0			
1985	20	136.7			
1986	23	133.7			
TOTAL POPULATION	129	143.5			

*Duncan groupings showed significant differences in all years.

TABLE 17

Significance of the Means SG vs Year of Graduation

VARIABLE*	N	M SG	F	df	PR>F
1980	17	3.29	2.21	6	0.0640
1981	18	3.17			
1982	16	2.92			
1983	14	3.07			
1984	20	3.10			
1985	20	2.87			
1986	23	2.85			
TOTAL POPULATION	129	3.03			

*Duncan groupings showed no significant difference in years 82,85, and 86.

TABLE 18

Significance of the Means OG vs Year of Graduation

VARIABLE*	N	M OG	F	df	PR>F
1980	17	3.29	2.65	6	0.0191
1981	18	3.21			
1982	16	3.06			
1983	14	3.21			
1984	20	3.21			
1985	20	2.97			
1986	23	2.88			
TOTAL POPULATION	129	3.11			

*Duncan groupings showed significant differences in all years.

TABLE 19

Significance of the Means AHPAT, ASCP, SG and OG By Sex

SEX	VARIABLE*	N	MEAN	F	df	PR>F
Males	AHPAT	22	329.9	0.38	1	0.5375
Females		107	315.4			
TOTAL POP.		129	317.9			
Males	ASCP	22	146.8	0.73	1	0.3951
Females		107	142.8			
TOTAL POP.		129	143.5			
Males	SG	22	3.08	0.26	1	0.6083
Females		107	3.02			
TOTAL POP.		129	3.03			
Males	OG	22	3.12	0.02	1	0.8940
Females		107	3.10			
TOTAL POP.		129	3.11			

*Duncan groupings showed no significant difference between males and females on any of the variables.

TABLE 20

Significance of the Means AHPAT, ASCP, SG and OG by Students Passing or Failing the ASCP Exam

CLASS	VARIABLE*	N	MEAN	F	df	PR>F
Pass	AHPAT	113	329.0	12.33	1	0.0006
Fail		16	239.6			
TOTAL POP.		129	317.9			
Pass	ASCP	113	148.2	81.9	1	0.0001
Fail		16	110.1			
TOTAL POP.		129	317.9			
Pass	SG	113	3.07	7.79	1	0.0061
Fail		16	2.70			
TOTAL POP.		129	3.03			
Pass	OG	113	3.14	8.77	1	0.0037
Fail		16	2.81			
TOTAL POP.		129	3.11			

*Duncan groupings showed significant differences between all variables on those passing and those failing the ASCP exam.

TABLE 21

Significance of the Means AHPAT by Race

VARIABLE*	N	M AHPAT	F	df	PR>F
White	105	330.1	2.32	4	0.0603
Black	10	270.3			
Oriental	9	255.6			
Hispanic	4	283.8			
Mid-East	1	216.0			
TOTAL POPULATION	129	317.9			

*Duncan groupings showed no significant differences among any of the races.

TABLE 22

Significance of the Means ASCP by RACE

VARIABLE*	N	M ASCP	F	df	PR>F
White	105	146.2	2.71	4	0.0332
Black	10	129.7			
Oriental	9	134.4			
Hispanic	4	130.0			
Mid-East	1	136.0			
TOTAL POPULATION	129	143.5			

*Duncan groupings showed no significant differences among any of the races.

TABLE 23

Significance of the Means SG by Race

VARIABLE*	N	M SG	F	df	PR>F
White	105	3.06	0.57	4	0.6841
Black	10	2.87			
Oriental	9	2.86			
Hispanic	4	3.04			
Mid-East	1	3.00			
TOTAL POPULATION	129	3.03			

*Duncan groupings showed no significant differences among any of the races.

TABLE 24

Significance of the Means OG by Race

VARIABLE*	N	M OG	F	df	PR>F
White	105	3.14	0.76	4	0.5536
Black	10	3.01			
Oriental	9	2.95			
Hispanic	4	2.96			
Mid-East	1	2.84			
TOTAL POPULATION	129	3.11			

*Duncan groupings showed no significant differences among any of the races.

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Teacher's Certificate
Community College
State of Florida, Division of Education
Number: 360428

AWARDS:

1982 Medical Laboratory Observer
Article Award

1981 American Society for Medical Technology
National Omicron Sigma Award

AWARDS: (con't)

1979 Top Ten Article of 1978
Medical Laboratory Observer

1977 Medical Laboratory Observer
Article Award

1973 Medical Laboratory Observer
Article Award

1966 American Chemical Society
Student Achievement Award

PUBLICATIONS:

1. Kreider, R.B., Somma, C.T., et.al. (1988). Effects of Phosphate Loading on Oxygen Uptake, Anaerobic Threshold, and Run Performance, MEDICINE AND SCIENCE IN SPORT AND EXERCISE, (in press).

2. Somma, C.T. (1982). Clinical Laboratory Management, REVIEW IN CLINICAL LABORATORY SCIENCE, 1st Edition, American Society for Medical Technology.

3. Somma, C.T. (1982). A Bill of Rights for Medical Technology Interns, MEDICAL LABORATORY OBSERVER, Vol. 14, No. 11.

4. Williams, M.H., Somma, C.T. (1981). The Effect of RBC Infusion Upon a 5-Mile Threadmill Run Time, MEDICINE AND SCIENCE IN SPORTS AND EXERCISE, Vol. 13, No. 3.

5. Somma, C.T. (1978). Handling the Salesrep, MEDICAL LABORATORY OBSERVER, Vol. 10, No. 2.

6. Somma, C.T. (1975). Let Techs Test New Kits, MEDICAL LABORATORY OBSERVER, Vol. 7, No. 8.

7. Somma, C.T. (1973). How to Create a Back-Up Lab, MEDICAL LABORATORY OBSERVER, Vol. 5, No. 8.

8. Somma, C.T. and Ache, H.J. (1968). Self-Induced Tritium Labeling in Cyclohexane-Benzene Mixtures, RADIOCHIMICA ACTA, 10: 49.

ABSTRACTS:

1. Miller, G.W., Somma, C.T., et.al. (1989). Effects of Phosphate Loading on Maximal and Five Mile Run Performance, AMERICAN COLLEGE OF SPORTS MEDICINE ANNUAL MEETING. (Baltimore, Maryland)

2. Kreider, R.B., Somma, C.T., et.al. (1989). Effectsof Phosphate Loading on Serum Phosphate, 2,3-DPG, Hemoglobin, Hematocrit, and Lactate in Maximal and Five Mile Run Performance, AMERICAN COLLEGE OF SPORTS MEDICINE ANNUAL MEETING. (Baltimore, Maryland)

3. Miller, G.W., Somma, C.T., et.al. (1989). Analysis of Ventilatory Anaerobic Threshold as a Limiting Factor in a Five Mile Performance Run, SOUTHEAST AMERICAN COLLEGE OF SPORTS MEDICINE ANNUAL MEETING. (Atlanta, Georgia)

4. Krieder, R.B., Somma, C.T., et.al. (1989). Effects of Three and Six Day Sodium Phosphate Supplementation Regimens on Serum Phosphate, Hemoglobin, 2,3-Diphosphoglycerate, and Hematocrit, SOUTHEAST AMERICAN COLLEGE OF SPORTS MEDICINE ANNUAL MEETING. (Atlanta, Georgia)

5. Miller, G.W., Somma, C.T., et.al. (1989). Analysis of Ventilatory Threshold as a Limiting Factor in Five Mile Run Performance, VIRGINIA ALLIANCE OF HEALTH, PHYSICAL EDUCATION, RECREATION, AND DANCE. (Roanoke, Virginia)

6. Somma, C.T. (1986). Fostering and Maintaining Clinical Affiliations in an Era of Hospital Retrenchment, PROCEEDINGS OF THE 19TH ANNUAL MEETING OF THE AMERICAN SOCEITY OF ALLIED HEALTH PROFESSIONS. (Pittsburg, Pennsylvania)

AN ABSTRACT OF THE DISSERTATION OF

Carmine T. Somma, Jr., for the Doctor of Education, presented on November 8, 1988 at the College of William and Mary in Williamsburg, Virginia.

TITLE: "A Comparison of the Predictive Ability of Selected Variables Upon Success on the American Society of Clinical Pathologists Medical Technology Registry Exam."

Major Professors: Dr. Armand J. Galfo (Advisor)
Dr. Roger G. Baldwin, Jr.
Dr. John R. Thelin

The use of the Allied Health Professions Admissions Test (AHPAT) as an admission tool to upper level medical technology programs was compared against the most commonly accepted criteria of overall grade point average (OG) and science grade point average (SG). The comparison was based on how well each predicted success on the Board of Registry Exam of the American Society of Clinical Pathologists. The sample population included admission and program data on 129 graduates of a University 2+2 Medical Technology Program from 1980 to 1986. The population consisted mostly of white (81.4%) (n=105) females (83.0%) (n=107) applying from four year institutions (74.4%) (n=96) without previous baccalaureate degrees (91.5%) (n=118) whose mean age was 22.8.

Using stepwise regression analysis on all numerical variables including the OG, SG, AHPAT and its subscores, the first variable to enter was the AHPAT (r^2 = 0.2730) and the second variable to enter was the SG explaining an additional 14% of the variance (r^2 = 0.4088). No other variable met the 0.0500 significance level for entry into the model. The same order of entry existed for the white, non-degreed subjects. These data strongly support the use of the AHPAT, along with the SG, as an additional admission criterion for entry into medical technology programs.

Additional studies revealed that Medical Laboratory Technicians (MLT's) did not score significantly higher than those without previous laboratory training on either the AHPAT [F (1,127) = 2.53, n.s., p>.05] nor the ASCP exam [F (1,127) = 0.29, n.s., p>.05], and that both scores were independent of sex, race and previous college degree. The AHPAT scores proved signficantly different

in those individuals who passed or failed the ASCP upon first attempt [F (1,128) = 12.33, $p<.0006$], thus providing further support for its use. Duncan groupings showed no signficant differences in the AHPAT scores of the subjects when compared by year of admission. This runs counter to the national belief of a steady decline in the quality of the applicant pool during the time frame studied.