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An Assessment of the Descriptors and Determinants of Academic Success of Selected Allied Health Students in Virginia

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ABSTRACT

An Assessment of the Descriptors and Determinants of Academic Success of Selected Allied Health Students in Virginia

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This study assessed the relationship of cognitive and noncognitive variables in relationship to academic success of students from selected allied health majors: respiratory therapist (RTT), radiologic technology (RT), surgical technology (ST) and medical records technician (MRT) from hospital based and community college programs in Virginia. Student academic success was defined as academic (classroom) grade point average, clinical grade point average, cumulative grade point average and passing status. The cognitive variables were preclinical (high school) grade point average, academic, clinical and cumulative grade point averages. The noncognitive variables were character type, temperament type/preference for learning style, and the Sedlacek Noncognitive Questionnaire subscale scores.

One hundred sixty-nine allied health technology students returned usable questionnaires which provided demographic data and an adaption of Sedlacek's Noncognitive Questionnaire (Tracey & Sedlacek, 1984). The students also completed the Keirsey Temperament Sorter (1978) (assessing character type, temperament type, and preference for learning style).

The data indicated that both cognitive and noncognitive variables correlate with student academic success. The noncognitive variables of temperament type/preference for learning styles, positive self-concept, preference for long range goals, availability of support, age, year of study and program base of study were significantly related to the student's academic success, achievement, reported as theoretical (academic) and/or clinical grade point average.

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Introduction

There is a consensus of public opinion that there is reason for concern about the quality, quantity and appropriateness of health care delivery, both medical and surgical (Health Resources and Services Administration, 1990). Quality care in medicine has been defined as the pre-planned and systematic actions of a qualified professional team that provides health care in which clients can have confidence in the care provided as well as with the methods of providing the care (Health Resources and Services Administration, 1990).

Currently there is concern about sufficient and appropriate care personnel and the dangerous shortages of registered allied health personnel to provide diagnostic, therapeutic, interventional and ongoing care that is appropriate and accurate (Fauser, 1992; Freudenheim, 1990). Services can and will be provided only if qualified subspeciality staffs are available. The students of today and technologists of the future will be the qualified staff which are needed. The recruitment and retention of students and new graduates, are crucial to maintaining the numbers of allied health professionals and the quality of the services provided (Breo, 1988; Dunlap, 1992).

Unless selection and teaching/training methods are reviewed and revised, there will be increasing shortages of

working allied health technologists and technicians in the 21st century due to poor initial selection of students, ongoing student attrition, and student dissatisfaction with program training methods (Bell, 1988). Programs of education in the health occupations must face this challenge and strive to improve student selection by defining those who are best matched by character type to a program and which teaching/training methods are most effective (Bell, 1988).

Noncognitive variables; i.e. personality characteristics, temperament types and associated preferences for function, are highly related to student academic success in higher education (Aiken, 1964; Astin, 1975; Keirsey & Bates, 1984; Kroeger & Thuesen, 1988; Matthews & Hamby, 1995; McMillan & Reed, 1994; Messick, 1979; Myers, 1962; Nelson, Scott, & Bryan, 1984; Pascarella & Chapman, 1983; Schroeder, 1993; Tinto, 1975). A majority of the studies reporting use of noncognitive variables as predictors of student academic achievement are from the discipline of educational counseling. Myers & Briggs (1950) generalized the noncognitive variables of four dimensions of differences NT (Intuitive, Thinking), NF (Intuitive, Feeling), SJ (Sensing, Judging), and SP (Sensing, Perception) to identify preferences and success in terms of 16 character/temperament types. The literature is limited in the areas of allied health occupations and the effects of

noncognitive variables and student academic success. This situation supports the need for this investigation.

The purpose of this study was to assess the relationship of both cognitive and noncognitive variables to the academic success of students enrolled in four selected allied health majors. The selected major areas were respiratory therapist, radiologic technology, surgical technology and medical records technician offered at institutions located in the Commonwealth of Virginia.

Description of the Problem

The escalating expenses of recruiting, selecting, training and orientating of new allied health occupations staff are borne by all in that we share limited access to medical technology and care, insurance premiums are higher, co-payments are increasing and the tax payers must support the underinsured and the uninsured (Perry, 1989; Wootton & Ross, 1995). Since 1987, expenditures for health care have increased six fold, from $51 billion a year to more than $300 billion a year (Equitable Life Assurance Society, 1983; Skow, 1995). Health care spending now accounts for more than 10% of the gross domestic product and continues to rise rapidly (Skow, 1995). The patient population is larger, growing older, wiser, sicker and more aware of its' rights to quality care (Cerne, 1988).

These problems have motivated both the government and the private sector to search for new approaches to control

health care costs. One solution is a well educated and stable staff of allied health workers who can consistently provide state of the art care (Perry, 1989; Turkeltaub, 1991).

For the past 20 years, financing allied health education has not been a problem. The federal government made a concerted effort to facilitate developing educational programs to increase the number of health workers. Today, decreases in disposable income of students and their families are influencing educational choices regarding an education for an allied health occupation. Several factors have led to educational cutbacks and the closing of some health care training programs (American Medical Association, 1994-1995), (See Table 3).

In the current situation, recruitment, student selection, retention problems and the decrease in the number of educational facilities have created a serious problem. Allied health education has been changed and may be doomed to enrolling and graduating low numbers of students due to attrition unless there are changes in how educational programs are conducted (American Medical Association, 1994-95; Fauser, 1992; Health Resources and Services Administration, 1990; Hudis, 1992; Schimmpfhauser & Broski, 1976).

The study of shortages of allied health students, student attrition and graduates is timely as needs for these

individuals continues to increase. Allied health educational programs have decreased in number in 1994-95 in the Commonwealth of Virginia which also contributes to the shortages (American Medical Association, 1994-95), (See Table 3). The current and predicted staff shortage (and low student numbers) affect both the professionals and the clients (patients) alike (American Medical Association, 1991; Perin & Greenberg, 1994). This problem is concentrated in the urban setting where training centers, better employment opportunities, advancement possibilities, and the "full service" facilities generally are clustered (Fauser, 1995; Gupta & Konrad, 1992; Turkeltaub, 1991). Market competition and limited governmental funding further exacerbate the problem (Fauser, 1992; Gupta & Konrad, 1992).

Theoretical Basis

The purpose of this study was to examine whether certain noncognitive variables are significant factors in the selection, retention, and completion of an allied health educational program for a selected group of health occupations students.

To study this area required the examination of theory from three related areas of General Student Population Retention Theory, Myers-Briggs Theory of Jung's character types and the Gap Theory proposed by Anderson (Aiken, 1964; Anastasi & Meade, 1960; Anderson, 1989; Blagg, 1985; Blume, 1976; Boyer & Sedlacek, 1988; Dunteman, 1966; Laudicina,

1986, 1993; Matthews & Hamby, 1995; McCaulley, 1981; Myers, 1962; Sedlacek, 1989, 1991; Tracey & Sedlacek, 1984, 1985, 1986, 1987).

The General Student Population Retention Theory suggests that the retention of students, in general, in a program area or field of study is directly related to the influences and expectations of external and/or internal sources. Students may be retained in their studies through positive influences of mentoring, tutoring, peer association, monetary support and availability of remedial or academic facilities resources as well as the availability of personal guidance or support, housing, safety and a sense of accomplishment (Anderson, 1989; Astin, 1982; Baker, 1989; Himburg, 1989; Pittman, 1985; Villella & Hu, 1990, 1991; von Borstel, 1992).

The Myers-Briggs Theory of Jung's temperament types states the theory that people are different in fundamental ways. The preference for how an individual functions is characteristic and therefore individuals may be typed. Myers and Briggs suggest that by knowing a person's type his or her behavior can be predicted and correlated to actions and accomplishments (Keirsey & Bates, 1984; McCaulley, 1981).

The Gap Theory, a theory in the student retention literature, is a theory of student academic success. The theory suggests that the level of student academic success

is attributable to a variety of student performance, teacher and institutional factors (Anderson, 1989). Specific student character traits are needed for student academic success. These traits include motivation to achieve, commitment to goals and self-efficacy. Anderson (1989) stated that these attributes bridge the 'gaps' between student skills, student ability and student academic success. Berry and Asamen (1989) suggest:

> Motivation to achieve generates the energy needed to bridge gaps necessary for achievement and persistence; commitment to achieve directs the energy and invests the time needed to bridge those gaps; and self-efficacy supplies the confidence to actually begin working toward achievement. Motivation, commitment, and self-efficacy supply, give direction to, and enable students to invest the energy needed to overcome the gaps and adjust to the forces and obstacles that college students encounter (Berry & Asamen, 1989, p. 227-228).

Assumptions

The study has the following assumptions:

1. Character/temperament types are indicators of preferences for learning styles as reflected in performance in classroom or clinical learning situations.

2. Allied health care majors responded honestly when completing the study questionnaire.

3. Allied health care program directors distributed the questionnaires to the students under the controlled conditions of a standard class meeting. These directors

accurately completed the Allied Health Care Program Director's Reporting Form with the student program data.

Limitations

The study has the following limitations:

1. The study was restricted to the Commonwealth of Virginia.

2. The measurement tool required self-reporting of factors contributing to the definition of personality, character and temperament types.

Delimitations

The study has the following delimitations:

1. Only select variables were used in this study.

2. Only certain allied health technology specialities were chosen for this study.

3. The selected programs of the student respondents were all certificate/registry eligible programs.

Definition of Terms

Academic student achievement. Achieving and maintaining a minimum grade point average (2.50 GPA for this study) as defined by the dependent cognitive variables of theoretical grade point average (GPA), clinical GPA, and/or cumulative GPA (American Medical Association, 1994-95).

Accreditation. A peer review process whereby a private agency or association grants public recognition to an institution or specialized program of study or training that meets or exceeds pre-established standards of educational

quality (American Medical Association, 1994-95).

Allied health careers. Career study/train for up to two years in an allied health occupation that offers certification and/or registry sponsored by the subspecialities own governing body (American Medical Association, 1994-95; Health Careers Reference Manual, 1991-92).

Artisans. Artisans (SPs) (Sensing, Perceptive) are ESPTs (Extrovert, Sensing, Perceptive, Thinking) or promoters, ISPTs (Introverted, Sensing, Perceptive, Thinking) or crafters, ESPFs (Extroverted, Sensing, Perceptive, Feeling) or performers and ISPFs (Introverted, Sensing, Perceptive, Feeling) or composers (Keirsey & Bates, 1984; Kroeger & Thuesen, 1988; Myers, 1987).

Committee on Allied Health Education and Accreditation (CAHEA). An allied health education accrediting body which was sponsored by the American Medical Association. CAHEA was an accrediting body/agency worked in cooperation with externally sponsored review committees to accredit certain allied health educational programs. CAHEA was replaced by CAHHEP in late 1994 (American Medical Association, 1994-95).

ENFJ. (Extroverted, Intuitive, Feeling, Judging) Responsive and responsible. They generally feel real concern for what others think or want. ENFJs can present a proposal or lead a group discussion with ease. They are sociable, popular, sympathetic, and responsive to both

praise and criticism (Keirsey & Bates, 1984; Kroeger & Thuesen, 1988; Myers, 1987).

ENFP. (Extroverted, Intuitive, Feeling, Perceptive) ENFPs are enthusiastic, high-spirited, ingenious, imaginative and are able to do almost anything that interests them. They are quick and willing to help anyone with a problem. They often rely on their ability to improvise instead of preparing in advance (Keirsey & Bates, 1984; Myers, 1987).

ENTJ. (Extroverted, Intuitive, Thinking, Judgment) ENTJs are hearty, frank, decisive, leaders in activities and are adept at reasoning and intellectual discussion, such as public speaking. They are usually well informed and enjoy adding to their base of knowledge (Keirsey & Bates, 1984; Myers, 1987).

ENTP. (Extroverted, Intuitive, Thinking, Perceptive) ENTPs are quick, ingenious, stimulating company, aware, and outspoken. They banter for fun on either side of a question. ENTPs are resourceful in problem solving. They are easily distracted by new interests (Keirsey & Bates, 1984; Myers, 1987).

ESFJ. (Extroverted, Sensing, Feeling, Judgment) ESFJs are considered to be warm-hearted, talkative, cooperative, active committee members. They need harmony and strive to create it. They work best with feedback, encouragement and praise. Their main interest is in directly and visibly helping others (Keirsey & Bates, 1984; Myers, 1987).

ESFP. (Extroverted, Sensing, Feeling, Perceptive) They are outgoing and easygoing. They are team players. They often find remembering facts easier than learning theories and are best in situations that rely on common sense and practical ability both with people and things (Keirsey & Bates, 1984; Myers, 1987).

ESTJ. (Extroverted, Sensing, Thinking, Judgment) They are practical, realistic and matter-of-fact. ESTJs are not interested in general subjects but apply themselves if it is required. They like to organize and lead activities. ESTJs often make good administrators (Keirsey & Bates, 1984; Schroeder, 1995).

ESTP. (Extroverted, Sensing, Thinking, Perceptive) ESTPs do not worry, they take life in stride. ESTPs like mechanical things. They are adaptable, tolerant and generally conservative in values. They dislike long explanations and are best with real things, "hands on" work (Keirsey & Bates, 1984; Myers, 1987; Schroeder, 1995).

Guardians. Guardians (SJs) (Sensing, Judgment) are the ESTJs (Extroverted, Sensing, Thinking, Judgment) or supervisors, ISTJs (Introverted, Sensing, Thinking, Judgment) or inspectors, ESFJ (Extroverted, Sensing, Feeling, Judgment) or providers and the ISFJs (Introverted, Sensing, Feeling, Judgment) or protectors (Keirsey & Bates, 1984; Kroeger & Thuesen, 1988; Myers, 1987).

Idealists. Idealists (NFs) (Intuitive, Feeling) are the

ENFJs (Extroverted, Intuitive, Feeling, Judgment) or teachers, INFJs (Introverted, Intuitive, Feeling, Judgment) or counselors, ENFPs (Extroverted, Intuitive, Feeling, Perceptive) or revealer and the INFPs (Introverted, Intuitive, Feeling, Perceptive) or conciliator (Kroeger & Thuesen, 1988).

INFJ. INFJs (Introverted, Intuitive, Feeling, Judgment) succeed by perseverance. They do whatever is needed. Their best efforts go into their work. They are conscientious, concerned for others and are respected for their principles (Keirsey & Bates, 1984; Myers, 1987; Schroeder, 1995).

INFP. INFPs (Introverted, Intuitive, Feeling, Perceptive) are enthusiastic, loyal and private. INFPs are interested in theory and language. They prefer independent projects. INFPs are friendly, but self-absorbed. They are not always sociable. INFPs are not materialistic in nature (Keirsey & Bates, 1984; Kroeger & Thuesen, 1988; Myers, 1987).

INTJ. INTJs (Introverted, Intuitive, Thinking, Judgment) usually have creative minds and purport their own ideas. They have the power to organize and follow through. They are skeptical, critical and sometimes stubborn (Keirsey & Bates, 1984; Myers, 1987).

INTP. (Introverted, Intuitive, Thinking, Perceptive) They are quiet and reserved. INTPs prefer theoretical/ scientific pursuits. They like solving problems with logic and analysis. INTPs need careers where a personal interest

can be developed/applied (Keirsey & Bates, 1984; Kroeger & Thuesen, 1988).

ISFJ. (Introverted, Sensing, Feeling, Judgment) ISFJs are quiet, responsible, stable, perceptive, and concerned with how other people feel. They accept and meet their obligations. They are not interested in technical work (Keirsey & Bates, 1984; Kroeger & Thuesen, 1988).

ISFP. (Introverted, Sensing, Feeling, Perceptive) ISFPs are retiring and modest about their abilities. They do not want to be leaders. ISFPs are slow to complete things and do not over exert themselves (Keirsey & Bates, 1984; Kroeger & Thuesen, 1988).

ISTJ. (Introverted, Sensing, Thinking, Judgment) ISTJs are serious and earn student academic success by concentration and wrote memorization. They are orderly, logical, and dependable. ISTJs decide what is important and work steadily towards it (Keirsey & Bates, 1984; Myers, 1987).

ISTP. (Introverted, Sensing, Thinking, Perceptive) ISTPs are outsiders. They analyze events with detached curiosity. They are interested in cause and effect and how and why, and the organization of facts (Keirsey & Bates, 1984; Schroeder, 1995).

Medical Record Technician (Health Information Technician)

Occupational Description. Health information technicians prepare and/or keep the medical record's details of patient care. Health information technicians are employed in the

medical records department of hospitals, clinics, public health agencies and long-term care facilities (American Medical Association, 1994-95; Health Careers Reference Manual, 1991-92).

Radiologic Technologist, Occupational Description.

> Radiographers provide patient services using imaging equipment, as directed by physicians qualified to order and/or perform radiologic procedures. When providing patient services, they continually strive to provide quality patient care and are particularly concerned with limiting radiation exposure to patients, self, and others. Radiographers exercise independent judgment in the technical performance of medical imaging procedures by adopting variable technical parameters of the procedure to the condition of the patient and by initiating lifesaving first aid and basic life support procedures as necessary during medical emergencies (American Medical Association, 1994-95, p. 180).

Rationals. Rationals (NTs) (Intuitive, Thinking) are categorized as the ENTJs (Extroverted, Intuitive, Thinking, Judgment) or field marshals, INTJs (Introverted, Intuitive, Thinking, Judgment) or planners, ENTPs (Extroverted, Intuitive, Thinking, Perceptive) or inventors and INTPs (Introverted, Intuitive, Thinking, Perceptive) or architect as designer/mastermind (Kroeger & Thuesen, 1988).

Respiratory Care Therapist. Respiratory Care Therapists, under the guidance/orders of a physician, treat patients to include either temporary or long-term therapy for patients with disorders not limited to asthma, emphysema, bronchitis,

pneumonia, heart failure, chest injuries, stroke, shock, premature birth, and post-surgical complications (American Medical Association, 1994-95; Health Careers Reference Manual, 1991-92).

School of Allied Health. School offering several allied health education programs. The programs operate within a variety of institutions, including, but not limited to, community colleges, academic medical centers, and hospitals. The length of the educational programs may be from a few months up to two years duration (American Medical Association, 1994-95; Health Careers Reference Manual, 1991-92).

Surgical Technologist.

> Surgical technologists are integral members of the surgical team who work closely with surgeons, anesthesiologists, registered nurses, and other surgical personnel delivering patient care and assuming appropriate responsibilities before, during, and after surgery. Surgical technologists prepare the operating room by selecting and opening sterile supplies. Preoperative duties also include assembling, adjusting, and checking nonsterile equipment to ensure that it is in proper working order. Common duties include operating sterilizers, lights, suction machines, electrosurgical units, and diagnostic equipment (American Medical Association, 1994-95, p. 264).

Chapter 2

Review of the Literature

The purpose of this chapter is to discuss the literature concerning allied health care personnel shortages, training and program selection of students. The chapter also addresses the theoretical basis for the study concerning student character/temperament types, preferences for learning styles and student academic success. The discussion delineates Myers-Briggs and Keirsey character and/or temperament sorting and typing. It further includes a discussion of the "Gap Theory" of student success as related to allied health care students.

The shortage of qualified allied health care personnel, with few exceptions, is dire and widespread (American Medical Association, 1991; Bell, 1988; Breo, 1988; Brown-West, 1989; Freudenheim, 1990; Gupta & Konrad, 1992). Leaders in the health occupations must become both self-critical and creative in order to shore up their ranks by enhanced recruiting and retaining new members into their health occupation groups. Hedl (1987) suggested that an initially poor selection of students contributes to increased drop out numbers (Blagg, 1985; Bynum, 1983-84; Desmarais, 1991; Ott, 1978; Tinto, 1982, 1985). It was further suggested that the social acceptance theory has an impact on the numbers of individuals electing to stay in their existing role (Hedl, 1987).

It is important to seek and select candidates who are not only academically successful but temperamentally well suited to the job as well (Rezler & Rezmovic, 1981). They should be willing, decisive, diligent, energetic, stable and have demonstrated the characteristics of caring and serving. It is also important to nurture these would be health workers through training activities during their program of study (Baker, 1989).

The ideal student might become the ideal "professional". They would have a sense of self-worth, respect others, be loyal to their sponsor, maintain the highest of standards in their field, give care that is honest, accurate and gentle, consider the patient on the whole as body, mind, and spirit and will also, by role modeling, encourage growth of their ranks (Brown-West, 1991; Carnevale, Villet, & Holland, 1990; Fauser, 1992; McMillan & Reed, 1994).

Educators will have to address any or all of the following issues: retraining of displaced workers; content expansion; theory and methodology of instruction; increased education in licensed occupations will enhance the image and expand the arena of adult education. Required continuing education will increase greatly as a source of revenue; there will be increased development of testing and certification (Bell, 1988; Buzzell, 1986; Daggett, 1991; Dole, 1989; Gupta & Konrad, 1992; Schroeder, 1993).

There is little literature available to substantiate the significance of initial recruiting and selection activities with respect to the perceptions of the students themselves. There is also little literature available to substantiate the identification of these factors as significant predictors of the training program's goal, student academic success, as a well trained body of students, and graduates (Aiken, 1964; American Medical Association, 1991; Anastasi et al, 1960; Blume, 1976; Himburg, 1989; Matthews & Hamby, 1995).

Health care marketing and personnel (student) selection and retention efforts in the year 2000 will shape the character of health care delivery. It will play a major role in setting medical business policy and in developing the culture of medical business (Bush, 1990). Those programs that "hype themselves and deliver the goods" will capture the market share of professionals and patient clientele alike (Raymond, p. 30).

Student Retention

A crucial issue facing higher education in general, and allied health care technology training programs specifically, is student retention (Buzzell, 1993; Dunlap, 1992; Hu, 1985; Perin & Greenberg, 1994; Stewart, 1990; von Borstel, 1992). Retention of students is accomplished through a favorable environment created by means of preset goals, student needs assessment, teaching, training and

student centered learning (Matthews & Hamby, 1995; McMillan & Reed, 1994; Miville & Sedlacek, 1991; Schroeder, 1993; Tinto, 1975; Villella & Hu, 1990). This "learning", as an indicator of a favorable environment, is measured by both cognitive and noncognitive variables (Fauser, 1992).

Tracey and Sedlacek (1981) described three different types of research being done with respect to student retention. The first type uses cognitive variables as indicators of student academic success (prediction research). The second defines and tests the association of independent personal characteristics with student academic achievement (dependent cognitive understanding). This type, association of personal characteristics, research effort was directed to define the differences between students who succeed academically and those who do not succeed. This prediction technique examines the personality traits of those who persevere to successfully complete the training program and those students who fail to complete the training (Tracey & Sedlacek, 1981). The third research technique (correlation research), investigated how methods assist students and whether an institution training program has helped with student retention. The dependent variables cited were ongoing enrollment and increased grade point average (Tracey & Sedlacek, 1981).

The above authors suggest that both cognitive and noncognitive variables are good predictors of student

academic achievement. Hedl (1987), Tinto (1975), Tracey and Sedlacek (1987), Mese (1989), Sedlacek (1989, 1991), and Miville and Sedlacek (1991) also suggest that noncognitive attributes contribute greatly to the academic success of the student.

The American Medical Association (1994) surveyed CAHEA accredited programs representing 28 allied health occupations with respect to program enrollment, graduates, and attrition rates, fees, capacity and demographic data of students per program subspeciality. The surveyors sent 3,155 questionnaires directly to the program directors of those accredited CAHEA programs as of July 1993. The questionnaires were sent in August 1993 and were completed by the directors and reviewed by "principal administrative officers" of the training institutions.

The surveyors made three reminder calls to institutions to ensure complete response (American Medical Association, 1994, p. 347). They reported that there were 3,116 allied health programs nationally and 73 programs in the Commonwealth of Virginia. The Virginia programs reported an enrollment capacity of 2,156, actual enrollment of 2,111 and 870 graduates (American Medical Association, 1994-95).

Table 1 lists the data of Virginia 1993 CAHEA program capacity, enrollees and graduates in the specialities of radiologic technology, respiratory therapist, medical records technician and surgical technology. The table shows

that medical records technician capacity was 98, enrollees were 68 and there were 23 graduating students; radiologic technology capacity was 632, enrollees were 539 and graduates 244; respiratory therapist capacity was 160, enrollees were 180 and graduates 128 (American Medical Association, 1994-95, p. 369), and surgical technician capacity was 152, enrollees were 43 and graduates 25. These numbers are significant as they contribute to a pattern of reported student enrollment and graduating students numbers over the years 1992-1994.

Table 2 lists the variety of health occupations and the number of (CAHEA) accredited programs, by subspeciality major in the Commonwealth of Virginia in 1993. The (subjects) sample for this survey was selected from this population of Virginia allied health occupation training programs. They were respiratory therapist (5 programs surveyed), radiologic technology (11 programs surveyed), surgical technology (4 programs surveyed), and medical records technician (2 programs surveyed).

Table 3 lists the Virginia CAHEA accredited allied health occupations training programs by subspeciality for the years 1994, 1995 and shows the decrease in the number of programs and the rate of change in the number of programs. The subspeciality majors with a reported decrease in the number of programs is pertinent as these majors were surveyed in this study. These subspecialities of training

are respiratory therapist, medical records technician, surgical technologist and radiologic technologist. The change in the number of open training programs impacts both the number of graduates and the paired subspeciality work forces of respiratory therapist and medical records technician. Table 3 reports a 10.52% decrease overall of Virginia CAHEA allied health training programs from 1994-1995. The data further represents a 23% decrease, in one year, of Virginia CAHEA radiology technology training programs as well as a 17% decrease, in one year, of Virginia CAHEA respiratory therapist training programs. This data contributes to the explanation of a trend of allied health student shortages which may impact on the allied health staff shortages (American Medical Association, 1991-92; American Medical Association, 1993-94; Bell, 1988; Breo, 1988, Freudenheim, 1990; Gupta & Konrad, 1992). No new programs were reported to offset the decreases of programs in 1994-1995.

Table 4 represents the 1992-1993 national numbers of enrollments, attrition and graduating students by subspeciality area (American Medical Association, 1994-95). This is important as it also relates to the current numbers of enrolled students and the number of students who have demonstrated student academic achievement reported in this study. The previous, national numbers help to define the demographics of the allied health occupations studied.

Table 5 lists the 1992-1993 national ethnography and attrition numbers for the study group allied health occupations of medical records technician, radiologic technologist, respiratory therapist and surgical technologist. These data contribute to the understanding of the study subjects numbers as a subset of the national trend numbers of ongoing attrition in allied health training programs. The Virginia program attrition rates can be compared to these national numbers.

Table 6 lists the 1992-1993 national enrollment numbers of students by ethnic class and allied health occupation as surveyed in the study. (Table 6 differs from Table 4 as Table 6 reports numbers by race and attrition is not reported.)

In 1993, Caucasian students, not of Hispanic origin, accounted for 78% of the total CAHEA enrollment and 69% of the attrition for CAHEA accredited programs. African-Americans, not of Hispanic origin, accounted for 11% of total enrollment and 20% of the attrition. Hispanic students comprised 6% of the enrollments and 6% of the 69% attrition rate. Asians comprised 4% of the enrollments and 4% of the 69% attrition and Native Americans accounted for less than 1% of both enrollment and attrition (American Medical Association, 1994-95).

Table 7 presents 1992-1993 enrollment capacity by occupation in Virginia. Descriptive statistics state that

in Virginia, during academic year 1992-1993, medical records technician programs had 68 enrolled students, graduated 23 students at 23% of the 98 student capacity. Radiologic technology programs enrolled 539 students and graduated 39% of the 632 student capacity. Respiratory therapist programs graduated 80% of the 180 enrolled students. Surgical technologist programs enrolled 43 students and graduated 16% of these students (American Medical Association, 1994-95). These data signify that allied health training program numbers by enrollment and graduation by capacity enrollment are low, contributing to the low numbers of allied health occupation workers.

Table 1

1992-1993 Enrollments, Graduates, and Enrollment Capacity by State and Occupation

Virginia

	MRT	RT	RESTT	ST	Total of Programs Surveyed	Total of all National Programs
Enrollments	68	539	180	43	883	2,058
Graduates	23	244	128	25	430	860
Capacity	98	632	160	152	1,117	2,081

1993 Profile of CAHEA-Accredited Educational Programs of Virginia program enrollment, graduates, and program capacity by Allied Health Occupation.

Legend: MRT = Medical Records Technician

RT = Radiologic Technologist

RESTT = Respiratory Therapist

ST = Surgical Technologist

Table 2

CAHEA-Accredited Programs by State and Occupation in 1993

VIRGINIA

Anesthesiologist's Assistant (AA)	0
Cardiovascular Technologist (CVT)	1
Cytotechnologist (CYTO)	1
Diagnostic Medical Sonographer (DMS)	1
Electroneurodiagnostic Technologist (ET)	1
Emergency Medical Technician-Paramedic (EMT-P)	2
Histologic Technician/Technologist (HT)	0
Medical Assistant (MA)	1
Medical Illustrator (MI)	0
Medical Laboratory Technician-Associate Degree (MLT-AD)	4
Medical Laboratory Technician-Certificate (MLT-C)	3
Medical Record Administrator (MRA)	2
Medical Record Technician (MRT)	3
Medical Technologist (MT)	9
Radiologic Technologist (RT)	19
Respiratory Therapist (RESTT)	6
Surgical Technologist	5

Allied Health Education Directory 1994-1995, American Medical Association, Twenty-second edition.

Table 3

CAHEA-Accredited Programs* by State, Occupation, and % of Change 1994-1995

VIRGINIA	1994	1995	Program Number Change 1994-95	% Change 1994-95
Cardiovascular Technologist (CVT)	1	1	0	
Cytotechnologist (CYTO)	1	1	0	
Electroneurodiagnostic Technologist (ET)	1	1	0	
Emergency Medical Technician-Paramedic (EMT-P)	2	2	0	
Medical Assistant (MA)	1	1	0	
Medical Laboratory Technician-Associate Degree (MLT-AD)	4	4	0	
Medical Laboratory Technician-Certificate (MLT-C)	3	3	0	
Medical Record Administrator (MRA)	2	1	-1*	50%
**Medical Record Technician (MRT)	3	3	0	
Medical Technologist (MT)	9	9	0	
**Radiologic Technology (RT)	18	14	-4*	23%
**Respiratory Therapist (RESTT)	6	5	-1*	17%
**Surgical Technologist (ST)	5	5	0	
	N=57	N=51	N=6	

*1993 Profile of CAHEA Accredited Program Education Directory, American Medical Association 1995 and Program Director's Verbal Response, 1995. **Allied Health Career Specialty Programs included in this study.

Table 4

1992-1993 National Enrollments and Graduates by Occupation

Occupation	Enrollments*	Attrition*	Graduates*
	Total	Total	Total
Medical Record Technician	6,538	753	1,756
Radiographer	23,816	2,587	10,061
Respiratory Therapist	6,671	1,461	3,914
Surgical Technologist	3,579	795	2,211
Total	40,604	5,596	17,942

*Enrollment, attrition and graduate data were provided by the 3,096 (100%) programs accredited as of July 1993 and 59 (100%) programs that were discontinued in 1992-1993. Data reflect the 1992-1993 academic year.

Legend: Graduates are those students who successfully completed the program as of academic year 1992-1993.

Table 5

1992-1993 National Attrition of Students Enrolled in Programs of Interest by Race/Ethnic Origin, and Occupation

	MRT	RT	RESTT	ST	Total
	Total	Total	Total	Total	Total
Caucasian	513	2,054	991	605	4,163
African-American	145	300	269	124	838
Hispanic	36	70	66	34	206
Puerto Rican	13	41	32	2	88
Other Hispanic	16	37	36	13	102
Pacific Islander	27	69	57	9	162
Alaskan Native	3	16	10	8	37
Total	753	2,587	1,461	795	5,596

Valid data were provided by 99% (3,128) of the 3,155 responding programs. Data reflect the 1992-1993 academic year.

Legend: MRT = Medical Records Technician
RT = Radiologic Technologist
RESTT = Respiratory Therapist
ST = Surgical Technologist

Table 6

1992-1993 National Enrollment by Race/Ethnic Origin, and Occupation

	MRT	RT	RESTT	ST	Total
	Total	Total	Total	Total	Total
Caucasian	5,059	19,765	4,642	2,696	32,162
African-American	781	1,537	792	416	3,526
Hispanic	176	619	262	127	1,184
Puerto Rican	103	291	244	21	659
Other Hispanic	94	317	124	44	579
Pacific Islander	169	630	342	68	1,209
Alaskan Native	15	108	46	20	189
Total	6,397	23,267	6,452	3,392	39,508

Valid data were provided by 99% (3,128) of the 3,155 responding programs. Data reflect the 1992-1993 academic year. (N) Indicates the National number of 1992-1993 enrollment as reported by American Medical Association, 1994-95.

Legend: MRT = Medical Records Technician
RT = Radiologic Technologist
RESTT = Respiratory Therapist
ST = Surgical Technologist

Table 7

1992-1993 Enrollments, Graduates, Graduate % by Capacity, and Enrollment Capacity by State and Occupation

VIRGINIA	ENROLLMENTS	ENROLLMENT CAPACITY	GRADUATE % OF ENROLLMENT CAPACITY
MRT (3 programs)	68	98	23
RT (19 programs)	539	632	39
RESTT (6 programs)	180	160	80
ST (5 programs)	43	152*	16
TOTAL	830	1,042	40

Legend: MRT = Medical Records Technician - 2 year

RT = Radiologic Technologist - 2 year

RESTT = Respiratory Therapist - 2 year

ST = Surgical Technologist - 1 year (all hospital based)

Graduate % of capacity = graduating student % of program student capacity numbers

(American Medical Association, 1994-1995, pp. 368-369).

*One program's capacity is 110 and the other programs combined capacity is 42.

Temperament Types and Preferences for Learning Styles

In the 1950s Myers and Briggs devised the Myers-Briggs Type Indicator based on Jung's theory of four "functional" character/temperament types: Dionysian (SP) (Sensing, Perceptive), Epimethean (SJ) (Sensing, Judgment), Promethean (NT) (Intuitive, Thinking) and Apollonian (NF) (Intuitive, Feeling) (Myers, 1962). The four temperament types represent the preferred attitude(s) and were demonstrated in the conscious expression of personality, the aim, will and achievement of the personality (Keirsey & Bates, p. 15). There are four dimensions of difference, resulting in 16 types that have emerged and have generally been accepted as universally applicable (Keirsey & Bates, p. 26), (Myers, 1962). These 16 (paired-attractor) types are:

INTP (Architect)	ESFJ (Seller)
ENTP (Inventor)	ISFJ (Conservator)
INTJ (Scientist)	ESFP (Entertainer)
ENTJ (Field Marshal)	ISFP (Artist)
INFP (Questor)	ESTJ (Administrator)
ENFP (Journalist)	ISTJ (Trustee)
INFJ (Author)	ESTP (Promotor)
ENFJ (Pedagogue)	ISTP (Artisan)

(Keirsey & Bates, p. 70)

The following summarizes the ways the four temperament types learn, their preferred instructional technology, preferred curriculum content, and their responses to appropriate feedback from mentors. The temperaments NF (Intuitive, Feeling), NT (Intuitive, Thinking), SJ (Sensing, Judging), and SP (Sensing, Perceptive) give the most accurate prediction about one's personality and expected

behavior (Keirsey & Bates, p. 181), (Kroeger & Thuesen, 1988).

NFs (Intuitive, Feeling) have a strong need to please teacher, parent and peers and generally do well with theory (Keirsey & Bates, p. 187). NFs represent an estimated 12% of the American population (Keirsey & Bates, p. 60). Generally, NFs have a vast capacity for working with people and have a strong desire to aid others. NFs are known to take criticism too personally and this disruption of their harmony may cause obstacles to their learning. An NF enjoys interaction and will do well in two-way exchanges and thrives on teacher-student feedback. The NF student works better in a team, prefers specific directions. They learn through face to face dialogue, written communication such as a report or research paper, giving a rehearsed speech, working in small groups and sharing information (Keirsey & Bates, p. 188). As idealists, NFs are noted as pleasing, inspired, sage/wise/oracle, ethical, good willed, genuine, mentor/envoy, intuitive, counselor/conciliator, prophetic, diplomatic, teacher/interpreter. They can be alienated, altruistic, mystical, enthused, warm, needy for love, affectionate, and unique (Kroeger & Thuesen, p. 54).

NTs (Intuitive, Thinking) are driven by a need for competence and expect their instructors to have it. NTs test the status quo and raise the standards with each achievement. The NT student is seen as counterdependent,

and as an intellectual snob (Keirsey & Bates, p. 47). NTs, representing 12% of the population, learn by discussing, they must know all in order to "understand, explain, predict, and control". They focus on technology as a subject area.

NTs are independent learners, and are comfortable with logical, didactic presentation and learn by following up separately by reading. NT students are "self-sufficient" (Keirsey & Bates, p. 126).

NTs are described as rationals who are efficient, organized, calm/serene, competent/capable, wizard like, pragmatic, independent, can be preoccupied/distracted, ingenious, progressive, skeptical, technical, self-directed, independent and inventive. They need achievement and autonomy (Keirsey & Bates, 1984; Kroeger & Thuesen, 1988).

SJs (Sensing, Judgment) represent about 38% of the United States population. SJs "polish the (teacher's) apple" (Keirsey & Bates, p. 187). SJs accept that the teacher is there to teach and they are there to learn. SJs learn theory because they "should do it" (Keirsey & Bates, p. 187) although "their rigidity may make them less than open to learning new things" (Kroeger & Thuesen, p. 57). They do not thrive on long-term, independent projects. They may not always enjoy discussion or debate; they prefer a demonstration lesson.

The SJ prefers to learn by a teacher directed question

and answer formatted session. The socratic method of instruction suits the SJ learner well (Keirsey & Bates, 1984). They have a need to belong to meaningful institutions or programs. There is a high frequency of SJs in business, service occupations, and the medical arena (Schroeder, 1993). They gravitate to organized fields/companies that nurture, such as hospitals (Keirsey & Bates, p. 47). Of all the temperament types, they respect the report card most of all. As judgers they organize and are well prepared to meet the demands of an academic schedule (Kroeger & Thuesen, p. 56).

SJs are best described as guardians who are accountable, traditional, concerned, solemn, conventional, predestined, established, official, serious/staunch. They provide stability, continuity and safety. SJs can be forebearing and have a need for security, standardization, rites/ceremony, and a sense of belonging or membership in a group (Kroeger & Thuesen, p. 56).

SPs (Sensing, Perceptive) represent about 38% of the population and are often the losers in the education system as they live in the moment and are not interested in storing knowledge and/or data for possible future use (Keirsey & Bates, 1984). For the SP "To learn is to grapple successfully" (Keirsey & Bates, p. 187).

SPs seek action and are attracted to technically skilled, hands-on task careers. They are adept at learning,

functioning, through practical application of skills (Kroeger & Thuesen, p. 60).

> They are attracted to careers that have immediate, tangible rewards, fire fighting, emergency medicine, mechanics ... anything involving technical skills (Kroeger & Thuesen, p. 59).

SPs are depicted as artisans who are effective, excited, winning, practical, expediter, adventuresome, spontaneous, bold, optimistic, and competitive. They can be crafty, impetuous, urbane, cynical, and daring people who need spontaneity and thrills (Kroeger & Thuesen, 1988).

Gap Theory

Anderson's (1989) Gap Theory attempts to explain differential levels of student academic achievement that are attributable to the student's temperament type, teachers and institutional factors. The following discussions delineate ways that students, instructors, instructional methods and institutional factors can/may influence the student academic achievement of students.

Anderson (1989) used the Forced Field Analysis of College Persistence to delineate and explain the internal and external forces that students encounter. Anderson (1989) suggested that persistence in college is related to the number and severity of the varying forces that either promote or prevent the student's academic achievement towards the completion of his or her studies. The negative internal forces may include procrastination, little or poor

assessment of one's needs and problems, self-doubt, and stubbornness. These are based in the theory of personality traits and temperament types (Keirsey & Bates, 1984; Maslow, 1954; Myers, 1962). Specific negative external forces include isolation, social pressures, discrimination, expectations, lack of fiscal support, transportation and/or housing problems (Anderson, 1989).

The salient point of Anderson's discussion is that students must expend both time and energy to overcome "force obstacles" during their learning (training program) experience. The theoretical premise is that while teachers evaluate whether students are or are not achieving academically, the student must be willing to invest of him or herself by developing or drawing on their "where with all" and it is the student's responsibility to expend enough time and energy to learn and to achieve according to the expectations of the instructors (Anderson, 1989). Therefore, gaps may be found between the student needs in order to learn and what the student has at the time of entry into academic programs (Anderson, 1989; Fuller, 1994; Schroeder, 1993).

Theoretically, student academic success is predicated on the student's character and temperament qualities as follows: motivation to achieve, commitment to succeed, and self-efficacy (Anderson, 1989). Anderson (1989) and Berry and Asamen (1989) both suggest that these attributes are

needed to "bridge the gaps" between the student's skills, knowledge and abilities and those required for student academic success such that:

> Motivation to achieve generates the energy to bridge gaps necessary for achievement and persistence; commitment to achieve directs the energy and invests the time needed to bridge those gaps; and self-efficacy supplies the confidence to actually begin working toward achievement. Motivation, commitment and self-efficacy supply, give direction to, and enable students to invest the energy needed to overcome the gaps and adjust to the forces and obstacles that college students encounter (Berry & Asamen, 1989, p. 227-228).

Anderson (1989) further suggested that a student's perception of the situation, the specific assignment, and expectation of the instructor are crucial to the success of the student. "How students perceive that they can best meet their needs and fulfill their desires is most important" (Berry & Asamen, 1989, p. 230). Instructors can help to increase student motivation for student academic success by:

> (a) helping students identify and clarify their needs and desires; (b) helping students identify and clarify their satisfactions and dissatisfactions; (c) helping students identify and clarify areas of desired competence; and (d) helping students identify and clarify values (Berry & Asamen, 1989, p. 230).

Academic Success of the General Student Population

Researchers have studied cognitive and noncognitive variables as predictors of student academic success. Ott

(1978) suggested that more careful selection of students would increase the retention and success rate of training programs. Moll (1979) suggested that often selection criteria are weighted towards cognitive variables favorably over nonstandardized noncognitive variables. Moll (1979) further suggested that standardization of criteria is needed.

Tracey and Sedlacek (1984, 1985, 1987, 1988, and 1989) repeatedly tested for and provided evidence of the significance of noncognitive variables as related to student academic success. Motivation, interest, perseverance and social acceptance are directly related to the grade point average and retention rates of the general student population as well as minority subgroups of students.

Sedlacek (1989) discussed noncognitive variables as predictors of student academic success with respect to student characteristics, personality traits in the following characterization:

Positive self-concept/confidence. High scorers possess strong self-concept, a sense of determination, and are independent. High scorers also feel confident of completing their studies and of graduating. They make positive statements about themselves. They expect (and others expect them) to do well in academic areas (Sedlacek, 1989; Tracey & Sedlacek, 1989).

Low scorers state reasons for leaving, dropping out of

school. They are not sure they have the ability to complete study programs. They feel other students are more capable (Sedlacek, 1989; Tracey & Sedlacek, 1989).

Realistic Self-Appraisal. High scorers recognize and accept any deficiencies they have and work hard at personal growth. They have developed a system of using feedback to assess and alter behavior (Sedlacek, 1989; Tracey & Sedlacek, 1989).

Low scorers often are not sure how academic evaluations are done and react to the most recent positive or negative reinforcement (Sedlacek, 1989).

Prefers Long-Range Goals to Short-term or Immediate Needs. These students are able to respond to delayed rewards. High scorers set goals and proceed for long stints without reinforcement. They are both future- and past-oriented. They demonstrate evidence of planning in both academic and non-academic areas (Fuller, 1994; Sedlacek, 1989).

Low scoring students show little ability to set and accomplish goals. They are likely to proceed without clear direction. They do not have a plan for approaching an academic course. Their goals are often vague and unrealistic (Fuller, 1994; Sedlacek, 1989).

Availability of Strong Support Person. High scoring students identify and seek help, support, and encouragement from one or more specific individuals. They are not loners

and are willing to admit they need help as may be appropriate to their situational needs (Sedlacek, 1989; Tracey & Sedlacek, 1989).

Low scorers show little or no evidence of seeking help. They do not voice their problems to others. They feel they can handle things on their own. They do not realize the importance of a support person or an ongoing support system (Fuller, 1994; Sedlacek, 1989).

Successful Leadership Experience. High scorers show evidence of influencing others in academic and/or nonacademic areas. They are willing and able to provide advice and direction to others (Sedlacek, 1989).

Low scorers do not show evidence that others seek them out for advice, help or guidance. They are generally very cautious and try to avoid conflict. Low scoring students are not well-known by their peers (Tracey & Sedlacek, 1989).

Student Success in Allied Health Education

Fuller (1994) compared selected cognitive and noncognitive variables and their relationship to the student academic success of medical technology students in general, and specifically African-American medical technology students. The study population consisted of 75 university-based medical technology students from 10 institutions. The participants were enrolled at a college or university located in the southeastern United States with either a minority of African-American students or majority of

African-American students.

The researcher found that there were no significant differences between students educated at minority and majority institutions. Statistically, only the cognitive variable of preclinical GPA was significantly related to cumulative GPA and clinical practical grades. It is notable that the researcher also found that:

> Some noncognitive dimensions are significantly related to clinical practica performance when these attributes are measured by cumulative clinical practica grades. ... The findings from this study support previous research which suggested that cognitive and some noncognitive predictors may function independently of each other as predictors of success in the academic and clinical aspects of medical technology programs (Rifken et al., 1981) ... Thus, both types of variables, cognitive and noncognitive, may be helpful in predicting these student's potential for success in medical technology education (Fuller, p. 88-89).

Sedlacek and Prieto (1990) in a study titled "Predicting Minority Students' Success in Medical School" stated that minorities were and are forced to develop their skills in experiential and contextual intellect in a variety of ways that the general (majority) student population historically has not had to do. The premise is based on "traditionality", that is "having experience in dealing with Caucasian middle-class and upper middle-class cultures and institutions" (Sedlacek & Prieto, 1990, p. 165). It was further suggested that the inherent racism of an institution

of training/learning limits the choices of minority students. Therefore, the researchers suggested that the use of traditional measures of cognitive benchmarks were limited with respect to the assessment of and prediction of minority student academic success.

Knowles (1978, 1980) suggested that adults are a product of what they have done. It is through the (generally) vast array of learner backgrounds and experiences that validation of knowledge is obtained. This confirmation of beliefs is critical to the adult learning process, as experience is the essence of who an individual is and/or who he is becoming.

Other researchers (Blagg, 1985; Lehmann et al., 1984; Love et al., 1982; Rezler & French, 1975; Rifken, 1981) reported that noncognitive variables/factors are indeed significant as predictors of allied health care student academic success and clinical practice success.

Millstead (1992) tested the relationship between student personality characteristics, (temperament types) clinical GPA and Board of Registry (BOR) scores of medical technology students. The survey data were collected as ex-post facto causal comparative data on 31 medical technology students. The researcher used 10 independent variables from a collegiate Instructor Rating Form, and two dependent variables, the student's clinical GPA and the BOR score. Statistically, both the correlation of variables and the

strength of the relationships between the 10 personality characteristics and the GPA were found to be significantly correlated with the BOR examination scores. Personality attributes and characteristics were not significantly related to GPA. However, the analysis, a stepwise multiple regression, did indicate that some specific personality characteristics, when used in combination, were indicators of the BOR examination score. These characteristics were student initiative, comprehension and understanding. Millstead (1992) suggested that a variety of variables be included along with the GPA to assess a student's demonstrated cognitive ability.

Rezler and French (1975) surveyed the personality types, student temperaments, and the preferences for learning styles in six allied health care professional majors. The majors were medical illustrator, dietician, medical laboratory technician, medical records technician, occupational therapist and physical therapist. The scope of their survey was to define "what are the learning preferences of students in the six curricula ..." (p. 20). Are students of a particular temperament and/or learning preference "attracted to specific allied health professions" (Rezler & French, p. 20)? The sample population of 152 students was tested with respect to six dimensions of a Learning Preference Inventory (LPI). The dimensions were:

Abstract: Preference for learning theories and generating hypotheses,

with focus on general principles and concepts.
Concrete: Preference for learning tangible, specific, practical tasks, with focus on skills.
Individual: Preference for learning or working alone, with emphasis on self-reliance and tasks that are solitary, such as reading.
Interpersonal: Preference for learning or working with others, with emphasis on harmonious relations between students and teacher, and among students.
Student-structured: Preference for learning via student-organized tasks, with emphasis on autonomy and self-direction.
Teacher-structured: Preference for learning in a well-organized, teacher-directed class, with expectations, assignments, and goals clearly identified (Rezler & French, p. 21).

The researchers computed Cronbach's alpha to test for internal reliabilities and found that the consistency was moderately significant given the small number of items that resulted in each scale of the survey instrument. The students also were tested to define the students according to the Myers-Briggs Type Indicator (MBTI). The MBTI differentiates individuals into one of sixteen personality types. The MBTI, a self-report personality inventory, was used to measure the characteristics of Extroversion, Introversion, Sensing, Intuition, Thinking, Feeling, Judging, and Perception (Keirsey & Bates, 1984; Myers, 1962).

A trend was noted that higher percentages of Feeling scores as compared to Thinking scores were reported in each

of the six groups. This is consistent with the fact that predominately female groups tend to split at an estimated rate of 78% Feeling and 22% Thinking (Rezler & French, 1975).

The researchers further found that five of the six groups of allied health care students favored Judging over Perception and this was interpreted to mean that the students preferred to "proceed in a planned, orderly manner" having individual control (Rezler & French, p. 24).

The results of the Extroversion-Introversion scale were that they supported the survey assumption that "extroverts tend to choose" occupations involving varied and direct interaction, contact, with the public. In this study, direct patient; clinical contact (Rezler & French, p. 175).

The researchers found that the Sensing-Intuition (S-N) scale was an approximation of equal distribution in the six groups suggesting that equal numbers of students in the allied health care major groups were "realistic, practical and fact oriented as imaginative problem solvers" drawn to new ideas, (Rezler & French, p. 25).

The researchers concluded that to better ensure student academic success:

> individual differences within a profession are more important to identify than the differences among the professions if teachers wish to adjust their teaching styles to student preferences in learning (Rezler & French, p. 25)

It was found that the majority of these students "preferred teacher-structured learning experiences, dealing with concrete rather than abstract aspects of course content and practice oriented learning" (Rezler & French, p. 25).

Research Questions

The previous review of the literature, the need to assess allied health occupation student academic success and the Theories of General Student Population Retention, Gap Theory and Myers-Briggs Theory of Jung's character types have led to the following research questions:

A. Does the cognitive variable, preclinical (high school) grade point average, significantly predict the academic achievement of the selected allied health majors in the study?

B. Do any of the noncognitive variables, realistic student self-appraisal, positive self-concept, age, sex, race, marital status, student major, parental occupations, student expectations/long range goals, significantly contribute to or predict the student academic achievement of the select allied health majors of the study?

C. Is there a relationship between the temperament types SJ, SP, NT, and NF and student academic achievement as defined by the dependent cognitive variables of passing status and the independent noncognitive variables of the study?

D. Are the students of a particular (like) temperament type attracted to the allied health occupations studied?

E. Is there a relationship between character traits and academic achievement?

Chapter 3

Methods and Procedures

This chapter describes the methodology that was used to conduct this study. The design, population and sample, along with the procedure, instrumentation, description, statistical data, and protection of human subjects are described.

Research Design

The research study employed a nonprobability correlation design to investigate the relationships and plausible "causal" factors contributing to student academic success. This design afforded a quantitative method of determining the relationship of cognitive and noncognitive variables to student academic success of selected allied health technology majors. The dependent measures of student academic achievement were clinical grade point average, academic (theoretical) grade point average, cumulative grade point average, and passing status.

The independent variables were the four summed noncognitive questionnaire scores, student temperament and preference for learning style types, 16 character types described by Myers-Briggs, other personality variables and the cognitive variable preclinical (high school) grade point average.

Subjects

The study population consisted of allied health

professional majors in radiologic technologist, medical records technician, respiratory therapist and surgical technology from CAHEA (1994) accredited programs (three majors studied were two year programs and one major, surgical technology, was less than a two year program) in the Commonwealth of Virginia. These institutions were listed in the American Medical Association Allied Health Education Directory 1994-95. Allied health care students participating in the study were classified as 1st or 2nd year students as of Fall, 1994.

The respondent sample totaled 177 students. The usable sample totaled 169 students. All students enrolled in the selected Virginia (22 of 32) programs were seeking certificate/registry eligible status. Of the programs surveyed (22) 16 programs responded on or before the preset cut off date for receipt of data. Nonprobability purposive sampling was the method used.

Protection of Human Subjects

This research project has been reviewed and approved by the Old Dominion University Committee for the Protection of Human Subjects by expedited decision.

Training institutions providing the data for this study were assured that anonymity would be maintained. Aggregate data only was reported in this study.

The respondents (22 of 32 programs) allied health training programs in this study were coded 1-22 since the

study was not concerned with the institutions individually.

A letter of informed consent was sent to each participant inviting him/her to participate in the study (See Appendix C). This letter described the purpose of the study and informed each participant that participation in the study would be voluntary and that the student could withdraw from the study at any time. The letter also assured the subjects that their right to privacy would be protected using only the last four digits of their social security number and subspeciality training field on the returned materials. The names of the subjects were not requested. Completion and return of the questionnaire by the participants were taken as evidence of their willingness to participate in the study.

Procedures

The allied health technology program director(s) were requested to complete the Program Directors Reporting Form delineating the following data regarding the training program: number of student slots, slots filled, attrition by race, and percentages of graduates per class (See Appendix A).

The program directors also were requested to distribute the student questionnaires in a controlled classroom setting as stated in the cover letter (See Appendix B). The program directors were further requested to assign a student to collect the completed questionnaires. The assigned student

would seal the questionnaires in the envelope provided. The student would give the sealed envelope to the program director. The program director would mail the sealed envelope, along with the completed Program Director's Reporting Form to the researcher.

A total of 230 student questionnaires, which included the Keirsey Temperament Sorter, and 22 Program Director's reporting forms were mailed to allied health technology program directors. Telephone calls were made repeatedly, at weekly intervals, to those program directors who had not returned surveys.

Instrumentation

The student questionnaires used in the research study included the Keirsey Temperament Sorter, which was designed to assess the personality characteristics/temperament types, the student preferences for learning styles, and contributing noncognitive factors to student achievement (See Appendix B). The instrument components had been psychometrically tested by Keirsey and Bates (1984) and by Tracey and Sedlacek (1984) and found to be related to preferences for learning style and student academic success of students post high school education respectively.

The student questionnaire consisted of 96 items that were Likert-scaled, dichotomous, multiple choice and open ended (Isaac & Michael, 1981; Tuckman, 1988). The Likert scaled questions assessed student self-concept, expectations

regarding college, availability of support, the setting of long range goals, and leadership/recognition. The multiple choice questions gathered information regarding student goals and reasons for possible attrition which, as reported, is related to student self-concept.

Scoring of Likert Scales

The reverse scoring of negative Likert items provides a score or a total summed score of correlated statements that reflected overall positiveness with respect to the tested variable of the question (Tuckman, 1988). In this study those with high scores to statements would indicate a positive response and those with low scores would indicate a negative response to the noncognitive variables of leadership, self-concept, goal setting, realistic self-appraisal and availability of support.

Positive response Likert scaled items were scored by the following key:

SA = 5, A = 4, N = 0, D = 2, SD = 1

Negative response Likert scaled items were scored by the following key:

SA = 1, A = 2, N = 0, D = 4, SD = 5

Data Analysis

The questionnaires' noncognitive variables were scored manually. Frequency distributions and percentages were calculated for the demographic data of the study groups. Means and standard deviations were calculated for both

independent and dependent variables. Pearson-Product Moment Correlation coefficients were calculated to define the degree of relationship between cumulative grade point average, academic (theoretical) grade point average, clinical (practical) grade point average, four noncognitive questionnaire sub scores and preclinical (high school) grade point average. The variables that were found to contribute independently and/or significantly to the prediction of the cumulative grade point average, academic (theoretical) grade point average and clinical (practical) grade point average were assessed through stepwise multiple regression equations and multiple analysis of covariance (MANCOVA).

All items have been found to have adequate test-retest reliabilities (each item had a median value of 0.85) (Tracey & Sedlacek, 1984). Construct validity on the noncognitive dimensions was demonstrated using factorial analysis (Tracey & Sedlacek, 1984).

The confidence level was set a priori at alpha .05 for all analyses of this research study. Data were coded at the nominal level for demographic information so that "dummy" variables were created for both the correlation and multiple regression analysis testing.

Frequency distributions and percentages were used to display the demographic data, a comparison was made of the cognitive variable preclinical (high school) GPA and the noncognitive variables effect on student academic success as

measured by the dependent variables, academic (theoretical) GPA, clinical (practical) GPA and cumulative GPA of the survey's population. Means and standard deviations were obtained for the variables. Independent t tests and Chi Square tests were computed. Pearson-Product Moment Correlation coefficients were computed to report the relationships between the independent and dependent variables. Scheffe testing also was computed to determine the statistical significance of the variables computed by MANCOVA.

Chapter 4

Presentation and Analysis of Data

This chapter presents both the analysis and results of the data. Demographic data about the sample allied health students is presented first. Following this, the results of the student temperament and character type questionnaire is presented. This includes the relationship of student characteristics to the allied health occupations surveyed.

Demographic Data

A total of 177 student questionnaires from 16 programs were returned to the researcher on or before March 31, 1995, the preset termination date for data collection. The response rate was 74%. Questionnaires were not used if they were incomplete. (Eight student questionnaires were incomplete; five of which were medical records majors.)

The respondent sample consisted of 169 allied health students enrolled in accredited programs during 1994-1995 in Virginia. The health occupations representing the 22 (of 32 Virginia) selected Virginia programs were radiologic technology, surgical technology, respiratory therapist, and medical records technician. Tables 8 through 12 provide the summary of the demographic characteristics of the sampled students. Data of no response/missing information were not included in the tables. With respect to numbers, 51 students, (30.4%) were from hospital based programs and 117 students (69.6%) were enrolled in community college based

programs. Enrollment in the different programs was 68 radiologic technology, 21 medical records technician, 13 surgical technologist and 63 respiratory therapist. Males constituted 25.6% (n = 43) of the sample while females numbered 125 or 74.4% of the sample. In terms of ethnic class, 81.7% (n = 138) were Caucasian, 8.3% (n = 14) were African-American, 4.1% (n = 7) were Asian, 2.4% (n = 4) were Hispanic, and 3.6% (n = 6) were reported as Other. The participants ages ranged from 18-30+ with 43 (25.4%) between 18-21 years of age, 31 (18.8%) between 22-25, 30 (18.2%) between 26-29 years of age and 65 (38.5%) reporting 30 or more years of age.

Respondents reported that 54 (32%) of their fathers and 74 (43.8%) of their mothers were characterized as white collar workers. Respondents further reported that 71 (42%) of the fathers and 60 (35.5%) of the mothers were blue collar workers. Students stated that 22.5% of the fathers and 19.5% of the mothers were retired or otherwise unemployed (See Table 12).

The data indicates 17 (10.3%) had been in training programs less than five months, 95 (57.6%) had been in training less than 13 months, 13 (7.9%) had been in training less than 19 months, and 44 (26.7%) had been in training 19 to 24 months (See Table 9).

NFs (Intuitive, Feeling) (Idealists) represent an estimated 12% of the United States population. They

represented 7.7% (n = 13) of the purposive study sample. Further, they represented 4.7% (n = 3) of the respondent NF radiologic technology students, 15% (n = 2) of the surgical technology students, 23% (n = 15) of NF respiratory therapist students and 15% (n = 3) of medical records technician students.

NTs (Intuitive, Thinking) (Rationals) also represent 12% of the United States population while this designation was reported in 4.8% of the study sample. They represented 25% of the respondent radiologic technology students, 12.5% of the respondent surgical technology students, 12.5% respiratory therapist students and 50% of the respondent medical records technician students. NTs are the smallest group of the study.

SJs (Sensing, Judgment) (Guardians) represent an estimated 38% of the United States population and they represent 75.6% of the overall sample. SJs represent 82% of all respondent radiologic technology students, 62% of all respondent surgical technology students, 90% of respondent respiratory therapist students and 57% of the respondent medical records technician students. SJs are the largest group of the study. This suggests that SJs (Sensing, Judging) are selected at twice the expected population rate of 38% for the overall survey sample. It further suggests that there is homogeneity within study groups and among some of the study groups. This majority representation (SJ) is

statistically significant at the alpha .05 level with respect to student persistence, student academic achievement, and teaching technique.

SPs (Sensing, Perceptive) (Artisans) represent an estimated 38% of the United States population and 11.9% of the overall study sample. They represent 30%, 10%, 40%, and 20% for the SP respondent radiologic technology students, surgical technology students, respiratory therapist students and medical records technician students respectively.

Table 8 represents demographic data of the survey students by gender, race, age category, and marital status.

Table 9 represents the student's length of study in an allied health program. Frequencies of the allied health subspeciality student majors of respiratory therapist, surgical technology (a one year study program), radiologic technology and medical records technician are stated.

Table 10 represents the reported independent variable preclinical (high school) GPA breakdown for the total sample of the study.

Table 11 represents the frequencies of reported dependent variables academic (theoretical) GPA, clinical (practical) GPA and cumulative GPA.

Table 12 represents the parent occupation status. Parental occupation was found to be significant in this study. These findings do support the previous research of Tracey and Sedlacek, however, it is thought that the value

as related to this study is minimal. Job listings reported were collapsed into job occupation categories of retired, white collar worker, blue collar worker and other.

MANCOVA analysis was also computed to test for significant relationships between the independent and dependent variables. There was no significance at alpha .05.

Table 8

Demographic Characteristics of Students Participating in the Study

Characteristic	N	%
Sex n = 168*		
Male	43	25
Female	125	74
Race n = 169*		
Caucasian	138	81
African-American (Black)	14	8
Asian	7	4
Hispanic	4	2
Other	6	3
Age n = 169*		
18 - 21	43	25
22 - 25	31	18
26 - 29	30	17
30+	65	38
Marital Status n = 167*		
Single	88	52
Married	65	38
Divorced	14	8

Legend: % numbers have been rounded to the nearest whole number.

*Numbers reported do not include 3 missing responses, 1 by sex and 2 by marital status.

Table 9

Education Characteristics of 169 Students Participating in the Study

Characteristic	N	%
Length of Study		
4 months or less	17	10
5 - 12 months	95	56
13 - 18 months	13	8
19 - 24 months	44	26
Year of Study		
1st year of study*	103	61
2nd year of study	66	39
Major		
Respiratory Therapist	63	37
Surgical Technology	13	8
Radiologic Technology	68	40
Medical Records Technician	21	12
Other	4	3

N = 169

Legend: % numbers have been rounded to the nearest whole number.

*One program (surgical technology) with 13 respondent students was a one year program.

Table 10

Preclinical (High School) Grade Point (4 Point Scale) Average Demographic Data of 169 Students Participating in the Study

Variable	N	%
Preclinical (High School) GPA		
1.5	2	1
2	14	8
2.5	42	25
3	52	31
3.5	53	31
4	6	4

N = 169

Legend: % numbers have been rounded to the nearest whole number.

Table 11

Students Self-Reported GPA in Academic (Classroom), Clinical and Overall Cumulative, Clinical Course Work

Variable	N	%
Academic (Theoretical, Classroom) GPA		
2	6	4
2.5	24	14
3	49	29
3.5+	90	53
Clinical GPA		
2	3	2
2.5	6	3
3	33	21
3.25	1	1
3.5+	117	73
Cumulative (All Courses) GPA		
2	3	2
2.25	1	1
2.5	5	3
2.75	14	8
3	22	13
3.25	25	15
3.50+	97	56

Legend: % numbers have been rounded to the nearest whole number.

Table 12

Demographic Data Regarding Parents Occupational Status of 169 Students Participating in the Study

Characteristic	N	%
Father's Occupation		
Not reported	6	4
White Collar	54	32
Blue Collar	71	42
Other/Retired etc.	38	22
Mother's Occupation		
Not reported	2	1
White Collar	74	44
Blue Collar	60	36
Other/Retired etc.	33	19

N = 169

Legend: % numbers have been rounded to the nearest whole number.

Table 13 lists independent variable characteristic types (16) and frequencies of 169 students surveyed.

Table 14 lists frequencies by student temperament type and preference for learning style. The independent variable of temperament type SJ (Sensing, Judgment) and preference for learning style was found to represent 75.6% of the student sample. SPs (Sensing, Perceptive), NTs (Intuitive, Thinking), and NFs (Intuitive, Feeling) represented 11.9, 4.8 and 7.7% of the student sample respectively.

Table 15 states the frequencies by subspeciality and temperament type of the student sample. SJs (Sensing, Judgment) far outnumber the SPs (Sensing, Perceptive), NTs (Intuitive, Thinking), NFs (Intuitive, Feeling) for all subspecialities studied.

Table 16 represents the descriptive data, mean, standard deviation, t value and probability for the dependent variables, academic GPA, clinical GPA and cumulative GPA, by program base of study, hospital or college based. Independent t-tests were not statistically significant. Scheffe testing was computed, as a more sensitive measure, and theoretical grade point average was found to be statistically significant at alpha .05 for college based programs (See Table 27).

Table 17 represents descriptive statistics for variable SJ (Sensing, Judgment) temperament type, preference for learning style, Table 18, Table 19 and Table 20 for SPs

(Sensing, Perceptive), NTs (Intuitive, Thinking), and NFs (Intuitive, Feeling) respectively for first and second year students. The sample numbers, means, standard deviation, t value and probability are given for the four temperament types with regard to the independent variables of positive self-concept, availability of support, long range goals, leadership/recognition, and preclinical (high school) grade point average. All variables were Scheffe tested and certain variables were found to be significant indicators, variable criteria measures, for the selection of allied health occupation students, predictors of persistence, student academic achievement (See Tables 27-29). These variables, one variable at a time (no covariance), can indicate and do indicate correlation at alpha .05 level of significance for student academic achievement and supports the findings of previous researchers (Anderson, 1989; Berry & Asamen, 1989; Fuller, 1994; Sedlacek, 1987; Tinto, 1975).

Table 13

Demographic Characteristics of Student Character Types

Characteristic	N	%
Character Type		
INTP	2	1
ENTP	3	2
INTJ	3	2
ENTJ	0	0
INFP	2	1
ENFP	7	4
INFJ	1	1
ENFJ	2	1
ESFJ	57	34
ISFJ	18	11
ESFP	11	7
ISFP	4	2
ESTJ	32	19
ISTJ	18	11
ESTP	6	4
ISTP	1	1

N = 169

Based on Myers-Briggs Definitions (Myers, 1987).

Legend: % numbers have been rounded to the nearest whole number.

Table 14

Demographic Characteristics of Student Temperament Types

Characteristic	N	%
Temperament Type		
SJ	127	76
SP	20	12
NT	8	5
NF	13	8

N = 168

Legend: % numbers have been rounded to the nearest whole number.

Table 15

Descriptive Data of Allied Health Majors by Health Occupations and Temperament Type

Characteristic	N	SJ	SP	NT	NF
Major					
Respiratory Therapist	63	53	6	1	3
Surgical Technology	13	8	1	2	2
Radiologic Technology	68	56	5	2	5
Med Record Technician	21	12	3	3	3
		130	15	8	13

N = 165*

*There were 4 nonvalid (missing) responses of major by the 169 respondents.

Table 16

Descriptive Statistical Analysis and Result of Tests of Significant Difference Between Means of Grade Point Average Comparing Hospital to College Programs

Institutions	N	Mean	SD	t Value	Probability
Academic (Theoretical, Classroom) GPA					
1	51	3.401	.500	1.697	.091
2	117	3.243	.578		
		N = 168*			
Clinical GPA					
1	48	3.562	.511	.344	.731
2	112	3.533	.478		
		N = 160*			
Cumulative GPA					
1	51	4.117	4.431	1.750	.081
2	117	3.393	.483		
		N = 168*			

1 Hospital based program

2 College based program

*Responses with missing data were not included in the computation of the descriptive statistics.

Table 17

Descriptive Statistics for Independent Variables of SJs

Variables	N	Mean for Subjects	SD	t Value	Probability
Positive Self-concept					
1	82	15.414	4.931	.586	.559
2	45	14.888	4.782		
Availability of Support					
1	82	12.646	2.768	.718	.473
2	45	12.244	3.425		
Sets Long Range Goals					
1	82	9.914	2.450	-0.763	.446
2	45	10.244	2.257		
Leadership/Recognition					
1	82	1.975	2.024	-0.608	.543
2	45	2.200	1.914		
Preclinical (High School) GPA					
1	82	2.957	0.522	-0.875	.383
2	45	3.044	0.562		

N = 127

1 1st year students
2 2nd year students

Table 18

Descriptive Statistics for Independent Variables of SPs

Variables	N	Mean for Subjects	SD	t Value	Probability
Positive Self-concept					
1	13	13.923	3.817	1.920	.070
2	7	17.857	5.304		
Availability of Support					
1	13	11.230	4.815		
2	7	12.000	3.651	-0.3678	.717
Sets Long Range Goals					
1	13	9.000	2.345		
2	7	10.714	2.497	-1.525	.144
Leadership/Recognition					
1	13	2.000	2.121	0.000	1.000
2	7	2.000	2.516		
Preclinical (High School) GPA					
1	13	3.000	0.456	.873	.393
2	7	2.785	0.636		

N = 20

1 1st year students
2 2nd year students

Table 19

Descriptive Statistics for Independent Variables of NTs

Variables	N	Mean for Subjects	SD	t Value	Probability
Positive Self-concept					
1	3	13.666	1.154	-0.986	.361
2	5	16.800	5.263		
Availability of Support					
1	3	12.333	1.154	.071	.945
2	5	12.200			
Sets Long Range Goals					
1	3	8.333	1.527	-1.023	.345
2	5	10.400	3.209		
Leadership/Recognition					
1	3	1.333	1.154		
2	5	1.800	2.049	-0.354	.734
Preclinical (High School) GPA					
1	3	2.500	.500		.370
2	5	3.000	.790	-0.968	

N = 8

1 1st year students
2 2nd year students

Table 20

Descriptive Statistics for Independent Variables of NFs

Variables	N	Mean for Subjects	SD	t Value	Probability
Positive Self-concept					
1	4	15.500	3.696	.214	.833
2	9	15.111	2.713		
Availability of Support					
1	4	14.250	0.957	1.267	.231
2	9	11.888	3.586		
Sets Long Range Goals					
1	4	10.500	4.358	.3706	
2	9	9.666	1.658		.733
Leadership/Recognition					
1	4	3.250	2.217	.683	.508
2	9	2.333	2.237		
Preclinical (High School) GPA					
1	4	3.250	0.288	1.533	.153
2	9	2.833	0.500		

N = 13

1 1st year students
2 2nd year students

Tables 21 through 25 provide descriptive statistics by Temperament type SJ (Sensing, Judgment), SP (Sensing, Perceptive), NT (Intuitive, Thinking), and NF (Intuitive, Feeling) for preclinical (high school) GPA, academic (theoretical) GPA, clinical GPA, cumulative GPA, T1-self concept, T2-availability of support, T3-sets long range goals and T4-leadership/recognition. The subscale mean scores, maximum value scores and standard deviation are stated.

Table 26 provides descriptive statistics and the result of the t-test statistics for respiratory therapist, surgical technology, radiologic technology and medical records technician for the independent noncognitive variables of positive self-concept, availability of support, sets long range goals, leadership/recognition and the independent cognitive variable preclinical (high school) GPA. The t tests were not statistically significant at the alpha .05 level.

Table 21

Descriptive Statistics for Variables of SJs

Variables (n = 127)	Mean	Maximum Value	SD
Preclinical GPA	2.988	4.0	.536
Q10 Academic GPA	3.311	4.0	.556
Q11 Clinical GPA	3.548	4.0	.510
Cumulative GPA	3.673	4.0	2.844
T1 Positive Self-concept	15.228	20	4.866
T2 Availability of Support	12.503	15	3.010
T3 Sets Long Range Goals	10.031	15	2.380
T4 Leadership/ Recognition	2.055	5	1.981

Table 22

Descriptive Statistics for Variables of SPs

Variables (n = 20)	Mean	Maximum Value	SD
Preclinical GPA	2.925	4.0	.519
Q10 Academic GPA	3.15	4.0	.587
Q11 Clinical GPA	3.552	4.0	.404
Cumulative GPA	3.387	4.0	.417
T1 Positive Self-concept	15.3	20	4.669
T2 Availability of Support	11.5	15	4.358
T3 Sets Long Range Goals	9.6	15	2.479
T4 Leadership/ Recognition	2	5	2.200

Table 23

Descriptive Statistics for Variables of NTs

Variables (n = 8)	Mean	Maximum Value	SD
Preclinical GPA	2.812	4.0	.703
Q10 Academic GPA	3.375	4.0	.582
Q11 Clinical GPA	3.437	4.0	.417
Cumulative GPA	3.381	4.0	.429
T1 Positive Self-concept	15.625	20	4.340
T2 Availability of Support	12.25	15	2.375
T3 Sets Long Range Goals	9.625	15	2.774
T4 Leadership/ Recognition	1.625	5	1.685

Table 24

Descriptive Statistics for Variables of NFs

Variables (n = 12)	Mean	Maximum Value	SD
Preclinical GPA	2.961	4.0	.477
Q10 Academic GPA	3.269	4.0	.563
Q11 Clinical GPA	3.576	4.0	.449
Cumulative GPA	3.5	4.0	.408
T1 Positive Self-concept	15.230	20	2.891
T2 Availability of Support	12.615	15	3.176
T3 Sets Long Range Goals	9.923	15	2.596
T4 Leadership/ Recognition	2.615	5	2.180

Table 25

Descriptive Statistics for Dependent Variables of Students by Program Base of Study

Variables	N	Mean for Subjects	SD	t Value	Probability
Academic (Theoretical, Classroom) GPA					
1	51	3.401	.500	1.697	.091
2	117	3.243	.578		
Clinical GPA					
1	48	3.562	.511	0.344	.731
2	112	3.533	.478		
Cumulative GPA					
1	51	4.117	4.431	1.750	.081
2	112	3.393	.483		

1 Hospital Program
2 College Program

Table 26

Statistics of Independent Samples of Allied Health Majors

Health Major	N	Mean	SD	Variance	Probability > T	T Value
Self-Concept						
1.	63	14.82	4.86	23.63	.0001	24.20
2.	13	14.15	5.12	26.30	.0001	9.94
3.	68	15.35	4.29	18.44	.0001	29.48
4.	21	16.85	4.59	21.12	.0001	16.80
Availability of Support Person						
1.	63	13.09	2.48	6.18	.0001	41.79
2.	13	11.30	3.75	14.06	.0001	10.87
3.	68	11.82	3.54	12.56	.0001	27.50
4.	21	12.57	3.12	9.75	.0001	18.44
Sets Long-range Goals						
1.	63	10.04	2.33	5.46	.0001	34.11
2.	13	7.30	1.54	2.39	.0001	17.01
3.	68	10.05	2.34	5.51	.0001	35.30
4.	21	10.66	2.17	4.73	.0001	22.46
Leadership/ recognition						
1.	63	2.26	2.11	4.49	.0001	8.50
2.	13	2.07	1.93	3.74	.0001	3.87
3.	68	2.0	1.93	3.76	.0001	8.50
4.	21	1.95	1.90	3.64	.0001	4.68
Pre-clinical GPA						
1.	63	2.93	.53	.286	.0001	43.56
2.	13	2.84	.65	.432	.0001	15.60
3.	68	3.02	.484	.234	.0001	51.45
4.	21	3.00	.601	.361	.0001	23.03

Legend: 1 = Respiratory Therapist
2 = Surgical Technologist
3 = Radiologic Technologist
4 = Medical Record Technician

N = 165

Table 27 presents Scheffe testing results of only statistically significant differences reported at the alpha .05 level for the following variables: year of study, academic status and program base with respect to the dependent variables of academic (theoretical) GPA and clinical GPA.

Table 28 represents variables of age, marital status, parental occupation categories, setting of long range goals/student expectations and subspecialities of radiologic technology and respiratory therapist that are significant at the alpha .05 level by Scheffe testing with respect to academic (theoretical) GPA. Medical records technician and surgical technologist were not significant at the alpha .05 level by Scheffe testing.

Table 29 represents Scheffe testing results of significant difference at alpha .05 level for variables with respect to the clinical GPA. These variables are paternal occupation, maternal occupation, student expectations/long range goals, months of training, subspeciality major, self-concept (absolutely certain to obtain a degree) and possible reasons for attrition (lack of academic ability and insufficient reading skills).

Table 30 represents data from Chi-square and Pearson correlation testing for noncognitive variables of temperament type and preference for learning styles. These were both significant at the alpha .05 level with respect to

year of study. In this study the SJ (Sensing, Judging) temperament type/preference for learning style was found to be a statistically significant (at alpha .05) contributor to student academic achievement as determined by the dependent variables of student academic (theoretical) grade point average, clinical (practical) grade point average and cumulative grade point average for the allied health majors surveyed in this study that were in their first year of training. This finding included surgical technologists in less than two year programs.

Table 31 represents results of MANCOVA testing of all other variables with respect to academic (theoretical) GPA and are significant at the alpha .05 level. The significant variables are student age, positive self-concept, preclinical (high school) GPA, availability of a support person and parental occupation. This supports the premise that both cognitive and noncognitive variables are significant with respect to student academic achievement and should be considered in the student selection process.

Table 32 represents the significant data results for MANCOVA testing of independent variables with respect to the dependent variable of clinical GPA. The variables year of study and positive self-concept were found to be significant at the alpha .05 level.

These data indicate that the noncognitive variables demonstrate a significant level (alpha .05) of correlation

to student academic achievement by allied health occupations majors as studied in this research.

Table 27

Scheffe's Testing for Variable Means that are Significantly Different at Alpha .05 Level

Variables	N	F value	Means	Minimum Significant Difference
Clinical GPA				
1st Year of Study	89	2.77	0.289	.117
2nd Year of Study	65	2.77	0.289	.117
Theoretical GPA				
Pass/Academic Success	144	4.019	3.354	.241
Fail/Academic Success	10	4.019	2.400	.241
Clinical GPA				
Pass/Academic Success	144	4.019	3.607	0.234
Fail/Academic Success	10	4.019	2.600	0.234
Theoretical GPA				
Hospital Based Program	48	4.019	3.385	.128
College Based Program	106	4.019	3.250	.128

N = 154*

Legend: Pass/Academic Success = 2.5 or greater GPA

Fail/Academic Success = less than 2.5 GPA

* Responses with missing cells (15) were not included in the Scheffe testing.

Table 28

Scheffe's Testing for Variables with a Significant Difference at the Alpha .05 Level with Respect to the Dependent Variable Academic (Theoretical) GPA

Variable	F Value	Diff. Between Means	Upper Confidence Limit
Age			
18-21	2.77	-0.397	-0.177
22-25	2.77	-0.327	-0.086
26-29	2.77	-0.250	-0.005
30+	2.77	.250	.494
	2.77	.327	.569
	2.77	.397	617
Marital Status			
Single	3.16	-0.301	-0.142
Married	3.16	.301	.459
	3.16	.538	.822
Divorced	3.16	.538	-0.254
Father's Occupation Category			
Retired	2.77	.247	.467
Blue Collar Worker	2.77	-0.247	-0.026
Mother's Occupation Category			
Retired	2.77	.254	.495
	2.77	.257	.490
White Collar	2.77	-0.257	-0.024
Blue Collar	2.77	-0.254	-0.013
Student Expectations/ Long Range Goals			
1-2 Years Graduate School	2.54	.366	.640
College but less than 2 years	2.54	-0.366	-0.092
Health Care Major			
Radiologic Technology	2.38	.536	.765
Respiratory Therapist	2.38	-0.536	-0.308

Table 29

Scheffe's Testing for Variables with a Significant Difference at the Alpha .05 Level with Respect to the Dependent Variable Clinical GPA

Variable	F Value	Diff. Between Means	Upper Confidence Limit
Father's occupation category			
Retired	2.77	.272	.486
Blue collar worker	2.77	-0.272	-0.058
Mother's occupation category			
Retired	2.77	.285	.511
	2.77	.354	.588
White collar worker	2.77	-0.285	-0.058
Blue collar worker	2.77	-0.354	-0.120
Student expectations/ long range goals			
Bachelor's degree	2.54	.231	.449
College but less than 2 years	2.54	-0.231	-0.012
Months of training			
5-12 months	2.77	.289	.482
19-24 months	2.77	-0.289	-0.097
Radiologic Technology	2.38	.429	.652
Medical Records Technician	2.38	.544	1.03
Respiratory Therapist	2.38	-0.366	-0.033
Surgical Technology	2.38	-0.607	-0.188
Self-concept			
Absolutely certain will obtain a degree			
	2.11	.590	1.138
	2.11	1.152	2.208
Lack of academic ability			
	2.11	-0.590	-0.041
Insufficient reading skills			
	2.11	-1.152	-0.097

Table 30

Summary of Significant Statistics at the Alpha .05 Level for Student Temperament Type/Preference for Learning Style and Academic Status by Year of Study Using Chi-Square and Pearson Product Moment Correlation Coefficients

Statistic	N	DF	Value	Probability
Chi-Square	167*	3	7.639	0.05

Passing Students	Preference for Learning Style/ Temperament Type				
Frequency Percent Row Percent Col Percent	SJ	SP	NT	NF	Total
1st year	82	13	3	4	102
	48.81	7.74	1.79	2.38	60.71
	80.39	12.75	2.94	3.92	
	64.57	65.00	37.50	30.77	
2nd year	45	7	5	9	66
	26.79	4.17	2.98	5.36	39.29
	68.18	10.61	7.58	13.64	
	35.43	35.00	62.50	69.23	
Total	127	20	8	13	168
	75.60	11.90	4.76	7.74	100.00

N = 168*

*Responses with missing data were not computed in the Chi-Square test (2 missing responses) and the Pearson Product Moment Correlation test (1 missing response).

Table 31

MANCOVA Statistics of Independent Variables with Significance for Student Academic (Theoretical) GPA

Variable	F Value	Probability
Preclinical (High School) GPA	25.47	.0001
Age	14.99	.0002
Parental Occupations	8.26	.0047
Positive self-concept	4.59	.0340
Availability of Support	4.54	.0350

N = 168*

*There was one missing response cell of the 169 respondents and this was not included in the MANCOVA test for significance.

Table 32

MANCOVA Results of Testing Independent Variables for Significance with Respect to the Dependent Variable Clinical GPA

Variable	F Value	Probability
Year of Study	8.91	.0034
Positive self-concept	5.24	.0237

N = 168*

*There was one missing response not included in the MANCOVA test for significance.

Chapter 5

Discussion and Conclusions

This chapter presents a discussion of the study and conclusions based on the research findings and the implications of these findings with regard to educational practice and research. Recommendations for future study are suggested.

Discussion

The purpose of this study was to identify and describe certain characteristics of students attending selected allied health training programs in Virginia and to analyze and compare cognitive and noncognitive variables and their relationship to the student academic achievement of radiologic technology students, surgical technology students, respiratory therapist students, and medical record technician students.

The research questions and data were tested utilizing a nonprobability survey design. One hundred sixty-nine students from 16 of the 22 allied health training programs in Virginia participated in the study and responded on or before the preset date for accepting responses. The participants completed the noncognitive questionnaire, the Keirsey Temperament Sorter (Keirsey & Bates, 1978), and provided noncognitive data, cognitive data and demographic information. Directors of the selected allied health programs did not provide programmatic data at an acceptable

response rate on or before the preset cut off date of March 31, 1995 for receipt of the data. Program director data was not tallied or reported. The length of the questionnaire and the specifics of data requested might have contributed to the low response rate.

The adapted questionnaire (Tracey & Sedlacek, 1984) provided noncognitive cumulative scores and subscores for each student participant and cognitive information.

The research questions for this study were:

A. Does the cognitive variable, preclinical (high school) grade point average, significantly predict the student academic achievement of the selected allied health majors in the study?

The cognitive independent variable, preclinical (high school) grade point average was found to be significant at the alpha .05 level as a contributor/predictor of student academic achievement as measured by both dependent variables, clinical grade point average and academic (classroom) grade point average. This was demonstrated by stepwise multiple regression analysis.

A student's cognitive performance historically has been predicted by the student's grade point average. The results of this study supports the previous research findings of Blagg (1985), Fuller (1994), Heilman (1991), Laudicina (1986, 1993), Love, Holter, & Kroll (1987), Schimmpfhauser & Broski (1976), and Sedlacek and Prieto (1992) that cognitive variables, to include high school (preclinical) grade point

averages, are significant predictors of student academic success. This positive finding of high school (preclinical) grade point average to student academic achievement as a contributor/predictor correlates positively with Anderson's Gap Theory (1989) of student academic success and retention and the General Student Population Theory with respect to the student's foundation of academic knowledge, good (positive) academic experience, realistic academic self-appraisal, positive self-concept and academic motivation (Anderson, 1989; Berry & Asamen, 1989; Knowles, 1980; Villella & Hu, 1991).

B. Do any of the noncognitive variables, realistic student self-appraisal, positive self-concept, age, sex, race, marital status, student major, parental occupations, student expectations/long-range goals significantly contribute to or predict the student academic achievement of the select allied health majors of the study?

The noncognitive independent variables of student age, marital status (single), parental occupations, student expectations/long range goals and the subspeciality majors of both respiratory therapist and radiologic technology students were found to contribute significantly at the alpha .05 level in explaining the variance for the dependent variable student academic (theoretical, classroom) grade point averages. Surgical technologists and medical records technicians were not significant at the alpha .05 level in explaining the variance for the dependent variable academic

(theoretical, classroom) grade point average.

In addition, the noncognitive independent variables of months in training, positive self-concept, realistic student self-appraisal of ability, subspeciality majors, student expectations/long range goals and parental occupations were found to be significant at the alpha .05 level in explaining the variance for the dependent variable student clinical grade point averages and student academic success for all program majors surveyed.

The findings of this study indicate that noncognitive variables, in addition to historic cognitive variables, are useful criteria for predicting academic (theoretical) and clinical (practical) student academic achievement in the allied health occupations for both college and hospital based programs of training. A longitudinal study would test for causation which cannot be determined from these statistically significant (alpha .05) measures of correlation. The results of this study support the previous research findings of Aiken (1964), Anastasi et al. (1960), Anderson (1989), Astin (1982), Bailey et al. (1969), Berry and Asamen (1989), Blume (1976), Boyer and Sedlacek (1988), Fuller (1994), Hilton and Meyers (1967), Laudicina (1986, 1993), Maslow (1954), McCaulley (1981), Messick (1979), Millstead (1992), Myers (1962), Sedlacek and Prieto (1992), Sedlacek (1989, 1991), Taylor (1967), Tracey and Sedlacek (1987, 1989), White and Sedlacek (1986).

The findings of this study further support previous research which suggested that cognitive and some noncognitive variables (predictors) may function separately from one another as indicators of student academic success and clinical practice success (Rifken et al., 1981). A student's positive self-concept, diligence, and setting of long range goals as criteria are separate character traits as well as descriptors of temperament types/preference for learning style. Criteria/trait variables are not limited to those listed above. Each trait variable may be determined as independently statistically significant with respect to student academic achievement. Further, each trait may also be grouped (preference for learning style) and tested as a temperament type. These results support Anderson's Gap Theory of student academic achievement (1989).

C. Is there a relationship between the temperament types SJ, SP, NT, and NF and student academic achievement as defined by the dependent cognitive variables of passing status and the independent noncognitive variables of the study?

The study reports a positive correlation at the alpha .05 level of significance for temperament types SJ (Sensing, Judgment), SP (Sensing, Perceptive), NT (Intuitive, Thinking), NF (Intuitive, Feeling) and their preference for learning style and the year of study for students who had achieved student academic success as demonstrated by passing status.

The finding supports the Myers-Briggs Theory of Jung's character/temperament typing; people are different in fundamental ways. Individual function is preferential and characteristic, therefore predictable (Keirsey & Bates, 1984; Knowles, 1978; Kroeger & Thuesen, 1988; McCaulley, 1981; Myers, 1962).

D. Are the students of a particular (like) temperament type attracted to the allied health occupations studied?

Students with an SJ (Sensing, Judgment) temperament type/preference for learning style selected into allied health major training programs at twice (75%) the general population representation (38%) in all subspecialities surveyed. SJs accept that the teacher is there to teach and they are there to learn. SJs learn theory because they "should do it" (Keirsey & Bates, p. 187). They do not thrive on long-term, independent projects. They may not always enjoy discussion or debate; they prefer a demonstration lesson.

Generally, the:

> SJ would prefer that a question and answer session be conducted and it should be led by the teacher. The Socratic method of instruction has appeal to the SJ and he learns well in this mode (Keirsey & Bates p. 41).

The other three types SP (Sensing, Perception), NT (Intuitive, Thinking), and NF (Intuitive, Feeling) were underreported with regard to general population expected

numbers.

The significant type (alpha .05 level) respondent allied health major student of the study were found to be 30+ years in age, single (never married), completing their first year of study in a training program. They were ESFJ (Extroverted, Sensing, Feeling Judgment) (a seller) by character type, SJ (Sensing, Judging) by temperament type and preference for learning style. Their fathers were categorized as blue collar workers and their mothers as white collar workers. They had a high (3.5) preclinical (high school) grade point average and were in college-based programs of study.

The results support the previous research of Broillier (1970), Dunteman et al. (1966), Myers (1962), Nelson et al. (1984), and Rezler and French (1975). These researchers suggest that a variety of independent noncognitive trait variables significantly contribute, alone or collectively, to student academic achievement and further that traits are functional and therefore predictable. They suggest traits should be considered as good indicators of student academic success and/or persistence, with respect to student selection. They further suggested that the trait differences within a group is more important with regard to attaining a program's goals (student graduation) than the differences among several subspeciality allied health majors so that teachers may adjust their teaching styles to match

the student group type.

Only one research study noted in the literature review of this study, Rezler and French (1975), offered a partial differing result with regard to character/temperament type and preference for learning style as related to allied health occupation student success. They found no relationship. The difference in results may be attributable to the instrument used in their study, the Learning Preference Inventory (LPI). The LPI was designed by Rezler and French (1975) and used the paired factors of Introversion-Extroversion, Sensing-Intuition and Feeling-Thinking. They reported that the majority of students surveyed were ESFJ (Extroverted, Sensing, Feeling, Judgment) by character (the same as this study) but did not further sub divide by temperament when testing. Therefore, no conclusion can be made with respect to the subdivided temperament types of SJ (Sensing, Judgment), SF (Sensing, Feeling), NT (Intuitive, Thinking) and NF (Intuitive, Feeling) data of this study (Chi-Square testing and Pearson Product Moment Correlation testing) and their finding of no correlation with student academic success.

E. Is there a relationship between character traits and academic achievement?

There is a correlation between character (personality) traits and student academic success at the alpha .05 level of significance with respect to both clinical grade point

averages and theoretical grade point averages in the subspeciality areas of respiratory therapist and radiologic technology. These traits were positive self-concept and the setting of long range goals as self-imposed student expectations of success. Surgical technology and medical records technician reported no significant correlation.

The results of this study support the theoretical premise that cognitive and noncognitive variables of preclinical (high school) grade point average and character traits, not limited to, positive self-concept, realistic self-appraisal, the setting of long range goals and functional preference for learning style are related to student academic achievement in allied health training programs. These indicators after further (longitudinal) testing should be considered and included by both program directors and program instructors in the student selection process, curriculum design and employment of teaching technique.

The results support previous researchers' findings that the necessary student characteristics for student academic achievement, and success, include: commitment to achieve, setting of goals, motivation to achieve and positive self-efficacy (Anderson, 1989; Berry & Asamen, 1989; Fuller, 1994; Sedlacek, 1987; Tinto, 1975).

Recommendations for Research

This study identified characteristics and demographic

information about students attending selected Virginia allied health occupation training programs and examined the relationship between a linear combination of cognitive variables, noncognitive variables, and student academic achievement.

The results of this survey study attest to the validity of the relationship between specific allied health care major student noncognitive dimensions and student academic achievement. The findings may be viewed as an indicator of the academic performance/achievement of selected allied health majors enrolled in the selected programs of study in the Commonwealth of Virginia.

Limited information in the allied health literature is available concerning the relationship between students' noncognitive dimensions and their performance in training. Further research regarding the predictive value of the noncognitive variables on student academic achievement, dependent variables, would be useful:

1. A larger sample of the four selected allied health major fields would provide more representative data and strength of validity (Isaac & Michael, 1981; Tuckman, 1988) of these groups of health occupation.

2. A longitudinal study would define the role of these variables effects on student academic success of student groups over time.

3. A study of graduates in employment would be of interest in assessing the predictive validity of noncognitive factors to success in the work environment.

Conclusion

The significant findings of this research study should be used as measures of the student applicant as possible predictors of student academic achievement by allied health educators and allied health training programs to improve the process of student recruitment, selection, training, and retention of allied health occupation majors. The implications are that a review of existing program policies and revision of those same program policies may enhance the selection process of allied health occupation applicants in turn increasing the potential for student academic achievement and graduation. Many programs are not enrolling students to program capacity and have high attrition rates. This leads to graduation of low numbers of students as compared to capacity. The selection process of allied health student majors may be enhanced by the selection committee considering and including noncognitive variables as selection criteria in the mix of their existing selection variables. The selection process may further be enhanced by the selection of more students, filling to capacity with SJ (Sensing, Judging) students who demonstrate the significant character traits of positive self-concept, realistic self-appraisal and a determination to succeed by meeting their

long-term goal of student academic achievement, passing status. The program selection committee might also consider selecting SJs who have a lower preclinical (high school) grade point average than the 3.0-3.5 preclinical (high school) grade point average mean(s) of this study as these students might also "bridge the gaps" and do relatively well and academically succeed.

More appropriate student selection, recruiting and student enrollment should lead to increased enrollment and graduation successes. These are relevant in this study to the tested noncognitive variables of temperament types and preference for learning style and the clustering of any one student temperament type by subspeciality group. SJs prefer to learn by demonstration as well as the Socratic method.

These findings should be considered by allied health program directors and instructors with regard to curriculum design, instructional technique and the goals of student persistence. Instructors might also want to employ other methods of instruction directed at the minority student numbers of the group SPs (Sensing, Perception), NTs (Intuitive, Thinking) and NFs (Intuitive, Feeling). This supports both the Gap Theory (Anderson, 1989) and Myers-Briggs Theory of functional/predictable preferences for learning to include noncognitive traits that students persist despite instructors' varied teaching techniques.

This issue is relevant to the present and future of

allied health with regard to training, clinical practice, patient education, and employee satisfaction. The increase in the professional ranks should ease the shortage of workers and the patient clientele should be safer, healthier, and happier when cared for by registered or registry eligible allied health care professionals. This ultimately effects quality assurance, risk management and maintenance of an acceptable standard of care.

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Appendix A

Program Director Letter
Program Director Questionnaire

Dear Allied Health Care Program Director/Educator:

Your participation is needed for a research study designed to examine student character/temperament types and preferences for learning style, cognitive and noncognitive measures of allied health technology student success. This study attempts to provide additional knowledge to better understand the problems of the consistent under-enrollment and decreased numbers of students graduating from Allied Health Technology Programs.

My doctoral dissertation in Health Services at Old Dominion University is an analysis of student temperament types, preference for learning styles and academic success of allied health care majors. Your educational program has been chosen to participate in this study. As Program Director, you are asked to:

(1) distribute the questionnaire to the students. The questionnaires should be completed in a class setting.

(2) assign a student to collect the completed questionnaires and seal them in the enclosed envelope. The sealed envelope will be returned by the student to you. The envelope is to remain sealed and mailed by the Program Director.

In order to maintain confidentiality, the forms request the students' last four digits of their social security number. Further, collected data will not be analyzed for the individual institutions but expressed only in the aggregate. Your commitment and consent to participate in this study will consist of returning the requested information in the enclosed envelope. Please know that your participation in this research is voluntary. Also, you have the right to withdraw from this research project at any time. However, since there is a limited number of programs that meet the criteria for inclusion, I hope that you will participate in this study. This research involves no known risks to you or the student participants.

In advance I wish to thank you for your quick response and support of this survey. The results will be shared with you after the completion of this research project.

Sincerely,

T. Christine Gordon, MSM, R.T.(R)
Doctoral Candidate
College of Health Sciences
Old Dominion University
Norfolk, Virginia 23529

Dr. John Echternach
Committee Chairman
Old Dominion University
Norfolk, Virginia 23529

PROGRAM DIRECTOR QUESTIONNAIRE

Program Subspeciality of Allied Health Care Technology

_____

STUDENT INFORMATION - Enter Data to Reflect Academic Year 1994 (Fall 1993 through Summer 1994)

Enrollment capacity (total): _____

Length of Program in months: _____

Month class begins: _____

Awards granted:
_____ Diploma
_____ Certificate
_____ AA degree
_____ AS degree

Title (not name) of person completing survey:

_____

Size and type of institution: (check one in each column)

_____ Less than 1,000 students
_____ 1,000 - 4,999 students
_____ 5,000 - 9,999 students
_____ 10,000 - 20,000 students
_____ More than 20,000 students

_____ 2-year public
_____ 2-year private
_____ 4-year public
_____ 4-year private

Is the institution on the semester or quarter system?

_____ Semester _____ Quarter

Number of faculty: (please differentiate between full time and part time)

_____ Full-time faculty _____ Part-time faculty

Student to faculty ratio to students lecture courses:

_____ : 1.0

Student to faculty ratio in clinical courses:

_____ : 1.0

Enrollments, Graduates, and Attrition by Gender and Race/Ethnic Origin:

	Enrollments Male/Female	Graduates Male/Female	Attrition Male/Female
White	____ / ____	____ / ____	____ / ____
Black	____ / ____	____ / ____	____ / ____
Mexican American	____ / ____	____ / ____	____ / ____
Puerto Rican	____ / ____	____ / ____	____ / ____
Other Hispanic	____ / ____	____ / ____	____ / ____
American Indian or Alaskan Native	____ / ____	____ / ____	____ / ____
Asian or Pacific Islander	____ / ____	____ / ____	____ / ____
Totals:	Enrollments	Graduates	Attrition
	____ / ____	____ / ____	____ / ____

Graduate/Registry Eligible Passing GPA: _____

A	B+	B	C+	C	D+
4.0	3.5	3.0	2.5	2.0	1.5

PART II: Admissions Process

Is the admissions process:

_____ a. Selective (students must meet certain criteria to be accepted into Program)
_____ b. Open admission (no criteria established for entrance)

If you answered "a" to Number 1, please continue.

If you answered "b" to Number 1, please go to Part III.

Is a pre-admission interview required?

_____ Yes _____ No

Titles of those who participate in the pre-admission interview?

_____

_____

Admission to the program is determined by the recommendation of: (check all that apply)

_____ Program Director only
_____ Admissions Committee (including non faculty)
_____ Division Chairman
_____ Program Faculty
_____ Department Chairman
_____ Dean
_____ Others (please specify) _____

What are the program's pre-admission requirements? (check all that apply)

_____ High School Biology _____ High School Algebra
_____ High School Chemistry _____ High School English
_____ College Anatomy and Physiology
_____ Other College Coursework (please specify) _____

_____

_____ Experience (volunteer work or employment) in a health care facility

PART III Program Information

Total credits required in curriculum: _____

Maximum number of contact hours per week required of students in one semester/quarter (including lecture, laboratory, and clinical)? _____

Minimum number of contact hours per week required of students in one semester/quarter (including lecture, laboratory, and clinical)? _____

Average number of contact hours per week required of students (including lecture, laboratory, and clinical)?

_____

Number of total clinical contact hours: _____

Please give the number of credit hours required in each of the following areas:

_____ English
_____ Mathematics
_____ Physics
_____ Psychology
_____ General Biology
_____ Anatomy and Physiology
_____ Other (please specify) _____

_____ Pre-admission academic counseling
_____ Mid-term counseling
_____ Open Advisement
_____ Other (please specify) _____

Describe the program's policy on academic probation and expulsion from the program: _____

_____

Rank the following factors from 1 to 8 according to their importance in decreasing student attrition (1 is most important, 8 is least important).

_____ Career counseling (pre-admission)
_____ Admission criteria
_____ Pre-admission interview
_____ On-going academic counseling by faculty
_____ Student-to-faculty ratio
_____ Program curriculum
_____ Clinical education program (total hours and variety of facilities)
_____ Other (please specify) _____

PART IV: Student Information

If data requested is not known or not available, please put a question mark (?) in the space provided for the answer.

	Graduating Class of: 1993	1994
Number of students originally admitted into this class	_____	_____
Number of students at end of 1st year in this class	_____	_____
Number of graduates	_____	_____
Number of students with prior college coursework:	_____	_____

	Graduating Class of: 1993	1994
a. 1 - 12 credit hours	_____	_____
b. 13 - 24 credit hours	_____	_____
c. 25 or more credit hours	_____	_____
Number of students with previous college Anatomy and Physiology (C or better grade)	_____	_____

Program Offers:
_____ Mentoring
_____ Preceptorship, ie. "big sister"
_____ Free parking
_____ Free health care
_____ Day care
_____ Stipend $_____/month
_____ Tutoring

Student Activities:
_____ Membership
_____ Trips/meetings
_____ Picnic-social

Other: _____

Program Historical Data:

Graduates _____% average per year
Pass registry _____% average per year

What are the three most important reasons your students give for dropping out of the program (in priority order)?

a. _____

b. _____

c. _____

Have you collected data on this? _____ Yes _____ No

Thank you for completing this survey. Please fill in your name and address on the enclosed postcard if you would like a copy of the results.

This project has been approved by the Old Dominion University Committee for the Protection of Human Subjects.

Appendix B

Student Questionnaire

The student questionnaire was adapted from Tracey and Sedlacek's Noncognitive Questionnaire (1984) and included the Keirsey Temperament Sorter (Keirsey, 1978).

The appendix is marked leadership, self-concept, goal setting, realistic self-appraisal, and support to define the area of interest per noncognitive question, as may be appropriate, in the study. The student questionnaires were not marked to define the area of interest.

STUDENT QUESTIONNAIRE
KEIRSEY TEMPERAMENT SORTER

INSTRUCTIONS FOR COMPLETING THE QUESTIONNAIRE

1. This questionnaire can be completed in approximately thirty minutes. Please read and answer each question carefully.

2. Enter the last four digits of your social security number in the space provided on the questionnaire (upper right-hand corner). Do not write your name on the questionnaire.

3. After completing the questionnaire, please put it in the envelope for mailing. An assigned student will seal the envelope after all questionnaires have been completed and placed in the envelope. This will assure the confidentiality of your responses.

THANK YOU FOR YOUR COOPERATION.

STUDENT QUESTIONNAIRE ___ ___ ___ ___
Last 4 digits of S.S. #

SECTION ONE: Please fill in the blank or circle the appropriate answer.

1. Current year of study: 1st year / 2nd year

2. Your sex is: Male / Female

3. Your age is: 18 - 21 22 - 25 26 - 29 30+

4. Marital status: Single Married Divorced

5. Your father's occupation is: _____

6. Your mother's occupation is: _____

7. Your race is:

   1. Caucasian (not of Hispanic origin)
   2. African-American (Black)
   3. Asian (Pacific Islander)
   4. Hispanic (Latin American)
   5. American Indian (Alaskan native)
   6. Other

8. How much education do you expect to get during your lifetime? (GOAL SETTING)

1. College, but less than a bachelor's degree
2. Bachelor's degree
3. 1 or 2 years of graduate or professional study (Master's degree)
4. Doctoral degree such as M.D., Ph.D, etc.

9. High school grade point average (GPA):

A	B+	B	C+	C	D+
4.0	3.5	3.0	2.5	2.0	1.5

10. Current program GPA for theoretical (classroom) study:

_____

11. Current program GPA for clinical (hands on/practical) study:

_____

12. Months of training completed:

4 or less 5 - 12 13 - 18 19 - 24

13. Specialty:

___ Respiratory Therapist
___ Surgical Technologist
___ Radiologic Technologist
___ Medical Records Technician
___ Other _____

14. Program Base Sponsorship:

Hospital ___
College ___

15. About 50% of university students typically leave before receiving a degree/certificate. If this should happen to you, what would be the most likely cause?
(SELF-CONCEPT)

1. Absolutely certain that I will obtain a degree
2. To accept a good job
3. To enter military service
4. It would cost more than my family could afford
5. Marriage
6. Disinterest in study
7. Lack of academic ability
8. Insufficient reading or study skills
9. Other _____

16. Academic achievement/success/passing GPA.

1. _____ Yes
2. _____ No

SECTION TWO: Please indicate the extent to which you agree or disagree with each of the following items. Respond to the statements below with your feelings at present or with your expectations of how things will be. Write in your answer to the left of each item.

1	2	3	4	5
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

___ 1. In groups where I am comfortable, I am often looked to as leader. (LEADERSHIP)

___ 2. I expect to have a harder time than most students at my college/university. (SELF-CONCEPT)

___ 3. Once I start something, I finish it. (GOAL SETTING)

___ 4. I am as skilled academically as the average applicant to my college/program of study. (REALISTIC SELF-APPRAISAL)

___ 5. My friends and relatives do not feel I should go to college. (SUPPORT)

___ 6. My family has always wanted me to go to college. (SUPPORT)

___ 7. If course tutoring is made available on campus at no cost, I would attend regularly. (SELF-CONCEPT)

___ 8. I want a chance to prove myself academically. (GOAL SETTING)

___ 9. My high school grades do not really reflect what I can do. (REALISTIC SELF-APPRAISAL)

___ 10. If I run into problems concerning school, I have someone who would listen to me and help me. (SUPPORT)

SECTION THREE:

Keirsey Temperament Sorter
(c) Keirsey 1978
Available to readers through
Prometheus Nemesis Box 2748, Del Mar CA 92014

Appendix C

Student Letter

Dear Allied Health Student:

You have been selected to participate in a research study I am conducting as a doctoral student in the Urban Services (Health Services Concentration/Adult Education) Program at Old Dominion University, Norfolk, Virginia. The Clinical Sciences literature, reports that there is a shortage of allied health care workers/technologists. I am interested in studying what factors influence the academic success of select allied health technology students.

I am asking you, an allied health care major, to participate in this study. Enclosed in this packet you will find a Questionnaire that has been field tested and validated. You are being asked to participate in a Virginia sample of students attending allied health care training programs. I hope that you will take the time to participate in this research and contribute to the understanding and knowledge base of allied health care education and allied health care select students.

There are no identifying marks on the survey form. Your responses will be confidential. Only the last four digits of your social security number will be reported on your form. Your total commitment to the study will consist of completing and returning the Questionnaire. Your participation in this research is voluntary, you have the right to withdraw at any time, and the right not to respond to this request. This research involves no known risks to you as a participant. By completing and returning the document you have given your consent to participate in this study.

In advance I wish to thank you for your quick response, your time and support of this research project.

THIS PROJECT HAS BEEN REVIEWED BY THE OLD DOMINION UNIVERSITY COMMITTEE FOR THE PROTECTION OF HUMAN SUBJECTS (804) 683-5233.

Sincerely,

T. Christine Gordon, MSM, R.T.(R)
2243 N. Lakeside Drive
Virginia Beach, Virginia 23454
804-496-7951

John Echternach, Ph.D
Committee Chairman

Clare Houseman, Ph.D.,R.N.,C.S.
Concentration Area Director
Doctoral Program in Urban Medical Services
Old Dominion University
Norfolk, Virginia 23529

Autobiographical Statement

Theodora Christine Gordon was born in Ithaca, New York on May 5, 1948, the second daughter of Theodore Alfred and Maryanna Dedowitz. In June, 1966 she graduated Northport Senior High School, Northport, Long Island, New York and in September 1966 she entered Duke University School of Medicine, Durham, North Carolina. She studied Radiologic Technology and graduated in September 1968 and successfully wrote the American Registry of Radiologic Technologists examination in December 1968. From September 1968 through December 1988 she worked in the specialty fields of Radiology, Cardiology and Pathology as a technologist, trainer, applications specialist, administrator and researcher at St. Christopher's Hospital for Children, Philadelphia, Pennsylvania, Duke University Medical Center, Durham, North Carolina, Variety Children's Hospital, Miami, Florida, Lutheran General Hospital, Park Ridge, Illinois, St. Francis Hospital, Evanston, Illinois, Lake Forest Hospital, Lake Forest, Illinois, Rush Presbyterian Saint Lukes (Skokie Valley), Skokie, Illinois and Virginia Beach General Hospital, Virginia Beach, Virginia.

She received a Bachelor of Science in Applied Behavioral Science and Human Resources Development in 1984 and a Master of Science, Management, 1985 from National Louis University, Evanston, Illinois. In January 1989, she entered Old Dominion University's doctoral program in Urban

Services/Health Services Concentration. Concurrently, she has worked as administrator and consultant to private medical corporations as well as holding adjunct faculty positions with St. Leo College, Virginia Beach, Virginia and Tidewater Community College, Norfolk, Virginia. She is married to Christopher Foster Delahanty and has one son, David Avram Gordon.