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A Comparison of the Learning Styles of Graduate Athletic Training Students and Their Demographic Characteristics

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A COMPARISON OF THE LEARNING STYLES OF GRADUATE ATHLETIC TRAINING STUDENTS AND THEIR DEMOGRAPHIC CHARACTERISTICS

by

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ABSTRACT

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Using the Productivity Environmental Preference Survey (PEPS) and a self-designed demographic survey, this study assessed the learning styles of students enrolled in a NATA approved graduate athletic training education program and compared the relationship between learning style preferences and the demographic characteristics of the graduate students. The PEPS survey is a 100-item Likert scale learning style inventory relating to 20 learning style elements of 4 domains: environmental, emotional, sociological, and physical. As part of the demographic research, participants completed measures assessing geographic, family, educational, and personal information.

Participants were 163 (55 men, 108 women) graduate athletic training students from eleven of the thirteen CAAHEP-accredited graduate athletic training programs. The demographic survey and PEPS survey were mailed to the program directors of the various institutions with specific directions for distribution to the students. Correlations were calculated between learning styles and demographic data using Pearson Chi-Square, one-way ANOVA, and t-tests. The learning style preferred most on the PEPS included structure (59.11 ± 6.96) and afternoon learning (58.05 ± 10.73). Some significant ($p<0.05$) cross-tabulations included persistence with race ($p=0.01$), reputation ($p=0.008$), application status ($p=0.02$), region lived most ($p=0.002$), and undergraduate school region ($p=0.004$); late morning with type of program ($p=0.01$) and location ($p=0.03$);

alone/peers with class level (p=0.005); authority figures with class level (p=0.002); several ways with class level (p=0.01); time of day with class level (p=0.01); structure with money (p=0.006), certification status (p=0.03), and curriculum (p=0.008); and kinesthetic with reputation (p=0.04). Both undergraduate ($F_{2,20}=3.010$, p=0.05) and graduate ($F_{2,20}=4.819$, p=0.009) GPA's were influenced by light.

The results of this study demonstrate that some of the demographic characteristics influence learning style preferences of graduate athletic training students. While some of the results are unexplainable, two consistent findings regarding athletic training education are the preference for a structured learning environment and the preference for afternoon learning, specifically for first-year graduate athletic training students. In general, more research needs to be conducted about the demographic characteristics of graduate athletic training students, and further research should investigate how athletic training improves when educators teach according to student learning style preferences.

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CHAPTER 1

INTRODUCTION

Adult education researchers have worked to define learning styles, to develop instruments to measure them, and to devise and implement models to facilitate learning among students based on learning styles (Freeman & Whitson, 1991). Learning styles are the various factors that influence and determine how students learn and reflect many characteristics of students, including personality and environmental adaptation abilities (Green, Snell & Parimanath, 1990). Students employ varying approaches to learning (Lynch, Woelfl, Steele & Hanssen, 1998) and have a preferred method for obtaining knowledge (Draper, 1989). Not all students receive and process information in the same way, and every student has a different approach to learning and how they learn best (Billings, 1991). Some educators recognize the individual student as the central unit of instruction (Payton, Hueter & MacDonald, 1979). The learning process may be more effective and efficient when learning style and teaching strategy match (Billings, 1991). According to Sims and Sims (1995), in higher education, the lecture serves as the main vehicle for imparting knowledge, and it is assumed that the outcome will be integrated into the student's overall learning experience.

Recently, there has been a significant amount of research on individual differences in student learning (Newstead, 1992). Increased attention has been directed toward assessing and improving academic quality in higher education and the education process for athletic trainers. Harrelson, Leaver-Dunn, and Wright (1998) assessed the learning styles of undergraduate athletic training students and found that little is known about athletic training students and how they learn. They found that knowledge of

learning style information allows students to pursue their studies in a more effective and efficient manner.

Every individual has a unique style and the characteristics of different styles can facilitate an educator's instructional methods of meeting individual learning needs (Sims & Sims, 1995). Athletic training educators need to examine their teaching strategies and educational environments to adapt to the different learning styles of students. Graduate athletic training students learning styles are not known, but undergraduate athletic training students learning styles have been identified. Harrelson et al. (1998) assessed the learning styles of 27 undergraduate athletic training students, but found that the small number of subjects involved limited the study. Their research may act as a stepping-stone in athletic training education because, at the present time, no in depth study of graduate athletic training students learning styles has been performed to date.

Learning takes place in many different ways - through discussion of ideas, analysis of theory, organization of concepts, and integration of new information and experiences with past knowledge and experiences (Sims & Sims, 1995). Demographics, as it relates to the educational aspect of athletic training programs, may affect students learning styles. Demographics are the statistical data of a population that includes age, income, gender, religion, education, and geographic location. An understanding of student learning preferences based on student demographics would allow athletic training educators to strengthen the quality of teaching by modifying their teaching techniques based on known demographics and learning preferences of their graduate athletic training students.

Statement of the Problem

The purpose of this study is to assess the learning styles of students enrolled in a National Athletic Trainers' Association (NATA) approved graduate athletic training education program. We specifically are interested in the relationship between learning style preferences and the demographic characteristics of the graduate students.

Research Hypothesis

Some demographic characteristics influence learning style and there will be a statistically significant difference between the learning styles of graduate athletic training students when compared to their individual demographic qualities.

Independent Variables

The independent variables being studied are age, gender, race, marital status, living arrangements, number of children, number of siblings, religion, type of graduate program, length of graduate program, present class level of graduate student, number of credit hours the student is presently taking and the total number of credit hours required by the graduate program, present employment status, reasons for choosing the graduate program, certification status of the graduate student when applying to graduate school and at the present time, region of the United States where the student spent the most time growing up, region of the United States where their undergraduate school is located, year the undergraduate degree was received, undergraduate and graduate GPA, and the type of research the student is performing.

Dependent Variables

The dependent variables of this research include the following components of the learning environment: noise level, light, temperature, design, motivation, persistent,

responsible, structure, alone/peers, authority figures, several ways, auditory, visual, tactile, kinesthetic, intake, time of day, late morning, afternoon, and mobility.

Operational Definition

Demographics are the age, sex, race, geographic location of upbringing, and geographic location of undergraduate athletic training program.

Learning style preferences encompass a variety of meanings. They may be referred to as the teaching method and environment in which a student learns best (Price, 1996); characteristic cognitive, affective, and physiological behaviors that serve as indicators of how students perceive, interact with, and respond to the learning environment (Sims & Sims, 1995); and a certain pattern of behavior in approaching a learning experience, taking in new information, developing new skills, and retaining that new information and those new skills (Sarasin, 1999). Learning style preferences may be broken down into 20 components: noise level, light, temperature, design, motivation, persistent, responsible, structure, alone/peers, authority figures, several ways, auditory, visual, tactile, kinesthetic, intake, time of day, late morning, afternoon, and mobility (Appendix A) (Price, 1996). Each learning style component may identify how a student prefers to function, learn, concentrate, and perform educational activities in the following four areas: environmental needs (noise level, light, temperature, and design); psychosocial needs (motivation, persistent, responsible, and structure); sociological needs (alone/peers, authority figures, and several ways); and physical needs (auditory, visual, tactile, kinesthetic, intake, time of day, late morning, afternoon, and mobility) (Price, 1996).

Assumptions

It will be assumed that the learning style instrument and demographic survey are both reliable and valid, and that the students will understand and truthfully answer all the questions in the surveys. It will also be assumed that the program directors will read the directions for the correct completion of the surveys and the students will then follow those directions.

Limitations

The research may be limited by a student choosing not to fill out the survey or answer a question, a student may unknowingly not answer a question, or a student may not answer a question in the manner it was intended. The program directors may not read the directions for correct completion of the surveys to the students or the students may not listen to the directions.

Delimitations

All subjects participating in this study must be enrolled in a National Athletic Trainers' Association accredited graduate athletic training program. The questionnaires will be administered by the graduate program directors during the middle of the Fall 2001 and Spring 2002 semesters. The graduate program directors will receive an e-mail from the investigator and will be given a cover letter explaining the administration process of the questionnaires. The administration process will be uniform.

CHAPTER II

REVIEW OF THE LITERATURE

Learning Style Models

A number of researchers have studied the learning processes of individuals and have developed instruments that try to identify learning characteristics and categorize individual learning styles. In an attempt to provide a framework for the different learning style theories, Curry (1987) conceived the "onion" model consisting of four layers. The first layer deals with personality dimensions that assess the influences of basic personality on preferred approaches to acquiring and integrating information, such as the Myers-Briggs Type Indicator (Griggs, 1991). The second layer, called information processing, studies an individual's preferred intellectual approach to assimilating information and was used by Kolb (Griggs, 1991). The third layer, used by Riechmann and Grasha, is called social interaction, which addresses how students interact in the classroom (Griggs, 1991). The last layer, called multidimensional and instructional preference, addresses the individual's preferred environment for learning, as seen in the learning style model of Price, Dunn, and Dunn (Griggs, 1991).

According to Jonassen and Grabowski (1993), differences in learning styles are a result of heredity, past life experiences, and the demands of the present environment. Through socialization experiences in family, school, and work, learners tend to emphasize some learning abilities over others. Every individual has developed a learning style that has some strong and weak points (Jonassen & Grabowski, 1993). In the medical profession, research has shown dominant learning styles among nursing, physical therapy, physician assistant, and medical students (e.g., Brower, 2001; Markert, 1986;

Vittetoe, 1983; Lynch, 1998). Research of the learning styles of athletic training students, however, has been limited.

Kolb Learning Style Inventory

Kolb defined learning style as one's preferred method for perceiving and processing information (Jonassen & Grabowski, 1993). With this in mind, he developed a learning style inventory that portrays the process of meaningful learning as a series of events that integrate the functions of feeling, perceiving, thinking, and acting (Nilson, 1998). He used a cycle made up of four different phases of adaptive learning modes: concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (AE).

Kolb described experiential learning as a cyclical process, containing four stages that build upon each other (Fox, 1984). During the first stage, the learner has a concrete experience. This experience leads to stage two where it is reflected and observed upon. Stage three involves the experience being abstracted, conceptualized and generalized. During stage four, the generalization is tested in new situations, leading to a new concrete experience. Sugarman (1985) uses a description given by Honey and Mumford to explain the four-stage process. A learner has an experience, reviews the experience, concludes from the experience, and then plans the next steps.

Kolb places the learning modes onto a graph with CE at the top, AC at the bottom, AE at the far left, and RO at the far right. CE and AC position themselves at the extreme ends of the vertical component of the continuum that represents how one prefers to perceive the environment or grasp experiences in the world (Jonassen & Grabowski, 1993). RO and AE comprise a horizontal continuum that represents how one prefers to

process or transform incoming information. According to Jonassen and Grabowski (1993), each of these learning modes has unique characteristics. Abstract individuals comprehend information conceptually and symbolically. Concrete individuals rely on the tangible, felt qualities of immediate experience. Active individuals extend the environment by external manipulation. Reflective individuals exhibit intention by internal reflection on the external world. Jonassen and Grabowski (1993) further state that each phase is put into a quadrant on a graph and each quadrant has a labeled learning style and type: accommodators, divergers, convergers, and assimilators. Because the elements of this process are polar opposites, learners tend to develop more skill in one of the four quadrants (Fox, 1984).

Divergers achieve learning concretely through feelings (Jonassen & Grabowski, 1993). They have many interests and active imaginations (Fox, 1984). They are located in the upper right quadrant on the graph and combine CE with RO. Assimilators learn through abstract comprehension. They orient themselves toward theoretical models and inductive reasoning and will more likely question facts rather than logical explanations (Fox, 1984). Assimilators are in the lower right quadrant and combine the AC and RO phases (Jonassen & Grabowski, 1993). Convergers learn through problem solving and abstract comprehension. This is transformed through action, which combines AC and AE and places them into the lower left quadrant on the graph (Jonassen & Grabowski, 1993). They are relatively unemotional, preferring to work with things rather than people (Fox, 1984). Accommodators learn concretely through feelings and "hands-on" experience (Jonassen & Grabowski, 1993). They involve themselves in new experiences and are well suited to circumstances that require adaptation and action. They rely on trial and

error, intuition, and others for information and combine the CE and AE phases. They are located in the upper left quadrant on the graph (Fox, 1984).

Kolb's Learning Style Inventory (LSI) measures a person's relative preference for each of the four modes of learning (Jonassen & Grabowski, 1993) and bases itself on the comparison of two sets of word pairs distributed across four columns, with each pair reflecting one end of the continua (Fox, 1984). The respondent ranks nine sets of four words in such a way that best describes his or her learning style preference (Jonassen & Grabowski, 1993). A "four" is assigned to the word which best describes the learning style while a "one" is assigned to the word which is believed to be least characteristic of the respondent as a learner. The categorization of the learner is based upon locating the score in a matrix. Subtracting the CE total from the AC total results in a value on the vertical axis, and subtracting RO total from AE total results in a value on the horizontal axis. The learning style category is revealed by locating the point of intersection of these two scores on the matrix (Fox, 1984). Two scores are computed from these four rankings: AC-CE indicates how much the learning style is biased toward abstraction or concreteness, and RO-AE reflects a possible bias toward reflection or activity (Jonassen & Grabowski, 1993).

To improve reliability and construct validity, the LSI was revised in 1984. The LSI was also revised in an attempt to strengthen its internal consistency, temporal stability, and construct validity (Allinson & Hayes, 1990). On the new form, respondents rank sentence endings that describe how they learn best (Jonassen & Grabowski, 1993). There are twelve items to rank, and the sentences contextualize the choices available. Examples of these sentences are: when I learn – I like to deal with my

feelings; I like to watch and listen. I learn best when – I trust my hunches and feelings; I listen and watch carefully (Jonassen & Grabowski, 1993). Veres, Sims, and Locklear (1991) found increased stability in the modified version of the LSI and argued against dismissal of the LSI as an instrument for the study of learning style.

Jonassen and Grabowski (1993) concluded that the instrument was better for learning about one's learning style rather than for making prescriptions. Several studies conducted to establish a correlation between LSI and other cognitive, learning, or vocational indicators found no correlations for other cognitive styles (Jonassen & Grabowski, 1993).

Using Kolb's LSI, Coker (2000) studied the consistency of learning styles of 26 undergraduate athletic training students in the traditional classroom versus the clinical setting. She found that learning styles shift depending on the domain through which an individual is learning. Also, teaching strategies in one setting may not be equally effective in another setting. Each learning setting should be treated separately to accommodate individual learning styles and achievement. She concluded that if learning styles are to be considered in athletic training education, it might be necessary to provide the student with a specific focus of a classroom or clinical setting before completing the LSI.

Another study by Brower, Stemmans, Ingersoll, and Langley (2001) investigated undergraduate athletic training students' learning style and athletic training program admission success using Kolb's Learning Style Inventory IIA (KLSI IIA). They found that no certain learning style correlated with program admission and athletic training students had no dominant learning style. Academic factors seem to have an effect on

academic performance among undergraduate athletic training students, as in this study, where GPA seemed to be related to admission success. The mean GPA for subjects admitted to athletic training programs was 3.50 ± 0.31, and 2.82 ± 0.20 for those not admitted to athletic training programs.

Hansen (2001) studied the preferred learning styles of 489 student athletic trainers and 80 certified athletic trainers in NATA District IV and District V CAAHEP curriculum programs. The preferred learning styles of student athletic trainers were the converger, assimilator, and accomodator learning styles, whereas the certified athletic trainers preferred the converger and assimilator learning styles. Learning style preferences differed between male and female certified athletic trainers. Male certified athletic trainers preferred assimilator and converger learning styles, and female certified athletic trainers preferred converger and accomodator learning styles. There was no significant relationship between student athletic trainer gender and learning styles and student athletic trainer and certified athletic trainer learning styles.

Lynch et al. (1998) studied whether there was a relationship between learning styles and academic performance in medical school and during a required 3rd year surgery clerkship. They reported that learning style influenced performance on objective measures of academic achievement, while the application of that knowledge in the management of clinical situations required additional skills beyond those measured. They used the LSI to determine if learning style correlates with objective multiple-choice and clinical measures of performance. Performance was measured using the US Medical Licensing Examination step 1 (USMLE 1), the National Board of Medical Examiners (NBME) MC surgical subject examination (MCQ), and the NBME computer-based case

simulations (CBX).

Within their results for learning style and performance, Lynch et al. (1998) found that 45% were classified as convergers and 26% were classified as assimilators. Convergers and assimilators performed better on the USMLE 1 and NBME subject exam. For learning orientations and performance, the medical students showed a preference for abstract conceptualization and active experimentation.

According to Sugarman (1985), it is important to note that in Kolb's model neither pole of the concrete-abstract continuum or of the active-reflective continuum is inherently superior. Each is necessary for maximal learning to take place. Sugarman (1985) further states that although the LSI successfully demonstrates individual differences in preferred learning styles, it has a number of weaknesses. It is a forced-choice questionnaire, and its ranking and scoring methods result in the four dimensions being dependent on one another. A high score on one dimension necessitates lower scores on others (Sugarman, 1985). Criticisms focus on its lack of reliability, the possibility of individual words being interpreted differently, and the lack of correlation with statements taken from Kolb's descriptions (Bonham, 1988). Options are always presented in the same order, increasing possibility of response set. Choices are sometimes more difficult to make because they are not opposite. The ranking format prevents dimensions from being independent, although theory says that they are. When one option is ranked first, no other choices in that item can be equally valued. Lack of independence prevents the Kolb LSI from measuring the ability to use whatever style is most beneficial in a given context (Bonham, 1988). This also makes it inappropriate to factor analyze results and makes even simple correlations artificially high (Bonham,

1988).

According to Sugarman (1985), even if the ranking format were not a problem in itself, it would be a problem when combined with interpretations based on norms. The ranking process measures the subject against self-norms and compares the subject to other subjects (Sugarman, 1985). Use of norms with this instrument affects the quadrant in which subjects are placed. If a subject scores even on the four measures, he or she would not be shown as having equal preference. Instead, the person would be classified as reflective and concrete (Sugarman, 1985).

Myers-Briggs Type Indicator

According to Sugarman (1985), if Kolb's model of learning is more valid than his LSI, the question of how else to measure individual learning styles becomes important. Lewis and Margerison (1979) wrote of the relevance of the Myers-Briggs Type Indicator (MBTI) in measuring learning styles. The MBTI examines preferred ways in which individuals interact with the environment by focusing specifically on the ways people take in information and on the ways they reach conclusions concerning that information (Lewis & Margerison, 1979). It also provides a measure of people's preferences for acquiring or using information and indicates whether people prefer to direct these processes outward onto the world of people and things or inward onto the world of ideas (Sugarman, 1985). Sims and Sims (1995) define this concept of cognitive personality style as an individual's approach to adapting and understanding information. This adaptation does not interact directly with the environment. Rather, these are underlying and relatively permanent personality constructs.

The MBTI was designed in 1962 based on Jung's theory of psychological types

(Sims & Sims, 1995). It contains 143 forced-choice items that assess four dimensions of personality: extroversion versus introversion, sensing versus intuition, thinking versus feeling, and judging versus perceiving. This instrument measures the constructs in Jung's theory of psychological types, but the last two dimensions were proposed by Myers and Briggs (Sims & Sims, 1995). The pattern of results generated by the four bipolar concepts is interpreted in terms of Jungian theory. This in turn is used to predict attitudes and behavior. The reliability test sample involved 91 medical students and 56 undergraduate students. The predictive validity testing took place over 12 years involving 5,355 medical students (Sims & Sims, 1995). Sims and Sims (1995) do not report any statistical data but state that the overall psychometric rating was good for reliability and strong for validity. It is among the most frequently used personality instruments and highly reliable (Sims & Sims, 1995).

Canfield Learning Style Inventory

In 1974, Canfield and Lafferty developed an instrument for measuring the relative learning style preferences of students for academic conditions, content, and modes of learning (Payton et al., 1979). This instrument was field tested on a wide variety of college students in professional programs, including physical therapy. This Learning Styles Inventory (LSI) includes the personality and attitudinal variables believed to influence the teaching-learning process (Payton et al., 1979). The Canfield LSI was designed with 120 self-report rank ordered items to examine 20 scales grouped into four areas: conditions of learning, content of learning, mode of learning, and expectations for learning (Sims & Sims, 1995). The purpose of this inventory was to identify learner preferences for instruction. The resultant profile of the individual gives both the student

and the instructor a clearer idea of how the student perceives learning occurs best for him, based on past educational experiences (Sims & Sims, 1995).

The specific characteristics described by this LSI included conditions for learning such as the need for affiliation, structure, achievement, and importance (Sims & Sims, 1995). Content areas identified were number, qualitative, inanimate, and people orientations. Modes of learning were listening, reading, visual, and direct experience. Expectancy scores were computed as both projected letter grades (A,B,C,D) and as an overall expectancy value (Sims & Sims, 1995).

A problem with the LSI is the restricted range of subjects – community college students only. Using the Canfield and Lafferty LSI, Payton et al. (1979) studied the learning style preferences of one class of 1099 junior physical therapy students in October 1975 and again in July 1977 during the last week of their senior year. Payton et al. (1979) used this learning style because it appeared to be the most validated and because physical therapy students were included in its validation sample. In their results they found slight learning style differences between men and women, except that men had a significantly higher preference for competition than women. The typical first-year physical therapy student was indifferent in his preference for working with peers, setting his own objectives, and working with inanimate objects. The typical physical therapy student prefers to work closely with the instructor and prefers logical and organized course work. The typical physical therapy student is not strongly inclined to independent action, working alone, competing with others, and does not want the teacher to be an authority figure. Physical therapy students strongly prefer to work with people and learn by listening and direct experience rather than reading.

Bonham (1988) reports Canfield's technical manual does not explain the theory underlying delineation of elements and grouping of the condition elements, and when validity evidence was cited, there was no explanation relating evidence and theory. The Canfield LSI shares problems with the Kolb LSI by presenting options in the same order each time, ranking items so that scales lose their independence, and using norms with ranking format. According to Bonham (1988), there seems to be no way to overcome the inherent weakness of the ranking format. Although not reported, the overall psychometric ratings of the inventory performed by Curry (1987) contained poor reliability and poor validity evidence.

Grasha and Riechmann Learning Style Inventory

Grasha and Riechmann examined and assessed the learning styles of college students through a social and emotional perspective on the different ways individuals approach the classroom environment (Jonassen & Grabowski, 1993). The purpose of these scales was to develop an instrument based on the type of learning styles college students demonstrate in the classroom that they felt appropriate if teachers were to innovate and take student learning needs into consideration (Riechmann & Grasha, 1974).

According to Payton et al. (1979), Riechmann and Grasha identified six learning styles they derived from self-reported classroom behaviors: independent/dependent, collaborative/competitive, and participant/avoidant. Each of the six response styles was defined around three classroom dimensions: student attitudes toward learning, view of teachers and/or peers, and reactions to classroom procedures (Riechmann & Grasha, 1974).

The participant/avoidant scale measures how much an individual wishes to become involved in the classroom environment, reaction to classroom procedures, and attitude toward learning (Jonassen & Grabowski, 1993). The collaborative/competitive dimension measures the motivation behind an individual's interactions with others (Jonassen & Grabowski, 1993). The third, independent/dependent scale measures attitudes towards teachers and how much the learner desires freedom and control in the learning environment (Jonassen & Grabowski, 1993). Student Learning Styles Scale is a 90-item self-report inventory that measures the preferences of college and high school students regarding the six dimensions of classroom interaction. It consists of six subscales of 15 items each for each of the six dimensions. Ferrell (1983) reported test-retest reliability range at 0.79 to 0.83 and construct validity via methods used to develop the test. Riechmann and Grasha (1974) reported the construct validation of this instrument using undergraduate college students. The reliability and validity testing involved 940 college students and rated fair in regards to both (Sims & Sims, 1995).

Two potential problems with any instrument that relies on ranking and rating things important to students are the issues of frames of reference and data collection (Riechmann & Grasha, 1974). Ranking various activities uses judgments of likes and dislikes and may bias the results. People may believe things about themselves and use those beliefs as reference points when answering questionnaires, but may act differently when actually involved in a learning situation (Riechmann & Grasha, 1974). This measure can be classified as a social interaction scale because it deals with patterns of preferred styles for interacting with teachers and fellow students in a learning environment rather than how information is perceived or organized (Jonassen &

Grabowski, 1993). Research has found that most individuals do not score on polar extremes, but have some degree of preference for each of these categories (Jonassen & Grabowski, 1993). The styles for each of the learners change from class to class, so Riechmann and Grasha (1974) designed two different forms of the scale – one that assesses a general class, and one that relates to a specific course.

Gregorc Learning Style Delineator

According to DeBello (1990), the basis of Gregorc's model was that style consisted of distinctive, observable behaviors that provided clues to the functioning of individuals' minds and their relationship to the world. Those mind qualities suggested that individuals learn by combining perception and ordering. Gregorc used a theory that identified style in terms of the labels concrete sequential, abstract sequential, concrete random, and abstract random (Hendricson, Bulocher & Herbert, 1987).

Concrete sequentials need to be involved in learning a concept in a very real way by becoming physically involved with a new concept or new information (DeBello, 1990). They are methodical, attentive to details, reliable, and have low tolerance for ambiguity. They prefer factual and concrete information, an organized learning environment, hands on experiences, and a structured curriculum. (Hendricson et al., 1987) Abstract sequentials tend to be precise, serious, logical, attentive to specific details, and have a low tolerance for distractions (DeBello, 1990; Hendricson et al., 1987). They take pieces of data and synthesize them together to understand concepts as wholes (DeBello, 1990). Abstract randomists are idealistic, creative, perceptive, and people oriented. They prefer courses that focus on behavioral issues, a busy environment, and group discussions or instructional learning activities (Hendricson et al., 1987). Concrete

randomists are inquisitive, independent, practical, and have a low tolerance for details. They prefer problem solving, challenges such as games and simulations, working alone, and experiments (Hendricson et al, 1987).

The Gregorc Learning Style Delineator (GLSD) measures bi-dimensional patterns of learning preferences for making sense of the world through the perception and ordering of incoming information (Jonassen & Grabowski, 1993). This instrument is similar in format and design to the Kolb Learning Style Inventory. The styles developed by Gregorc are not described by polar extremes. Rather, individuals fall within ranges on both channels. The GLSD is a self-report instrument that consists of 40 words arranged in ten columns of four items each (Jonassen & Grabowski, 1993). The subject is asked to rank the four words relative to who they are with "four" being most and "one" being least like themselves. Four distinct learning patterns are discerned in this model. While everyone may exhibit all four patterns to some degree, most exhibit inclinations toward one or two. Gregorc believed that styles emerged from an in-born predisposition, and that they may be encouraged and disciplined (Jonassen & Grabowski, 1993). Observation and interviews are suggested to aid in categorizing learning preferences. Gregorc emphasized the matching of instructional materials and methods to meet the range of individual preferences; however, he also emphasized that nonpreferences should be used at times to encourage students to strengthen those areas (Jonassen & Grabowski, 1993).

Hendricson et al. (1987) studied the perceived learning styles of 48 dental students through their four years of dental school. Students scored higher in the concrete sequential dimension during each year of the curriculum. Their preference for this

dimension increased as they progressed towards graduation, suggesting that the learning environment of the dental school reinforced the students' initial predisposition toward the concrete sequential orientation.

Gregorc reported internal consistency from 0.89 to 0.93 and test-retest reliability at 0.85 to 0.88 (Jonassen & Grabowski, 1993). To test construct validity he used definitional strategy, but the manual provided little information to support the reliability or validity of the instrument. Normative data was nonexistent, and the validity and reliability information provided was so limited and methodologically flawed that no firm conclusions could be drawn (Jonassen & Grabowski, 1993).

Price, Dunn, and Dunn Productivity Environmental Preference Survey (PEPS)

Dunn and Dunn (1978) suggested that learning styles are based on an individual's response to five categories of elements: environmental, emotional, sociological, physical, and psychological. An individual's needs or preferences in each category add up to his or her learning style. This is a complex model but gives a comprehensive picture of the needs and preferences that influence how and whether we learn something. It acknowledges that learners differ in their reliance on auditory, visual, tactile, and kinesthetic perception processes; in their orientations of self, peers, and authorities; in the power of their motivation to learn; and in the strength of their sense of responsibility for the results of the process (Dunn & Dunn, 1978).

Dunn and Dunn (1978) also found that individuals differ in their needs for mobility, in their daytime and nighttime energy levels, and in their intake needs. It is unique among the models in its coverage of various environmental and physical elements of learning style and its recognition that people respond differently to their surroundings

in a learning situation, especially if what they are learning is complex or difficult. The emphasis is on various environmental and physical elements of learning. It is important for educators to understand the design of educational programs and environments that are most conducive to effective and efficient learning (Dunn & Dunn, 1978).

A learning style instrument developed by Price, Dunn, and Dunn is the Productivity Environmental Preference Survey (PEPS). This instrument claims to be the first comprehensive approach to the diagnosis of an adult's individual productivity and learning style (Sims & Sims, 1995). The instrument aids in prescribing the type of environment, working conditions, activities, and motivating factors that would maximize individual output. The PEPS does not measure underlying psychological motivation, value systems, or the quality of attitudes (Sims & Sims, 1995). Rather, it gives information concerned with the patterns through which the highest levels of productivity tend to occur. It reveals how someone prefers to learn best, not why (Price, 1996). The PEPS analyzes an individual adult's personal preference for each of the 20 different elements. These include noise level, light, temperature, design, and structure (Jonassen & Grabowski, 1993).

This instrument also measures certain affective and physiological learning styles, such as persistence or perseverance (Billings, 1991). High persistence is characterized by the disposition to work at a task until it is completed, seeking whatever kind of help is necessary to persevere (Sims & Sims, 1995). A low persistence style results in short attention span and the inability to work on a task for any length of time (Sims & Sims, 1995). Physiological learning styles measured by the PEPS include health-related behavior, time rhythms, need for mobility, and environmental elements (Sims & Sims,

1995).

According to Price (1996), learning styles measure a learner's preferred modes for concentration and learning difficult information. Their concept takes into account multiple interacting elements including environmental, sociological, emotional, and physical variables, each with its own sub-factors. The environmental variable includes four factors: sound, temperature, light, and seating/furniture design (DeBello, 1990). The sociological variable includes three general factors consisting of learning groups, presence of authority figures, and ways of learning (DeBello, 1990). The emotional variable consists of four factors including motivation, responsibility, persistence, and need for structure (DeBello, 1990). Finally, the physical variable is comprised of four overall factors: modality preferences, intake, time of day, and mobility (DeBello, 1990).

The PEPS, which uses self-report methods to measure preferences for functioning, learning, concentrating, and performing educational activities, is an adult version of the Price, Dunn, and Dunn Learning Style Indicator (LSI) for children. Like the LSI, it can be administered in a pencil-paper format, orally, by tape, or by computer. This 100-item test measures 20 factors using a Likert scale and takes approximately 20 minutes to administer (LaMothe, Billings, Belcher, Cobb et al., 1991).

LaMothe et al. (1991) studied the construct validity, reliability, intercorrelations of the subscales, and differences between subpopulations of 433 nursing students. They established validity for all of the 20 factors of the PEPS except for the afternoon subscale. Most of the scales met the standards for minimal reliability (.70). The environmental (.83) and physical (.74) variables formed the highest reliabilities. The psychosocial variables had a reliability of .70, whereas the sociological variables had a reliability of

.58. Intercorrelations existed between motivation and persistence (.68), motivation and responsibility (.60), responsibility and persistence (.55), and motivation and kinesthetics (.52).

The youngest (18-23) and oldest (40-49) students preferred a greater degree of structure. Younger students preferred to study or work with peers and in the evening, whereas older students preferred to study or work alone and in the morning. LaMothe et al. (1991) also found nursing students' need for structure is a consistent finding in the literature regardless of learning style instrument used. They found no significant differences for race, but significant differences for gender. Men preferred more authority and afternoon and evening classes. Women preferred to learn in the late morning. Registered nurses preferred more mobility than regular baccalaureate nursing students. Students who failed one or more prerequisite courses scored significantly lower on the motivation subscale and the several ways subscale.

According to Jonassen and Grabowski (1993), the instrument does not attempt to measure underlying psychological factors, value systems, quality of attitudes, or why student preferences exist. It also does not assess whether or not learners possess the skills that enable them to use their preferred mode of learning (Jonassen & Grabowski, 1993). According to Billings (1991), the reliability and validity of the PEPS instrument has been established for nurses and is comparable to findings for the use of the instrument with other college age and older students.

Harrelson et al. (1998) used the PEPS to assess the learning styles of 27 undergraduate athletic training students. They investigated the differences in learning style between the sexes and between students at different levels of an athletic training

education program. Using PEPS they concluded that undergraduate athletic training students function best as learners in a well-lit learning environment. Female subjects preferred more light than male subjects, and first-year students preferred afternoon learning and work activities. The afternoon being the preferred time for learning reinforces the importance of the clinical setting in skill development. They found no significant interactive effects between year in program and gender on the afternoon subscale. This study was limited by repeated testing and a small number of subjects (Harrelson et al., 1998).

Educational Demographics in the United States

According to the United States Census Bureau (1999), as of July 1, 1999, 273 million people resided in the United States. Over the years there has been rapid growth in the Asian and Pacific Islander population (45%). This group is small, however, only accounting for 4 percent of the total population and numbering about 11 million residents in 1999. Hispanic residents encompassed the second fastest growing ethnic group, increasing about 40 percent. Their total population equaled 31 million and became almost as large as the African American population in the United States. The African American and American Indian and Alaska Native populations also experienced rapid population growth. The African American population numbered 35 million and accounted for 12.8 percent of the total United States population. American Indians and Alaska Natives grew to about 2 million and accounted for about 1 percent of all U.S. residents in 1999. Non-Hispanic Whites accounted for 72 percent of the total population or 196 million residents.

In 1999, the United States Census Bureau (1999) found that the South was the

most populous region of the country, accounting for 96 million residents. Sixty-three million people lived in the Midwest and 61 million people lived in the West. The Northeast had the smallest share of the U.S. population with 52 million residents. California, Texas, New York, Florida, and Illinois were the five most populous states in 1999.

The overall trend has been toward a more educated society (U.S. Census Bureau, 1999), however, significant differences exist among various population segments. Nevertheless, the educational attainment of young adults aged 25 to 29 indicates improvements by groups who historically have been less well educated. In 1999, the percent of people aged 25 and older completing high school was the lowest in the South (81%) and the highest in the Midwest (86%). People in the West were more likely to have completed some college (56%), and along with the Northeast, had the greatest share of people with college degrees (28% and 27%, respectively).

In October 1999, the United States Census Bureau (1999) determined that 15.2 million students were enrolled in colleges across the country. The number of traditional college-aged students (those under 25 years old) was 9 million. They concluded that this was due to the increased number of people in that age group and the increased proportion of those who continue onto college soon after high school. The number of college students under age 25 will increase over the next decade due to the growth of the large population born during the 1980s and 1990s reaching college age.

In 1999, 5.8 million nontraditional college-age students (aged 25 or older) were enrolled in college (U.S. Census Bureau, 1999). These students accounted for about 38 percent of all college students. Women accounted for 54 percent of all college students.

Women constitute the majority in the traditional college-age student population (52%), and are prevalent among older students, with women making up 57 percent of nontraditional college-age students.

Of the 15 million college students enrolled in 1999, 71 percent were White non-Hispanic, 13 percent were African American, 7 percent were Asian and Pacific Islander, and 9 percent were Hispanic (U.S. Census Bureau, 1999). One-third of college students were enrolled part-time in 1999. A greater proportion of female than male students attended part-time. The proportion of White non-Hispanic students who attended part-time did not differ significantly from African American students (34% and 32%, respectively), but Asian and Pacific Islander students (24%) were less likely than students of other races to attend college part-time. Hispanic students (41%) were most likely to enroll part-time.

Most college students (63%) worked while attending school (U.S. Census Bureau, 1999). Men were more likely than women to be employed full-time than part-time. White non-Hispanic (66%) college students were more likely to be employed than African American (57%) or Asian and Pacific Islander students (49%). Among Hispanic students, 62 percent were employed while they were enrolled in college in 1999.

The majority of people enrolled in college were attending public institutions (77%) (U.S. Census Bureau, 1999). African Americans were more likely to be enrolled in public colleges (79%) than White non-Hispanics or Asians and Pacific Islanders (both 75%). About 84 percent of Hispanic college students were enrolled in a public college.

Most college students were enrolled at the undergraduate rather than the graduate level (12 million) (U.S. Census Bureau, 1999). About 3 million students were enrolled in

graduate school in the fall of 1999. Demographically, the majority of these students were at least age 25, and more than one-third were at least age 35. More women than men were enrolled at the graduate level (1.8 million compared with 1.4 million). Of the Asian and Pacific Islander college students, 29 percent were in graduate school in 1999. This is higher than the percentage of White non-Hispanic or African American college students in graduate school (22% and 14%, respectively). About 16 percent of all graduate students were foreign born. Many independent students are more likely to be in a graduate or professional degree program. This is due to the fact that they are generally older and more independent of their parents.

Demographics, as they relate to the educational aspect of athletic training programs, may affect students learning styles. The Education Task Force was created by the National Athletic Trainers' Association (NATA) to comprehensively examine athletic training education (Harrelson et al., 1998). Chally and Kleiner (1999) studied the demographic makeup of students enrolled in entry-level athletic training programs accredited by the Commission for the Accreditation of Allied Health education Programs (CAAHEP). They compared the 10 NATA districts and the type of athletic training institution with the gender of the students and their ethnic background. They found the mean number of students enrolled at these institutions to be 36.7 ± 19.9. There was a significantly ($p<0.05$) greater number of female than male students enrolled, $57.3\% \pm 9.6$ to $42.8\% \pm 9.6$, respectively. The percentage of female students was greater in every district except District 6 and District 8. Racial and ethnic status was predominantly Caucasian ($90.2\% \pm 11.7$). Districts 7 and 8 reported the smallest percentage of Caucasian students enrolled and the greatest percentage of Hispanics enrolled. District 5

included the greatest percentage of Caucasian and District 9 included the greatest percentage of African Americans enrolled. Chally and Kleiner (1999) also reported an uneven distribution of CAAHEP-accredited programs across the 10 NATA districts and encouraged academic institutions to develop accredited curricula in under served geographic regions.

According to Sarasin (1999), teachers must understand their students and their learning needs, and must take the time to know and understand learning styles research. They need to apply the specific strategies that are appropriate for their students and continually plan and modify strategies as individual learning needs change (Sarasin, 1999). Appropriate teaching should always be accompanied by continual assessment of learning outcomes, teaching strategies, and student needs (Sarasin, 1999). Teachers should conceive of learning style as referring to actions of the learner rather than the ability of the student (Freeman & Whitson, 1991). Teachers need to recognize and attend only to actions, which they can control, and they cannot force students to think or act in a particular manner. According to Freeman and Whitson (1991), an understanding of learning styles and the most appropriate teaching styles for different types of learners, when properly used, can enhance the process for both teachers and learners.

Faculty can use the results of a learning style indicator to plan and effectively control a specific teaching-learning environment for a class (Billings, 1991). Some choices may include determining how to structure the class, when to time "breaks", or whether to provide opportunities for group learning (Billings, 1991). The purpose of learning style analysis is to identify student strategies for learning and combine them with instructional material, experience, and methods that promote a lasting achievement (Sims

& Sims, 1995). A prerequisite for use of any learning style measuring device is the demonstration of a significant level of reliability and validity (Sims & Sims, 1995).

In reference to the demographic characteristics of the United States population and college students, studies comparing the relationship between learning styles and demographic qualities of athletic training students may determine if there is a correlation with academic performance. An understanding of an athletic trainer's learning style may allow athletic training educators to enhance the quality of their instruction and modify their teaching style in order to accommodate the various demographic qualities of their students.

CHAPTER III

METHODOLOGY

Subject Characteristics

Participants included 163 (55 men, 108 women; mean age, 24.03 ± 3.15 years) graduate athletic training students currently enrolled in eleven of the thirteen graduate athletic training programs approved by the National Athletic Trainers' Association. The graduate athletic training program directors of two graduate athletic training programs did not wish to have their students participate in the study. The investigation was approved by the Old Dominion University Human Investigation Committee.

Instrumentation

The Productivity Environmental Preference Survey (PEPS) (Price systems, Inc, Lawrence, KS) was used to evaluate learning preferences. The PEPS is the first comprehensive approach to identifying an adult's individual productivity and learning style (Price, 1996). The PEPS analyzes the conditions under which an adult is most likely to produce, achieve, create, solve problems, make decisions, or learn, and also aids in identifying the environment, working conditions, activities, and motivating factors that maximize individual output (Price, 1996). The scale gives information concerned with the patterns through which the highest levels of productivity tend to occur, revealing how a student prefers to learn best, not why (Price, 1996).

The PEPS identifies an adult's personal preference for each of the 20 different elements in the following areas: immediate environment, emotionality, sociological needs, and physical needs (Price, 1996). Students were given a written form of the inventory. Reliabilities for the 20 PEPS subscales range from 0.07 to 0.90, with 70% of

the reliability coefficients being equal to or greater than 0.60.

A demographic data survey was used to obtain background information for each participant (Appendix B). Questions elicited information such as the age, gender, class level, race, GPA, undergraduate institution, and geographic location of the student. Each student had been given an identification code that allowed for the two surveys to be analyzed and compared. This code was the student's mother's maiden name followed by the first initial of her first name.

Testing Procedure

Each program director was contacted by e-mail prior to the distribution of the surveys explaining the purpose of the research study. A total of 11 of the 13 graduate athletic training programs participated in the study. Two of the four programs not participating in the study in the fall were undergoing a transition of program directors and were unable to participate. They did participate in the spring of 2002, taking both the demographic survey and the PEPS survey. They did not participate in the reliability study during the spring of 2002.

The surveys were sent to the program directors along with a scripted letter explaining the study again and the testing procedures (Appendix C and D). The program directors were to read the directions in the letter word for word to their graduate athletic training students so that a standardized testing format could be used. The surveys were administered twice, once in the middle of the fall 2001 semester, and once again in the middle of the spring 2002 semester. During the spring semester, only the PEPS survey was re-administered to gather reliability data for the study. Only the students participating in the fall of 2001 (N=149) were included in the reliability portion of the

study.

Each survey was administered during regularly scheduled graduate athletic training class periods or at the discretion of the program director of the institution. Subjects first completed the PEPS by responding to 100 five-point Likert scale items (strongly agree to strongly disagree) related to 20 different elements of learning and were instructed to give their immediate response to each question as if they were learning new material (Price, 1996). The students then completed the demographic survey that contained 24 open and closed ended questions. The estimated time to complete both surveys was 30 minutes (Price, 1996). The surveys were then returned to the investigator in an enclosed postage-paid envelope. Once all the surveys from the participating institutions were returned to the investigator, they were sent to Price Systems, Inc. for scoring.

Data Analysis

Each program director reported the number of graduate athletic training students in their program. A total of 191 surveys were sent to the program directors of the schools agreeing to participate. The response rate was 85% completing 163 surveys. The completed PEPS surveys were returned to Price Systems, Inc. (Lawrence, Kansas) for scoring and calculation of raw and standard scores. Price Systems, Inc. calculates a computerized, individual profile of each student's responses to the PEPS (Price, 1996). A statistical analysis is performed using SPSS and 0.05 for alpha level. Each student received a standard score for each of the 20 different learning style variables (Price, 1996). A standard score ranges from 20 to 80 and is then converted to a t-score that has a mean of 50 and a standard deviation of 10 (Price, 1996). The standard score is based on a

random sample of 1000 subjects from the national database who have taken the PEPS (Price, 1996). Student's having a standard score of 40 or less or 60 or more find that variable important when they study (Price, 1996). Students having scores that fall between 40 and 60 for a variable can interpret that as meaning other learning style preferences are more important than that learning variable (Price, 1996). Standard scores for all learning style variables of each participant were entered into SPSS v10.1 for analysis with the demographic data of each student.

The areas of the demographic survey were broken down into individual components and compared to the results of each of the 20 domains of the PEPS survey (Appendix A). The identification code given to each student allowed for the two surveys to be analyzed and compared. All demographic data was manually recorded from each survey and entered into SPSS v10.1 for analysis.

CHAPTER IV

RESULTS AND DISCUSSION

Results

Descriptive statistics were run for all data. Descriptive statistics for the learning style variables show that the standard scores tended to fall in the mid-range for most of the subscales except for the Structure and Afternoon variables (table 1). Scores above 60 or below 40 indicate that variable is important when a student learns (Price, 1996). Sixty percent (N=98) of the graduate students had standard scores above 60 for the Structure variable and 56% (N=92) scored above 60 for the Afternoon variable. The mean standard score on the Structure variable for the entire sample was 59.11 ± 6.96. The mean standard score on the Afternoon variable for the entire sample was 58.05 ± 10.73.

A Cronback alpha analysis was run by Price Systems, Inc (Lawrence, Kansas) for each of the learning style variables. Eleven of the twenty learning style variables met the standards for minimal reliability (0.70) (table 2). The overall mean reliability of the instrument was found to be 0.67. The highest reliabilities were found for the light (0.89), temperature (0.86), alone/peers (0.90), intake (0.86), time of day (0.89), and afternoon (0.88) variables. The lowest reliabilities were found for the persistence (0.07), several ways (0.37), and late morning (0.47) variables. The mean reliabilities for the variable groupings of environmental, psychosocial, sociological, and physical were 0.71, 0.53, 0.59, and 0.74, respectively.

Frequency scores were calculated for each of the demographic characteristics to determine if there was enough information in each category to run a data analysis. Thirteen of the demographic characteristics were selected as having enough information

Table 1

Mean Score of Each Learning Style Variable for All Subjects (Mean ± SD)

Learning Style Variable	Mean Score
Noise Level	54.10 ± 5.68
Light	51.88 ± 7.78
Temperature	49.20 ± 8.87
Design	48.95 ± 7.97
Motivation	51.64 ± 6.07
Persistent	53.30 ± 6.09
Responsible	48.52 ± 8.45
Structure	59.11 ± 6.96*
Alone/Peers	51.98 ± 9.78
Authority Figures	56.24 ± 7.13
Several Ways	47.47 ± 8.54
Auditory	53.07 ± 8.94
Visual	46.61 ± 7.75
Tactile	54.39 ± 7.78
Kinesthetic	54.01 ± 5.66
Intake	55.78 ± 7.87
Time of Day	44.74 ± 8.89
Late Morning	46.90 ± 9.05
Afternoon	58.05 ± 10.73*
Mobility	57.29 ± 6.47

*indicates variables of significance

Table 2

Productivity Environmental Preference Survey Reliabilities

Learning Style Variable	Reliability
Environmental Variables	
Noise Level	0.33
Light	0.89
Temperature	0.86
Design	0.76
Environmental Variable Mean	0.71
Psychosocial Variables	
Motivation	0.65
Persistent	0.07
Responsible	0.78
Structure	0.61
Psychosocial Variable Mean	0.53
Sociological Variables	
Alone/Peers	0.90
Authority Figures	0.51
Several Ways	0.37
Sociological Variable Mean	0.59
Physical Variables	
Auditory	0.77
Visual	0.69
Tactile	0.57
Kinesthetic	0.73
Intake	0.86
Time of Day	0.89
Late Morning	0.47
Afternoon	0.88
Mobility	0.79
Physical Variable Mean	0.74
Mean for Instrument	0.67

to be analyzed (Appendix E). A Pearson Chi-Square ($\chi 2$) analysis was used to determine if there was an association between the 13 demographic characteristics and the 20 learning style variables. Tables were suppressed so that only $\chi 2$ values were shown for the selected data. Output consisting of 260 $\chi 2$ values was then assessed for values of significance. Of those output, 19 had values of significance and were then rerun in a $\chi 2$ test of independence with tables. The probability level was set at $p<0.05$ for all tests (table 3). Separate one-way ANOVAs and independent t-tests were also used to identify and confer the differences in the subpopulations.

Race exhibited an effect on the Persistent variable ($\chi 2=25.07$, $p=0.014$) with African Americans exhibiting a higher preference than Caucasians (33.3% to 11.5%, respectively). Students from internship programs exhibited a higher preference for studying and learning in a cool atmosphere ($\chi 2=10.28$, $p=0.036$) and did not prefer to have learning activities in the late morning ($\chi 2=12.44$, $p=0.014$). Although more graduates from both internship and CAAHEP programs had a low preference for late morning learning activities than a high preference (29.3% and 27.6%, respectively), those that did report a high preference for late morning learning activities were from CAAHEP programs (9.2%). Means and standard deviations for type of undergraduate program can be found in table 4.

First-year graduate students had a higher preference for studying and learning with their peers ($\chi 2=14.71$, $p=0.005$). A higher percentage of second-year graduate students (24.4%) than first-year graduate students (5.2%) and graduate students in one-year programs (6.7%) preferred to study alone. Second-year graduate students also had a higher preference for authority figures to be present during learning activities ($\chi 2=17.05$,

Table 3

Pearson Chi-Square Results for Significant Cross-Tabulations ($p<0.05$)

Cross-Tabulation	$\chi 2$ Value	Significance Value
Persistent * Race	25.07	0.01
Temperature * Program	10.28	0.04
Late Morning * Program	12.44	0.01
Alone/Peers * Class Level	14.71	0.005
Authority Figures * Class Level	17.05	0.002
Several Ways * Class Level	11.95	0.02
Time of Day * Class Level	13.06	0.01
Structure * Money	7.58	0.006
Intake * Money	6.55	0.04
Motivation * Reputation	6.86	0.03
Persistent * Reputation	9.58	0.008
Kinesthetic * Reputation	6.28	0.04
Late Morning * Location	7.37	0.03
Persistent * Application Status	7.70	0.02
Structure * Certification Status	4.80	0.03
Structure * Curriculum	9.55	0.008
Persistent * Most Time	31.21	0.002
Persistent * Undergraduate School Region	28.86	0.004
Auditory * Undergraduate School Region	21.15	0.05

Table 4

Learning Style Means, Standard Deviations and Probabilities for Type of Undergraduate Program ($p<0.05$)

Learning Style Variable	CAAHEP (N=87)	Internship (N=75)	Probability
Noise Level	53.99 ± 6.27	54.17 ± 4.97	0.84
Light	52.13 ± 7.28	51.65 ± 8.40	0.70
Temperature	49.59 ± 8.14	48.96 ± 9.59	0.65
Design	48.28 ± 7.88	49.60 ± 8.04	0.29
Motivation	51.68 ± 5.20	51.72 ± 6.92	0.97
Persistent	53.02 ± 5.25	53.67 ± 6.98	0.51
Responsible	47.59 ± 9.11	49.57 ± 7.60	0.14
Structure	58.55 ± 7.13	59.69 ± 6.78	0.30
Alone/Peers	51.67 ± 9.32	52.43 ± 10.36	0.62
Authority Figures	55.79 ± 7.06	56.84 ± 7.23	0.35
Several Ways	48.53 ± 8.55	46.25 ± 8.48	0.09
Auditory	52.83 ± 9.16	53.16 ± 8.66	0.81
Visual	45.91 ± 7.44	47.57 ± 8.01	0.17
Tactile	54.48 ± 7.62	54.37 ± 8.02	0.93
Kinesthetic	54.08 ± 5.41	53.97 ± 5.99	0.91
Intake	55.51 ± 7.82	56.27 ± 7.87	0.54
Time of Day	44.57 ± 8.54	45.01 ± 9.37	0.76
Late Morning	47.18 ± 8.95	46.33 ± 9.02	0.55
Afternoon	58.51 ± 10.11	57.64 ± 11.48	0.61
Needs Mobility	57.23 ± 5.87	57.24 ± 7.08	0.99

($p=0.002$). First-year graduate students had a higher preference than second-year graduate students and students in one-year programs for having a pattern or routine for their learning environment ($\chi2=11.95$, $p=0.018$). More second-year graduate students preferred learning activities in the evening than first-year graduate students and students in one-year programs ($\chi2=13.06$, $p=0.011$). Unlike first-year graduate students (0%) and students in one-year programs (5%), some second-year graduate students did report a preference for morning studies (12.1%). Learning style means for class level can be found in table 5. Overall, students in one-year programs had similar results to first year students in a two-year graduate athletic training program.

Students who reported money as a reason for choosing their graduate athletic training program preferred more structure in the classroom ($\chi2=7.58$, $p=0.006$) and reported that they prefer to consume some type of food or beverage while studying ($\chi2=6.55$, $p=0.038$). Students who reported reputation as a reason for choosing their graduate athletic training program scored higher on the Motivation ($\chi2=6.86$, $p=0.032$) and Persistent ($\chi2= 9.58$, $p=0.008$) variables. They also reported a higher kinesthetic preference with learning activities ($\chi2=6.28$ and $p=0.043$). A majority of students who reported location of the graduate school as a reason for choosing the graduate athletic training program did not prefer late morning learning activities ($\chi2=7.37$, $p=0.025$). Means for these variables may be found in table 6.

Graduate athletic training students who were NATABOC certified when they applied to graduate school scored higher on the Persistent variable than students who were applying for NATABOC certification when they applied to graduate school ($\chi2=7.70$, $p=0.021$). Students who reported not being NATABOC certified at the time

Table 5

Means and Standard Deviations for Class Level and Learning Style Variables

Learning Style Variable	Class Level		
	1st Year	2nd Year	N/A*
Noise Level	53.72 ± 5.62	55.02 ± 5.50	53.77 ± 5.87
Light	51.83 ± 6.71	51.27 ± 8.83	52.38 ± 7.99
Temperature	47.48 ± 8.68	51.00 ± 9.45	49.52 ± 8.44
Design	47.86 ± 8.10	50.40 ± 8.67	48.92 ± 7.24
Motivation	51.19 ± 5.67	52.47 ± 6.85	51.45 ± 5.85
Persistent	53.62 ± 5.79	52.93 ± 6.70	53.27 ± 5.97
Responsible	48.41 ± 8.15	49.82 ± 9.15	47.63 ± 8.20
Structure	59.64 ± 6.13	58.33 ± 7.37	59.18 ± 7.45
Alone/Peers	54.78 ± 9.79**	49.11 ± 9.58	51.42 ± 9.35
Authority Figures	58.52 ± 6.16	53.67 ± 8.26**	55.97 ± 6.47
Several Ways	45.29 ± 8.84**	50.09 ± 8.94	47.62 ± 7.42
Auditory	51.79 ± 9.56	53.71 ± 9.19	53.82 ± 8.12
Visual	47.64 ± 8.28	47.36 ± 7.60	45.07 ± 7.19
Tactile	54.38 ± 7.16	55.07 ± 7.98	53.88 ± 8.28
Kinesthetic	53.62 ± 5.40	54.40 ± 5.96	54.08 ± 5.75
Intake	55.29 ± 7.56	54.71 ± 8.31	57.05 ± 7.77
Time of Day	43.55 ± 9.44	46.47 ± 8.79**	44.60 ± 8.35
Late Morning	47.07 ± 8.53	48.44 ± 9.34	45.58 ± 9.26
Afternoon	60.19 ± 10.64	54.11 ± 10.95	58.93 ± 10.02
Mobility	57.52 ± 6.82	57.04 ± 6.78	57.27 ± 5.97

*Refers to students who are in 1 year programs

**Refers to preferences of significance

Table 6

Learning Style Means (±SD) for Money, Reputation, and Location as Reasons for Choosing Graduate Institution ($p<0.05$)

Learning Style Variable	Money		Reputation		Location	
	Yes (N=50)	No (N=113)	Yes (N=119)	No (N=44)	Yes (N=46)	No (N=117)
Noise Level	54.16 ± 6.52	54.07 ± 5.29	54.08 ± 5.80	54.14 ± 5.38	54.54 ± 6.36	53.92 ± 5.40
Light	52.92 ± 7.16	51.42 ± 8.02	52.66 ± 7.78	49.75 ± 7.44	53.11 ± 5.91	51.39 ± 8.37
Temperature	49.38 ± 7.93	49.12 ± 9.30	48.93 ± 8.65	49.93 ± 9.52	48.46 ± 8.01	49.50 ± 9.21
Design	49.68 ± 8.13	48.63 ± 7.92	49.57 ± 8.29	47.27 ± 6.86	48.76 ± 7.41	49.03 ± 8.21
Motivation	51.28 ± 6.49	51.80 ± 5.89	52.34 ± 5.90	49.73 ± 6.17	52.37 ± 6.16	51.35 ± 6.03
Persistent	53.46 ± 5.57	53.23 ± 6.33	53.63 ± 6.06	52.41 ± 6.15	53.74 ± 6.25	53.13 ± 6.04
Responsible	48.40 ± 8.78	48.57 ± 8.34	48.87 ± 8.78	47.55 ± 7.51	48.96 ± 8.55	48.34 ± 8.44
Structure	61.58 ± 5.89	58.02 ± 7.14	59.50 ± 6.89	58.07 ± 7.13	59.35 ± 7.05	59.02 ± 6.96
Alone/Peers	52.00 ± 8.07	51.96 ± 10.48	51.82 ± 10.10	52.39 ± 8.95	51.20 ± 10.19	52.28 ± 9.64
Authority Figures	56.98 ± 5.57	55.91 ± 7.72	57.14 ± 6.95	53.80 ± 7.10	55.48 ± 8.05	56.54 ± 6.75
Several Ways	49.06 ± 7.95	46.77 ± 8.73	47.95 ± 8.59	46.18 ± 8.36	48.87 ± 8.62	46.92 ± 8.48
Auditory	53.04 ± 10.08	53.08 ± 8.44	52.51 ± 8.83	54.57 ± 9.19	51.89 ± 10.25	53.53 ± 8.38
Visual	47.10 ± 7.63	46.40 ± 7.83	46.94 ± 8.10	45.73 ± 6.73	47.96 ± 7.87	46.09 ± 7.67
Tactile	55.06 ± 8.16	54.09 ± 7.63	54.87 ± 7.85	53.09 ± 7.52	55.76 ± 7.82	53.85 ± 7.73
Kinesthetic	54.60 ± 4.73	53.74 ± 6.02	54.76 ± 5.13	51.98 ± 6.52	53.54 ± 6.38	54.19 ± 5.37
Intake	57.90 ± 6.83	54.84 ± 8.14	55.97 ± 7.91	55.27 ± 7.83	55.87 ± 7.80	55.74 ± 7.85
Time of Day	45.80 ± 9.16	44.27 ± 8.77	45.05 ± 9.26	43.91 ± 7.84	43.91 ± 9.39	45.07 ± 8.71
Late Morning	48.10 ± 9.89	46.37 ± 8.64	47.02 ± 9.12	46.59 ± 8.94	44.67 ± 10.13	47.78 ± 8.47
Afternoon	55.86 ± 10.84	59.02 ± 10.59	58.07 ± 10.91	58.00 ± 10.35	58.46 ± 10.24	57.89 ±10.96
Needs Mobility	57.20 ± 6.15	57.34 ± 6.63	56.97 ± 6.76	58.18 ± 5.58	57.00 ± 6.81	57.41 ± 6.36

this study was conducted scored higher on the Structure variable than those who were NATABOC certified ($\chi 2=4.80$, $p=0.028$) (table 7). Students doing research projects had a higher preference for structure than those students doing a thesis or no research at all ($\chi 2=9.55$, $p=0.008$) (table 8).

Students who spent most of their time growing up in the Northwest and students who attended an undergraduate school in the Northwest had higher preferences on the Persistent variable ($\chi 2=31.21$, $p=0.002$ and $\chi 2=28.86$, $p=0.004$, respectively). Students who attended an undergraduate school in the Northwest also had a lower preference for auditory learning, while students who attended an undergraduate school in the Southwest demonstrated a higher preference for auditory learning ($\chi 2=21.15$, $p=0.048$). Means and standard deviations for region students lived in the most when growing up and undergraduate school region may be found in tables 9 and10. The percentages and scores for all $\chi 2$ results can be found in tables 11 through 29.

Separate one-way ANOVA's were used to measure the learning style variables against both undergraduate and graduate GPA. Results indicated that light had an effect on both undergraduate ($F2,20=3.010$, $p=0.05$) and graduate GPAs ($F2,20=4.819$, $p=0.009$) (tables 30 and 31).

Table 7

Learning Style Means (±SD) for Application Status and Present Certification Status

Learning Style Variable	Application Status		Certification Status	
	Applying (N=122)	Certified (N=41)	Yes (N=135)	No (N=28)
Noise Level	54.04 ± 5.72	54.27 ± 5.60	54.19 ± 5.83	53.64 ± 4.92
Light	51.86 ± 7.80	51.93 ± 7.81	52.18 ± 7.91	50.43 ± 7.07
Temperature	49.55 ± 9.17	48.17 ± 7.96	49.65 ± 8.98	47.04 ± 8.17
Design	49.31 ± 8.16	47.88 ± 7.40	48.85 ± 7.89	49.43 ± 8.49
Motivation	51.33 ± 5.82	52.56 ± 6.75	52.22 ± 6.21	48.82 ± 4.42
Persistent	52.74 ± 5.73	54.98 ± 6.86	53.36 ± 6.20	53.04 ± 5.59
Responsible	48.48 ± 8.45	48.63 ± 8.55	48.93 ± 8.82	46.50 ± 6.10
Structure	59.21 ± 7.10	58.80 ± 6.63	58.74 ± 7.14	60.89 ± 5.85
Alone/Peers	52.52 ± 9.62	50.37 ± 10.19	51.23 ± 9.72	55.57 ± 9.45
Authority Figures	56.07 ± 7.04	56.73 ± 7.46	56.10 ± 7.32	56.93 ± 6.21
Several Ways	47.57 ± 8.79	47.20 ± 7.82	48.21 ± 8.46	43.89 ± 8.15
Auditory	52.94 ± 8.97	53.44 ± 8.97	53.48 ± 9.08	51.07 ± 8.12
Visual	46.53 ± 7.96	46.85 ± 7.19	46.43 ± 7.53	47.50 ± 8.83
Tactile	54.41 ± 8.02	54.32 ± 7.12	54.83 ± 7.65	52.25 ± 8.18
Kinesthetic	53.89 ± 5.67	54.34 ± 5.67	54.36 ± 5.48	52.29 ± 6.27
Intake	55.13 ± 7.98	57.71 ± 7.26	55.85 ± 8.07	55.43 ± 6.93
Time of Day	45.21 ± 9.21	43.34 ± 7.80	44.96 ± 8.68	43.71 ± 9.97
Late Morning	47.13 ± 9.02	46.22 ± 9.21	46.96 ± 9.31	46.61 ± 7.82
Afternoon	57.00 ± 10.97	61.17 ± 9.43	58.01 ± 10.71	58.25 ± 11.03
Needs Mobility	57.21 ± 6.45	57.54 ± 6.59	57.22 ± 6.32	57.64 ± 7.24

Table 8

Means (±SD) for Curriculum and Learning Style Variables

Learning Style Variable	Curriculum		
	No Research	Project	Thesis
Noise Level	55.13 ± 4.78	54.25 ± 5.61	53.61 ± 6.02
Light	51.91 ± 8.27	51.69 ± 7.74	51.98 ± 7.70
Temperature	49.53 ± 10.23	48.23 ± 9.69	49.64 ± 7.84
Design	47.63 ± 7.42	48.79 ± 8.28	49.55 ± 8.03
Motivation	51.03 ± 6.97	51.38 ± 5.92	52.02 ± 5.83
Persistent	53.16 ± 6.62	53.48 ± 5.93	53.25 ± 6.04
Responsible	50.44 ± 7.99	48.29 ± 8.30	47.90 ± 8.69
Structure	56.13 ± 6.80	61.06 ± 6.36	59.13 ± 7.03
Alone/Peers	49.66 ± 10.90	54.98 ± 8.80	51.13 ± 9.57
Authority Figures	55.22 ± 8.09	57.65 ± 5.95	55.82 ± 7.32
Several Ways	47.41 ± 6.87	45.29 ± 9.93	48.76 ± 8.07
Auditory	53.88 ± 7.98	53.56 ± 9.66	52.47 ± 8.93
Visual	43.81 ± 7.61	47.19 ± 6.96	47.36 ± 8.08
Tactile	54.22 ± 7.37	55.79 ± 7.37	53.64 ± 8.14
Kinesthetic	54.75 ± 6.28	54.54 ± 5.87	53.41 ± 5.28
Intake	55.69 ± 8.34	56.54 ± 8.42	55.37 ± 7.41
Time of Day	43.38 ± 6.76	44.48 ± 10.15	45.42 ± 8.87
Late Morning	45.31 ± 8.22	48.96 ± 9.78	46.33 ± 8.80
Afternoon	59.53 ± 11.27	57.77 ± 10.62	57.64 ± 10.67
Mobility	57.88 ± 6.38	57.50 ± 7.24	56.95 ± 6.08

Table 9

Learning Style Means and Standard Deviations for Most Time Growing Up

Learning Style Variable	C (N=11)	E (N=54)	MW (N=46)	NW (N=5)
Noise Level	55.00 ± 5.16	53.06 ± 6.45	54.61 ± 5.84	52.00 ± 6.04
Light	50.82 ± 6.62	51.02 ± 8.05	52.02 ± 8.70	56.20 ± 5.72
Temperature	47.64 ± 8.42	50.74 ± 8.31	45.96 ± 8.44	52.20 ± 12.03
Design	46.27 ± 6.83	50.80 ± 7.78	47.26 ± 7.54	52.80 ± 8.93
Motivation	50.36 ± 8.62	51.67 ± 6.11	52.52 ± 6.25	52.60 ± 8.39
Persistent	54.36 ± 7.08	53.52 ± 5.47	52.67 ± 5.42	56.20 ± 8.64*
Responsible	48.36 ± 8.19	47.96 ± 8.59	50.43 ± 8.53	48.80 ± 11.19
Structure	60.64 ± 5.52	59.19 ± 6.98	57.89 ± 7.02	59.60 ± 7.64
Alone/Peers	52.64 ± 11.71	51.28 ± 8.16	50.96 ± 10.57	56.20 ± 9.65
Authority Figures	58.45 ± 7.42	54.44 ± 6.78	56.65 ± 7.82	56.80 ± 4.09
Several Ways	45.45 ± 7.39	49.00 ± 8.24	48.02 ± 9.30	47.20 ± 9.20
Auditory	52.27 ± 8.78	53.07 ± 9.44	52.74 ± 9.01	44.80 ± 4.55
Visual	47.91 ± 7.79	47.24 ± 7.80	45.85 ± 7.60	44.60 ± 12.12
Tactile	53.09 ± 9.36	53.85 ± 7.06	53.80 ± 8.19	56.40 ± 3.91
Kinesthetic	54.36 ± 5.16	52.81 ± 5.98	54.76 ± 5.99	56.20 ± 3.90
Intake	56.36 ± 6.19	54.72 ± 7.39	55.72 ± 8.80	58.20 ± 6.94
Time of Day	37.45 ± 5.50	45.61 ± 8.43	45.11 ± 9.36	53.20 ± 6.42
Late Morning	43.18 ± 7.51	48.80 ± 8.90	45.22 ± 9.37	48.00 ± 8.37
Afternoon	62.91 ± 12.87	56.39 ± 10.55	58.28 ± 11.00	52.40 ± 12.12
Needs Mobility	57.36 ± 7.47	57.15 ± 6.72	58.17 ± 5.56	53.40 ± 7.40

*Refers to preferences of significance
C=Central (Colorado, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Wyoming)
E=Eastern (Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont)
MW=Midwest (Illinois, Indiana, Michigan, Ohio, West Virginia, Wisconsin)
NW=Northwest (Alaska, Idaho, Montana, Oregon, Washington)

Table 9 Continued

Learning Style Variable	S (N=27)	SW (N=12)	O (N=8)
Noise Level	55.00 ± 4.99	55.50 ± 3.32	53.13 ± 4.52
Light	53.63 ± 7.65	51.42 ± 6.33	50.38 ± 5.18
Temperature	51.30 ± 9.23	49.33 ± 10.59	50.50 ± 7.01
Design	49.67 ± 8.08	46.67 ± 8.02	48.50 ± 10.65
Motivation	51.22 ± 5.60	50.75 ± 3.60	50.25 ± 4.74
Persistent	54.22 ± 6.72	53.33 ± 6.02	49.00 ± 8.28
Responsible	47.41 ± 8.45	50.17 ± 5.08	42.50 ± 8.73
Structure	62.26 ± 7.05	55.08 ± 6.74	58.63 ± 4.81
Alone/Peers	52.56 ± 11.77	53.50 ± 9.92	54.75 ± 5.99
Authority Figures	57.93 ± 7.07	55.25 ± 6.70	58.38 ± 6.19
Several Ways	45.81 ± 7.86	44.50 ± 6.95	47.00 ± 11.49
Auditory	52.26 ± 8.97	58.25 ± 5.35	56.13 ± 8.92
Visual	46.59 ± 8.15	45.42 ± 7.65	48.13 ± 5.59
Tactile	57.63 ± 8.44	52.92 ± 6.92	53.13 ± 7.92
Kinesthetic	55.56 ± 4.73	53.50 ± 4.98	51.38 ± 5.93
Intake	57.22 ± 7.27	58.67 ± 8.71	51.75 ± 8.26
Time of Day	43.85 ± 9.32	45.92 ± 9.56	42.75 ± 6.69
Late Morning	46.11 ± 9.84	50.00 ± 7.98	46.25 ± 7.91
Afternoon	59.78 ± 10.68	55.92 ± 8.45	62.13 ± 8.36
Needs Mobility	57.67 ± 6.82	59.00 ± 6.38	51.75 ± 4.89

S=Southern (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia)
SW=Southwest (Arizona, California, Hawaii, Nevada, New Mexico, Utah)
O=Other

Table 10

Learning Style Means and Standard Deviations for Undergraduate School Region

Learning Style Variable	C (N=16)	E (N=47)	MW (N=47)	NW (N=4)
Noise Level	54.19 ± 5.88	53.15 ± 6.70	54.49 ± 5.47	50.50 ± 5.80
Light	52.69 ± 7.20	51.51 ± 7.92	51.17 ± 8.14	55.00 ± 5.83
Temperature	48.25 ± 10.59	51.17 ± 8.12	46.94 ± 7.90	56.50 ± 8.35
Design	46.38 ± 5.98	50.55 ± 8.14	47.87 ± 7.98	51.75 ± 9.95
Motivation	50.81 ± 7.96	52.21 ± 6.11	51.57 ± 6.02	54.00 ± 8.98
Persistent	52.25 ± 6.27	53.62 ± 6.32	52.49 ± 5.44	57.00 ± 9.76
Responsible	49.75 ± 7.55	48.17 ± 8.99	48.38 ± 9.16	51.00 ± 11.61
Structure	61.06 ± 6.59	59.13 ± 6.75	57.55 ± 6.80	58.50 ± 8.35
Alone/Peers	54.13 ± 11.07	51.09 ± 8.24	50.91 ± 10.14	58.25 ± 9.81
Authority Figures	58.75 ± 6.40	54.47 ± 6.78	56.34 ± 8.08	56.00 ± 4.24
Several Ways	47.44 ± 6.98	49.60 ± 8.27	46.55 ± 9.51	44.25 ± 7.41
Auditory	52.38 ± 7.28	53.45 ± 9.77*	53.70 ± 8.63	43.00 ± 2.45*
Visual	45.00 ± 8.15	47.85 ± 7.29	46.09 ± 7.93	46.75 ± 12.84
Tactile	52.31 ± 9.16	53.60 ± 7.28	53.53 ± 7.78	55.50 ± 3.87
Kinesthetic	54.19 ± 5.61	53.04 ± 6.18	53.94 ± 5.94	56.50 ± 4.44
Intake	56.06 ± 7.24	54.57 ± 7.48	56.21 ± 8.50	58.25 ± 8.02
Time of Day	40.31 ± 8.36	46.15 ± 8.39	44.83 ± 8.85	52.25 ± 6.99
Late Morning	43.13 ± 8.14	48.94 ± 9.09	45.85 ± 8.87	47.50 ± 9.57
Afternoon	62.69 ± 12.12	55.64 ± 10.76	58.19 ± 10.49	54.25 ± 13.15
Needs Mobility	55.63 ± 6.64	56.66 ± 6.86	58.57 ± 5.75	56.00 ± 5.29

*Refers to preferences of significance
C=Central (Colorado, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Wyoming)
E=Eastern (Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont)
MW=Midwest (Illinois, Indiana, Michigan, Ohio, West Virginia, Wisconsin)
NW=Northwest (Alaska, Idaho, Montana, Oregon, Washington)

Table 10 Continued

Learning Style Variable	S (N=31)	SW (N=15)	O (N=3)
Noise Level	54.94 ± 4.91	55.87 ± 3.16	49.67 ± 5.69
Light	52.52 ± 8.64	52.40 ± 6.43	51.00 ± 6.25
Temperature	51.00 ± 9.30	46.33 ± 9.93	45.00 ± 5.57
Design	49.19 ± 8.10	48.40 ± 8.16	51.00 ± 11.36
Motivation	51.74 ± 5.69	50.53 ± 4.76	49.33 ± 2.52
Persistent	54.71 ± 7.04	53.60 ± 5.78	45.67 ± 9.07
Responsible	48.65 ± 7.74	49.33 ± 5.98	40.67 ± 9.45
Structure	62.03 ± 7.01	56.40 ± 6.74	57.00 ± 7.00
Alone/Peers	52.74 ± 11.17	51.80 ± 9.69	55.67 ± 6.03
Authority Figures	57.48 ± 6.94	55.60 ± 6.09	59.67 ± 8.51
Several Ways	46.61 ± 8.29	46.00 ± 7.67	49.33 ± 13.43
Auditory	51.06 ± 8.99	57.07 ± 7.33*	55.00 ± 13.08
Visual	47.00 ± 7.42	45.80 ± 8.59	44.00 ± 5.29
Tactile	58.16 ± 7.75	54.07 ± 7.17	52.33 ± 9.24
Kinesthetic	55.58 ± 4.60	53.40 ± 4.72	52.67 ± 9.24
Intake	55.81 ± 7.55	57.80 ± 8.79	52.67 ± 9.07
Time of Day	44.45 ± 9.55	44.60 ± 9.53	38.67 ± 3.22
Late Morning	46.29 ± 9.22	50.33 ± 8.76	40.00 ± 8.66
Afternoon	59.81 ± 10.52	56.20 ± 9.24	65.00 ± 5.57
Needs Mobility	57.32 ± 6.51	58.47 ± 7.39	51.67 ± 5.03

*Refers to preferences of significance
S=Southern (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia)
SW=Southwest (Arizona, California, Hawaii, Nevada, New Mexico, Utah)
O=Other

Table 11

*Persistent * Race Cross-Tabulation*

Race	High	Middle	Low
African American			
Count	3	6	0
% within Race	33.3%	66.7%	0
Caucasian			
Count	16	122	1
% within Race	11.5%	87.8%	.7%

Table 12

*Temperature * Program Cross-Tabulation*

Program	Cool	Middle	Warm
Internship			
Count	13	52	10
% within Program	17.3%	69.3%	13.3%
CAAHEP			
Count	7	70	10
% within Program	8.0%	80.5%	11.5%

Table 13

*Late Morning * Program Cross-Tabulation*

Program	No	Middle	Yes
Internship			
Count	22	49	4
% within Program	29.3%	47.9%	6.0%
CAAHEP			
Count	24	55	8
% within Program	27.6%	63.2%	9.2%

Table 14

*Alone/Peers * Class Level Cross-Tabulation*

Class Level	Alone	Middle	Peers
N/A**			
Count	4	44	12
% within Class	6.7%	73.3%	20.0%
1st - Year			
Count	3	36	19
% within Class	5.2%	62.1%	32.8%
2nd – Year			
Count	11	27	7
% within Class	24.4%	60.0%	15.6%

**indicates students in 1-year programs

Table 15

*Authority Figures * Class Level Cross-Tabulation*

Class Level	No	Middle	Yes
N/A**			
Count	0	38	22
% within Class	0%	63.3%	36.7%
1st – Year			
Count	3	31	11
% within Class	6.7%	68.9%	24.4%
2nd – Year			
Count	0	26	32
% within Class	0%	44.8%	55.2%

**indicates students in 1-year programs

Table 16

*Several Ways * Class Level Cross-Tabulation*

Class Level	No	Middle	Yes
N/A**			
Count	10	50	0
% within Class	16.7%	83.3%	0%
1st – Year			
Count	20	37	1
% within Class	34.5%	63.8%	1.7%
2nd – Year			
Count	7	35	3
% within Class	15.6%	77.8%	6.7%

**indicates students in 1-year programs

Table 17

*Time of Day * Class Level Cross-Tabulation*

Class Level	AM	Middle	Evening
N/A**			
Count	3	36	21
% within Class	5.0%	60.0%	35.0%
1st – Year			
Count	0	30	15
% within Class	0%	66.7%	33.3%
2nd – Year			
Count	7	22	29
% within Class	12.1%	37.9%	50.0%

**indicates students in 1-year programs

Table 18

*Structure * Money Cross-Tabulation*

Money		Middle	Yes
Yes			
	Count	12	38
	% within Money	24.0%	76.0%
No			
	Count	53	60
	% within Money	46.9%	53.1%

Table 19

*Intake * Money Cross-Tabulation*

Money		No	Middle	Yes
Yes				
	Count	0	24	26
	% within Money	0%	48.0%	52.0%
No				
	Count	4	72	37
	% within Money	3.5%	63.7%	32.7%

Table 20

*Motivation * Reputation Cross-Tabulation*

Reputation		High	Middle	Low
Yes				
	Count	23	94	2
	% within Reputation	19.3%	79.0%	1.7%
No	Count	4	36	4
	% within Reputation	9.1%	81.8%	9.1%

Table 21

*Persistent * Reputation Cross-Tabulation*

Reputation		High	Middle	Low
Yes				
	Count	17	102	0
	% within Reputation	14.3%	85.7%	0%
No				
	Count	3	38	3
	% within Reputation	6.8%	86.4%	6.8%

Table 22

*Kinesthetic * Reputation Cross-Tabulation*

Reputation		No	Middle	Yes
Yes				
	Count	1	90	28
	% within Reputation	.8%	75.6%	23.5%
No				
	Count	2	38	4
	% within Reputation	4.5%	86.4%	9.1%

Table 23

*Late Morning * Location Cross-Tabulation*

Location		No	Middle	Yes
Yes				
	Count	20	23	3
	% within Location	43.5%	50.0%	6.5%
No				
	Count	26	81	10
	% within Location	22.2%	69.2%	8.5%

Table 24

*Persistent * Application Status Cross-Tabulation*

Application Status	High	Middle	Low
Certified			
Count	10	30	1
% within Apply Status	24.4%	73.2%	2.4%
Applying			
Count	10	110	2
% within Apply Status	8.2%	90.2%	1.6%

Table 25

*Structure * Certification Status Cross-Tabulation*

Certification Status		Yes	Middle
Yes			
	Count	76	59
	% within Certification Status	56.3%	43.7%
No			
	Count	22	6
	% within Certification Status	78.6%	21.4%

Table 26

*Structure * Curriculum Cross-Tabulation*

Curriculum	Yes	Middle
Thesis		
Count	49	34
% within Curriculum	59.0%	41.0%
Project		
Count	36	12
% within Curriculum	75.0%	25.0%
No Research		
Count	13	19
% within Curriculum	40.6%	59.4%

Table 27

*Persistent * Most Time Cross-Tabulation*

Most Time Region		High	Middle	Low
SW				
	Count	1	11	0
	% within Most Time	8.3%	91.7%	0%
S				
	Count	4	23	0
	% within Most Time	14.8%	85.2%	0%
NW				
	Count	2	3	0
	% within Most Time	40.0%	60.0%	0%
MW				
	Count	4	41	1
	% within Most Time	8.7%	89.1%	2.2%
E				
	Count	7	47	0
	% within Most Time	13.0%	87.0%	0%
C				
	Count	2	9	0
	% within Most Time	18.2%	81.8%	0%
Other				
	Count	0	6	2
	% within Most Time	0%	75.0%	25.0%

S=Southern (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia)
SW=Southwest (Arizona, California, Hawaii, Nevada, New Mexico, Utah)
O=Other
C=Central (Colorado, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Wyoming)
E=Eastern (Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont)
MW=Midwest (Illinois, Indiana, Michigan, Ohio, West Virginia, Wisconsin)
NW=Northwest (Alaska, Idaho, Montana, Oregon, Washington)

Table 28

*Persistent * Undergraduate School Region Cross-Tabulation*

UG School Region		High	Middle	Low
SW				
	Count	2	13	0
	% within Region	13.3%	86.7%	0%
S				
	Count	6	25	0
	% within Region	19.4%	80.6%	0%
NW				
	Count	2	2	0
	% within Region	50.0%	50.0%	0%
MW				
	Count	3	42	2
	% within Region	6.4%	89.4%	4.3%
E				
	Count	6	41	0
	% within Region	12.8%	87.2%	0%
C				
	Count	1	15	0
	% within Region	6.3%	93.8%	0%
Other				
	Count	0	2	1
	% within region	0%	66.7%	33.3%

S=Southern (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia)
SW=Southwest (Arizona, California, Hawaii, Nevada, New Mexico, Utah)
O=Other
C=Central (Colorado, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Wyoming)
E=Eastern (Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont)
MW=Midwest (Illinois, Indiana, Michigan, Ohio, West Virginia, Wisconsin)
NW=Northwest (Alaska, Idaho, Montana, Oregon, Washington)

Table 29

*Auditory * Undergraduate School Region Cross-Tabulation*

UG School Region		No	Middle	Yes
SW				
	Count	1	8	6
	% within Region	6.7%	53.3%	40.0%
S				
	Count	9	16	6
	% within Region	29.0%	51.6%	19.4%
NW				
	Count	2	2	0
	% within Region	50.0%	50.0%	0%
MW				
	Count	4	33	10
	% within Region	8.5%	70.2%	21.3%
E				
	Count	10	18	19
	% within Region	21.3%	38.3%	40.4%
C				
	Count	1	10	5
	% within Region	6.3%	62.5%	31.3%
Other				
	Count	0	2	1
	% within Region	0%	66.7%	33.3%

S=Southern (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia)
SW=Southwest (Arizona, California, Hawaii, Nevada, New Mexico, Utah)
O=Other
C=Central (Colorado, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Wyoming)
E=Eastern (Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont)
MW=Midwest (Illinois, Indiana, Michigan, Ohio, West Virginia, Wisconsin)
NW=Northwest (Alaska, Idaho, Montana, Oregon, Washington)

Table 30

ANOVA Values and Means for Undergraduate GPA

Learning Style Variable	F	df	Probability	Grand Mean
Noise Level	0.220	2	0.80	3.44
Light	3.010	2	0.05	3.45
Temperature	0.671	2	0.51	3.42
Design	0.786	2	0.46	3.49
Motivation	1.841	2	0.16	3.46
Persistent	2.432	2	0.09	3.42
Responsible	1.002	2	0.37	3.48
Structure	2.483	1	0.12	3.46
Alone/Peers	0.666	2	0.52	3.45
Authority Figures	0.459	2	0.63	3.46
Several Ways	1.937	2	0.15	3.49
Auditory	1.812	2	0.17	3.44
Visual	1.345	2	0.26	3.48
Tactile	1.057	2	0.35	3.50
Kinesthetic	0.116	2	0.89	3.42
Intake	0.203	2	0.82	3.42
Time of Day	1.551	2	0.22	3.49
Late Morning	2.211	2	0.11	3.40
Afternoon	0.250	2	0.78	3.47
Mobility	0.511	2	0.60	3.43

Table 31

ANOVA Values and Means for Graduate GPA

Learning Style Variable	F	df	Probability	Grand Mean
Noise Level	1.071	2	0.35	3.36
Light	4.819	2	0.009	3.55
Temperature	1.544	2	0.22	3.47
Design	2.194	2	0.12	3.57
Motivation	0.029	2	0.97	3.48
Persistent	0.902	2	0.41	3.49
Responsible	1.137	2	0.32	3.52
Structure	0.206	1	0.65	3.49
Alone/Peers	0.827	2	0.44	3.50
Authority Figures	1.239	2	0.29	3.40
Several Ways	0.595	2	0.55	3.51
Auditory	0.809	2	0.45	3.48
Visual	0.003	2	0.99	3.49
Tactile	1.570	2	0.21	3.57
Kinesthetic	0.071	2	0.93	3.52
Intake	1.108	2	0.33	3.44
Time of Day	0.588	2	0.56	3.47
Late Morning	2.269	2	0.11	3.43
Afternoon	0.053	2	0.95	3.50
Mobility	0.701	2	0.50	3.63

Discussion

The purpose of this study was to assess the learning styles of students enrolled in a NATA approved graduate athletic training education program. We specifically were interested in the relationship between learning style preferences and the demographic characteristics of the graduate students. We hypothesized that some demographic characteristics influence learning styles and that there would be certain preferences found for graduate athletic training students. This study aimed to identify what those demographic characteristics may be and how much of an influence they have on learning styles.

Our results indicate that graduate athletic training students have a higher preference for classroom structure (59.11) and afternoon learning (58.05). Harrelson et al. (1998) used the PEPS surveys to assess the learning styles of 27 undergraduate athletic training students. They found that undergraduate athletic training students had a mean standard score of 62.78 for the Structure variable. While we found a score of 59.11, 54.1% of junior year physical therapy students (Katz, Miller & Balogun, 2000) and 45.2% of dental students also preferred classroom structure (Hendricson et al., 1987), indicating this learning style preference to be important among allied health professionals.

Students doing research projects (75%) prefer a more structured learning environment compared with students doing a thesis (59%) or no research at all (40.6%). In regards to research for a thesis, students have a committee that is there for guidance and to lend structure to the research process, whereas those students working on a research project, whether alone or in a group, do not have a committee to confer with to

give them structure and guidance within their research. This may explain the preference for structure amongst those students doing research projects. There is also a discrepancy among graduate athletic training institutions in differentiating between a research project and a thesis. Some programs identify a thesis as a research project, causing mixed results for the demographic question concerning graduate curriculum.

Those presently certified in graduate school had a lower percentage than those not presently certified in graduate school for desiring structure, 56.3% and 78.6%, respectively, within the learning environment. This may be due to the need to refine athletic training skills in order to become certified.

Graduate students who were certified when they applied to graduate school prefer to study in a timely manner (24.4%). This may be due to the methodical study habits required for preparing for the NATABOC examination. Those who are presently not certified in graduate school prefer a more structured learning environment (78.6%). This may be explained by the need for organization within the learning environment to prepare for the examination.

The Northwest region of the United States for spending time (40%) and attending undergraduate school (50%) generates students who prefer to study in a timely manner. Those attending undergraduate school in the Southwest (40%) and the East (40.4%) prefer auditory learning. A more in-depth demographic study within education of these regions may need to be performed to explain the results of these variables.

Blagg (1985) administered Canfield's LSI along with 3 personality tests to 51 graduate students in a variety of allied health programs in order to predict academic success. He found students who prefer having organized course work, discipline in the

classroom, and knowledgeable instructors had higher academic success. Hendricson et al. (1987) used the Gregorc Learning Style Delineator to assess the learning styles of 48 dental students over 4 years. They found dental students function best in a highly organized and structured learning environment. These predictors coincide with the graduate athletic training students preference for a structured learning environment.

The preference of first-year graduate students for having a set pattern for learning (34.5%) may be explained by the common lecture and note-taking format of many undergraduate programs. This makes it convenient to adapt to one style of learning. Graduate athletic training educators may vary their teaching methods because of the knowledge their students should already have of the subject matter entering the program. This may allow graduate students to become more diversified in their study methods by their second year.

Afternoon learning was high for both male (57.80) and female (58.18) subjects, and specifically for first-year graduate athletic training students (60.19). Physical therapy students (40.5%) (Katz et al., 2000) and male baccalaureate nursing students (11.37) had a higher preference for afternoon learning, while female baccalaureate nursing students had a higher preference for morning learning (22.6) (LaMothe et al., 1991). We found that graduates of both CAAHEP and internship programs prefer not having late morning educational experiences (47.18 and 46.33, respectively). This may cause some difficulty for program directors in scheduling class times because of the usual unwillingness of students to enroll in early morning classes. Our results indicate that graduate athletic training students fall in the mid-range for preference of morning and evening classes, neither variable presiding over the other.

First-year graduate athletic training students may prefer afternoon learning more than second-year graduate athletic training students due to the clinical learning environment that normally takes place in the afternoon in undergraduate athletic training programs. A majority of first-year graduate athletic training students attended graduate school right after completing their undergraduate degree and may have brought this transition with them. Similar results found by Harrelson et al. (1998) for undergraduate athletic training students on this subscale indicate a strong preference for athletic training students for afternoon instruction of skills and learning. Both of these studies reinforce the importance of making use of the clinical setting for the instruction and development of athletic training skills.

A preference for light in relationship to gender has only been reported by a few researchers (Hansen, 2001; Harrelson et al., 1998). Using Kolb's LSI, Hansen (2001) studied the preferred learning styles of student athletic trainers and certified athletic trainers in NATA Districts 4 and 5. She found no statistically significant relationship between gender and learning styles. Harrelson et al. (1998) found that female athletic training students preferred significantly more light than male athletic training students ($p=0.02$). Our results for gender and light preferences of graduate athletic training students support the results found by Harrelson et al. (1998). Our results also indicate that graduate GPA's are influenced by light ($p=0.009$). All of these findings support the notion that all instructive and clinical learning areas should be well lit.

Certified athletic trainers prefer to problem solve and incorporate information into a concise and logical format (Hansen, 2001). Our results found a higher percentage of graduate athletic training students who were certified when applying to graduate school

favored the Persistent variable (24.4%). This indicates a desire to study and learn in a timely manner.

The age of a student and the relationship to learning preferences has demonstrated controversial results. Age had no effect on learning style preferences of baccalaureate nursing students (Highfield, 1988). Our results found no statistically significant correlation between age and learning style preferences of graduate athletic training students. The majority of graduate athletic training students (76.8%) were between the ages of 22 to 24 years old. Highfield (1988) suggests that determining the learning style of the student may be more helpful to the educator than knowing the student's age.

Younger nursing students (ages 18-23) preferred to work with peers, whereas older students (ages 30-39) preferred to work alone (LaMothe et al., 1991). Our study found slightly higher means of younger students for working with peers, but no significant data was discovered for this variable. Significant data for learning alone or with peers was found in relation to class level. A higher percentage of first-year students (32.8%) preferred to study or learn with peers, and a higher percentage of second-year students (24.4%) preferred to study or learn alone. The maturity and confidence level of the second-year graduate student compared with the first-year graduate student may explain this result. First-year students may be trying to adapt to a new learning environment and new teaching methods and rely on each other to help with this process.

Older baccalaureate nursing students preferred morning learning and younger students preferred evening learning (LaMothe et al., 1991). With regards to time of day, our results indicate a higher percentage of second-year graduate athletic training students (50%) preferred evening learning than first-year graduate athletic training students

(33.3%) and those in one-year graduate athletic training programs (35%).

A surprising finding was the preference of second-year graduate athletic training students for having an authority figure present during learning activities. We hypothesized that this would be a learning style preference among first-year graduate students due to their need for reinforcement in a new learning environment. Also, second-year graduate students should be able to rely more on themselves due to their preparation for re-entering the workplace.

We are unable to explain some of the correlations except that they may be a finding of the population in this study. African Americans (33.3%) exhibited a higher preference than Caucasians (11.5%) for studying and learning in a timely manner. There were no significant differences for race and learning style variables with nursing students (LaMothe et al., 1991). The effect of temperature on the type of undergraduate program attended ($p=0.04$) is difficult to explain and may only be noted as a finding of this study along with students from internship programs preferring to learn in a cool atmosphere (17.3%).

Contrary to many learning style studies on other allied health professionals, this study did not find a preference for kinesthetic learning among graduate athletic training students (54.01). It would seem that since the clinical aspect of athletic training is essentially hands-on, graduate athletic training students would demonstrate a preference for this learning style variable. Harrelson et al. (1998) was also surprised to discover that undergraduate athletic training students did not demonstrate a preference for kinesthetic learning. They believe lower kinesthetic scores may be due to a more stringent definition of this variable with the PEPS and that student preferences vary according to specific

athletic training topics.

Students who chose their graduate athletic training program based on its reputation (23.5%) was the only demographic characteristic that linked graduate athletic training students with kinesthetic learning preference. Sixty percent of students taking the NATA certification exam were categorized as kinesthetic learners (Draper, 1989), and hands-on experience was a predictor of academic success for graduate allied health students (Blagg, 1985). Dental students also preferred kinesthetic learning experiences (45.2%) during all 4 years of dental school (Hendricson et al., 1987).

The PEPS met a majority of the tests for reliability for graduate athletic training students and obtained similar results on a majority of the subscales as LaMothe et al. (1991) and Price (1996). The highest reliabilities were found for the light (0.89), temperature (0.86), alone/peers (0.90), intake (0.86), time of day (0.89), and afternoon (0.88) variables. These findings are similar to those reported by LaMothe et al. (1991) and Price (1996) except for the persistence (0.07), several ways (0.37), and late morning (0.47) variables being significantly lower. LaMothe et al. (1991) performed intercorrelation reliabilities between the variables and concluded that lower reliabilities may be due to the lack of clarity in distinguishing some of the learning style variables from each other. This along with the fact that students may have just completed the learning style survey without reading the questions during the second distribution may have contributed to the lower reliabilities.

The overall reliability for each variable grouping differed from other two studies in the environmental (0.71) and psychosocial (0.53) variable means. LaMothe et al. (1991) found environmental and psychosocial means to be 0.83 and 0.70, respectively,

and Price (1996) found those means to be 0.85 and 0.69, respectively. The instrument identified differences of graduate athletic training students by class level, undergraduate and graduate GPA, type of undergraduate program, and undergraduate school region to name a few. This research supports other studies that have found differences in student learning style preferences.

The use of a learning style inventory in a graduate athletic training curriculum may be beneficial for both the instructor and the student. The instructor is always trying to motivate and challenge students. Results of this research suggest some demographic characteristics may correlate with a particular learning style preference. This would allow the instructor to devise an alternative teaching method based on a student's demographic characteristics that may be more successful both in the classroom and clinically. A student's knowledge of his own learning style preference would allow him to alter his activities to facilitate his own learning. Uses of a learning style inventory have been primarily used for the classroom setting, but the information obtained could also be adapted to the clinical setting. The results of this study have important implications for graduate athletic training educators in terms of arranging their instructional activities to optimize student learning.

Further Research

As educational standards within athletic training become more exact, educators within the athletic training profession must begin to assess their teaching technique and the learning tendencies of their students. Undergraduate athletic training students learning style preferences shift depending on whether they are in the didactic or clinical setting (Coker, 2000). Because both settings are as important in graduate athletic training

education as in undergraduate athletic training education, research should be performed to see if this learning trend also occurs at the graduate level. It would be important for athletic training educators to modify their teaching methods based on the educational setting in order to enhance the graduate athletic training student's learning experience.

Learning style research has been performed for graduate students of various allied health professions (Payton, 1979; Hendricson, 1987; LaMothe, 1991; Lynch, 1988) and has increased for undergraduate athletic training students (Harrelson, 1998; Coker, 2000; Hansen, 2001). Because this area of research is fairly new, limited studies have been conducted on graduate athletic training education, specifically, learning styles of graduate athletic training students. The information gained from this research is a small yet important contribution to graduate athletic training education.

In general, more research needs to be conducted on the demographic characteristics of graduate athletic training students. Because of the significant amount of data collected from this research, results focused on the comparison of individual demographic characteristics and learning styles. More research involving correlations between various demographic characteristics and learning styles of graduate athletic training students have not been performed. Continuing studies need to be conducted on graduate athletic training students to see if the results from this research are a trend within the graduate athletic training population or just a characteristic of the population within this study. Also of importance is whether the learning style preferences of graduate students in NATA approved graduate athletic training programs differ from athletic training students who attend other graduate programs.

Future research should also investigate how athletic training education improves

when educators teach according to student learning styles. Many learning style inventories have been used across the allied health professions. It would be of interest to use one specific learning style instrument, specifically within athletic training research, in order to compare results across studies.

CHAPTER V

SUMMARY AND CONCLUSIONS

By understanding student learning preferences, athletic training educators could enhance the quality of the learning experiences they provide to their students. The purpose of this study was to assess the learning styles of students enrolled in a NATA approved graduate athletic training education program, specifically the relationship between learning style preferences and the demographic characteristics of the graduate students. No dominant demographic characteristic related to a particular learning style, rather a variety of demographic characteristics revealed many learning styles. An important result from this study is that graduate athletic training students are not as much kinesthetic learners as they are more structure-oriented with a preference for afternoon learning. An analysis comparing demographic characteristics and learning styles support the preference for structure. A significant amount of data was collected from this research and its importance may only be discovered with continuing research in this area.

Because no single learning style preference was found to prevail for graduate athletic training students when compared to demographic characteristics, it seems that graduate athletic training educators should not necessarily strive to develop any one preference in their students. Instead, educators that know a student's preferred learning style preference based on demographic information should not only use this knowledge to help the student better learn, but realize that as educators, educating students encompasses helping them beyond the classroom. The reliance on one particular learning style preference may discount the valuable learning traits associated with another learning style preference. One must remember that learning style inventories only

provide information about certain learning behaviors that preside at a specific point in time.

Identifying the correlations between demographic data and learning styles requires continual research. The results of this study help to provide more information about what these similarities may be, and if any similarities exist, maybe they exist within other professions also. The results of this research are not expected to change athletic training education, but provide another piece of educational research to this continuously evolving profession.

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APPENDIX A

PEPS VARIABLE DESCRIPTIONS

*Productivity Environmental Preference Survey Variable Descriptions**

Learning Style Variable	Description
Sound	preference for quiet learning environment versus learning environment with noise
Light	preference for bright learning environment versus dim learning environment
Temperature	preference for warm learning environment versus cool learning environment
Design	preference for formal learning setting versus informal learning setting
Motivation	provides self-incentive to complete tasks versus requiring prodding by instructor
Persistent	willing to work at a task until it is completed versus preferring short-term tasks
Responsible	accountable for own completion of tasks versus requiring supervision and praise
Structure	preference for concise organization of coursework
Alone/Peers	preference for learning alone versus learning with others
Authority Figures	preference for instructor presence with learning
Several Ways	preference for variety of learning patterns versus using specific routine to learn
Auditory	prefers learning by hearing information
Visual	prefers learning by reading and seeing information
Tactile	prefers learning by touching and moving objects
Kinesthetic	prefers learning by becoming physically involved with experiences and objectives
Intake	preference for food and beverage with learning activities
Time of Day	preference for early morning learning versus evening learning
Late Morning	preference for learning during late morning
Afternoon	preference for learning in the afternoon
Mobility	preference for movement with learning activities

*Productivity Environmental Preference Survey Manual (1996), Price Systems, Inc., Lawrence, Kansas

DEMOGRAPHIC SURVEY

Thank you for participating in this study. Please read each question carefully and answer each question as honestly as possible. Your responses will remain confidential and you will not write your name on this survey. Please write your given identification number in the space below to allow the two surveys to be compared and analyzed.

Identification number: _____

Once you have completed the surveys, please return them to your program director making sure your identification number is on both forms. If you are unsure of any questions related to your current graduate program, please ask your program director.

If you have any questions related to this study or wish additional information, please contact:
Jennifer Plant at Old Dominion University, Norfolk, Virginia (757-722-1590)
vaplant@home.com

Thank you.

1. What is your ethnic background?
   (0) African American
   (1) American Indian
   (2) Asian
   (3) Caucasian
   (4) Hispanic
   (5) Other _____

2. What is your marital status?
   (0) Single (never married)
   (1) Married
   (2) Divorced
   (3) Separated
   (4) Widowed

3. What are your present living arrangements?
   (0) Living with parents
   (1) Living with friend(s)
   (2) Living alone
   (3) Single parent
   (4) Living with spouse
   (5) Living with significant other
   (6) Other _____

4. How many children do you have?

(0) 0
(1) 1
(2) 2
(3) 3
(4) 4
(5) 5
(6) 6
(7) 7
(8) 8
(9) >8

5. How many siblings do you have?

(0) 0
(1) 1
(2) 2
(3) 3
(4) 4
(5) 5
(6) 6
(7) 7
(8) 8
(9) >8

6. What is your religious background?

(0) Baptist
(1) Jewish
(2) Lutheran
(3) Roman Catholic
(4) Other _____

7. If you received your undergraduate degree in athletic training, what type of program was it?

(0) CAAHEP accredited
(1) Internship

8. Is your graduate program a one year or two year academic program?

(0) One year
(1) Two year

9. If your program is a two-year program, what is your present class level?

(0) 1st year graduate student
(1) 2nd year graduate student

10. What is your present credit hour load?

(0) <6
(1) 6
(2) 7
(3) 8
(4) 9
(5) 10
(6) 11
(7) 12
(8) 13
(9) >13

11. What is your present status?
(0) Clinical assistantship
(1) Research assistantship
(2) Teaching assistantship
(3) Studying
(4) No employment
(5) Outside employment

12. Why did you choose your present institution?
(0) Money
(1) Reputation
(2) Location
(3) Weather
(4) Relation to home
(5) Family
(6) Alma Mater
(7) Friends
(8) Other _____

13. What was your status when you applied to your graduate program?
(0) Applying for the NATA exam
(1) Certified athletic trainer

14. Which curricular option are you pursuing at your present institution?
(0) Nonresearch option
(1) Research problem/project option
(2) Thesis option

Please answer the following questions in the spaces provided.

15. In what city and state were you born? _____

16. In what city and state did you spend most of your time while growing up?
_____

17. In what state were you living in prior to attending your present institution?
_____

18. What undergraduate school(s) did you attend and what state(s) are these school(s) in?
_____
_____

19. In what year did you receive your undergraduate degree? _____

20. What was your undergraduate degree in? _____

21. What was your cumulative undergraduate GPA? _____

22. What was the GPA of your most recent semester? (If you are a first-year graduate student, please give your final undergraduate GPA) _____

23. How many total credit hours are required by your academic program? _____

24. Are you a certified athletic trainer? _____ If so, for how many years? _____

Date

Dear (Program Director's Name):

I am conducting a survey to study the relationship between learning styles of graduate athletic training students and their demographic characteristics. I am requesting your help to make this study a success. Please hand out the PEPS and demographic surveys to your graduate athletic training students in a classroom setting at your convenience. Number 2 pencils are enclosed and required to complete the PEPS survey. Once the surveys have been completed, please return them to Jennifer Plant in the enclosed postage-paid envelope by **November 10th**. Thank you for your help in conducting this study.

Please READ the following directions word for word to your students.

Thank you for taking the time to participate in this study. These surveys are being used to study the relationship between learning styles of graduate athletic training students and their demographic characteristics. The estimated time to complete both surveys is 30 minutes. No names are to be written on the surveys – responses are strictly confidential and anonymous. Comparisons of the surveys will be made by using your identification code. This code is your mother's maiden name followed by the first initial of her first name.

Please answer the PEPS survey first. This survey is a learning styles questionnaire. A #2 pencil must be used to complete this survey.

Please mark on the PEPS form:

1. Your identification code in the upper left-hand section where it says name. This section is highlighted in yellow. (example: Kirsits J)
2. Please fill in the sections on sex and birthday in the spaces provided. These sections are highlighted in blue.
3. **Do not mark** in the special codes or identification number sections on the form.

Please read the directions at the top of the survey. It is important when answering the PEPS questions that you give your immediate response to each question that best describes how you feel most of the time.

When you finish the PEPS survey, please complete the demographic survey. Please read the directions at the top of the survey and make sure to write your identification code in the space provided. Please answer each question as honestly as possible. Once you have completed this survey, you may return both the PEPS and demographic surveys to your program director (or the person administering the surveys). You do not have to wait for other students to finish the surveys.

Thank you for your time and assistance in this research.

Sincerely,

Jennifer L. Plant
Graduate Athletic Training Student
Old Dominion University

Bonnie L. Van Lunen
Director, Graduate Athletic Training
Old Dominion University

Jeffrey Bonacci
Director, Athletic Training Program
University of Arkansas

Elizabeth Dowling
Graduate Program Director
ESPER
Old Dominion University

Date

Dear (Program Director's Name),

I am completing my thesis on the relationship between learning styles of graduate athletic training students and their demographic characteristics. In the Fall 2001, I sent you a learning style instrument and demographic survey. To prove the validity and reliability of the learning style instrument, I need your assistance again to hand out the PEPS survey one last time to your graduate athletic training students. Enclosed are the same number of PEPS surveys as students that participated in this study in the fall. Would you please have those same students complete the PEPS survey again in the classroom setting at your earliest convenience. Number two pencils are enclosed so that the students may properly complete the surveys. Once the surveys have been completed, please return them to Jennifer Plant in the enclosed postage-paid envelope by **March 1st**. Thank you for your help with the completion of this study.

Please READ the following directions word for word to your students.

Thank you for taking the time to complete this study concerning the relationship between learning styles of graduate athletic training students and their demographic characteristics. The estimated time to complete the learning style survey is 15 minutes. No names are to be written on the survey – responses are strictly confidential and anonymous. Your responses will be matched with the previous surveys by your identification code. This code is your mother's maiden name followed by the first initial of her first name.

The PEPS survey is a learning styles questionnaire. A #2 pencil must be used to complete this survey.

Please mark on the PEPS form:

1. Your identification code in the upper left-hand section where it says name. This section is highlighted in yellow. (Example: KirsitsJ)
2. Please fill in the sections on sex and birthday in the spaces provided. These sections are highlighted in blue.
3. Please do not mark in the special codes or identification number sections on the form.

Please read the directions at the top of the survey. It is important when answering the questions that you give your immediate response to each question that best describes how you feel most of the time. When you finish the survey, please return it to your program director (or the person administering the survey). You do not have to wait for other students to finish the survey.

Thank you for your time and assistance in this research.

Sincerely,

Jennifer L. Plant
Graduate Athletic Training Student
Old Dominion University

Bonnie L. Van Lunen
Director, Graduate Athletic Training
Old Dominion University

Jeffrey Bonacci
Director, Athletic Training Program
University of Arkansas

Elizabeth Dowling
Graduate Program Director
ESPER
Old Dominion University

APPENDIX E

DEMOGRAPHIC CHARACTERISTIC DESCRIPTIONS

Demographic Characteristic Data and Descriptions

Race – African American, American Indian/Alaskan, Asian/Pacific Islander, Caucasian Hispanic, Other

Program – the type of undergraduate program the student attended (internship or CAAHEP)

Class Level – the present year classification of the student (1st Year, 2nd Year, or not applicable because attend a 1 year program)

Money – the student chose the graduate program he/she is attending because they are receiving money

Reputation – the student chose the graduate program he/she is attending because of its reputation

Location – the student chose the graduate program he/she is attending because of where it is located

Application Status – when applying to graduate school, was the student a certified athletic trainer or was he/she applying for the NATABOC examination

Certification Status – at the time of the study, was the student NATABOC certified

Curriculum – the student is doing a thesis, research problem/project, or no research

Most Time – the region of the country the student lived in the most while growing up

Undergraduate School Region – the region of the country where the undergraduate school the student attended is located

Undergraduate GPA – the cumulative undergraduate GPA of the student

Graduate GPA – the cumulative graduate GPA of the student

Length of Graduate Program – the graduate program is a 1-year or 2-year program

Demographic Statistics of Subjects

Demographic	N	Frequency
Race	163	
American Indian/Alaskan		1
Asian/Pacific Islander		7
African American		9
Caucasian		139
Hispanic		2
Other		4
Marital Status	163	
Single		151
Married		12
Siblings	163	
0		10
1		77
2		59
>2		17
Living Arrangements	163	
Alone		40
Friend		90
Family		7
Roommate		4
Significant Other		10
Spouse		9
Other		3
Children	163	
0		158
1		3
>1		2
Religion	163	
Buddhist		2
Christian		138
Jewish		3
None		15
Other		5

Demographic Statistics Continued

Demographic	N	Frequency
Class Level	163	
First-Year		58
Second-Year		45
One-Year Program		60
Curriculum	163	
No Research		32
Project		48
Thesis		83
Present Certification Status	163	
No		28
Yes		135
How Long Certified	163	
0 yrs		28
≤1 yr		96
>1 yr		37
Not Reported		2
Age	163	
21		2
22		42
23		42
24		22
25		9
>25		21
Missing		25
Year Past Undergraduate	163	
0 years		80
1 year		47
2 years		22
>2 years		12
Missing		2
Number of Graduate Credit Hours	163	
≤ 9		56
10-12		32
≥ 13		75

Learning Style Means for Gender (Mean ± SD)

Learning Style Variable	Male (N = 55)	Female (N = 108)
Noise Level	53.51 ± 5.75	54.40 ± 5.64
Light	50.25 ± 7.53	52.70 ± 7.81
Temperature	48.09 ± 8.02	49.77 ± 9.26
Design	49.15 ± 8.78	48.85 ± 7.57
Motivation	51.51 ± 6.12	51.70 ± 6.07
Persistent	52.76 ± 6.26	53.57 ± 6.01
Responsible	47.24 ± 8.89	49.17 ± 8.18
Structure	59.55 ± 7.10	58.89 ± 6.91
Alone/Peers	51.62 ± 9.55	52.16 ± 9.94
Authority Figures	56.69 ± 7.79	56.01 ± 6.79
Several Ways	48.00 ± 8.59	47.20 ± 8.54
Auditory	54.33 ± 9.52	52.43 ± 8.61
Visual	46.05 ± 6.58	46.90 ± 8.30
Tactile	54.62 ± 8.46	54.27 ± 7.45
Kinesthetic	53.80 ± 5.59	54.11 ± 5.72
Intake	55.40 ± 8.25	55.97 ± 7.70
Time of Day	45.11 ± 8.56	44.56 ± 9.09
Late Morning	47.36 ± 9.95	46.67 ± 8.59
Afternoon	57.80 ± 10.85	58.18 ± 10.72
Needs Mobility	56.60 ± 6.29	57.65 ± 6.56

Learning Style Means for Age

Learning Style Variable	Age			
	22 (N=42)	23 (N=42)	24 (N=22)	25(N=9)
Noise Level	55.02	53.29	53.09	55.56
Light	53.48	51.50	50.45	52.78
Temperature	50.76	48.45	51.73	47.11
Design	48.10	50.19	49.68	49.78
Motivation	52.10	50.24	50.77	51.22
Persistent	54.24	53.00	51.36	52.22
Responsible	47.00	49.71	47.36	43.78
Structure	57.88	59.62	61.95	60.22
Alone/Peers	53.71	50.43	50.27	50.78
Authority Figures	56.93	56.69	56.36	53.67
Several Ways	45.95	48.60	50.14	49.00
Auditory	52.00	54.50	54.68	55.11
Visual	47.19	45.40	47.18	45.89
Tactile	53.45	55.43	55.86	52.56
Kinesthetic	55.07	54.10	51.91	54.33
Intake	56.50	54.93	55.95	60.33
Time of Day	44.88	45.57	44.18	48.00
Late Morning	46.19	48.57	49.32	45.56
Afternoon	59.05	55.62	56.50	58.11
Needs Mobility	59.57	56.24	57.55	56.11

Standard Deviations (±SD) for Age and Learning Style Variable ($p<0.05$)

Learning Style Variable	Age			
	22 (N=42)	23 (N=42)	24 (N=22)	25 (N=9)
Noise Level	5.90	5.52	6.50	4.77
Light	7.06	7.79	10.15	3.83
Temperature	8.20	8.61	9.23	7.51
Design	7.24	8.06	8.70	8.74
Motivation	4.89	5.86	7.63	8.09
Persistent	5.89	5.08	7.75	4.99
Responsible	8.52	8.95	9.14	8.39
Structure	7.34	7.19	5.91	6.22
Alone/Peers	9.90	9.86	8.98	9.40
Authority Figures	7.19	6.68	8.32	7.87
Several Ways	7.76	7.89	9.40	6.98
Auditory	8.81	8.16	10.63	7.85
Visual	7.81	7.25	8.30	8.21
Tactile	8.05	7.45	7.90	8.13
Kinesthetic	4.98	5.81	6.96	4.74
Intake	7.66	8.06	8.32	7.02
Time of Day	9.72	9.29	8.51	8.59
Late Morning	8.03	8.85	10.27	9.83
Afternoon	9.35	11.70	11.46	12.53
Mobility	5.73	6.61	6.24	8.13

Probability Values for Age and Gender ($p < 0.05$)

Learning Style Variable	Age	Gender
Noise	0.99	0.35
Light	0.14	0.06
Temperature	0.95	0.26
Design	0.61	0.83
Motivation	0.79	0.85
Persistent	0.30	0.42
Responsible	0.49	0.17
Structure	0.08	0.57
Alone/Peers	0.97	0.74
Authority Figures	0.10	0.57
Several Ways	0.67	0.58
Auditory	0.60	0.20
Visual	0.62	0.51
Tactile	0.71	0.79
Kinesthetic	0.33	0.74
Intake	0.40	0.66
Time of Day	0.32	0.71
Late Morning	0.93	0.64
Afternoon	0.39	0.83
Mobility	0.37	0.33

Learning Style Means, Standard Deviations and Probabilities for Length of Graduate Program ($p<0.05$)

Learning Style Variable	1-Year (N=60)	2-Year (N=103)	Probability
Noise Level	53.77 ± 5.87	54.29 ± 5.58	0.57
Light	52.38 ± 8.00	51.58 ± 7.67	0.53
Temperature	49.52 ± 8.44	49.02 ± 9.15	0.73
Design	48.92 ± 7.24	48.97 ± 8.41	0.97
Motivation	51.45 ± 5.85	51.75 ± 6.22	0.76
Persistent	53.27 ± 5.97	53.32 ± 6.18	0.96
Responsible	47.63 ± 8.20	49.03 ± 8.59	0.31
Structure	59.18 ± 7.45	59.07 ± 6.70	0.92
Alone/Peers	51.42 ± 9.35	52.30 ± 10.05	0.58
Authority Figures	55.97 ± 6.47	56.40 ± 7.51	0.71
Several Ways	47.62 ± 7.42	47.39 ± 9.16	0.87
Auditory	53.82 ± 8.12	52.63 ± 9.40	0.42
Visual	45.07 ± 7.19	47.51 ± 7.95	0.05
Tactile	53.88 ± 8.28	54.68 ± 7.50	0.53
Kinesthetic	54.08 ± 5.75	53.96 ± 5.63	0.90
Intake	57.05 ± 7.77	55.04 ± 7.87	0.12
Time of Day	44.60 ± 8.35	44.83 ± 9.24	0.88
Late Morning	45.58 ± 9.26	47.67 ± 8.88	0.16
Afternoon	58.93 ± 10.02	57.53 ± 11.14	0.42
Needs Mobility	57.27 ± 5.97	57.31 ± 6.77	0.97

Frequencies and Percentages of Occurrence for Region Lived In for the Most Time

Region	Frequency (N=163)	Percentage
Central	11	6.7%
Eastern	54	33.1%
Midwest	46	28.2%
Northwest	5	3.1%
Southern	27	16.6%
Southwest	12	7.4%
Outside U.S./Many Places of Residence	8	4.9%

Central - Colorado, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Wyoming
Eastern - Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont
Midwest - Illinois, Indiana, Michigan, Ohio, West Virginia, Wisconsin
Northwest - Alaska, Idaho, Montana, Oregon, Washington
Southern - Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia
Southwest - Arizona, California, Hawaii, Nevada, New Mexico, Utah
Outside U.S. – Japan, Canada

*Learning Style Means and Standard Deviations for Race**

Learning Style Variable	Asian/Pacific Islander N=7	African American N=9	Caucasian N=139
Noise Level	53.29 ± 3.95	56.11 ± 6.13	54.08 ± 5.72
Light	49.29 ± 4.96	49.78 ± 8.53	52.07 ± 7.95
Temperature	52.14 ± 8.75	53.89 ± 13.16	48.77 ± 8.42
Design	47.00 ± 12.14	52.44 ± 7.16	48.59 ± 7.77
Motivation	49.29 ± 5.53	52.89 ± 4.23	51.67 ± 6.16
Persistent	49.71 ± 7.20	55.11 ± 8.33	53.41 ± 5.78
Responsible	43.71 ± 6.87	45.56 ± 10.81	48.96 ± 8.18
Structure	58.71 ± 7.23	61.44 ± 6.27	58.81 ± 7.03
Alone/Peers	53.57 ± 6.19	49.78 ± 12.61	51.88 ± 9.73
Authority Figures	61.29 ± 4.19	54.22 ± 10.99	55.97 ± 6.95
Several Ways	46.43 ± 13.13	48.56 ± 8.63	47.56 ± 8.36
Auditory	52.14 ± 8.07	53.00 ± 9.00	52.95 ± 8.86
Visual	48.29 ± 4.99	49.67 ± 6.95	46.21 ± 7.75
Tactile	55.43 ± 9.48	57.11 ± 8.61	54.13 ± 7.77
Kinesthetic	53.43 ± 6.05	56.78 ± 5.22	53.91 ± 5.63
Intake	52.29 ± 8.44	59.67 ± 6.91	55.74 ± 7.73
Time of Day	41.57 ± 12.01	45.11 ± 11.27	45.02 ± 8.61
Late Morning	46.43 ± 14.35	48.33 ± 6.61	46.65 ± 8.94
Afternoon	59.86 ± 9.21	59.00 ± 11.39	57.81 ± 10.81
Mobility	54.14 ± 6.52	57.44 ± 8.65	57.30 ± 6.39

*The categories of American Indian/Alaskan Native, Hispanic, and Other had less than 5 students each

*Learning Style Means and Standard Deviations for Number of Siblings**

Learning Style Variable	0 N=10	1 N=77	2 N=59	3 N=11
Noise Level	52.40 ± 6.40	54.27 ± 5.53	53.93 ± 5.95	56.18 ± 4.33
Light	50.50 ± 8.68	51.75 ± 8.25	52.00 ± 7.56	53.00 ± 5.68
Temperature	46.10 ± 7.17	48.64 ± 8.81	49.56 ± 8.84	52.18 ± 11.10
Design	49.70 ± 7.66	48.70 ± 8.61	48.37 ± 7.65	51.73 ± 7.31
Motivation	50.40 ± 6.82	52.14 ± 6.05	51.08 ± 6.21	50.27 ± 4.88
Persistent	55.10 ± 6.23	53.42 ± 6.47	53.07 ± 5.73	51.36 ± 5.63
Responsible	51.20 ± 8.80	49.25 ± 7.79	47.63 ± 9.32	46.36 ± 9.24
Structure	61.40 ± 6.13	59.40 ± 7.04	58.37 ± 7.07	58.73 ± 7.54
Alone/Peers	52.00 ± 9.30	52.10 ± 9.90	52.22 ± 10.01	48.09 ± 7.50
Authority Figures	61.50 ± 6.74	55.91 ± 6.51	55.63 ± 7.14	56.45 ± 8.93
Several Ways	48.70 ± 8.21	47.31 ± 8.99	47.00 ± 8.05	52.73 ± 6.70
Auditory	50.50 ± 9.34	53.81 ± 9.03	52.34 ± 8.73	54.55 ± 8.08
Visual	48.60 ± 7.09	46.86 ± 8.36	45.85 ± 7.18	47.18 ± 7.13
Tactile	52.50 ± 8.16	53.62 ± 7.92	55.25 ± 7.34	56.55 ± 9.28
Kinesthetic	54.10 ± 4.53	53.06 ± 5.89	54.97 ± 5.58	54.91 ± 4.35
Intake	52.60 ± 7.55	55.82 ± 7.86	56.83 ± 8.03	54.64 ± 7.71
Time of Day	39.30 ± 5.68	44.88 ± 8.31	44.86 ± 9.25	45.82 ± 10.90
Late Morning	46.00 ± 8.76	47.40 ± 9.16	47.63 ± 9.02	43.64 ± 8.97
Afternoon	62.00 ± 10.71	58.39 ± 11.16	57.41 ± 10.28	53.91 ± 10.75
Mobility	54.80 ± 7.02	57.42 ± 6.01	57.61 ± 7.09	56.45 ± 6.93

*Less than 6 graduate athletic training students reported having 4, 5, and 6 siblings

*Learning Style Means for Undergraduate GPA**

Learning Style Variable	A N=3	A- N=39	B+ N=70	B N=43	B- N=3	C+ N=2
Noise Level	53.33 ± 7.57	54.56 ± 6.03	53.87 ± 5.88	53.65 ± 5.34	56.00 ± 3.46	58.00 ± 5.66
Light	59.67 ± 6.66	54.77 ± 5.19	50.49 ± 8.80	51.51 ± 7.48	51.00 ± 6.25	46.50 ± 10.61
Temperature	52.67 ± 5.77	49.54 ± 9.68	49.17 ± 8.21	48.63 ± 9.10	52.67 ± 12.66	39.50 ± 7.79
Design	52.67 ± 8.08	48.97 ± 8.57	48.34 ± 7.66	49.56 ± 8.33	48.00 ± 8.19	46.00 ± 9.90
Motivation	54.67 ± 6.81	54.44 ± 5.45	50.30 ± 6.02	51.26 ± 5.75	54.67 ± 5.51	54.50 ± 7.78
Persistent	58.33 ± 5.51	55.49 ± 5.91	52.23 ± 5.36	52.63 ± 6.59	50.33 ± 9.82	61.50 ± 7.78
Responsible	55.33 ± 4.16	49.74 ± 9.08	48.17 ± 8.78	47.63 ± 7.61	46.67 ± 13.32	51.00 ± 4.24
Structure	53.67 ± 5.77	57.56 ± 7.91	60.27 ± 6.45	59.58 ± 6.61	51.33 ± 8.08	62.00 ± 2.83
Alone/Peers	45.67 ± 9.71	50.74 ± 10.11	51.56 ± 8.99	52.74 ± 10.18	52.67 ± 9.29	68.00 ± 12.73
Authority Figures	52.67 ± 5.13	56.62 ± 6.97	56.34 ± 7.01	55.93 ± 7.96	52.67 ± 8.08	60.00 ± 0.00
Several Ways	55.00 ± 4.00	48.59 ± 8.12	47.04 ± 8.87	47.21 ± 8.63	46.33 ± 7.51	40.50 ± 9.19
Auditory	51.33 ± 10.02	51.59 ± 7.14	54.56 ± 9.66	52.51 ± 9.25	53.33 ± 8.62	54.00 ± 14.14
Visual	51.00 ± 11.53	49.03 ± 7.22	45.30 ± 8.36	46.30 ± 7.15	47.00 ± 5.57	47.00 ± 4.24
Tactile	53.67 ± 8.51	54.13 ± 9.24	54.27 ± 6.91	54.51 ± 8.41	56.00 ± 3.46	61.50 ± 2.12
Kinesthetic	54.67 ± 4.62	55.03 ± 5.66	52.91 ± 5.84	54.95 ± 5.05	56.67 ± 4.16	57.50 ± 3.54
Intake	54.00 ± 7.81	56.59 ± 7.78	55.54 ± 7.46	55.70 ± 8.86	53.67 ± 10.50	61.50 ± 0.70
Time of Day	59.33 ± 2.89	44.56 ± 9.01	43.80 ± 8.63	45.16 ± 8.56	44.67 ± 9.82	40.50 ± 12.02
Late Morning	55.00 ± 0.00	46.28 ± 7.84	46.71 ± 9.32	46.86 ± 9.64	51.67 ± 2.89	52.50 ± 10.61
Afternoon	45.00 ± 0.00	58.97 ± 10.72	57.56 ± 10.75	58.93 ± 10.66	59.67 ± 12.70	60.00 ± 21.21
Mobility	55.67 ± 2.31	56.90 ± 6.94	57.57 ± 6.06	57.74 ± 6.66	59.00 ± 8.00	58.00 ± 12.73

*6 students did not report any data for undergraduate GPA

A= 4.00 B+= 3.30-3.69 C+= 2.30-2.69

A-= 3.70–3.99 B= 3.00-3.29

C+= 2.30-2.69 B-= 2.70-2.99

Learning Style Means for Graduate GPA

Learning Style Variable	A N=19	A- N=34	B+ N=51	B N=31	B- N=4	C+ N=2	P/F N=16
Noise Level	52.84 ± 6.68	56.79 ± 5.42	52.53 ± 5.09	53.61 ± 5.74	56.00 ± 1.63	58.00 ± 5.66	54.81 ± 5.67
Light	54.37 ± 8.28	51.76 ± 9.51	52.45 ± 7.56	50.68 ± 6.68	44.25 ± 7.27	46.50 ± 10.61	53.19 ± 5.17
Temperature	49.89 ± 7.08	48.68 ± 10.47	49.35 ± 8.96	49.10 ± 8.94	54.50 ± 12.15	39.50 ± 7.78	49.56 ± 6.74
Design	52.00 ± 7.82	48.68 ± 8.33	48.27 ± 7.78	49.00 ± 7.45	44.00 ± 10.99	46.00 ± 9.90	49.13 ± 9.16
Motivation	53.32 ± 5.22	53.97 ± 6.29	49.69 ± 4.96	51.90 ± 6.33	54.00 ± 8.98	54.50 ± 7.78	51.44 ± 5.35
Persistent	55.42 ± 6.27	55.32 ± 6.79	51.67 ± 4.90	52.71 ± 6.49	55.75 ± 2.06	61.50 ± 7.78	52.25 ± 5.93
Responsible	49.58 ± 9.88	51.00 ± 8.57	46.63 ± 7.60	47.87 ± 8.87	53.50 ± 6.61	51.00 ± 4.24	48.75 ± 9.23
Structure	61.42 ± 7.58	57.82 ± 7.73	58.94 ± 7.32	60.23 ± 5.58	48.50 ± 3.00	62.00 ± 2.83	59.31 ± 5.24
Alone/Peers	49.32 ± 11.08	51.21 ± 9.99	52.29 ± 9.19	51.55 ± 9.85	50.50 ± 15.02	68.00 ± 12.73	53.69 ± 6.45
Authority Figures	54.47 ± 6.73	57.47 ± 6.95	57.02 ± 6.72	57.71 ± 7.07	48.00 ± 11.43	60.00 ± 0.00	53.19 ± 7.09
Several Ways	47.32 ± 8.93	49.00 ± 9.22	46.90 ± 8.91	46.94 ± 6.91	47.75 ± 11.98	40.50 ± 9.19	50.00 ± 7.71
Auditory	51.68 ± 10.08	52.85 ± 7.86	53.14 ± 9.02	55.35 ± 8.24	43.00 ± 2.45	54.00 ± 14.14	52.00 ± 10.62
Visual	44.84 ± 8.09	49.09 ± 6.54	45.16 ± 8.58	45.81 ± 7.50	49.00 ± 6.06	47.00 ± 4.24	49.06 ± 7.35
Tactile	54.26 ± 9.07	54.41 ± 8.48	53.63 ± 7.57	56.00 ± 7.85	53.00 ± 5.48	61.50 ± 2.12	54.88 ± 6.47
Kinesthetic	53.95 ± 5.99	54.62 ± 5.98	53.59 ± 5.91	55.03 ± 4.77	55.75 ± 2.87	57.50 ± 3.54	53.69 ± 4.80
Intake	57.26 ± 7.76	56.41 ± 8.93	54.86 ± 7.42	55.65 ± 8.57	45.25 ± 3.30	61.50 ± 0.70	57.87 ± 5.56
Time of Day	45.74 ± 8.47	44.44 ± 9.09	43.25 ± 9.10	44.68 ± 8.10	56.25 ± 6.60	40.50 ± 12.02	48.50 ± 8.83
Late Morning	47.37 ± 9.77	46.03 ± 7.76	46.86 ± 9.11	45.65 ± 10.63	45.00 ± 14.14	52.50 ± 10.61	50.31 ± 6.95
Afternoon	57.16 ± 10.56	58.24 ± 11.00	59.31 ± 10.29	59.55 ± 10.54	46.75 ± 6.45	60.00 ± 21.21	53.19 ± 11.19
Mobility	57.32 ± 5.71	56.94 ± 7.34	59.51 ± 5.42	55.45 ± 6.98	59.00 ± 8.49	58.00 ± 12.73	55.88 ± 5.21

*6 students did not report any data for graduate GPA

A= 4.00 B+= 3.30-3.69 C+=2.30-2.69 P/F= Pass/Fail

A-= 3.70-3.99 B= 3.00-3.29

B-= 2.70-2.99

*Learning Style Means (±SD) for Year Between Completion of Undergraduate School and First Year of Graduate School**

Learning Style Variable	0 Years N=80	1 Year N=47	2 Years N=22
Noise Level	53.71 ± 6.13	54.77 ± 5.56	53.55 ± 5.01
Light	52.39 ± 7.54	50.43 ± 8.36	53.86 ± 6.85
Temperature	48.44 ± 8.97	50.77 ± 8.74	49.86 ± 9.18
Design	48.31 ± 7.62	51.11 ± 8.55	47.91 ± 7.12
Motivation	51.91 ± 5.22	52.32 ± 6.66	50.00 ± 7.80
Persistent	53.72 ± 5.77	54.00 ± 6.38	51.45 ± 6.55
Responsible	49.35 ± 7.68	48.00 ± 10.02	48.09 ± 7.57
Structure	59.21 ± 7.19	58.74 ± 7.32	59.00 ± 6.96
Alone/Peers	53.78 ± 10.27	50.11 ± 8.59	51.95 ± 10.61
Authority Figures	57.36 ± 6.18	56.30 ± 7.93	52.55 ± 7.97
Several Ways	46.15 ± 8.51	48.79 ± 8.98	47.55 ± 7.18
Auditory	52.30 ± 8.93	53.57 ± 9.38	54.00 ± 7.90
Visual	46.71 ± 8.05	47.51 ± 8.11	44.23 ± 6.13
Tactile	54.31 ± 8.28	55.47 ± 7.26	51.82 ± 6.94
Kinesthetic	54.31 ± 5.69	54.02 ± 5.08	54.18 ± 7.05
Intake	55.80 ± 8.01	55.09 ± 8.16	56.91 ± 7.10
Time of Day	44.61 ± 9.50	45.26 ± 9.07	45.55 ± 8.11
Late Morning	46.06 ± 8.92	48.09 ± 9.00	45.91 ± 9.84
Afternoon	59.44 ± 10.73	55.23 ± 10.96	58.50 ± 10.98
Mobility	57.88 ± 6.39	56.53 ± 6.77	57.00 ± 6.41

*Less than 6 students reported graduating from undergraduate school 3, 4, 6, and 7 years before attending graduate school

*Learning Style Means (± SD) and Probabilities for Marital Status**

Learning Style Variable	Single N=151	Married N=12	Probability ($p<0.05$)
Noise Level	54.26 ± 5.71	52.08 ± 5.05	0.20
Light	51.99 ± 7.84	50.42 ± 7.13	0.50
Temperature	49.26 ± 8.86	48.42 ± 9.43	0.75
Design	49.05 ± 7.95	47.75 ± 8.59	0.59
Motivation	51.73 ± 6.18	50.50 ± 4.50	0.50
Persistent	53.20 ± 6.14	54.58 ± 5.47	0.45
Responsible	48.33 ± 8.37	50.83 ± 9.44	0.33
Structure	59.09 ± 6.91	59.42 ± 7.93	0.88
Alone/Peers	52.25 ± 9.87	48.58 ± 8.20	0.21
Authority Figures	56.28 ± 7.27	55.75 ± 5.19	0.81
Several Ways	47.32 ± 8.50	49.42 ± 9.09	0.41
Auditory	52.95 ± 8.78	54.50 ± 11.16	0.57
Visual	46.64 ± 7.83	46.33 ± 6.99	0.90
Tactile	54.27 ± 7.78	55.83 ± 7.94	0.51
Kinesthetic	54.05 ± 5.76	53.50 ± 4.32	0.75
Intake	55.90 ± 7.97	54.25 ± 6.47	0.49
Time of Day	44.58 ± 8.72	46.83 ± 11.05	0.40
Late Morning	47.02 ± 8.82	45.42 ± 11.96	0.56
Afternoon	58.25 ± 10.75	55.58 ± 10.62	0.41
Mobility	57.64 ± 6.41	53.00 ± 5.91	0.02

*No students reported being divorced, separated, or widowed

VITA

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Education

May 2002	Master of Science in Education Old Dominion University Norfolk, Virginia
December 1997	Bachelor of Science in Sports Medicine Barry University Miami Shores, Florida

Professional Experience

1/02 – 5/02 Graduate Teaching Assistant for Advanced Orthopaedic Evaluation and Assessment, Old Dominion University. Responsibilities included teaching graduate athletic training students the knowledge, skills, and values of a complete systematic evaluation and rehabilitation protocol for injuries of the upper and lower extremity. Instructed on special testing and palpation of specific anatomical structures of the upper and lower extremity.

8/00 – 5/02 Graduate Assistant Athletic Trainer at Hampton University. Assisted head athletic trainer with prevention, recognition, and rehabilitation of athletic injuries and provided event and team coverage of all Hampton University athletic teams, specifically volleyball, softball, indoor/outdoor track, and football.

8/01 – 12/01 Graduate Teaching Assistant for Care and Prevention of Athletic Injuries, Hampton University. Responsible for instructing undergraduate students from a variety of majors on general athletic training terminology, injury mechanisms and common athletic injuries inherent to sport activities, etiology associated with injury mechanisms, injury evaluation format, and basic taping and wrapping techniques to prevent injury.

12/98 – 7/00 Head Athletic Trainer for Piper High School, Sunrise, Florida. Provided athletic training services for Piper High School athletic teams and for national soccer and tennis tournaments held in Broward County Florida.