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Kolb's Experiential Learning Theory in Athletic Training Education: A Literature Review

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Objective: Kolb's Experiential Learning Theory offers insight into the development of learning styles, classification of learning styles, and how students learn through experience. Discussion is presented on the value of Kolb's Experiential Learning Theory for Athletic Training Education.
Data Sources: This article reviews research related to experiential learning theory and learning styles in athletic training education and other allied health professions. Studies reviewed include published articles and dissertations involving experiential learning, learning styles, and clinical educator behaviors.
Data Synthesis: Learning styles research related to athletic training is inconclusive due to the differences in vocabulary and measuring instruments used by researchers.
Conclusions/Recommendations: This review illustrates the need to conduct more research on learning styles and how experiential learning theory might be used to facilitate education in athletic training education programs.
Key Words: Learning Styles Inventory, Classification of Learners, Accomodative Learning

Athletic training educators face the challenge of educating students both in the classroom and the clinical environment. The learning situations encountered in these distinctly different settings allow students to gain didactic and practical experience.[1] Though students can "experience" learning in any setting, experiential learning is generally used to represent learning that occurs in a hands-on or clinical environment. The National Athletic Trainers' Association (NATA) Education Council considers clinical education to be among the most important issues in athletic training education.[2] In addition, many athletic training students spend more time in clinical education courses than they do in the classroom, and therefore it is necessary to address how athletic training educators can best educate students in clinical education courses.

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Clinical rotations offer students learning opportunities in a professional athletic training setting. However, little is known about how students learn best in this environment. It is not certain if athletic training students learn differently when in the classroom and clinic, or if educators should teach students differently depending upon setting. Kolb's Experiential Learning Theory proposes that students go through a systematic process when they learn through experience. He further proposes that each student has a preferred learning style, and that this learning style can be determined using his Learning Styles Inventory (LSI).[3] Athletic training educators and clinical instructors can use Kolb's Theory to better engage students in the learning process.[4, 5]

Kolb's Experiential Learning Theory provides a variety of implications for educators; decisions about instruction, admissions, administration, and exam success rates could be affected by the understanding of learning styles.[6] There is limited research into the learning styles of athletic training students. However, there is plenty of information on the learning styles of other allied health professions, especially nursing.[7] It is necessary for athletic training educators to understand what learning styles are, if they influence learning in the clinical environment, and if so, how we can use that information to better serve our students.

Overview of Kolb's Experiential Learning Theory

History of Experiential Learning

The origins of Kolb's Experiential Learning Theory, and his Experiential Learning Cycle, are found in the works of Dewey, Lewin, and Piaget.[3, 4, 8] John Dewey[9], a pragmatist, wrote the book *Experience and Education* where he integrated the idea of experiential learning into traditional higher education. Dewey believed that experiential learning could be used as a bridge between the academic and the practical. Colleges and universities have embraced this idea and are offering more internships, externships, work-study arrangements, and credit based on prior experience. Dewey's Model of Learning encompasses impulse, observation, knowledge and judgment in a cyclical arrangement that perpetuates until all information is learned. Dewey's model served as one of the frameworks for Kolb's Experiential Learning Cycle.[3]

Kurt Lewin, a proponent of Gestalt psychology, studied group dynamics and leadership styles. Lewin believed that people learn best when there is tension between their detached thought and their concrete experience. In this atmosphere, people challenge each other, and themselves, in the pursuit of further understanding. Lewin's Model of Action Research is comprised of four stages: concrete experience, observations and reflections, formation of abstract concepts and generalizations, and testing implications of concepts in new situations. The model emphasizes concrete experience and feedback. Feedback facilitates action on the part of the learner and enables evaluation of consequences. Lewin's ideas contribute greatly to the field of organizational behavior and Kolb's Experiential Learning Cycle closely resembles Lewin's Model of Action Research.[3]

Jean Piaget, a rationalist, believed that learning comes from a person's interaction with their environment. During each of his stages, the child learns to manipulate objects, images and symbols respectively.[3] In contrast to Dewey and Lewin, Piaget's learning model consists of linear stages. His model does not address learning by adults, but rather limits learning to stages based on the age of the child. According to Piaget, a child passes through 4 developmental stages: sensorimotor (concrete/enactive), preoperational (representational/iconic), concrete operational (abstract/symbolic) and formal operations (hypothetical reasoning capabilities). Like Piaget, the idea that knowledge is not innate, but is a product of action forms a primary component of Kolb's Experiential Learning Theory.[3]

Development of Learning Styles

Kolb believed that a person's learning style results from an interaction between an individual's internal characteristics and their external environment. In addition, he thought that there were two components to learning; acquiring an experience, and transforming the experience into knowledge. In some ways, Kolb's theory about how learning styles develop is very similar to Piaget's Developmental Theory. Kolb's first stage, acquisition, includes most elements of Piaget's sensorimotor, preoperational, concrete operational, and formal operations stages. Kolb's acquisition stage encompasses four developmental sub-stages. Each stage is described within the framework of two dialectics, how one acquires knowledge and how one transforms that knowledge. Kolb's first sub-stage corresponds to Piaget's sensorimotor stage. This is a time when learning is through enactive mechanisms. Kolb calls this accommodative learning because it is acquired through apprehension (concrete mechanisms) and transformed by extension (active means). The second sub-stage corresponds to Piaget's preoperational stage. This is a time when learning is through iconic mechanisms. Kolb calls this divergent learning because it is acquired through apprehension (concrete mechanisms) and transformed by intension (reflection). The third sub-stage corresponds to Piaget's concrete operational stage. This is a time when learning is through symbolic mechanisms. Kolb calls this assimilative learning because it is acquired through comprehension (abstract mechanisms) and transformed by intension (reflection). The final sub-stage corresponds to Piaget's formal operations stage. This is a time when the learner uses hypothetical reasoning. Kolb calls this convergent learning because it is acquired through comprehension (abstract mechanisms) and transformed by extension (active means).[3]

Kolb's second stage, called specialization, is associated with formal education, career training and career experiences. He believes that the direction of people's lives comes as a result of both personality and external social forces. Individuals are selected by education programs based on their strengths. In addition, individuals self-select into educational programs and professions in which they are comfortable. Kolb believed that environment will reinforce or change the characteristics of an individual and therefore, a person's identity develops through the experiences they have placed themselves in through education and career choice.[3]

Kolb's third stage, integration, is associated with middle and advancing age. At this time, a person experiences conflict between what society demands of them and their personal need to fulfill themselves. People in this stage desire to influence others and shape their own experiences; they desire to become self-actualized. Some reach this stage through crisis, and some through gradual awakening. Kolb's theory recognizes the possibility that some may not enter this stage for various reasons.[3]

Classification of Learners

In an attempt to classify learners, Kolb proposes a model that incorporates two opposing dimensions: concrete-abstract and active-reflective (Figure 1). This dialectic is derived from Kolb's definition of learning as the "process whereby knowledge is created through the transformation of experience".[3] He believes that experiencing something is not enough; one must use that experience in order to create knowledge. Learning emanates from the conflict between these two opposing dimensions. The concrete-abstract dimension describes the act of prehension, or taking hold of an experience. Within this dimension, a learner can prefer to use comprehension (abstract conceptualization) or apprehension

(concrete experience). Someone who prefers comprehension will favor "thinking", whereas someone who prefers apprehension will favor "feeling", when presented with a learning experience. The active-reflective dimension describes the act of transformation, or making meaning of the experience. Within this dimension, a person can prefer to use extension (active experimentation) or intension (reflective observation). Someone who prefers extension will favor "doing", whereas someone who prefers intension will favor "watching", when attempting to apply meaning to a learning experience.[1, 3]

Kolb designed a Learning Styles Inventory (LSI) that attempts to measure a learner's preferred orientation to each of the opposing dialectics. The score from the concrete experience-abstract conceptualization (CE-AE) continuum is combined with the score from the active experimentation-reflective observation (AE-RO) continuum in order to determine a learning style (see Figure 1). Learners are categorized depending on which of the quadrants of the Experiential Learning Model they fall. Learners who fall in the upper right corner are classified as divergers.[3] Divergers are imaginative, creative, and in touch with feelings. They can view things from many perspectives and prefer to observe more than take action. Learners who fall in the lower right corner are classified as assimilators. Assimilators do well with theory and abstract concepts. Learners who fall in the lower left corner are classified as convergers. Convergers are good at problem solving, practical and technical issues, hypothetical reasoning, and do well on single answer tests. They are not particularly good with social and interpersonal tasks. Learners who fall in the upper left corner are classified as accommodators. Accommodators prefer to take action. They like to take risks, participate in hands on activities, make plans and solve by trial and error. Accommodators will often rely on others for information rather than personal analysis. [1, 3, 10, 11]

Kolb[3] contends that learning styles are not fixed, rather, they can be influenced by five factors: personality type, educational specialization, professional career choice, current job role, and current task. The majority of these influences are dynamic through a person's lifetime. The idea that learning style differs dependent on the task at hand, exemplifies the rationale behind differing instructional methods dependent on the type of learning experience. A student may favor one learning style when faced with traditional classroom instruction and favor another when faced with instruction in the clinical environment. He proposed that an educator who knows the learning style that is predominant in their area of educational specialization, and the learning style most associated with that educational task, they can tailor their instruction to better meet the needs of students.

The influence of educational specialization, professional career choices and current job role is often referred to as "environmental press". Kolb calls it "accentuation". He found that the career choice of an individual is guided by their learning style. Individuals will both choose and succeed more often in a career choice when the demands of the job match the preferred learning style of the person. Furthermore, when a person chooses a career where the environmental press does not match the preferred learning style of the student, failure and unhappiness are more likely. In addition, Kolb states that career choice will influence the learning style of the learner.[3] The environmental press put on the learner through the education process and by the professional mentality of coworkers will guide the learner to adapt in order to increase the chance of success.[3, 12] For instance, a learner who is weak in the concrete experience or active experimentation modes will need to improve in order to succeed in a course that stresses active learning. In a program that integrates many classes involving active learning, an individual will expand their skills as an accommodator. This was shown in the nursing profession, as senior nursing students had a more concrete orientation than freshman[13], and concrete orientation was found to increase following the preceptorship experience.[7, 12, 13]

Just as no learner uses strictly one learning style, the environmental press of a learning situation is never oriented to just one learning style. Each environment will necessitate using a combination of the four learning modes. If the predominant mode used in the experience matches the student's preferred learning style, it will increase the chances of success.[3, 12, 14]

Kolb's Experiential Learning Cycle

Kolb's theory integrates experience, perception, cognition, and behavior.[3] Within the framework of the Experiential Learning Cycle, a person passes through the modes of concrete experience, reflective observation, abstract conceptualization and active experimentation. A person passes through these modes repeatedly in a way that helps them learn from the past and take new information into future learning situations.[3, 4] A learner must participate in each of these four modes in order to complete the learning cycle, and the cycle is a continuous process which takes from the past and builds knowledge for future experiences.[3] It is possible to enter the cycle at any one of the modes; however s learner will usually begin by taking part in an experience, then watching and reflecting upon that experience. After reflection, a learner must analyze their ideas and plan for the final mode, which entails testing out their ideas. Each learner will differ in their ability to perform in each of these modes, however adequate performance in each area is necessary to complete the learning cycle. A learner who can integrate each of the four modes during the same learning task demonstrates higher level thinking abilities.[3, 7, 12, 14, 15] According to Harrelson and Leaver-Dunn, "experiential learning is a planned experience in which the primary focus is to learn and for which the student takes responsibility".[4] It allows a student to learn from experience, draw a conclusion and use that conclusion to assist them in similar future experiences. Experiential learning is student-centered instruction rather than teacher-centered instruction. It is the student's progress through the four experiential learning stages that facilitates and drives the education process.[4]

Criticism of Kolb's Experiential Learning Theory

According to Sugarman[14], there are three components to Kolb's

Theory that necessitate evaluation: establishing the existence of learning styles, measuring these differences effectively, and validating the cyclical model of learning. There is little argument among allied health education researchers as to the existence of individual learning preferences. There are semantic differences among the literature regarding the use of the terms "learning style" and "cognitive styles". Some authors contend that cognitive style describes the learning process whereas learning style describes the environment of preferred learning. The majority of this literature review will focus on how students prefer to learn through experience, hereafter referred to as learning styles. This literature review will not focus on what environmental preferences a student may have, unless it is relevant to the discussion of learning styles.

Most athletic training research is not concentrated on validating whether there are learning styles, but on categorizing learners, measuring learning styles, and determining optimal learning environments. Other researchers have categorized learners as auditory/visual/ kinesthetic[16], and field independent/field dependent.[6, 13, 16, 17] Measuring instruments, other than Kolb's LSI, reported in allied health education research were the Interpersonal Topical Inventory (ITI)[6], the Learning Profile Indicator (LPI)[17], and Babich and Randol's Learning Styles Inventory (LSI).[16] Environmental preferences measured frequently were time of day, lighting[18], and group versus independent learning[16]. Environmental preferences were measured using the Productivity Environmental Preference Survey (PEPS)[18], and other original and unique survey instruments made by the researchers.[6, 16, 18]

Though the majority of allied health researchers seem to accept Kolb's overall theory of learning styles and his cyclical model, there are questions about the validity of the Kolb's LSI.[1, 11, 14, 19] Kolb developed his LSI to designate learners as a diverger, assimilator, converger, or accommodator.[3] Though research shows the existence of learning preferences, research is mixed regarding learning styles' stability over time.[1, 6, 20] In addition, the LSI has non-specific directions, which does not allow differentiation in learning preferences when learners are encountered by different types of learning tasks. The existence of different learning styles used by the same learner when in a classroom versus a clinical environment is an important research question for allied health educators.[1] The LSI does allow applicability to various groups, which is beneficial, as it can be used for assessment of different educational program students.

Weinstein Webb[21]offers perhaps the sharpest criticism of the cyclical model that Kolb proposes. She completed an unpublished dissertation, *The Definitive Critique of Experiential Learning Theory*, at the request of David Kolb. Kolb was a principal committee member for her research. She contends that Kolb uses different definitions of and applications for his four modes of learning than the epistemologies that he claims to have based his theory. For example, concrete experiencing is used by Kolb to mean actively involved, whereas Piaget clearly indicated that actions on objects are necessary for concrete experience. She describes the same type of issue when discussing reflective observation. Kolb restricts reflective observation to an act of intension, whereas Dewey indicates that reflective observation can happen by intension (meaning making) and extension (classifying objects). Furthermore, Weinstein Webb disagrees with the idea that the modes operate in a linear fashion and are independent of each other. She argues that concrete experience, reflective observation, abstract conceptualization and active experimentation must work simultaneously in a learning task.[21] Kolb contends that they work independently, and that it is only when higher order thinking is being used, that they work together.[3]

Weinstein Webb[21] argues against Kolb's contention that learning is not realized until the cycle is complete. She states the following in her argument;

> According to Webster's, to comprehend is to 'see the nature, significance, and meaning of, to grasp mentally and attain knowledge.' If comprehension results from abstract conceptualization, then it is problematic to suggest that learning does *not* complete itself at this stage. Certainly comprehension is a form of knowing which involves learning. If one accepts, as Experiential Learning proposes, that knowing does not evolve until the Experiential Learning Cycle is complete, then one must question whether apprehension and comprehension are forms of knowing to the exclusion of reflection and experimentation.[21]

In her most persuasive criticism of Kolb's Experiential Learning Theory, Weinstein Webb[21] disputes the idea that learning has not taken place until active experimentation is complete. Indeed, there are many instances where learning has taken place without a behavioral result. It is impossible to conclude that, unless an object is manipulated, or a theory applied, then learning has not truly taken place.[21]

Research of Learning Styles in Athletic Training and Allied Health Populations

Other allied health professions have found predominant learning styles associated with professionals and students. For instance, nursing research indicates predominant accommodative learning styles.[7] Nursing education research has also validated the idea of environmental press within their students and professionals.[12] This substantiates Kolb's theory that human service professions would have concrete learning styles.[3, 7] Nursing and athletic training have several commonalities, including classroom, laboratory, and internship incorporation in the education process. In addition, they are both human services and people oriented professions. Therefore, it is sensible to assume that the learning style preferences would be the same. However, researchers have investigated Experiential Learning Theory in athletic training populations, and have not been able to find any dominant learning style associated with athletic training students. [1, 8, 11, 16-19] The

incongruence of research methods and tools used has hindered the ability to compare learning styles research in athletic training education. Though categorizations and measurement instruments are different, it is possible to generate some common themes among the results.

Draper was the first to evaluate the learning styles of athletic training students. He compared a student's learning style with their performance on the January, 1988 NATA certification examination. Using Babish and Randol's LSI, Draper evaluated 165 students who volunteered to participate after turning in their NATA certification examination. This LSI differs from Kolb's as it measures three types of learning preferences: personal, social and examination. Personal learning preference was categorized as auditory, visual and kinesthetic. Social learning preference was categorized as group or independent. Examination preference was categorized as oral or written.

Draper found that the athletic training students who took the survey preferred independent learning (63%), written examinations (58%) and were kinesthetic learners (60%). There was no relationship between exam score and any of the preferences, except a preference for written examinations. Those who favored written examinations scored higher than those who did not.[16] These findings also support Kolb's belief that allied health professions would prefer concrete experience as a learning mode, as the students in this study preferred kinesthetic learning over other types of learning. [3] There was also no relationship found between the NATA certification examination score and total number of hours worked in clinical education. This supported the subsequent change in accreditation standards eliminating a minimum amount of hours worked. Draper recommended that educators should incorporate hands-on activities in the classroom but cautioned against teaching to only one learning style.[16]

It should be noted, that although this pioneer study lends insight, the educational format, standards and examination process in 2006 are drastically different than they were in 1989. Students in 1989 could go through internship or accreditation programs: The content and exposures were very different. Many students in internship experiences did not have any formal classroom education and their training was equivalent to apprenticeship training. Comparing students between programs would have likely shown differences between programs due to student self-selection and environmental press. In addition, the oral section of the NATA certification examination process is much different in 2006 and a written simulation has been added. For these reasons, the results cannot be generalized to apply with today's examination process.

Brower et al. investigated the learning styles of athletic training students and whether their learning style contributed to their admission into an athletic training education program. They used the newest version of the Kolb Learning Styles Inventory and found that there was no predominant learning style associated with pre-professional athletic training students. In addition, there was no significant difference in admission success rates dependent on learning style.[19] Since these students had not yet been admitted into an athletic training program, one cannot use the results to evaluate a learning style among athletic training students. However, since some students dropped out of the application process before completion, the results may be somewhat useful to determine if students with a specific learning style self-select into the athletic training major.

Other researchers attempted to classify athletic training students according to learning styles. Harrelson, Leaver-Dunn and Wright examined 27 athletic training students using the Productivity Environmental Preference Survey (PEPS). The results failed to corroborate Draper's study. This research did not find that athletic training students preferred kinesthetic learning. In addition, the study determined that athletic training students had a preference for structure and presence of authority figures, a contrast to Draper's finding that athletic training students preferred independent learning. The researchers hypothesized that the small sample size and the differences in semantics between the PEPS and previously researched learning style questionnaires may have contributed to the differences in results. This study showed environmental preferences only, with athletic training students preferring good lighting and afternoon learning.[18]

Stradley et al. investigated the learning styles and preferred environmental characteristics of athletic training students in accredited programs. They included 193 athletic training students from 50 CAAHEP-accredited programs. The LSI failed to show a learning style preference among these students however the PEPS indicated a preference for learning in the afternoon. The PEPS did not indicate a preference for kinesthetic learning as other studies have. This finding disputes the commonly held idea that students in the medical and allied health professions prefer concrete learning.[11]

Other researchers investigated the relationship between learning style and academic achievement. Taylor examined the differences in learning style according to academic achievement, and the learning style preferences of athletic training students and educators. In this study of 531 athletic training students, results did not show a dominant learning style. However, this study used Kolb's LSI and concluded that the amount of abstractness (on the AC – CE continuum) a student showed had a significant positive impact on academic achievement, as measured by GPA. The amount of experimentation or reflection (AE-RO continuum) did not have a significant impact on academic achievement. The 127 athletic training educators surveyed did not show a dominant learning style.[8]

Coker studied the differences in student learning styles in the classroom versus the clinical setting. This study is the only research available that gives insight into the two distinct learning environments to which athletic training students are exposed. She based her research on prior investigations that questioned whether learning styles were consistent for different tasks. Coker used the LSI, and the respondents were asked to complete it twice: once for learning something new in the classroom and once for learning something new in the clinical environment. Results showed that the

preferred learning mode for the classroom was reflective observation and the preferred mode for clinical was active experimentation. The research further discovered that 58% of the students switched preference according to setting. Students were classified as assimilators (65%) and convergers (15%) in the classroom, and in the clinic they were found to be convergers (42%) and accommodators (30.8%). This information implies that students cannot be labeled as preferring only one learning style. Students may adapt their preferences based on the setting, and, perhaps, the teaching style being used. Furthermore, this research suggests a larger issue with the vagueness of the LSI instructions. Perhaps all LSI research, regardless of domain, could be enhanced with improvements to the instructions.[1]

Everitt studied whether a students' learning style and clinical instructors teaching style congruence predicted success. The study evaluated the students using the Learning Profile Indicator (LPI) and the clinical instructors with the Teaching Style Inventory (TSI). Though the categorizations are different than Kolb's Learning Styles Inventory, they are similar, and can be used to generate associations. Students were matched with a clinical instructor using no learning or teaching style information. An examination, the Athletic Training Competency Test (ATCT), was derived using the athletic training educational competencies. Students were evaluated prior to and following their semester long clinical experience. The student's ATCT scores were evaluated and the results were analyzed to determine whether the level of match or mismatch between a student's learning style and the clinical instructors teaching style influenced their success. Additionally, students were rated by the clinical instructor at the start of the semester as having high, average or low potential for success.[17]

The LPI indicated that athletic training students have a preference for sensing-thinking and sensing-feeling. The LPI describes sensing-thinking learners as "focused and purposeful" and users of drill and practice, demonstrations, and facts. Sensing-feeling learners are described as focused on feelings and values and users of reading. Sensing-feelers appreciate group work and mentor relationships. The study concluded that matching the learning style of the student with the teaching style of the clinical instructor resulted in a significantly higher gain score on the ATCT when compared to mismatched pairs.[17]

In 1998, Curtis performed a critical incident study of student athletic trainer perceptions of clinical supervisor behaviors. He grouped these critical incident behaviors into four categories: mentoring, professional acceptance, nurturing, and modeling. He found that the majority (45%) of helpful clinical supervisor behaviors fell within the mentoring category. These behaviors included explaining, demonstrating, constructive feedback, testing knowledge and creating an effective environment. Although these categories do not directly correlate to Kolb's Experiential Learning Model, most of them would fall within concrete experience. The other categories rated as follows: professional acceptance (28%), nurturing (23%) and modeling (4%). Modeling behaviors would also fall within the concrete experience learning mode, yet students rated this as the lowest category. It is possible that the categories created some confusion, as demonstrating was included as a mentoring incident, and modeling was a separate category.[5]

Laurent and Weidner compared athletic training students' and clinical instructors' perceptions of helpful clinical behaviors. They found that modeling was the most important helpful clinical instructor behavior. With the small ratio of athletic training students to clinical instructors, it is reasonable to assume that modeling is a very common catalyst for student learning. When modeling occurs, students can begin the concrete experience portion of the Experiential Learning Cycle. In addition, modeling contributes directly to the concept of environmental press. The student not only observes the intended skill, but the situation further instills the need to adapt to the learning environment of the field.[22]

These research studies fail to show a predominant learning style used by athletic training students. Research also failed to show whether a students' learning style affects performance in coursework or examinations, including the NATA certification examination. It is not evident whether any of these studies can be used to guide educational practice due to their use of different learning style categorizations and learning style measurement tools. Without similar research methods and tools, many of the conclusions are not comparable. These studies do suggest that modeling, and subsequently the concrete and active dimensions of Kolb's model are vital to the education of athletic training students.

Implications for Practice

It is difficult to explore the implications of learning styles research on the education of athletic training students. The profession has barely begun to investigate whether there is a dominant learning style associated with athletic training students. Research in other allied health professions suggests a dominant concrete learning style.[7] However, it is not prudent to assume that athletic training students will have the same characteristics as nursing and other allied health students. Despite the lack of evidence of a predominant learning style among athletic training students, there are some implications for athletic training education and for higher education as a whole.

Administrators and educators within athletic training programs should realize that research has not shown a reliable and valid way to measure a person's learning style. There are many learning style inventories available. However, they contain a plethora of categorizations and measurements with differing meanings. This causes confusion, both for the person being evaluated and the evaluator. Kolb's Learning Styles Inventory is criticized for having non-specific directions and may need to be adapted to athletic training educational research needs.[1] In addition, research shows that learning styles may be different depending on the task, necessitating evaluation of a students learning style in the clinical and classroom environment.[3, 6, 14] For these reasons, administrators and educators should take caution when using information about learning style preferences. All applications of learning styles

research are hindered by the inability to clearly determine what learning style a student is. Athletic training educators can not appropriately apply many of the suggested implications for practice unless and until an accurate measurement of learning style can be made.

Regardless of preferred learning style, the Experiential Learning Cycle can be used by clinical instructors to facilitate instruction in the clinical environment. The clinical instructor can act as a facilitator, guiding the student through the cycle. Harrelson and Leaver-Dunn describe five steps clinical instructors can take to facilitate experiential learning: experiencing, publishing, processing, generalizing, and applying. Step one requires the clinical instructor to expose athletic training students to structured and unstructured experiences within their clinical experience. If a student receives no interaction following the experience, they cannot take full advantage of a potential learning situation. Step two requires the clinical instructor to ask guiding questions and offer pertinent information about the issue. Step three involves processing information. In this step, the clinical instructor offers expertise and encourages the student to reflect on their performance. In Step four, the student develops theories about what they have experienced. The student then begins to formulate plans for incorporating this information into future situations. Step five involves utilizing those plans and theories in subsequent experiences. The clinical instructor might provide further structured or unstructured experiences that involve use of this knowledge.[4]

The goal of these five steps is to teach students to guide themselves through the educational experiences. It is not always possible or appropriate for a clinical instructor to facilitate each experience for the student.[4] The clinical environment is not centered on student instruction; rather is must be centered on patient care and safety.[13] Therefore, it is advantageous to encourage the student to take responsibility for their own learning so that they can guide themselves through this process when the instructor does not have the time to facilitate. In addition, the ratio of students to clinical instructors should be evaluated to ensure that enough attention can be devoted to teaching and learning. If students are not taken through the steps, and do not learn to do them on their own, they run the risk of forming misconceptions which lead to incorrect theories and applications.[4, 13]

Athletic training education programs traditionally place students in the collegiate setting for clinical experiences. Some programs offer limited high school and rehabilitation clinic exposure, but the exposure to these and other alternative environments is still much less than the exposures offered in the collegiate setting. According to 2004 NATA member statistics, approximately 23-31% of it's members are now employed in clinical/industrial/fitness settings, 16-24 % in high school settings, and 16% in collegiate settings.[23] Athletic training students, who will intern for two years or more, will be disproportionately exposed to the collegiate setting, at the expense of exposure to other setting they are highly likely to encounter for their first job. The environmental press of each setting will inevitably be very different. If athletic training educational programs are training their students in the collegiate setting only, they will promote an environmental press that is different than the majority of students will encounter in their careers.

Some higher education program leaders have questioned whether learning style assessment should be used as criteria for admissions. While on the surface, it may seem wise to admit students who have a higher chance of success and enjoyment of the athletic training profession to the exclusion of those who may not have this same inclination, this strategy has been deemed unwise.[10, 19] Lewin and Kolb are in agreement that part of the process of learning includes conflict and disequilibrium between concrete experience and analytic detachment.[3] If programs admitted only students who exhibit certain learning styles, and programs taught only to that learning style, there would be little disequilibrium. In addition, it is not possible to teach to one learning style, just as it is not possible for a student to only work within one learning style. Educators and students are required to work within a variety of learning modes throughout the process of a learning task.

If given evidence that athletic training students in their program have a dominant learning style, an instructor might be tempted to exclude other learning styles from instruction in an attempt to build on the strengths of the students. Researchers of learning styles do not advocate this approach.[3, 16] Perhaps one of the most widely stated arguments against teaching to only one learning style is that a student will be at a disadvantage when confronted with a situation that calls for a different style. Most people will advance in their careers, or even change careers or job settings, within their lifetime. Many careers follow a path from apprenticeship to autonomous practitioner advancing to mid-level management to administration. These levels of career development necessitate a shift from a convergent learning style to accommodative learning style.[3] A convergent learning style is needed with problem solving and technical issues that happen with the practice of the career specialty. An accommodative learning style is needed with problem solving tasks that require trial and error and human resources issues. If an education program teaches to only one learning style, learning will come at the expense of the development of weaker learning styles. A professional taught in this manner may find themselves unprepared for the realities of their profession as they advance into new roles.

In some cases, knowledge of learning styles can be used to enhance the educational process, as long as it is not at the expense of exposing students to all learning modes. Athletic training instructors should take care to include instruction for as many learning styles as possible for a learning task. This will allow students with a particular strength to use that strength to their advantage while still allowing for improvement in weaker learning modes. In addition, students who know their particular learning style, can use this to take ownership in their education by utilizing techniques that work with their strengths.[10, 14]

Institutions of higher education create environmental press through mission and vision statements, policy, faculty choices,

student selection, course objectives and many other avenues. Athletic training programs should be aware of the messages their university, college and program send to prospective students and current students. Students are selected into programs, but they also self-select. Programs and courses that are housed in the College of Education may display a different environmental press than programs that are housed in the College of Health. Students may perceive that programs in the college of education will be more theory based and programs in the college of health to be more scientific and technical. These implicit and explicit messages can affect enrollment and retention rates as well as affect current students' satisfaction and enjoyment of a program/course. Students in programs that match their learning style show lower dropout rates, higher GPA, higher tendency to enter graduate school, and lower perception of workload.[3]

Those involved in instruction and administration of athletic training education programs should be aware of the environmental press within the program as well. Students will resist those courses and assignments that are outside of their learning style. When students are asked to take an elective, or participate in an assignment that is outside of their learning style, care should be taken to explain the teaching methods to be used, and benefits of the experience.[3] A student who is armed with the information that they will need to adjust their normal learning preference will be better prepared for success. In addition, a student who understands the applications of the learning experience is more likely to engage despite their fears. This may apply to research methods courses and administrative courses that serve a different purpose than the medical courses the students are used to.

Future Research

Future research needs to first center around measurement. Any research that is based on a false measurement of learning style will not be valid. Once accurate measures of learning styles are possible, athletic training education would benefit by further research in learning styles and their direct application to athletic training programs. Research needs to be conducted to determine if there is a predominant learning style associated with athletic training students. If there is a predominant style, this information should be used to improve the quality of instruction both in the classroom and the clinical environment. If there is no predominant learning style, this may also reveal interesting information about the need for athletic trainers to work in all learning modes equally.

Research is also necessary to determine whether the learning styles of athletic training students are different in the classroom and clinical environment. If students learn within the concrete experience and active experimentation modes when in the clinical education setting, clinical instructors should be trained to facilitate these modes. The steps to enhance experiential learning should be evaluated to determine whether they increase student success.

More research is needed concerning gender effects on learning style and the environmental press created by particular athletic training settings. The traditional settings of college and professional sports have become the career choice for a minority of athletic training graduates.

More research is needed to determine how we can use learning styles to better educate students in both the classroom and the clinical settings and if learning styles have an effect on certification examination pass rates and professional success.

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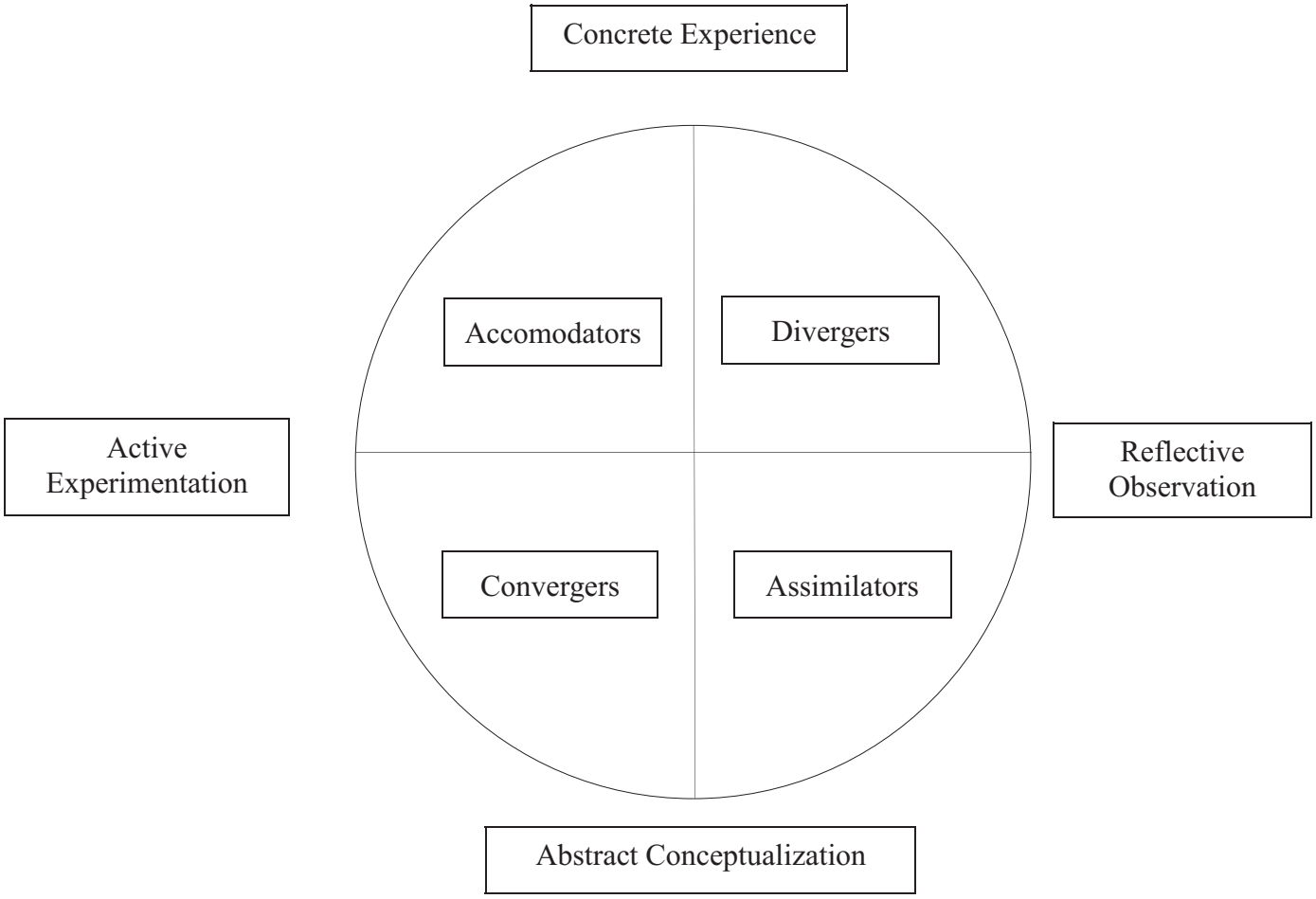

Figure 1. Kolb's Experiential Learning Model
Adapted from[25]

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Athletic Training Instructors: A Needs Assessment of Teaching Methodology Knowledge and Self-Perceived Competence

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Objective: The objectives were to assess teaching backgrounds, self-perceived teaching methodology knowledge, and self-perceived competence of Athletic Training Education Program (ATEP) instructors to determine if there was a need for more instruction in teaching methodology (TM).
Design & Setting: This was a quantitative design utilizing a discrepancy needs assessment model. A web-based survey was used to gather data. This was a total population study with no sampling.
Subjects: The population studied was Certified Athletic Trainers (ATCs) in the United States who had obtained a master's degree and were working in a college/university setting. The instrument further defined the study population to those who were currently teaching (study conducted in Fall 2002) in approved or accredited ATEPs (N=149).
Measurements: The items measured were each participant's educational and instructional background, their knowledge of 20 TM components, their self-perceived competence on those same 20 TM components, and their likelihood of pursuing future TM instruction.
Results: Participants with lower gap scores generally had less previous instruction in TM, lower knowledge scores, and were less likely to pursue future instruction in TM. Neither amount of previous instruction in TM nor how long the participants had been teaching significantly influenced self-perceived competence scores. Taking an undergraduate TM course and the use of structured mentoring significantly predicted self-perceived competence scores.
Conclusions: This study illustrates the need for more TM instruction to be included in the preparation of ATCs with master's degrees who have or will have teaching responsibilities associated with their jobs. It would be prudent for athletic training graduate degree programs to include TM instruction in their curriculums and/or fieldwork. There is also support for the pursuit of a M.Ed. degree for students who wish to teach in the future.
Key Words: pedagogy, teacher effectiveness, teaching skills, teacher training, education, instruction

In 1998, there were 82 accredited undergraduate programs.[1] As of April 2002, there were 165[2], and 273 in July 2004.[3] Each of these programs employed certified athletic trainers with a master's degree assigned teaching responsibilities. With this expanding number of programs, there is and will likely continue to be an increasing demand for athletic training instructors. Therefore, an increased emphasis on teaching methodology knowledge should be included in graduate curriculums to prepare students for this increasing job responsibility demand. Yet, at the time of this study, only one master's degree program of the 13 in the nation provided for teaching methodology (TM) instruction in its curriculum, albeit as an elective.

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Not only do Athletic Training Education Program (ATEP) instructors need to be knowledge experts in the field of athletic training, they must also be able to effectively teach that knowledge. With the wealth of knowledge available around learning styles, brain-based learning, and teacher effectiveness, it would be prudent for instructors of undergraduate students to possess a basic understanding of the information concerning these issues. Though an athletic trainer may be exceptional in one of the three components of clinical practice, research, or teaching, it does not necessarily follow that they are exceptional in the other two. Through the Graduate Standards and Guidelines, competency in clinical and research skills is required. Competency in teaching is not listed and at best, an option.[4]

The NATA Career Center web-site was visited (April 2002) to provide a general overview of the status of athletic training jobs requiring teaching experience. A search of "College: staff/faculty full-time" listings was performed (not including GA positions). There were a total of 72 postings (Table 1).

Some interesting aspects illustrated by this table are worth noting. Some jobs require the employee to teach, but do not require any teaching experience. Nearly half (45.8%) of the jobs posted had teaching responsibilities associated with the job. Of the jobs

Table 1. NATA Career Center Postings for College Staff/Faculty Full-Time[5]

Job Description	Number of Jobs	Percentage of Jobs
Require ATC only	20	27.8
Require master's degree; no teaching experience; no teaching responsibilities with job	12	16.7
Require master's degree; no teaching experience; teaching responsibilities with job	15	20.8
Require master's degree; teaching experience; teaching responsibilities with job	18	25.0
Require PhD	7	9.7
Total Postings	**72**	**100.0**
Total requiring master's degree	**45**	**62.5**
Total requiring teaching responsibilities with job	**33**	**45.8**

requiring a master's degree, 73.3% of those (33 out of 45) had teaching responsibilities associated with the job. One-quarter of the jobs in the college setting (where accredited undergraduate programs are housed) require an ATC with a master's degree with teaching experience *and* require teaching responsibilities with the job. This review of the NATA Career Center listings illustrates the demand for athletic trainers with master's degrees to fill jobs requiring teaching responsibilities. With roughly 73% of the available jobs for this population having teaching responsibilities associated with the job, this snapshot illustrates the need to assess the teaching competency of ATCs with master's degrees who will fill these jobs.

A follow-up search of the NATA Career Center was completed in March of 2006. This found 32 postings for "College – Academic/Educational and Dual Appointment" jobs, and 35 postings for "College – Professional Staff/Athletics/Clinic" jobs. These results indicate that nearly 48% of the job postings currently are for academic positions requiring teaching.

With teaching knowledge and experience theoretically becoming more in demand with the increase in numbers of ATEPs, one must ask the question are we preparing our graduate level ATCs well enough to excel within this job responsibility? ATEPs across the country differ greatly in the number and educational degrees of their faculty. Some programs employ only two instructors with master's degrees and dual appointments in athletics, while other programs employ four or more full-time tenure track faculty, among others. It was unknown how many of these faculty members have any background in pedagogy/teaching methodology. The author's working definition of pedagogical knowledge is the knowledge of teaching strategies and methodologies used to foster student learning. The creation of several pedagogy knowledge base frameworks has resulted in wide-spread efforts to define what this pedagogical knowledge base should include. To aid in conceptualizing these different frameworks, a table was created (Table 2). This table was used to construct Part 2 of the survey.

Currently, there have been no documented research efforts to assess the level of teaching knowledge held by ATCs with master's degrees who are responsible for educating within ATEPs. This study illustrated the state of self-perceived teaching knowledge held, the self-perceived teaching competence, and assessed the need for more formal teaching methods instruction. This study was performed in an effort to improve the educational experiences of all students in athletic training educational programs at all levels.

Research questions investigated were:

1. What is the relationship between the scores of participants' knowledge of TM and self-perceived teaching competence?
2. How do participants that have had instruction in TM and those who have not compare on knowledge of TM?
3. How do participants that have received none, some and much instruction in TM compare on the gap score created by their knowledge of TM and their self-perceived competence?
4. How do participants' likelihood of taking a TM seminar compare on gap scores?
5. Is there a combination of the eight types of instruction in TM that participants may have gained their competency in (course in undergraduate program, course in graduate program, GTA, professional development seminar, structured mentoring, athletic training content knowledge, experience on the job, observing others) that predicts their self-perceived competence level better than any one type of instruction alone?

Methods

This study investigated the level of self-perceived TM knowledge and competence held by current instructors in athletic training education programs nationally, assessed the need for further instruction in TM from the perspective of the instructor, and suggested recommendations to provide for the identified needs. This was a total population study with no sampling. Prior to study administration, Internal Review Board approval was obtained at Colorado State University.

Participants

All certified members of the NATA who possessed a master's degree and were working in the college/university setting were surveyed via an electronic, web-based survey (N=2644). The NATA granted permission to use and provided the participant e-mail list for this survey. The NATA database could not distinguish who was teaching and who was not. Therefore, the narrowest list the NATA could provide was of certified members with their master's degrees working in the college/university setting. The survey then asked who of the population identified was currently teaching. All responses to the survey were analyzed, whether currently teaching or not, for background data to inform the NATA membership what percentage of ATCs with master's degrees in college settings were currently teaching.

Table 2. Comparison of Components of Pedagogical Knowledge from Five Frameworks

Knowledge Area	Johnson[6]	Nilson[7]	Clymer[8]	Pregent[9]	Miller & Miller[10]
Determine objectives	●	●	●	●	●
Syllabus development	●	●		●	●
Classroom management	●	●			
Classroom environment	●	●	●	●	
Student learning styles	●	●	●	●	●
Teaching methods	●	●	●	●	●
Cognitive, affective, and psychomotor domains	●	●		●	●
Effective lectures	●	●		●	●
Discussion techniques	●	●		●	●
Cooperative learning	●	●		●	●
Alternative teaching methods	●	●	●	●	●
Student evaluation & grading	●	●	●	●	●
Term papers/oral presentations	●	●			
Adult learning principles			●		
Teaching styles			●		
Technology tools		●		●	●
Copyright laws		●			
Motivating students		●			

Procedures

The survey instrument was administered via an electronic on-line site. Each participant received an electronic mail message stating the scope of the research project, inviting them to participate, and directing them to the survey web site. Once the participant finished and submitted the survey, it was returned as an anonymous e-mail message. A reminder e-mail message was sent one week later to help increase the response rate. To ensure anonymity of the participants, each return message address line recorded the "sent from:" as "respondent", with no names, institutions, or any other identifiers. By utilizing a linked site, no return electronic addresses were included with the participants' response, thus assuring anonymity and confidentiality. Lastly, the cover letter stated that by returning the survey, the participant was giving informed consent to participate in the study.

Survey instrument

A review of the literature revealed no one instrument that measured both knowledge of TM and perceived teaching competence. Therefore, the instrument was created and designed by the researcher. The format of the instrument was established per recommendations by Salant and Dillman.[11] The literature review provided the 20 TM components used in Part 2 of the survey. The 20 TM components were measured separately for the participant's knowledge of each component and for their self-perceived competence in utilizing each component. The instrument had three sections:

Part 1: Background Information – 16 questions designed to address the general educational background information of each participant and information in regard to preparation to teach;

Part 2: Assessment of Teaching Knowledge and Self-Perceived Teaching Competence – measured both knowledge and self-perceived competence on 20 TM components utilizing a 5-point Likert scale;

Part 3: Comments and Feedback – allowed for comments from the participant about the study to be submitted to the researcher.

Once the instrument was on-line, a pilot test was performed. The instrument was delivered as a link in a cover letter to a representative sample (n=21) of ATCs with master's degrees who were teaching in ATEPs, as selected by the researcher. The participants were directed to the website and requested to use the "Comments", Part 3 section of the survey to evaluate the whole system, the face validity of the instrument, the format of the survey and of the response choices, the ease of completing the survey, the length of time it took to complete the survey, and any unclear or confusing parts. Upon return of the pilot tests, reliability measures revealed a score of 0.95 (Cronbach's alpha) for the knowledge measure and 0.87 for the perceived competence measure.

Instrument validity was established through three methods: 1) face validity using the pilot study participant responses; 2) content validity; and, 3) construct validity using factor analysis. Each of the pilot study participants responded positively to confirm face validity. Content validity was established by sending the instrument to four tenured professors in the School of Education at Colorado State University for evaluation. Each expert responded very positively to confirm content validity, particularly of Part 2 of the survey. A factor analysis created a rotated component matrix of the competence measure grouping the initial 22 TM components into five groups. The rotated component matrix of the knowledge measure created 5 groups also, though the groupings were different. For the final instrument, four groups were created that most closely preserved the groupings suggested by each separate factor analysis.

Two TM components of the original 22 were dropped from Part 2 after a factor analysis showed little correlation. The component of *giving students feedback* had negative correlations with both the competence measure (-0.819) and the knowledge measure (-0.191). The component of *use of cooperative learning*

had low correlation on the competence measure (0.405) and a very low correlation on the knowledge measure (0.274). Thus, both components were dropped from the final instrument. Comments from the pilot study participants indicated that the response choices provided were appropriate and thorough. Information gained from the pilot test was used to refine the final instrument.

Results

The survey was sent to 2701 participants who fit the description (as registered with the NATA membership database) of being certified, possessing at least a master's degree, and working in a college/university setting. It was not possible to identify those within that population who were teaching, per the NATA database. Assessing the response rate, then, was difficult. Of the 2701 initial contact letters sent, 57 were returned as "system error" or "undeliverable" with the electronic mail addresses used. This left a total of 2644 surveys successfully sent. There were 341 responses to the survey. This yielded a response rate of 12.9%, which was a dramatically low response rate. This was perhaps unacceptable by many standards. However, due to the nature of the cover letter, stating the purpose of the research was to assess teaching information of athletic training instructors in approved or accredited ATEPs, those who were not teaching may *not* have felt compelled to respond to the survey.

Of the 341 participants, 149 (43.7%) reported that they were currently teaching in a NATA approved or CAAHEP accredited program. 140 of the 149 participants currently teaching reported teaching in the classroom, while 124 reported teaching in the clinic. It was not established how many taught in both settings. Those who were not teaching completed the first six questions of the survey and were then directed to the comments section at the end of the survey, skipping Part II. Those who were teaching completed all three Parts of the survey. The data were checked for outliers before statistical analysis began. The mean number of years teaching in an ATEP program was 7.9 years. The mean percentage of job responsibilities dedicated to teaching was 47.0%.

Part 2 of the survey consisted of participants rating themselves on 20 TM components for both their knowledge of the component and their self-perceived competence in utilizing the component. Measurement reliability was assessed for both the knowledge scale and the self-perceived competence scale. Reliability was high for both scales using Cronbach's alpha (knowledge = 0.92; competence = 0.91), which indicated a high level of internal consistency and interitem reliability.

There were four indices created to assist in data reduction and analysis: a knowledge index (KI), a self-perceived competence index (CI), a gap score index (GSI; difference between knowledge and competence scores), and an amount of previous formal instruction in TM index (PII). For the latter index, those participants who had <u>*no*</u> previous instruction were coded as a 2 (none group); those who had instruction either before <u>*or*</u> after receiving their graduate degree were coded as a 3 (some group); and those who had instruction in TM <u>*both*</u> before and after receiving their graduate degree were coded as a 4 (much group). Descriptive statistics were run on all four indices (Table 3).

Research question one used a Pearson correlation to investigate the relationship between the scores on the KI and CI. The results were statistically significant, r 149) = .875, $p < .001$. This indicated that generally, participants who scored themselves highly on knowledge of TM components also scored themselves highly on self-perceived competence of those TM components. The effect size, $r^2 = .77$, was a large effect size.[12]

Table 3. Means and Standard Deviations of Indices of Knowledge Scores, Self-Perceived Competence Scores, Gap Scores, and Previous Instruction in Teaching Methodology Scores

Index	N	M	SD
Knowledge (KI)[a]	149	3.91	0.59
Competence (CI)[a]	149	3.74	0.57
Gap (GSI)[a]	149	0.17	0.29
Previous Instruction (PII)[b]	146	3.37	0.69

[a] based on scale of: 1=poor, 2=fair, 3=good, 4=very good, 5=excellent

[b] based on scale of: 2=no instruction, 3=some instruction, 4=much instruction

Research question two used a one-way ANOVA to determine how ATCs with master's degrees that had previous instruction in TM and those who had not compared on knowledge of TM. The results were statistically significant, $F_{2,140} = 4.6$, $p = .01$.

To discern where the difference was, a Tukey Honestly Significant Difference (HSD) post-hoc test was performed. The results revealed only one significantly different pair of means ($p = .01$), between the group with no instruction in TM (M = 3.61) and the group with much instruction in TM (M = 4.03). The effect size (d = 0.309) was a low to medium effect size.[12] This indicated that the participants with more instruction in TM, when compared with those with no previous instruction, had significantly more self-perceived knowledge of TM. Conversely, those with no previous instruction perceived themselves as having less knowledge.

Research question three investigated how ATCs with master's degrees who had received none, some and much previous instruction in TM compared on the GSI. A one-way ANOVA was used. The results were statistically significant, $F_{2,138} = 9.2$, $p < .001$. This indicated that there was a difference somewhere between the mean gap scores for the three levels of how much previous instruction in TM the participants possessed. To discern where the differences were, a Tukey HSD post-hoc test was performed.

The results of the post-hoc test revealed that there were two significant differences. The first significant difference ($p = .001$) was between those who had no instruction in TM (M = -0.095) and those who had some previous instruction in TM (M = 0.189). This had a low to medium effect size.[12] The second significant difference ($p < .001$) was between those who had no instruction in TM and those who had much previous instruction in TM (M = 0.23). This had a medium effect size (d = 0.46).[12] The lower mean of the "none" level suggested that those who had no instruction in TM had significantly *lower* gap scores than those in the other two groups (Table 4).

Research question four used a one-way ANOVA to investigate the likelihood of ATCs with master's degrees taking a TM seminar compared to the GSI. The results were statistically significant,

Table 4. Means of Knowledge, Competence, and Gap Indices by Previous Instruction Index (PII)

PII	Mean		
	Knowledge (KI)	Competence (CI)	Gap Score (GSI)
None	3.61	3.71	-0.10
Some	3.85	3.66	0.19
Much	4.04	3.81	0.23

$F_{4,139} = 2.52$, $p = .043$. This indicated that there was a statistically significant difference somewhere between the mean gap scores for the five levels of how likely the participants would be to take a TM seminar in the future.

The Tukey HSD post-hoc test revealed that the only significant difference between pairs of means ($p = .05$) was between those who were extremely likely to take a TM seminar (M = 0.34) and those who were not at all likely to take such a seminar (M = 0.08). The effect size was medium (d = 0.40).[12] This suggested that those with a lower gap score were *less likely* to take a seminar in TM, while those with a higher gap score were more likely. In combination with previously stated results, this suggested that generally, those with lower gap scores had less previous instruction in TM and would be less likely to pursue such instruction in the future.

Lastly, research question five investigated whether there was a combination of the eight types of instruction in TM that ATCs with master's degrees may have gained their competency in (course in undergraduate program, course in graduate program, GTA, professional development seminar, structured mentoring, athletic training content knowledge, experience on the job, observing others) that predicted their self-perceived competence level better than any one type of instruction alone. The results of the multiple regression indicated that two of the eight factors significantly contributed to the prediction of self-perceived competence $r^2 = 0.37$; adjusted $R^2 = 0.08$), over and above the contribution of all other factors (Table 5). The two predictive factors were competence from: 1) structured mentoring ($\beta = 0.17$, $p = .008$), and, 2) taking a TM course in an undergraduate program ($\beta = 0.120$, $p = .04$). The adjusted R^2 value indicated that 9% of the variance in self-perceived competence could be predicted by the combination of all 8 types of instruction. The effect size, $r^2 = 0.08$, was a medium effect size.[12]

When the data analysis was conducted, questions beyond the stated research questions arose about relationships between variables – specifically between the GSI, KI and CI. Further data exploration revealed statistically significant results between the GSI and both the KI and the CI scores. A Pearson correlation was used for both analyses. The relationship between the GSI and the KI was a positive correlation with a medium effect size ($r^2 = 0.09$).[12] This indicated that generally, the higher the gap score, the higher the knowledge score. Thus, those who had more TM knowledge generally perceived a larger gap between their knowledge of teaching and their self-perceived competence in teaching. Those with lower gap scores generally had less teaching knowledge. These results corresponded with the results presented previously. The statistically significant results of the GSI to the CI revealed a negative correlation with a low effect size ($r^2 = -0.01$).[12] This indicated that generally, the higher the gap score, the lower the self-perceived competence.

Limitations. Four limitations of this research study included: 1) it was unknown whether non-respondents to the survey were teaching or not, or had different characteristics than the respondents; 2) the response rate was low; 3) due to the low response rate, the generalizability of the results was limited; and 4) programs that were in candidacy should have been specifically included in the study population.

Discussion

The results of this study illuminated various relationships among the gap score, the knowledge index, the competency index, the previous instruction index, and the likelihood of the participants to pursue further instruction in TM. The importance of these relationships to the athletic training profession is discussed in the following section. A combination of these relationships points to a detrimental situation for the profession. Findings of this study are related to previous athletic training research and other allied health professions research in occupational therapy, nursing, emergency medicine and respiratory therapy.

The Gap Score. The knowledge index (KI) and the self-perceived competency index (CI), not surprisingly, were highly correlated $r^2 = 0.88$, $p < .001$) and had a very large effect size ($r^2 = 0.77$). These two indices comprised the formula for creating the gap score index (GSI), which was simply the knowledge score minus the competency score for each participant. Thus, not surprisingly again, the correlations of the KI to the GSI and the CI to the GSI were both statistically significant (Table 6), with medium ($r^2 = 0.10$) and low ($r^2 = -0.01$) effect sizes, respectively.

Interestingly, however, the KI to the GSI was a positive correlation ($r = 0.32$), indicating that the higher the knowledge score, the *higher* the gap score between that knowledge and their self-perceived competence. One could assume that the more knowledge one had, the *lower* the gap score would have been. A reason for this result may be that those who had more TM knowledge were more aware of what they *did not* know about the complexities of each of the 20 TM components. Conversely, the CI to the GSI was a negative correlation ($r = -0.18$), indicating that the higher the competency score, the lower the gap score between their knowledge and competence.

The GSI was investigated further when compared with the amount of previous instruction (PII) in TM of the participants. The statistically significant main effect results ($F = 3.52$, $p = .03$) yielded a simple effect between those who had no previous instruction in TM and those who had much instruction. The lower GSI mean of the "none" level suggested that those who had no instruction in TM had *lower* gap scores than those in the other two groups. This was counterintuitive and reinforced the results mentioned above. It appeared that those participants who had no previous instruction in TM and those who had lower scores on the KI, also had lower GSI scores. Practically speaking, this suggested that those with less previous TM instruction and/or less TM knowledge perceived less disconnect between what they knew about teaching and how competent they were to teach. A three-way relationship was emerging (Figure 1). When the KI was compared with the PII, the results revealed only one significantly different pair of KI score means (p=.011), again between the group

Table 5. Multiple Regression Coefficients Matrix of Types of Instruction in Teaching Methodology and Self-Perceived Competence Index (CI)

Factor	Unstandardized Beta	Standardized Beta	t	*p*
Course in undergraduate program	0 .120	0.175	2.023	0.045*
Course in graduate program	0.080	0.061	0.730	0.467
GTA	0.068	0.085	1.020	0.309
Professional development seminar	0.099	0.106	1.254	0.212
Structured mentoring	0.172	0.229	2.675	0.008*
Athletic training content	0.041	0.051	0.529	0.598
Experience on the job	-0.054	-0.067	-0.705	0.482
Observing others teach	-0.047	-0.066	-0.728	0.468

*Difference is significant at the .05 level

with no instruction in TM and the group with much instruction in TM. The results implied that those with less instruction in TM had lower KI scores. Thus, the findings indicated that the participants with lower gap scores had both significantly less instruction in TM and significantly less knowledge of TM.

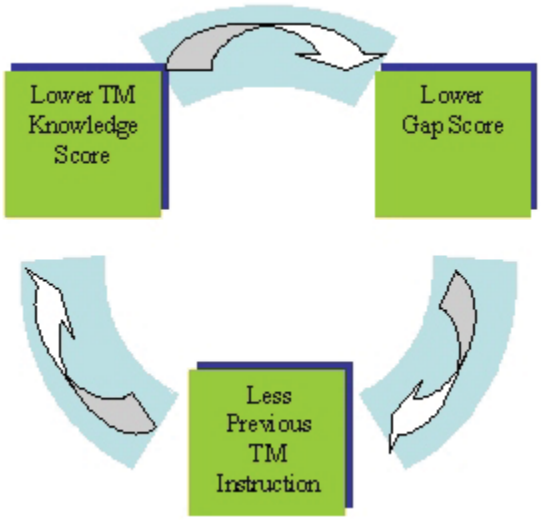

Figure 1. Relationship Between Previous Instruction Index (PII), Knowledge Index (KI), and Gap Score Index (GSI).

The last significant result concerning the gap score indicated that those who were more likely to take a TM seminar in the future were those with *higher* gap scores. Recall that those with the higher gap scores were already those with more knowledge of TM. Those with a lower gap score were less likely to take a seminar in TM, while those with a higher gap score were more likely. Thus, conceptually, in combination with the previously mentioned results, this suggested a more detrimental relationship between variables. Generally, those with lower gap scores had less previous instruction in TM, had less knowledge of TM, and were less likely to pursue such instruction in the future (Figure 2).

This is of concern to the profession. Those who are teaching, who have less TM knowledge, less previous TM instruction, and perceived less disconnect between their teaching knowledge and competency, theoretically, should be the ones who pursue future TM instruction. If those ATCs do not pursue TM instruction, our profession will continue to educate undergraduate students without the benefit of the most qualified instructors. Similarly, would it be beneficial for the profession to have ATCs with no background in research methods conducting research? Thus, it would be prudent for athletic training graduate programs to provide TM instruction in their curriculums to address this problem. Minimally, graduate athletic training programs should require one course in TM to prepare their graduates for this common job market demand.

The topic of preparing teachers/clinical instructors in allied health profession education programs to teach has been studied extensively by other professions.[13-17] Occupational therapy has devoted considerable research to improve the teaching quality of their faculty.[13-15] A study in the field of respiratory care concluded that training programs designed to improve effectiveness of clinical instructors showed significant improvements in teaching effectiveness when compared to control groups.[16] The preparation of nurse educators has similarly been studied with positive results supporting purposeful TM instruction to improve teaching.[17]

Self-Perceived Competency. Neither previous instruction in TM nor how long the participants had been teaching had a significant relationship to the CI scores. These results were surprising. One might assume that the more instruction one had, the more competent one might feel. Or certainly, the longer one teaches, the more competent one might feel. An athletic training education study by Stemmans supports this assumption.[18] An explanation for this is that perhaps the more instruction one gains in TM, the more new concepts one learns and attempts to implement in their classes. In turn, they may not feel very competent until they use the new concept for a semester/year or two.

Of the eight types of instruction in TM that may have contributed to the participant's self-perceived teaching competency,

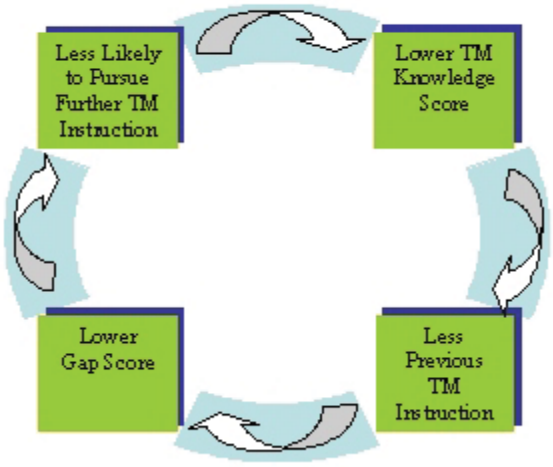

Figure 2. Relationship Between How Likely to Pursue Future Instruction in Teaching Methodology, Previous Instruction Index (PII), Knowledge Index (KI), and Gap Score Index (GSI).

the only two that significantly predicted the CI scores were: 1) taking a TM course in their undergraduate studies, and 2) the use of structured mentoring. Taking a course in their undergraduate program could have likely been a part of a teacher licensure program. This was not differentiated in the survey instrument. Structured mentoring requires working with a more experienced teacher as a pair to learn and grow in the teaching profession.[19]

The implications to our profession of these findings suggest that the undergraduate ATEP programs that include a pathway to teacher licensure are an important part of our profession, as are relationships between those just entering the teaching profession and possible mentors. These implications, however, must be interpreted with caution given the sample size and response rate of this study. Programs that provide an opportunity for a dual credential (athletic training and education) for students wanting to teach in the future are needed. These programs may be arranged at various institutions and add only one extra year to the undergraduate experience, while still meeting accreditation requirements. A further finding revealed that even though there were large numbers of participants who checked the three factors of: 1)athletic training knowledge, 2)experience on the job, and 3)observing others teach, as contributing to their teaching competence, these types of instruction in TM were not significant predictors of their CI scores (Table 5).

The influence of teacher preparation on clinical teaching activities and opinions of clinical instructors in the athletic training setting were studied by Foster and Leslie.[20] A survey was sent to 197 certified athletic trainers. The results indicated that clinical educators who had teaching degrees were more effective teachers in the clinical education setting. Further, ATCs with master's degrees demonstrated broader teaching activities than did ATCs with bachelor's degrees. The conclusions of the study were that teacher preparation and post-baccalaureate education were both desirable qualities when determining who to assign as clinical instructors. The Foster and Leslie study suggests two points: that instruction in TM improves teacher effectiveness and that holding a master's degree creates more effective teachers. Thus, does holding a master's degree in a related profession create more effective athletic training instructors? Of the two, taking a TM course or holding a master's degree, which is more influential for teacher effectiveness?

The results of this study support the Foster and Leslie[20] findings. Specifically, those in the "much" group of the PII perceived themselves to have significantly more knowledge of TM when compared with those in the "none" group. A difference must be pointed out, however, that having knowledge of TM does not transfer directly into being an effective teacher. Both of these studies reveal the efficacy of having TM instruction if one intends to teach. The Foster and Leslie study, which found that clinical educators with teaching degrees were more effective teachers in clinical settings, specifically confirms the importance of having ATEP programs with teaching certificate or licensure options to prepare these clinical educators.

Can taking one course in TM improve one's teaching skills? Studies by Veenman[21] and Rovegno[22] support the efficacy of taking one TM course to improve teaching skills. In relation to this study, "teaching skills" does not directly translate to teaching knowledge or to competence. However, if teaching skills are improved, there must theoretically be an increase in TM knowledge of some degree to improve teaching skills.

Teacher effectiveness of undergraduate athletic training clinical instructors has been studied utilizing various methodologies. One such study found that athletic training clinical instruction was positively influenced by the experience level of the instructor.[18]

By comparing behaviors among these groups [novice (n=10), intermediate (n=10), and advanced clinical instructors (n=10)], increased experience was directly correlated with athletic training student use of screening evaluation techniques. The data suggests that advanced clinical instructors allow athletic training students the most frequent amount of hands-on screening and evaluation time, while novice clinical instructors allow the least (p.52).

The importance of this study is that it illustrated teaching effectiveness differences between new and experienced athletic training instructors. This has implications to whether we should better prepare new teachers if, indeed, they are not as effective as they could or should be. This is not to say that better preparation and increased experience are the same. But rather, novice teachers who do not have experience may begin at a more competent level with better preparation.

The results of this study do not support the Stemmans[18] study results. If experience level can be measured by how many years one has been teaching, this study found that experience level was not significantly correlated with the participants' self-perceived competence. Again, these results must be interpreted with caution, as "experience positively influencing instruction" is a different measure than "experience positively influencing self-perceived competence". Regardless, the finding that the number of years teaching was not significantly correlated to self-perceived competence was a surprise from the data. Perhaps self-perceived

competence scores would have been higher if not measured on 20 separate and specific TM components.

Some other surprising findings from this study revolved around learning styles of students. In the past several years, there have been many studies published in the Journal of Athletic Training about learning styles of athletic training students and/or students in general.[23-32] The study of learning styles of students and educators reaches far beyond athletic training in the allied health professions. Emergency medicine, radiology, and nursing are a sample of other professions devoting significant research into learning styles.[33-37]

Of all the components of pedagogy and education, studies of this nature have been one of the most abundant in our profession. However, of the 20 components measured in this study, the two components with the lowest means for CI were assessing students' learning styles and matching instruction to students' learning styles. The means of these same two components were within the lowest three for KI means. Perhaps this is illustrative of the phenomena described earlier, in which once you learn more about a topic, you realize how much you really do *not* know about that topic. Conversely, perhaps the topic of learning styles is not valued in our profession beyond those who have researched it. How important is it for ACIs to understand the learning styles of their students? Is this importance different for students, for ACIs, and for didactic instructors? These questions require further inquiry.

It is important to note that these studies mainly address clinical instruction. While this is valuable, equally important is didactic instruction, which has rarely been studied in the athletic training setting. Many teaching methodologies and learning styles are common in both settings, but not all. The concepts and theories discussed in classroom settings lay the groundwork for developing skills and decision-making competence in the clinical setting. Making a distinction between clinical and didactic settings is necessary, as illustrated by a study of undergraduate athletic training students' learning styles in the classroom compared to the clinical setting.[24] The authors concluded that,

> …learning styles do indeed shift, depending on the domain through which an individual is learning. Consequently, teaching strategies incorporated in 1 setting may not be equally effective in the other setting. Each learning setting should, therefore, be treated separately in order to accommodate individual learning styles and maximize learning achievement (p. 441).

In a study by Mensch and Ennis, the focus was to determine to what extent theories of teaching, learning and achievement motivation were reflected in CAAHEP standards and guidelines, course syllabi in the programs, and student and instructor interviews.[38] The sample consisted of students (n = 21) and instructors (n = 12) from five CAAHEP accredited undergraduate athletic training programs. The results found that three pedagogical strategies – use of scenarios and case studies, authentic experiences, and establishing positive relationships - were acknowledged as positively influencing students' learning and motivation in these programs. The conclusions of the study were that both students and instructors recognize and value some specific theories of teaching and learning and achievement motivation in their programs. Without TM instruction, some instructors may not effectively utilize these specific theories/strategies and may, thus, not achieve the potential of student learning and motivation that exists.

Recall from the observation of the NATA Career Center website in April 2002, that roughly 73% of the available jobs that required a master's degree had teaching responsibilities associated with the job (Table 1). Additionally, the March 2006 review of this website revealed nearly 48% of job postings were for academic positions requiring teaching. When we consider the results of the Foster and Leslie[20] study, (clinical educators with teaching degrees were more effective in the clinical setting than those without teaching degrees) and the results of this study (those with "much" previous instruction in TM had significantly higher KI scores than those with "none"), a concern arises as to how well we are preparing our graduate students to teach and competently fill that job market.

Since nearly three-quarters of the available jobs advertised on the NATA Career Center web page required some teaching, shouldn't graduate students receive instruction and/or experience in how to teach before entering the job market? All athletic training graduate students are required to take research courses. Yet, only 26% of the participants in this study reported that they were currently conducting research. Knowledge of research is important not only to conduct research, but to be a wise consumer of research. Similarly, knowledge of TM is important not only to those with formal teaching responsibilities, but for all ATCs who work with athletic training students in any setting, regardless of the program's accreditation status. Certainly, with 73% of the available jobs for this population (ATCs with master's degrees) requiring teaching responsibilities, the importance of this preparation should be re-evaluated.

Conclusions

In the past, our profession had primarily and necessarily focused on the clinical skills of being an athletic trainer. Currently, however, the job market is changing. We are heading into a new era of a very different type of ATC becoming in demand – the academic ATC and/or clinical academic. This is a job market that is rapidly growing as the number of ATEPs seeking accreditation continues to grow. There are different job descriptions, different job responsibilities, and different job skills needed (for example - creating lesson plans, considering student-centered projects, varying teaching methodologies, and utilizing various assessment techniques) than the traditional ATC – the clinician. It would be fitting for the profession to provide for these new skills rapidly becoming in demand by employers across the nation.

The findings of this study point toward a need. When those with more previous instruction and more knowledge of TM have *higher* gap scores than those with less previous instruction and less knowledge, the gap score illustrates the phenomenon of *you don't know what you don't know*. As mentioned previously, this

phenomenon may be due to those having less instruction not knowing the complexities of the TM components, thus perceiving their level of competence with those components to be high. Therefore, the need established is not simply to provide more TM knowledge to those who need it, but to first provide an understanding of the complexities of TM and pedagogy in general. This should be done in an effort to create an understanding of what they do *not* know. Once these complexities are understood, instruction in TM would be more effective.

The purpose of this research study was to provide the profession of athletic training with information about the state of self-perceived TM knowledge and competence of those who are teaching in ATEP programs in order to determine if a need exists for further instruction in TM. The relevance of this study is that it is a national population study that provides specific and vital information never previously gathered about instructors of athletic training. This information should prove valuable to the profession and hopefully provide momentum for future research studies investigating the specialty of teaching in our profession.

Recommendations

Whether one is in the classroom or the clinical setting, one must learn and practice different strategies and skills to find what best fosters their students' learning. To this end, based upon the aforementioned conclusions, the following recommendations are proposed.

1) Include a TM course(s) *and* teaching experience in graduate programs.
2) Take a college course in TM (added benefit of CEUs).
3) Take TM professional development courses offered at NATA district / national meetings. This recommendation is proposed with caution, as one-shot seminars have proven to create little long-lasting change.[39]
4) Set up structured mentoring, including a formal relationship with a mentor and specific guidelines, goals, and expectations set in advance.

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Distinctions between Athletic Training Education Programs at the Undergraduate and Graduate Levels

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Objective: To provide a historical perspective on factors that have shaped the current structure of athletic training education, and to advocate development of a new conceptual framework for a continuum of professional education in athletic training.
Background: Athletic training is a relatively young profession that has undergone significant planned change in education and credentialing to enhance the practitioner knowledge and to promote the credibility of the profession within the healthcare community. However, comparison of the prevailing model for basic and advanced professional education in athletic training to those of other health professions reveals major structural differences. In an effort to promote an integrated approach to the spectrum of athletic training education, and to be consistent with terminology used by other health professions, the term professional education is used to designate entry-level education and the term post-professional education is used to designate post-certification, or advanced, education.
Conclusions: Perceived problems with the current educational structure, along with advocated changes, are presented to clarify issues that will affect the future of the athletic training profession. Although change inevitably generates controversy, a failure to address these issues will almost certainly impede advancement of the profession.
Key Words: Health Professions Education, Residency Programs, Knowledge Levels

The education of athletic trainers has evolved from a strong resemblance to a guild apprenticeship in the middle of the 20th century to the present rigorous standards for accreditation of ***"professional"*** (i.e., entry-level) athletic training education programs. Historically, following completion of an undergraduate curriculum, a large majority of athletic training students have searched for a graduate assistantship position that would provide financial support, opportunities for further development of clinical skills, and the opportunity to earn a master's degree. Prior to the standardization of professional athletic training education program content, some institutions developed graduate programs that combined an athletic training curriculum with a graduate assistantship assignment. Such programs were attractive to students who had completed an undergraduate "internship" in athletic training, and who had a desire to attain a greater level of discipline-specific education in the process of earning a master's degree.

During the 1970s, the first standards and guidelines governing National Athletic Trainers' Association (NATA) approval of undergraduate athletic training education programs were formalized by the NATA Professional Education Committee (NATA-PEC), which was followed by a related endeavor that produced analogous documents for graduate athletic training education programs.[1] Revised guidelines for NATA approval of undergraduate education programs were published in 1980 and 1983, and revised guidelines for NATA approval of graduate education programs were published in 1988.[1] Following creation of the Joint Review Committee on Educational Programs in Athletic Training (JRC-AT), and subsequent development of guidelines for accreditation of education programs, the NATA-PEC discontinued its approval process for undergraduate athletic training education. Although the NATA-PEC adopted a policy in 1996 requiring that graduate education programs offer "advanced" learning experiences for accreditation, the 1997 *Standards and Guidelines for Development and Implementation of NATA Accredited Graduate Athletic Training Education Programs* still included many aspects of the earlier requirements for NATA approval of undergraduate education programs.[2] When completion of an accredited athletic training education program became an eligibility requirement for the Board of Certification examination, much of the "advanced" curricular content of "post-certification" graduate programs became part of undergraduate curricula. The current accreditation standards and guidelines for ***"post-professional"*** (i.e., post-certification) graduate education programs, which were adopted in 2003, reflect a dramatic shift in emphasis that promotes diversity of curricular content and clinical experiences by requiring identification of points of program distinctiveness.[3] Based on the academic model of scholarly development, post-professional master's degree programs in athletic training continue to emphasize development of advanced

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