

# 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:** Kolb's Experiential Learning Theory, Kolb, Experiential Learning, Experiential Learning Model, Learning Styles, Learning Styles Inventory

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.<sup>1</sup> 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.<sup>2</sup> 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.

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).<sup>3</sup> Athletic training educators and clinical instructors can use Kolb's Theory to better engage students in the learning process.<sup>4,5</sup>

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.<sup>6</sup> 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.<sup>7</sup> 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.



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## 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.<sup>3, 4, 8</sup> John Dewey<sup>9</sup>, 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.<sup>3</sup>

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.<sup>3</sup>

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.<sup>3</sup> 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.<sup>3</sup>

### 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).<sup>3</sup>

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.<sup>3</sup>

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.<sup>3</sup>

### 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".<sup>3</sup> 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.<sup>1,3</sup>

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.<sup>3</sup> 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.<sup>1,3,10,11</sup>

Kolb<sup>3</sup> 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.<sup>3</sup> 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.<sup>3,12</sup> 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<sup>13</sup>, and concrete orientation was found to increase following the preceptorship experience.<sup>7,12,13</sup>

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.<sup>3,12,14</sup>

### Kolb’s Experiential Learning Cycle

Kolb’s theory integrates experience, perception, cognition, and behavior.<sup>3</sup> 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.<sup>3,4</sup> 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.<sup>3</sup> It is possible to enter the cycle at any one of the modes; however a 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.<sup>3,7,12,14,15</sup> 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”.<sup>4</sup> 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.<sup>4</sup>

### Criticism of Kolb’s Experiential Learning Theory

According to Sugarman<sup>14</sup>, 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<sup>16</sup>, and field independent/field dependent.<sup>6, 13, 16, 17</sup> Measuring instruments, other than Kolb's LSI, reported in allied health education research were the Interpersonal Topical Inventory (ITI)<sup>6</sup>, the Learning Profile Indicator (LPI)<sup>17</sup>, and Babich and Randol's Learning Styles Inventory (LSI).<sup>16</sup> Environmental preferences measured frequently were time of day, lighting<sup>18</sup>, and group versus independent learning<sup>16</sup>. Environmental preferences were measured using the Productivity Environmental Preference Survey (PEPS)<sup>18</sup>, and other original and unique survey instruments made by the researchers.<sup>6, 16, 18</sup>

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.<sup>1, 11, 14, 19</sup> Kolb developed his LSI to designate learners as a diverger, assimilator, converger, or accommodator.<sup>3</sup> Though research shows the existence of learning preferences, research is mixed regarding learning styles' stability over time.<sup>1, 6, 20</sup> 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.<sup>1</sup> 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<sup>21</sup> 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.<sup>21</sup> Kolb contends that they work independently, and that it is only when higher order thinking is being used, that they work together.<sup>3</sup>

Weinstein Webb<sup>21</sup> 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.<sup>21</sup>

In her most persuasive criticism of Kolb's Experiential Learning Theory, Weinstein Webb<sup>21</sup> 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.<sup>21</sup>

## 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.<sup>7</sup> Nursing education research has also validated the idea of environmental press within their students and professionals.<sup>12</sup> This substantiates Kolb's theory that human service professions would have concrete learning styles.<sup>3, 7</sup> 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.<sup>1, 8, 11, 16-19</sup> 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.<sup>16</sup> 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.<sup>3</sup> 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.<sup>16</sup>

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.<sup>19</sup> 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.<sup>18</sup>

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.<sup>11</sup>

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.<sup>8</sup>

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.<sup>1</sup>

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.<sup>17</sup>

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.<sup>17</sup>

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.<sup>5</sup>

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.<sup>22</sup>

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.<sup>7</sup> 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.<sup>1</sup> 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.<sup>3,6,14</sup> 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.<sup>4</sup>

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.<sup>4</sup> The clinical environment is not centered on student instruction; rather it must be centered on patient care and safety.<sup>13</sup> 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.<sup>4,13</sup>

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 its members are now employed in clinical/industrial/fitness settings, 16-24% in high school settings, and 16% in collegiate settings.<sup>23</sup> 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 settings 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.<sup>10,19</sup> Lewin and Kolb are in agreement that part of the process of learning includes conflict and disequilibrium between concrete experience and analytic detachment.<sup>3</sup> 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.<sup>3,16</sup> 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.<sup>3</sup> 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.<sup>10,14</sup>

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.<sup>3</sup>

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.<sup>3</sup> 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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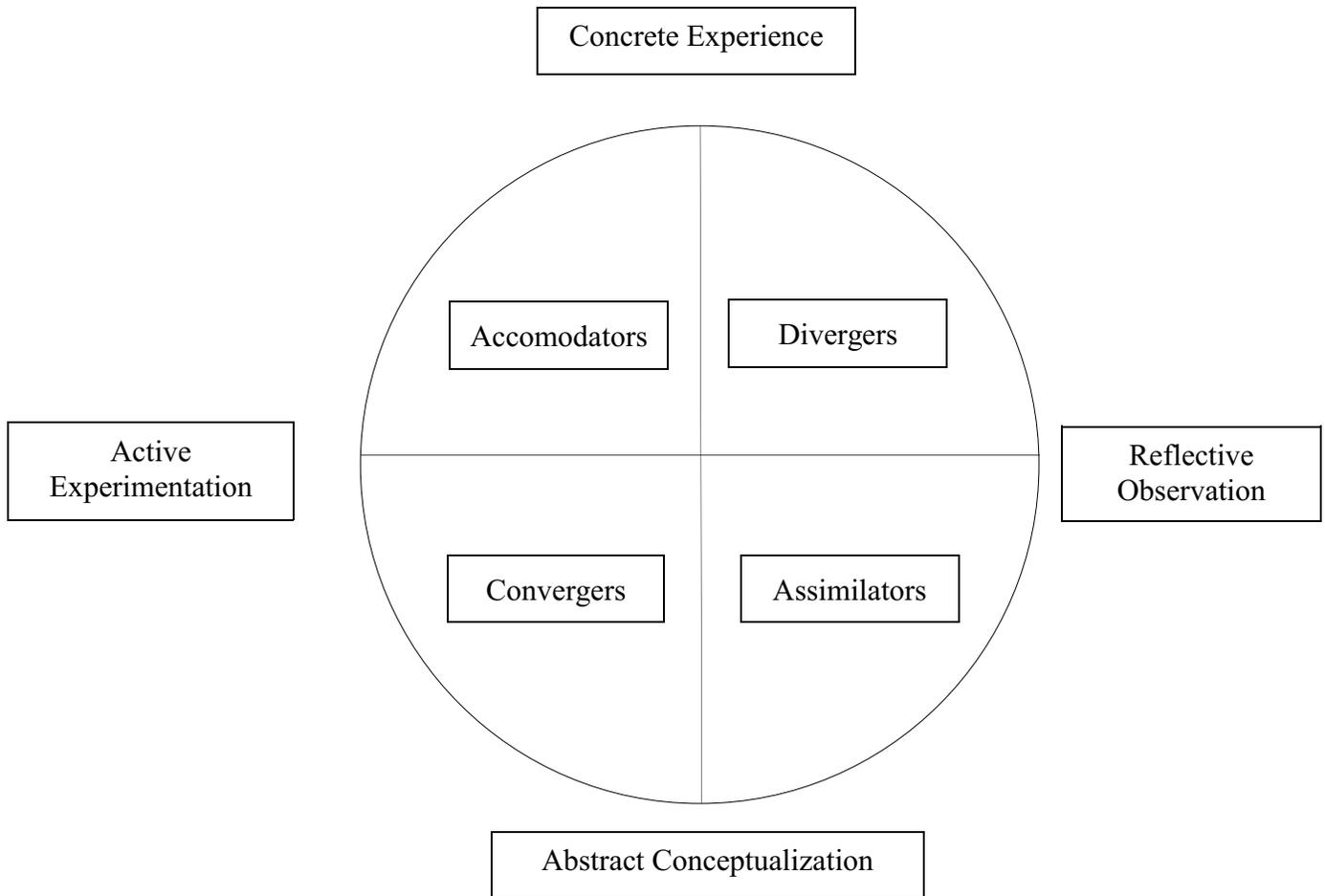


Figure 1. Kolb's Experiential Learning Model  
Adapted from<sup>25</sup>