# Preferred Learning Styles of Professional Undergraduate and Graduate Athletic Training Students

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**Context:** Recognizing the preferred learning style of professional undergraduate and graduate athletic training students will equip educators to more effectively improve their teaching methods and optimize student learning.

**Objective:** To determine the preferred learning style of professional undergraduate and graduate athletic training students using Marshall and Merritt's Student Learning Style Questionnaire based on Kolb's theory of experiential learning.

Design: Cross-sectional survey.

**Setting:** Colleges with Commission on Accreditation of Athletic Training Education accredited professional undergraduate and/or graduate athletic training programs.

**Patients or Other Participants:** Four hundred twenty-nine students (men = 125, women = 303, not available = 1) from 88 professional undergraduate programs and 69 students (men = 27, women = 42) from 21 professional graduate programs.

**Intervention(s):** A 40-item Student Learning Style Questionnaire (LSQ) was administered. Participants chose between words that were characteristic of how they learn. After scoring the LSQ, the learning style preferences were determined. The styles were *Diverger*, *Assimilator*, *Converger*, or *Accommodator*.

**Main Outcome Measure(s):** Learning Style Questionnaire survey scores were used to determine the preferred learning style of male and female professional undergraduate athletic training students, male and female professional graduate athletic training students, and any significant differences between learning styles. The  $\chi^2$  goodness of fit test and  $\chi^2$  test of independence were used to compare differences between the groups.

**Results:** A significant difference ( $P \le .0001$ ) was observed between learning styles. The Diverger style was preferred by both professional undergraduate and graduate athletic training students. We found no significant difference in preferred learning style between the undergraduate and graduate student groups or between men and women.

**Conclusions:** Although undergraduate and graduate athletic training students have a variety of learning styles, the Diverger style of learning, which relies on concrete experience and reflective observation, was preferred in our study. Educators should provide learning opportunities in a variety of ways to reach all preferred learning styles.

Key Words: Athletic training professional program, diverger, assimilator, converger, accommodator

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#### INTRODUCTION

David Kolb, an American educational theorist, developed the experiential learning theory as a result to his argument<sup>1</sup> that individuals learn through experience. Experiential learning indicates that an individual learns from life experience by proceeding through a learning cycle in which he or she must adapt to different situations. Kolb classified learners into two dimensions: concrete-abstract and active-reflective. He believed that "experiencing something alone is not enough and that learners must use the experience to create the knowledge."1(p19) The concrete-abstract dimension describes the act of a learner taking hold of an experience, what Kolb calls prehension, through either comprehension or apprehension.<sup>1,2</sup> The learner can use either comprehension, which is an abstract conceptualization of the experience, or apprehension, which is a concrete experience. A person who uses comprehension will most likely favor thinking when faced with a learning experience, whereas someone who uses apprehension will favor *feeling*.<sup>1</sup>

The active-reflective dimension describes the way the learner makes a meaning out of the experience they have just been involved in. People using the active-reflective dimension can either use extension (active experimentation), or *doing*, when it comes to a learning experience, or they can use intention (reflective observation) and favor *watching* in a learning situation. A student physically conducting an evaluation is engaged in doing, while a student observing a physician doing the same evaluation is engaged in watching (see Table 1).<sup>3</sup>

From the four different dimensions, Kolb<sup>3</sup> identifies four different learning styles: *Divergers, Assimilators, Accommodators,* and *Convergers.* Divergers combine concrete experience (CE) and reflective observation (RO). These individuals are imaginative, creative, and in touch with their feelings. They excel at viewing situations from many perspectives and generating many ideas in "brainstorming" sessions. Jobs such as counselors, organizational development specialists, and personal managers tend to be good fits for these individuals.<sup>3</sup>

Assimilators combine abstract conceptualization (AC) and RO. Assimilators do well with theories and abstract concepts. These individuals are good at synthesizing various ideas and observations into an integrated whole. They tend to work in the basic sciences, mathematics, research, and planning.<sup>3</sup>

Convergers are a combination of AC and active experimentation (AE).<sup>3</sup> Convergers are very good in the practical application of ideas. They seem to do best when there is a single answer or when they can focus on specific problems or situations. Convergers tend to specialize in physical sciences, engineering, and computer sciences.<sup>1,3</sup>

Accomodators are action people who score highest in CE and AE.<sup>3</sup> They are risk takers and enjoy hands-on activities, making plans, and solving problems by trial and error. Even

Table 1.	Kolb's	Model	of Learnin	g Styles.	Adapted
from Kolk	) <sup>3</sup>				

Concrete experience (CE)	Learning by feeling <ul> <li>Learning from specific</li> <li>experiences</li> <li>Relating to people</li> <li>Being sensitive to feelings and</li> </ul>
Reflective observation (RO)	<ul> <li>Learning by watching and listening</li> <li>Carefully observing before making judgments</li> <li>Viewing issues from different perspectives</li> <li>Looking for the meaning of things</li> </ul>
Abstract conceptualization (AC)	Learning by thinking • Logically analyzing • Systematic planning • Acting on an intellectual understanding
Active experimentation (AE)	<ul> <li>Learning by doing</li> <li>Ability to get things done</li> <li>Risk taking</li> <li>Influencing people and events though action</li> </ul>

with their active nature, however, they would rather rely on others for information instead of depending on their own personal analysis. These individuals are often found in jobs such as nursing, teaching, marketing, and sales.<sup>1,3</sup>

Over the past decade, the number of professional athletic training programs has increased. Currently, the profession is seeing an increase in the number of professional graduate athletic training programs. Studies have been conducted by Draper,<sup>4</sup> Harrelson et al,<sup>5</sup> and Strandley et al<sup>6</sup> on undergraduate professional athletic training student learning styles, but to date, studies have not considered learning styles for professional students at the graduate level. Learning styles can change over time and can be influenced by other factors, such as personality type, educational specialization, professional career choice, current job role, and current task.<sup>1</sup> Therefore, the purpose of our study was to determine the preferred learning styles of professional undergraduate and graduate athletic training students and the differences in preferred learning styles between men and women at the undergraduate and graduate levels.

#### METHODS

#### Participants

A total of 429 students (125 men, 303 women, 1 not applicable) from 88 Commission on Accreditation of Athletic

Year in Program	Undergraduate (n = 429) No. (%)	Graduate (n = 69) No. (%)
Freshman/first year graduate	27 (6.20)	36 (52.17)
Sophomore/second year graduate	150 (34.96)	29 (42.02)
Junior	143 (33.33)	NA
Senior	103 (24.00)	NA
No response	6 (1.39)	4 (5.79)

#### Table 2. Year in Program

Abbreviation: NA, not available.

Training Education (CAATE) accredited professional undergraduate programs, and 69 students (27 men, 42 women) from 21 CAATE-accredited professional graduate programs participated in our study. The program response rate was 27% for undergraduate programs and 81% for graduate programs. The average participant age was 20.74  $\pm$  1.87 for undergraduate students and 23.70  $\pm$  1.78 for graduate students. Refer to Table 2 for complete participant demographic information.

#### Student Learning Style Questionnaire and Procedures

The Marshall and Merritt<sup>7</sup> Student Learning Style Questionnaire (LSQ), which is based off of Kolb's experiential learning theory is a 40-item survey that asks participants to determine which of two words given is more characteristic of his or her learning style. The LSQ has been shown to be a reliable and valid tool in assessing learning style preferences.<sup>7</sup> In our study, an email was sent to all CAATE accredited undergraduate and graduate program directors inviting them to forward the LSQ to their students. The email had a link to the LSQ requesting the students' participation and served as informed consent for the students. The LSQ remained open for 3 weeks, and 2 reminder emails were sent to the program directors prior to the closing date.

#### **Data Analysis**

Preset instructions as stated on the LSQ were followed to score the LSQ and to determine the preferred learning style of each participant. Each item was pre-assigned to CE, AC, RO, and AE. The AC score was subtracted from the CE score to determine the information perceiving score. The AE score was then subtracted from the RO score to determine the information processing score. The scores were placed on a grid to determine which learning style the participant preferred. If a score happened to fall on the line between two in the learning style quadrant, the individual preferred a combination of both learning styles (see the Figure). For example, 1 subject fell directly in the middle of the grid and was classified as preferring all 4 learning styles equally.

Frequency distributions were calculated to determine the percentage of participants that fell into each learning style. We used  $\chi^2$  goodness of fit and  $\chi^2$  tests of independence to compare differences in learning style and differences between undergraduate and graduate programs, and between men and women. An  $\alpha$  of  $P \leq .05$  was chosen a priori to indicate significance.

#### RESULTS

Our results showed that, among undergraduate athletic training students, 74.83% (n = 321) preferred the Diverger,

9.79% (n = 42) preferred the Assimilator, 8.68% (n = 37) preferred the Accommodator, and 2.80% (n = 12) preferred the Converger style of learning. Combination learning styles were: 1.40% (n = 6) Accommodators/Divergers, 2.10% (n = 9) Divergers/Assimilators, 0.23% (n = 1) Convergers/Assimilators, and 0.23% (n = 1) encompassed all 4 learning styles.

Among graduate athletic training students, 68.12% (n = 47) preferred the Diverger, 15.94% (n = 11) preferred the Accommodator, 7.25% (n = 5) preferred the Assimilator, and 1.45% (n = 1) preferred the Converger style of learning. The combination learning style preferences were: 1.45% (n = 1) Accommodators/Divergers, 4.35% (n = 3) Divergers/Assimilators, and 1.45% (n = 1) a combination of all 4 styles.

There was a significant difference between learning styles for undergraduate (P < .0001) and graduate (P < .0001) athletic training students, with the Diverger being the preferred learning style of the participants (Table 3). No significant difference was found between the preferred learning styles of undergraduate and graduate students (P = .21).

Diverger was the preferred learning style of 79.20% (n = 99) undergraduate male students and 77.62% (n = 222) of undergraduate female students. Additionally, the male graduate students preferred the Diverger style (72.00%; n = 18), as did women (74.36%; n = 29). However, no significant differences were found between the preferred learning styles of undergraduate (P = .18) or graduate (P = .84) men and women.

## DISCUSSION

The Student Learning Style Questionnaire by Marshall and Merritt<sup>7</sup> was used in our study to determine the professional undergraduate and graduate athletic training students' preferred learning styles and to determine any differences between level of study and gender. Based on the percentages of undergraduate students (74.38%) and graduate students (68.12%), and the statistical significance, the Diverger style was indicated as the most preferred learning style. Our findings differ from previous research on this topic which found the Accommodator and Assimilator learning styles were preferred learning styles of athletic training students.<sup>4–6</sup>

However, in these studies,<sup>4–6</sup> the percentages for learning styles were fairly even, and there was no significance difference found between learning styles. In our study, there was no significance difference found in preferred learning styles between men and women or between undergraduate and graduate students, which is parallel to other research.



Quality athletic trainers care about their patients, show commitment and integrity, value professional knowledge, and communicate effectively with others.<sup>8</sup> Divergers have similar characteristics. An athletic trainer utilizes their time management skills and multitasks when practice runs late or the schedule is changed at the last minute, especially if they have other sports or events they need to attend. Time management and multitasking are Diverger strengths but also demonstrate an athletic trainer's commitment to their job and profession, to provide quality care to all patients. Another strength of the Diverger in the athletic training setting is the ability to be creative. Not all injuries present in the same manner, so the athletic trainer needs to tailor his or her problem-solving skillset to each patient and injury accordingly. For this reason, the athletic trainer needs to be able to consider multiple differential diagnoses instead of fixating on just 1. It is important for the athletic trainer to expand their

professional knowledge by referencing and reading current research that will aid in making a proper diagnosis.

The 2 modes that make up the Diverger learning style are concrete experience and reflective observation. Individuals with high scores in the concrete experience mode take a "receptive, experience-based approach to learning that relies heavily on feeling-based judgments."<sup>2(p68),3</sup> They have an artistic approach to problem solving versus a more scientific-based approach.<sup>2</sup> Like all athletic trainers, Divergers care about their patients and are more influenced by feeling-based decisions. These individuals are also intuitive decision makers that function well in unstructured situations and have a very open mind to problem solving.

The reflective observation mode is the second component of the Diverger learning style. This mode is true to its namesake; the individual "tends to focus on understanding the meaning

Learning Style	Undergraduate (n = 429) No. (%)	Graduate (n = 69) No. (%)
Accommodator	37 (8.68)	11 (15.94)
Assimilator	42 (9.79)	5 (7.25)
Converger	12 (2.80)	1 (1.45)
Diverger	321 (74.83*)	47 (68.12*)
Accommodator/Diverger	6 (1.40)	1 (1.45)
Assimilator/Converger	1 (0.23)	0 (0)
Assimilator/Diverger	9 (2.10)	3 (4.35)
Accommodator/Assimilator/Converger/Diverger	1 (0.23)	1 (1.45)
* Indicates significance.		

#### Table 3. Preferred Learning Styles

of ideas by carefully observing."2(p69) One of the strengths of individuals scoring high in the reflective observation mode is that they are able to see things from a different perspective and can appreciate different points of view. Athletic training clinical experiences are set up to be a gradual progression of skills, knowledge, and abilities taught in the didactic setting, which are then applied in authentic clinical situations. Students observe the preceptor, and as a student's skills progress, he or she takes a more active role. Activities utilized in the didactic setting to help integrate the clinical experiences are reflective journaling or writing papers. These activities allow students to actively reflect on what they have observed and provide feedback to questions they had formed as a result of their observation. By observing their peers and preceptors, students are able to decipher which skills are necessary in different situations and/or how they should apply skills in certain situations.

In order to help Divergers succeed, educators should take note of how these individuals tend to take in and process information. Clinical experiences, including those of observation, are beneficial to help the Divergers solidify skills needed for the athletic training profession. In addition, brainstorming sessions are very helpful for these individuals to get their ideas out in the open.<sup>3</sup> Brainstorming helps to focus the large amount of content that athletic training covers in the athletic training domains.9 Working with others is another strategy that brings out the best in Divergers because they are empathetic and socially oriented.<sup>2</sup> Therefore, group work or observation of other classmates are potentially beneficial didactic strategies to implement. Mentorship between upperclassman and underclassman may also be valuable. The underclassman would have the opportunity to observe the upperclassman as well as interact with them in the clinical and didactic experiences.

Graduate students have more didactic experiences and general life experience which may influence their preferred learning style. However, after an extensive review of the literature, no studies have been conducted using professional graduate athletic training students to date. Nonetheless, with brainstorming activities, life experiences may come into play, and as a result, new ideas may be generated. Moreover, graduate students have had more time to reflect on what they have experienced. Since a major element of the Diverger is that they acquire information through reflective observation, athletic training faculty should strive to include these types of activities, such as brainstorming, journaling, or a mentorship program, in the didactic and clinical education curriculum of the program.

#### CONCLUSIONS

Our study concluded that professional undergraduate and graduate athletic training students have a variety of learning

styles, but a majority prefer the Diverger learning style. Our results differ from similar studies that investigated learning styles of undergraduate athletic training students.

Athletic trainers are very versatile individuals and may possess traits of all the learning styles, including Diverger. As Divergers, athletic trainers are able to make decisions quickly and are very creative when it comes to making use of their resources. They are comfortable working with people and are able to think "outside the box" when necessary. Athletic trainers are known to stay calm when there is a lifethreatening issue, yet they can be great motivators when it comes to working with an athlete rehabilitating from an injury. Many athletic trainers are very creative and come up with new ideas for taping procedures, exercises, or even how to adapt a rehabilitation plan to get a certain individual back to play as soon as possible. Athletic trainers work with people on a daily basis and, therefore, need to be well versed in the human emotion spectrum. Since research in this area is inconclusive, continuing to investigate the preferred learning style of professional athletic training students is important. Additionally, research to determine the educator's preferred learning style would provide insight on how the educator learns and if their instructional methods meet the needs of all of the students in their class.

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