

Does Gender Impact on the Learning Style of Student Athletes?

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A Synthesis Project

Presented to the

Department of Kinesiology, Sport Studies, and Physical Education

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by

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Title of Synthesis Project: Does Gender Impact on Learning Style of Student  
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## Abstract

Throughout life everyone learns, but everyone does not learn the same. This is why learning styles have been a focal point of much research examining learning in various contexts. This synthesis examined a critical mass of research to determine if gender was a factor in the learning style preference of student athletes. Along with learning style preferences, this project focused on how to use existing research and identifying strategies to assist coaches working with female athletes. Results indicated that nonathletic males prefer to learn by words (read/write, abstract conception, and reflective learner) while females outside of athletics have been identified as preferring the learning styles of pictures (visual and reflective observation) and words. Collectively, males and females prefer pictures over the other learning styles. This synthesis examined a critical mass of research and found that the learning styles using pictures and words are most preferred over hearing/speaking and experience regardless of gender or athletic status. Additional research is needed to identify the learning style of student athletes and particularly female athletes.

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## CHAPTER I

### INTRODUCTION

Research examining how learning occurs and is mediated by gender is an important educational topic. Specifically, the topic of learning styles has been considered and with an eye towards determining if the differences between males and females exist (Ku & Chang, 2011). The focus of this paper is to examine a critical mass of research findings to determine if gender is a factor in learning styles for athletes and potentially identify differences in learning styles between athletes and non athletes. This paper will examine if there is a preferred learning style found both for male and female athletes. This introduction will provide information concerning the nature of athletics for students, the importance of recognizing learning styles in athletes, information on learning styles and three widely accepted models of learning theories are presented.

#### *Athletics*

Every student who plays a sport will agree that the expectations of student athletes are very demanding. This pertains to both “on the court” and in the classroom. A student athlete must be on time for practice, be prepared, give 100% effort and focus when playing or practicing, and most importantly stay academically eligible to play. Many schools expect student athletes to not only fulfill their academic obligations, but strive for academic achievement. Student athletes have two things to focus on at the same time. Parents and educators alike are enforcing the thought that the child is a student first and an athlete second. Many student athletes will use their academics to gain employment

not their athletic skills. That is why academics are the most important aspect in a student athlete's life.

Student athletes are representatives of their school whether they are playing a contest at their school or in an opponent's facility. An athlete must always represent their school in a dignified and positive manner. This creates more stress and pressure for the student athlete. The athletes must meet the demands of their coaches as well as their teachers. A student athlete must be able to make the most of every minute in the day. This may not be the easiest for a student that is struggling with a particular subject or teacher. Student athletes face pressures that a traditional student may not face. The sooner a student athlete understands these pressures and how it affects their performance in the classroom, the sooner they are able to be successful in the classroom (Harrison et al., 2009). If this student were able to identify the best way to study or learn for themselves, they would essentially be identifying their learning style and teaching themselves what study techniques work best. This would be making the most of the limited time available to devote to school work.

If a student is an exceptional athlete, then they may use that advantage as a way to gain access to opportunities that they otherwise may not be able to attain. According to Lucas & Lovaglia (2002), disadvantaged students could use their athletic success to further their education by attending college with a scholarship. This is true, but keep in mind that if a student athlete is hoping to move on and participate in sports at a higher level they must be able to maintain two things. First, they must be able to stay academically eligible in order to participate in sports at the high school level and second, have acceptable grades to enter into the college to continue their athletic career.

According to the National Collegiate Athletic Association (NCAA) regulations, to play their sport, college athletes are required to perform well in the classroom (NCAA, 2012). This is why the ability to understand how to process and retain information is crucial for any student athlete.

To play sports at a Division I college, a student athlete must qualify academically. According to the NCAA website, an athlete interested in playing Division I sports and enrolling in college August 2016 or later must obtain a 2.3 grade point average in their core courses in high school to compete their first year at college (NCAA, 2012). The pressure placed on a student athlete will only increase if that athlete decides to move on and play at the college level. This leads to additional pressures associated with working at a job and trying to have an adult social life. All of this points to a need for the student athlete to be able to manage their time successfully and make the most of every free minute during their time off. A student athlete should identify the learning style that they prefer in order to use their time to its maximum potential (Ramayah et al., 2009).

### *Learning Styles*

Every person learns in their own way. There is no right or wrong way to learn. There are however, many different ways to process information. A learning style is its simplest form would be the way each individual gathers and retains new information best. Orhun (2007) studied mathematic achievement with respect to learning style according to gender and stated an individual will be affected their entire life by their learning skills. There are many benefits to recognizing each person's learning style. Student athletes need to be able to manage their busy schedules by prioritizing their time and planning their schedule around their practices and homework. Orhun (2007) states that students

who know their own learning style become better learners and have more positive attitudes about their studies. A coach may be more affective at improving skills and strategic thinking of the players on their team when knowing the learning style preferred by the athlete.

Teachers play a part in the learning process as well. According to Ramayah et al. (2009), the teachers will become more aware of differences students bring into the classroom when they are more knowledgeable about the learning styles of their students. Learning styles influence how students learn, how teachers teach, and how the two interact. Carrier (2009) states that student learning may be enhanced when teachers not only know the learning style of their students, but also provide opportunities for engaging active learners. Improved learning would occur if the instruction would be adapted according to the learning styles of the students. There can be a positive effect on learning if the teacher would take into consideration the gender differences and learning styles of the students (Carrier, 2009). Teaching would be more effective if the teacher took into account what the learning styles of the students in the class were.

Everyone has a different learning style. A learning style can be defined as a way to collect and process information that is personally preferred by one student over another. This also includes the interests, attitude, the decision making process, and the way a student forms an idea (Orhun, 2007). Some prefer one distinct style over another; others combine parts of different learning styles together to create a style specific to them. No matter which style is preferred the end result is the same to acquire and retain knowledge.

There are many accepted learning style theories. The learning styles below have been described in detail because they are the most widely used and accepted when research is conducted concerning learning styles. This is an incomplete list, but one that will serve the purpose of this study. The Kolb, Fleming, and Felder models were used most often in the review of literature. Other learning style models were occasionally used, but these were the most common. These three theories will be referred to throughout this study therefore it is necessary to have a complete understanding of each and understand the instrument used by each of these theories. This information will be useful when trying to compare results of each study or when trying to choose which instrument would be best suited when conducting future research. Below are the explanations of three well known learning style theories.

### *Learning Theories*

There are multiple learning theories that are of importance for this synthesis. They have been used in the critical mass of literature and it is necessary to understand the learning theories in order to understand the results. These learning theories include:

*Kolb Experiential Learning Theory.* The Kolb Experiential Learning Theory concentrates mainly with the processing portion of learning. It aims to explain how individuals approach and solve problems (Tumkaya, 2012). This theory is most commonly preferred among researchers (Dobson, 2010; Ramayah et al., 2009). Kolb believes that learning is a series of experiences. Kolb's model works on two levels, a four stage cycle and a four type learning style by definition. This model is broken into four quadrants to represent the four personal learning styles. These four learning styles are converging, diverging, assimilating, and accommodating (Tumkaya, 2012). Kolb's theory

states that each person is the combination of the two continuums; therefore each person belongs in one of the four quadrants. The instrument used to measure this learning theory is the Learning Style Inventory. This is commonly available and easy to understand (Ramayah et al., 2009).

Table 1

## Learning styles and key words

<b>Keywords</b>	Pictures Not Words	Charts, Graphs	Group Discussions	Talking Things Through	Speak / Hear / Lecture	Word	Experience	Sample	Practice / Simulate	Sense	Watch	Think	Explain
<b>Learning Styles</b>													
<b>VARK - Fleming</b>													
Visual	X	X											
Auditory			X	X	X								X
Read/Write						X							
Kinesthetic							X	X	X				
<b>LSI - Kolb</b>													
Concrete Experience										X			
Reflective Observation	X										X		
Abstract Conception												X	
Active Experiment							X	X	X				
<b>ILS - Felder &amp; Soloman</b>													
Active							X		X				X
Reflective			X									X	
Sensing										X			
Intuitive													
Visual	X	X											
Verbal				X	X	X							
Sequential													
Global													

*Fleming – VARK.* VARK is a learning style model broken into four types of learning styles. Each initial stands for which learning style is described. V- Visual, A- Aural (Auditory), R – Read/Write, and K-Kinesthetic (Ramayah et al., 2009). Most

people have a preference of one of the above styles, but Fleming also believes that most people use more than one learning style. This is demonstrated with the results of the research used in this study. Dobson (2010), Kumar, Smriti, Pratap, and Krishnee, (2012), Ramayah et al. (2009) and Slater, Lujan, & DiCarlo (2007) have all reported that the most preferred learning style according to their research is a multimodal approach or one that includes all four (V, A, R, and K) learning styles. This learning style was developed to help both students and teachers understand the different styles of learning and work together to achieve success (Ramayah et al., 2009).

*Felder – Index of Learning Styles (ILS)* Felder and Silverman created a learning style model to give teachers and insight as to what the learning needs for their students were. Based on the model created by Felder and Silverman, Felder and Soloman created the Index of Learning Styles (ILS). The ILS would be the instrument of measurement for the Felder and Silverman model (Ku & Chang, 2011). There are four categories in this model, they are: Processing, Perception, Input, and Understanding. The ILS is 44 questions; 11 per category, answered with either an A or B. The results are calculated by scoring each of the 11 questions separately and counting the number of A answers and the number of B answers. Once this is completed the scorer would subtract the higher number from the lower one. The number left is how strong the preference for the particular category is (Ku & Chang, 2011). The Felder and Silverman model is widely used because of its comprehensive nature, in brings in parts of other models such as Meyers-Briggs, Kolb, and Dunn and Dunn (Alumran, 2008).

These three models are used interchangeably throughout the literature. In order to compare the results from each study in the critical mass a comparison of the different

styles was necessary. In table 1 a breakdown of each keyword used in the description for the different learning styles is shown. This is what was used to create a comparison of learning style categories. The similar traits of each learning style was compared and compiled in table 2. This is how the results will be compared from the critical mass. The three different learning theories consisted of similar traits they were preferred learning by: pictures, hearing/speaking, experience, and words.

### *Gender*

Gender plays a role in the way students learn. This is supported by Slater et al. (2007) who state that males and females can differ on preferred learning styles. These differences can be seen as young as elementary school and teachers, at times, changes their teaching style to accommodate both genders in the classroom. It was reported teachers are incorporating more male friendly teaching strategies into their classrooms because of the lower level of achievement that was found in some situations at the elementary level (Carrier, 2009). These findings are consistent with other educational studies. Research has shown that female learning styles are different than male learning styles (Alumran, 2008).

Table 2

### Comparison of Learning Styles

		<u><i>Key Words</i></u>		
<i>Learning Style</i>	<i>Pictures</i>	<i>Hearing / Speaking</i>	<i>Experience</i>	<i>Words</i>
VARK	Visual	Auditory	Kinesthetic	Read/Write
LSI	Reflective Observation	Concrete Experience	Active Experimentation	Abstract Conception
ILS	Visual	Verbal	Active Learner	Reflective Learner

### *Scope of Synthesis*

Athletes are expected to excel in multiple areas at the same time. It has been reported that when a student uses their preferred learning style that they are more able to focus and will retain the information better (Ramayah et al., 2009). For this reason the focus of this synthesis project is to utilize a critical mass of research findings to determine if male and female athletes learn differently and if a preferred learning style is identified in the literature. These findings will be examined in relation to athletes and to determine if differences are notable from non athletes based on the studies examined.

### *Operational Definitions*

The purpose of this section will be to define words found in this paper.

*Academically Eligible.* For the purpose of this paper, academically eligible is defined as having a grade point average that is high enough to be allowed to play sports at a specific institution. The specific number may vary from school to school (NCAA, 2012).

*Gender.* For the purpose of this study, gender will be considered biological differences between males and females (Marley, 2007).

*Index of Learning Styles (ILS).* The *Index of Learning Styles* is an instrument used to determine the preferred learning style based on four dimensions (Active - Reflective, Sensing - Intuitive, Visual - Verbal, and Sequential - Global). This model was created by Felder and Silverman and the instrument was developed by Felder and Soloman.

*Learning Styles.* The strengths and preferences in the way that individuals take in and process information (Ramayah et al., 2009).

*Learning Styles Inventory (LSI).* Developed by Kolb in 1984, the Learning Style Inventory (LSI) is a commercially available questionnaire with twelve items where

individuals are given four sentence endings that correspond to the four learning styles and are asked to choose what best suits their learning style (Tumkaya, 2012). These four learning styles are converging, diverging, assimilator, and accommodator (Tumkaya, 2012).

*Student Athlete.* A student athlete is a person that is enrolled in school either high school or college and is playing an organized sport for that organization (NCAA, 2012).

### *Summary*

Being an athlete is extremely difficult. When trying to find a balance between sport and academics, it will be increasingly easier for the student athlete if they use personal learning style preference when studying. Study time will decrease even though learning and retention will increase. The way that someone learns is specific to them as their fingerprint. Although there are many similarities among them no two are exactly alike. This is why there are multiple accepted theories when beginning to describe a learning style preference. The four theories mentioned in this paper are popular models and widely accepted throughout the research community.

## CHAPTER II

### METHODS

The critical mass of articles for this study was accumulated using various search engines. Five different searches were conducted in selecting the research articles reviewed for this synthesis. In the each of the searches, ERIC (Educational Resources Information Center), SPORTDiscus with full text, Psychology and Behavioral Science Collection, and Academic Search Complete were accessed as the database search engines. The following is a list of criteria that must have been met in order to be a part of this synthesis:

- 1) One variable in the study must be learning styles.
- 2) The article had to be published between January 2007 and January 2013.
- 3) The articles had to be peer reviewed.

#### *Data Collection*

The first search was using learning style as the first variable and the other variable in the research was gender, with these two keywords used in the search process 546 results were returned. After refining the results by adding peer reviewed and full text articles as limiters, the results were lowered to 275. To further refine the results the keywords of learning style and gender were required to be in the title. There was then left 23 results. Of those 23 articles the following were used in the critical mass for this study. The studies by Alumran (2008), Carrier (2009), Dobson (2009), Ku (2011), Lau and Yuen (2010), Orhun (2007), Ramayah et al. (2009), and Slater et al. (2007) were retrieved by using the process above. The second search was conducted using learning style and gender as above without the requirement of being listed in the title and adding

the keyword of sport. From this search there were 14 results produced; the article by Williams and Anshel (1997) was retrieved and used in this study.

The article by Gonzalez-Haro, Calleja-Gonzalez, and Escanero (2010) was retrieved and used in this study by using learning styles and athlete as the key search words. This search process originally produced 23 results, but when limited to articles that have the keywords in the title; this study was the one remaining result. The fourth search only produced one article, but it was the article in which the focus for this study was identified. The article written by Miller, Ogilvie, and Branch (2008) identifies the three variables this study was based on: gender, learning styles, and sport. During the final search both variables were changed to use similar words. The variables searched were cognitive styles and athletes. Those two keywords produced the studies by Hormati (2012) and Salmon (2010). The remaining articles used in the critical mass for review were collected when searching for a specific author that had been referenced in an earlier collected article.

When the electronic search of the data bases was narrowed to a manageable number, there was a set of inclusion criteria that was used to decide what studies would be used in the critical mass of research. During the first search the electronic search left 23 articles after the limiters were put in place. At this point, the title and the abstract for each article was read and an article was kept in this study if:

- 1) The topic of the article gender differences on a preferred learning style.
- 2) The date was no earlier than 2007.

The second electronic search left 14 articles after the limiters were put in place. At this point, the title and the abstract for each article were read and an article was kept in this

study if:

- 1) The topic was consistent with the current study.

### *Data Analysis*

All information was extracted from the studies in the critical mass by using a coding table. These tables are available to review in appendix A. Each table consists of a proper APA citation, the name of the study, the problem statement, the subjects, the instruments, the procedures and the findings. The bottom of each table has a summary sentence that is a quick reference to each article. All articles in the critical mass are qualitative in nature. Two research articles used in this synthesis were either a meta-analysis or a synthesis paper. These articles were used for information, but not as part of the critical mass.

### *Summary*

Using common words such as athlete and learning resulted in a large number of studies that was unmanageable. The studies must be limited and the search refined by some methods. For the purposes of this study the results were limited by the year the study was published. Also, more variables were introduced such as gender and learning style. For this collection of a critical mass, the article must have been peer reviewed and a full text version must be available to read. It was only after reading many of the articles in the critical mass that it was known where in this study they would be used. The articles were separated by instrument used in data collection, if athletes were used as subjects, and what field of study the research was about.

## CHAPTER III

### RESULTS

The purpose of this section will be to report findings from the critical mass of studies analyzed. The results are organized around the following headings including learning styles of student athletes and learning styles of students not in athletics. These heading are further broken down into the subcategories of male and female students for both main categories if it was available from the critical mass results. Finally a summary of the findings from the critical mass is provided.

#### *Gender Differences in Learning Styles*

There are conflicting reports from the studies used in the critical mass. Some studies such as Kumar et al., (2012) report that gender is not a factor when comparing learning styles. Ku and Chang, (2011) completed a study of college students learning styles and reported no significant differences between males and females. Others such as Orhun (2007) and Ramayah et al., (2009) report that gender does play a role in the preferred learning style for each learner. Alumran (2008) reported that males and females have different learning styles. The study by Carrier (2009) researched environmental education essentially trying to move the learning environment to an outdoor setting. It was in this article that the researcher reported that staying in a traditional classroom environment might be best suited for the learning styles of the females, but for the males an outdoor environment may be best (Carrier, 2009).

#### *Student Athletes Preference of Learning Styles*

Results in the study by Miller et al. (2008) stated that athletes both female and male prefer a sensory approach to learning. This would be using all their senses to

incorporate learning; these include visual learning, kinesthetic learning, and trial and error learning. Athletes tend to prefer information given to them at a slower rate than non-athletes and less information given to them at a time (Miller et al., 2008). A teacher or coach would benefit from the knowledge of how the athletes learn in order to change their teaching style to include the most students as possible. Miller et al. (2008) used the Learning Styles Profile to provide information on how athletes learn. The male and female athletes were found to prefer different ways of processing information almost 50% of the time according to the study performed by Miller et al. (2008).

A study done in 2010 by Gonzalez-Haro et al. researched learning styles preferred by athletes at three different levels (professional, amateur, and recreational). They reported that the learning style preferred by the athletes was the same in that each preferred the accommodator learning style. In this style the learner prefers to do things and be directly involved in the experience (Tumkaya, 2012). Student that prefer the accommodator learning style are more risk takers than in the other three styles associated with Kolb's theory (assimilator, converging, and diverging).

Lucas and Lovaglia (2002) completed a study with athletes, researching their expectations for success in athletics compared to academics. They reported that student-athletes expect fewer benefits and perceive there is a larger commitment to studies for academic success than do non student-athletes. The research by Lucas and Lovaglia showed that student athletes were less motivated to perform academically than athletically. A reason may be because they were less successful at the academics than the athletics (Lucas & Lovaglia, 2002). Male athletes prefer to take in knowledge using

details before concepts, male athletes prefer using logic when making decisions, and male athletes would prefer their learning style to be flexible (Chesborough, 2005).

#### *Non-Athletes Preference of Learning Styles*

In the study by Tumkaya, (2012) the findings indicated that there was no difference in what knowledge is, how knowledge is acquired, and how much can be known about a topic. This study researched the issue of gaining knowledge using a sample of university students according to gender, grade, field of study, academic success and learning style. Tumkaya (2012) used the Kolb Learning Style Inventory as the instrument to determine the learning style of the university students. The findings in this study showed that a majority of the university students participating have assimilating and converging learning styles and less of them preferred the diverging and accommodating learning styles.

A study by Orhun (2007), investigated academic achievement with respect to learning style according to gender. These results indicated that there were differences among learning styles preferred by female and male students (Orhun, 2007). Similar to Tumkaya (2012), the finding revealed that the majority of students preferred the converging and assimilator learning styles and did not prefer the diverging and accommodator learning styles.

The converging style of learning is when students would prefer to work by themselves and think carefully about what they are learning. Assimilator learners would prefer to think about what they are learning. They learn best by lecture; they are very logical in their thoughts. Assimilators learn by watching and thinking. Accommodator style of learning would prefer doing rather than thinking. Accommodators would prefer

to take risks instead of the same routine when learning. A student that prefers to brainstorm ideas and are able to see things from a different perspective would prefer the diverging learning style.

The study by Orhun (2007) also showed a breakdown by gender. It was found that most females in the study preferred the converging learning style and that the majority of males preferred the assimilating learning style. It should be noted that no person participating in this study chose the accommodating learning style as their preferred style of learning. According to these findings male and female students have different learning styles. Studies that used Kolb's Learning Style Inventory (LSI) as an instrument provided information that confirmed male and female students prefer different learning styles (Orhun, 2007) and that the assimilating and converging learning styles were preferred over the diverging and accommodating learning styles (Orhun, 2007; Tumkaya, 2012).

Dobson (2010) used the VARK learning style survey to compare learning style preferences and sex, status and course performance. Participants in this study were tested to discover if they preferred a single sensory modality, two modalities, three modalities, or all four modalities. The majority of the participants in Dobson (2010) preferred using all four modalities (visual (V), aural (A), read-write (R), and kinesthetic (K)) as opposed to a single style. Of the students who preferred only one of the modalities, the largest number of students preferred the R learning (read-write) (Dobson, 2010). This was followed by the kinesthetic (K) learning as the second most favored, the A learning as the third, and the least favored modality would be the Visual (V) learning. Dobson (2010) also reported that of the female students that preferred a single modality the largest number of students chose the read – write (R) learning. Male students in this study that

preferred a single modality had two of the learning styles tied for the most favored; read – write (R) learning and kinesthetic (K) learning (Dobson, 2010).

The VARK learning style model is best explained when the reader has a complete understanding of what each learning style is. Dobson (2010), Kumar et al., (2012) Ramayah et al. (2009), and Slater et al. (2007), all used this instrument in their respective studies. Through review of the critical mass: students that prefer to learn visually notice the color or design and would prefer the whole picture not the parts. A student that is an auditory learner will process information best by listening. They may also like to explain what they have learned to others. Students that prefer read – write learning best would prefer lists and words when learning; they would want a handout with the lecture. The student that learns best kinesthetically needs to be moving to learn. They may tap their foot in class, read while running on the treadmill, or trace letters with their fingers when spelling. In general participants appear to participate in a demonstration to fully comprehend what is being taught (Dobson, 2010; Kumar et al., 2012; Slater et al., 2007; and Ramayah et al., 2009).

An analysis of gender differences in learning styles preferences among medical students was conducted by Kumar et al. (2012). They reported that there were no differences in learning style preferences based on gender. Similar to Dobson (2010), Kumar et al., (2012) found that the majority of the participants preferred using all four modalities over one, two, or three. If the students did prefer a single modality it was different for males and females, but not statistically significantly. According to this study, female students preferred the visual (V) learning when they preferred a single modality

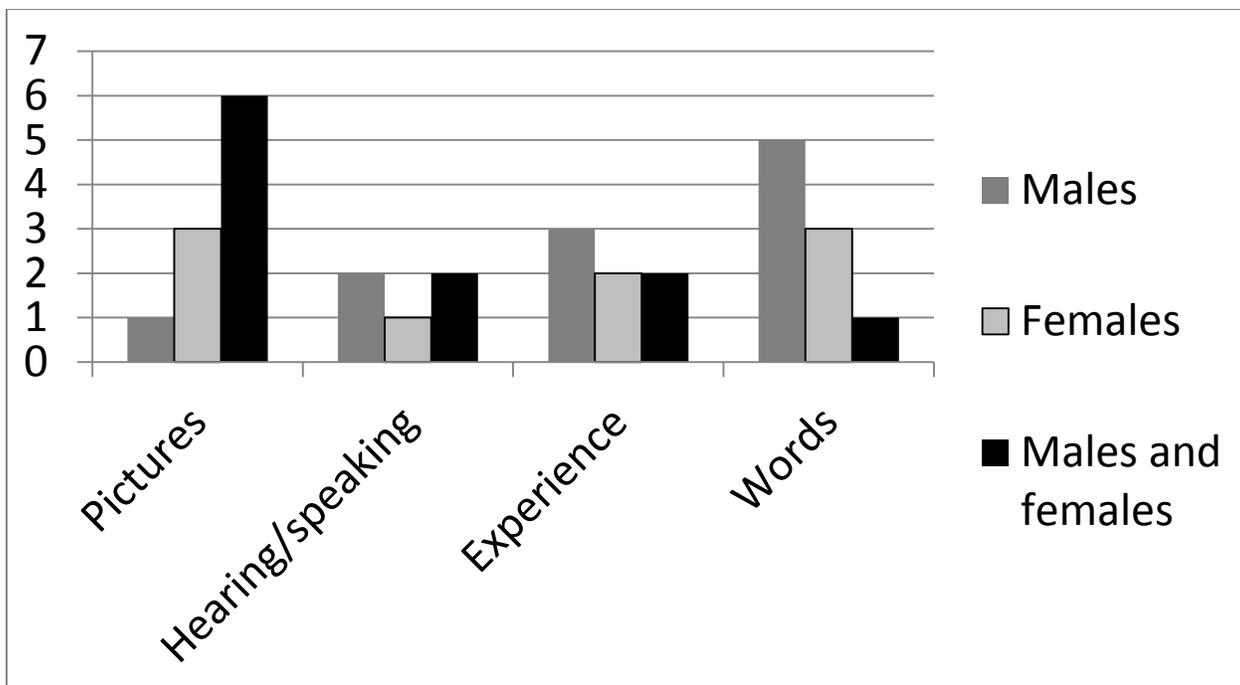
and male students preferred read- write (R) learning when they preferred only a single modality.

Slater et al. (2007), researched if gender has an influence on learning style preferences of medical students. They too found that most students both male and female would prefer a multimodal learning style. The majority of students in this study chose to prefer using all four modalities. Both males and females that did choose a single modality choose kinesthetic (K) learning as their preferred choice. It was when the authors reported the specific multimodalities that the differences between males and females became evident. The most preferred learning style after the use of all four modalities for the male students was VRK (a combination of visual, read –write, and kinesthetic) learning, but for the females it was read –write and kinesthetic (RK) learning. There was a greater variety of preferred methods of learning by the female students (Slater et al., 2007). This study does indicate that there are differences in learning style preference across the genders.

The influence of gender on preferred learning style among business students was a study that Ramayah et al. (2009) researched using the VARK learning style survey. They reported that gender influenced the visual (V) and auditory (A) learning styles, but no influence on the R and K learning styles. According to this study both females and males preferred the visual (V) learning style over the other three. Business school students in this study prefer the auditory (A) and visual (V) learning styles. This study also found that females preferred visual (V) and auditory (A) learning styles more than males.

Studies that used the VARK learning style survey all report the similar findings in that students would prefer to use all four modalities instead of choosing only one learning style (Dobson, 2010; Kumar et al., 2012; Slater et al., 2007). Studies conducted by Kumar et al. (2012) and Slater et al., (2007) indicated that there is no difference in learning style preference between males and females. Three out of the four studies accepted into the critical mass had results that demonstrated the same learning style preference for both males and females. The aural modality was never preferred by any of the students in these studies. The other three modalities were equally preferred by both males and females (Dobson, 2010; Kumar et al., 2012; Slater et al., 2007).

Alumran (2008) reported on preferred learning styles of students at a university at in Bahrain. In this study the preferences were broken into the categories of gender and field of study. Gender was broken into male and female categories, but field of study was divided into seven categories. These were arts, business, law, engineering, education, sciences, and technology. According to this study males and females were found to have different learning styles. Males were reported to prefer kinesthetic, tactual, or visual learning styles. Males also required more mobility than the females in this study. The females in this study were found to be more conforming and more motivated by self, by teacher, or by parents over their male counterparts. Males prefer the intuitive learning style, while females prefer the sensing learning style (Alumran, 2008).



*Figure 1.* Results displayed by gender

A study in Taiwan, using college students from three distance learning courses consisted of 46 males and 148 females, researched the learning style and strategies in a web – based learning environment concluded that regardless of learning strategy, academic discipline or gender, the visual type learner is the most dominate learning style for web learners (Ku & Chang, 2011). Ku and Chang (2011) also reported that there were no significant differences between males and females when learning style is concerned. There is a difference, according to the results of this study, that females have significantly higher motivation scores than males.

Another study found that there was a difference in learning style preference between males and females, but only when comparing the active – reflective and the visual - verbal sections of the Index of learning styles based on Felder’s research (Prajapati, 2010). This study was researching factors affecting academic performance of undergraduate students. It was reported by Prajapati (2010) that there were no statistically

significant differences between the sensing – intuitive and the sequential – global learning styles in males and females.

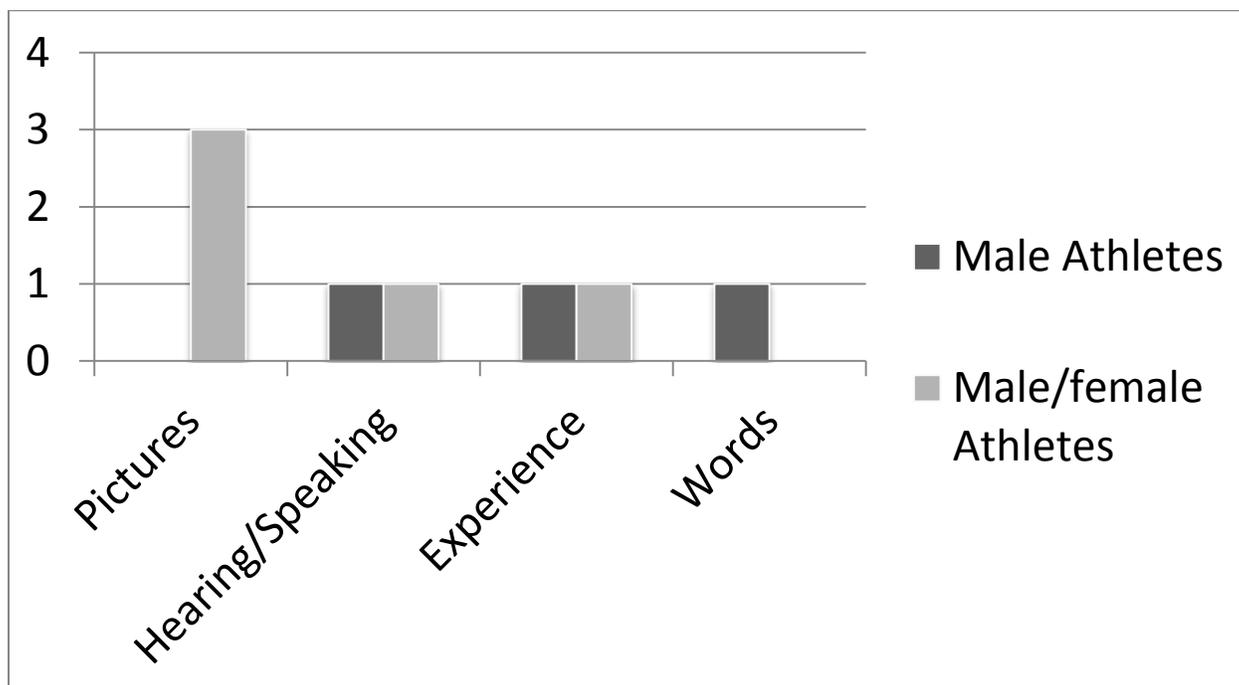


Figure 2. Results displayed by athletes

### Summary

It is observable that when males non – athletes are grouped by themselves they choose to prefer to learn by words (read/write, abstract conception, and reflective learner). When females non – athletes are grouped alone they are tied in preferring the learning styles of pictures (visual and reflective observation) and words. When the males and females were not separated when reporting results they preferred to learn by pictures over the other three styles. There was no study that reported female athletes separate from the other groups. Male athletes did have studies that reported their preferred learning style separately, but the results were inconclusive. Figure 1 is a visual display of the above information. Figure 1 displays the results with gender being the variable along with learning style. It is easy to interpret the results shown in this figure. Figure 2 displays the

results only in studies that used athletics as a variable. This shows that when there was no distinction between males and females; athletes prefer that pictures are used when learning. Figure 3 is a representation of the results from studies that did not use athletes as a variable. The learning styles using pictures and words are most preferred over hearing/speaking and experience regardless of gender or athletic status.

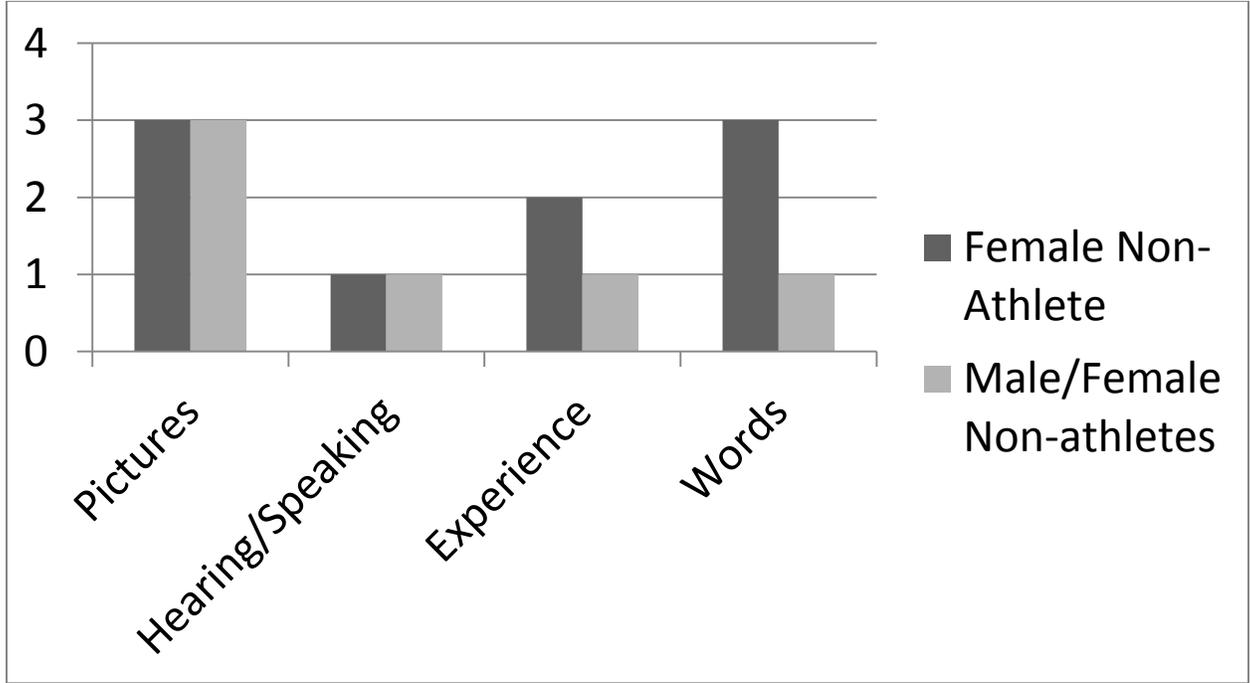


Figure 3. Results displayed by non-athletes

## CHAPTER IV

### DISCUSSION

The purpose of this study is to utilize a critical mass of research findings to determine if male and female athletes learn differently and if a preferred learning style is identified in the literature. This section is organized in four parts: An overview of the findings, limitations of this study, suggestions for future research, a conclusion.

#### *Overview of Findings*

After the review of literature was complete for this study, the conclusion was drawn that athletes both male and female learn differently from their non-athlete classmates. Males and females (athlete or not) do learn differently; this was reported by Orhun (2007). Specifically, male and female athletes prefer different learning styles according to Miller et al., (2008). Athletes are multimodal learners; they prefer to learn by using more than one learning style (Dobson, 2010; Kumar et al., 2012). The learning style in athletes has an impact on the learning and performing of athletic skills (Williams & Anshel, 2000). The performance of an individual can be improved when a teacher or coach can understand the learning styles of the student-athletes (Miller et al., 2008).

The phrase “dumb jock” is one used to describe a person that does not have very good grades but is popular because of their athletic ability. Athletes have been trying to combat this stereotype for some time now. Harrison et al. (2009) conducted a study that investigated the factors of gender identity, academic performance and athletics. The results in that study showed that females performed worse when their academic and athletic identities were linked. Female student athletes are trying not to confirm the “dumb jock” stereotype and will work harder to ensure that they are not classified

academically by the athletic ability (Harrison et. al, 2009). If the material in the classrooms were presented in a way that best suited the athletes style of learning they might be more successful academically (Chesborough, 2005).

Student athletes are having difficulty in academics. It is a common theme seen over and over again in this review of literature. Lucas and Lovaglia (2002) report that student athletes were less motivated to perform academically than student not involved in athletics and that student athletes struggle academically. There is however not a clear reason that this is happening. It is the purpose of this synthesis to conclude that the reason is that student-athletes prefer a different learning style than others student in academic settings. Student athletes are successful through the time and effort devoted to their sport. They work with a coach who not just verbally tells these athletes what to do, but includes a demonstration. This may be why most athletes prefer multimodal learning styles (Dobson, 2010; Kumar et al., 2012; Slater et al, 2007).

Athletes that are multimodal prefer more than one style of learning. In the study conducted by Dobson (2010) results indicated that although the participants believed that they were unimodal, after the study was complete 45 out of 64 participants were multimodal. Many times athletes will learn things best when done in a sequential format. An athlete may see a desired action written on the board. Next, they will hear the coach explain how the action is to be implemented into the game or contest. Finally, the athletes will be asked to demonstrate the skill. A full understanding of what the athlete is expected to learn may not be complete until all stages have been processed through. To be multimodal seems to be an advantage; multimodal learners retain knowledge better than unimodal learners (Kumar et al., 2012).

According to Fleming's learning style theory, learners prefer to receive information either visually, auditory, by reading, or kinesthetically. If an athlete prefers the three modalities of visual (V), auditory (A), and kinesthetic (K), that would fit in place with the type of learning that they need to be successful. Most successful athletes start training when they are young and so the learning style they prefer as a young adult might not only be one allows them to process and retain information the best but also the one that they have grown accustomed to over the years. On the opposite side of this theory, it is hypothesized that a student who prefers to learn by reading may not be as successful in athletics.

Chesborough (2005) states that athletes may need a different learning environment; one that information is given in accordance to their learning style preference to be as successful as their non-athletic counterparts. Athletes learn differently from other students and when teaching strategies and are implemented that take advantage of their learning styles they will have improved academic success (Chesborough, 2005). Athletes may need material presented in different ways for them to comprehend and retain the information. Colleges are not willing to risk their scholarship money on an athlete that cannot perform academically at that level (Miller et al., 2008). Again, why learning styles and knowing how to use them effectively are extremely important to athletes.

The results in the study by Chesborough (2005) are what would be expected by athletes. Athletes prefer details; in a game or contest, conceptual learning would restrict the players and possibly cause errors by the players. An athlete may prefer flexibility in the way that they learn because of the ever changing situations that arise during a game.

If an athlete required a learning environment that was planned and organized they may not be successful on the field.

The results from the studies in the critical mass for this synthesis reported that female students preferred to learn using the styles that contain pictures or words. This is shown in Figure 1. The results in Figure 2 report that athletes prefer the picture style of learning. These results are not separated by gender. The third category was preferred learning style of non-athletes; here female students reported to prefer the picture and words styles of learning. It is the opinions of the author that, it is fair to assume that female student athletes prefer to learn with pictures. This information can be useful to students, teachers and coaches. When the learning style of a student athlete is known, teachers and coaches can alter their teaching methods to ensure that everyone is learning. As for the student athlete, the knowledge of their learning style can help with time management, as well as help process and retain information.

#### *Limitations from the Critical Mass Studies*

The current research is failing to identify the preferred learning style of female athletes. This has occurred in three different ways. First, there is an issue with the instruments used to measure learning styles in this synthesis. Second, the samples do not allow for the comparison of females and males in relation to learning style and athletics. Lastly, gender typing may be a factor when studying learning style.

*Measurement Issues.* It is difficult to compare research studies about learning styles because there are many accepted instruments used to collect data. Some researchers prefer the theories set forth by Kolb, while others prefer Fleming or Felder. Each of these is acceptable measurements, but the results at times vary from one theory to

another. When comparing the research done by Gonzalez-Haro et al. (2010) and Miller et al. (2008) it is difficult to see the similarities and differences because although both are research articles on learning styles and athletes there is no direct way to compare the results. Each uses an instrument that is perfectly acceptable for the research they are conducting, but individually these instruments look specifically at different pieces to learning. There is no instrument that determines the learning style of athletes (Williams, Anshel, & Quek, 1997). To make these comparisons the researcher must study al depth all the instruments and understand them into order to compare them.

*Lack of Female Representation.* There is a void in the research when female athletes are a variable. The studies do not include enough female student athletes to create a comparison to male student athletes that would be applicable to the general public. Orhun (2007) suggests that not only should more research be completed concerning learning style differences, but they need to include gender as a variable. This may be for a number of reasons, first because once females use their sport as a gateway into college, the focus changes. A female student athlete may look to the future and see a career created through their athletic ability whereas a male athlete is still striving for the next level of competition and will use academics as a fall back if they do not succeed. Although there are women's professional sports, many of the athletes at that level have to carry other jobs because they league they play for cannot pay them enough to live. For this reason the way that male and female student athletes approach learning at the collegiate level are very different, causing the learning patterns in the research to be different as well.

*Gender Typing.* This missing research on female athletes could also be from gender typing. Gender typing is when a child becomes aware of their sexuality and begins to portray the stereotypical traits associated with that particular gender. The study by Alumran (2008) attributes the results of different learning styles to the child rearing practices and gender stereotyping. Gender typing could be affecting the research in this area because although female sport activities are just as common as male ones, because of Title IX, there still may be gender typing as far as thinking that females should not be as involved in sport as males are. From this perspective, females may play sports, but to gather research the male athletes are looked upon to see which direction the trends are going. There are increased educational opportunities for successful high school athletes both male and female, but these student often struggle when they move on to college (Lucas and Lovaglia, 2002). There is a need to find why female student athletes are struggling or succeeding in college level classes.

#### *Future Research*

Based on the results of this study there are a few recommendations for future research. Multiple studies have investigated learning styles of college students both athletes and non-athletes. Future research needs to focus on learning styles of younger athletes and divide the results into male and female categories. The LSI appears to have been a valid and reliable measure of learning style preference, so this instrument may be used in future studies that address learning style preferences in student athletes.

A research study that is more qualitative might be able to outline the learning style preference of female student-athletes for purposes of creating a more efficient learning environment in the classroom and allowing the student to maximize study time.

Another future direction includes gathering data from many different types of universities and academic institutions. This could include a combination of public and private schools of different sizes, high schools and colleges from different settings, and all levels of competition. By expanding to other settings, it would provide different groups to compare.

Carrier (2009), Dobson (2010), Marley (2007), Orhun (2007), and Williams et al. (1997) all call for more research to be done to determine the relationship between learning style and gender. The current studies are limited and even more so when the variable of athletics is added. There are differences in learning styles of athletes and non-athletes (Chesborough, 2005). Also there are differences in learning styles of male and females (Orhun, 2007). Clearly the next step would be to combine all of these variables. Finally, more studies need to focus on the female athlete from all academic levels. This includes the comparison of female student-athletes to female non-athletes, and the comparison of female student-athletes to male student athletes.

### *Conclusion*

It would be beneficial to both a teacher and a coach to have the knowledge of the learning styles of their student-athletes. The teacher or coach would be more aware of how to present the information in a way that the student-athlete would process and retain the knowledge (Gonzalez-Haro et al., 2010). The student-athlete would be able to take more control of their learning by recognizing the way they learn. The focus in the past was to teach teachers how to teach, the focus has now changed to include teaching the students how to learn.

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APPENDIX A  
DATA COLLECTION INFORMATION

### Learning Styles Data Collection

Alumran, J. A. (2008). Learning Styles in Relation to Gender, Field of Study, and Academic Achievement for Bahraini University Students. *Individual Differences Research*, 6(4), 303-316.

Study	Problem Statement	Subjects	Instruments	Procedures	Findings
Alumran, J. A. (2008). Learning Styles in Relation to Gender, Field of Study, and Academic Achievement for Bahraini University Students. <i>Individual Differences Research</i> , 6(4), 303-316.	This study investigated preferred learning styles of Bahraini university students and the differences in their learning styles according to Gender and Field of Study	877 students (17-30 years) 265 males 610 females  randomly selected from all the academic colleges	Felder and Silverman model because it is comprehensive and has benefitted from the other models  which categorizes learners on a continuum into four dimensions: sensing/intuitive, visual/verbal, active/reflective, and sequential/global  Index of Learning Styles	All the participants completed anonymous self-report questionnaires privately on campus outside of the classroom  psychology majors enrolled in four advanced educational psychology classes  participating students were then instructed by the author and a colleague on how to administer the instrument	Results showed that the total sample preferred the Visual LS and the following learning styles: Active over Reflective; Sensing over Intuitive; Visual over Verbal, and Sequential over global.  there were significant differences in learning styles according to gender and different fields of study  that Visual/ Verbal LS and Sequential/ Global LS were good predictors of student GPA  Males and females were found to have different learning styles

In a study that investigated preferred learning styles of Bahraini university students and the differences in their learning styles according to Gender and Field of Study, it was reported that the total sample preferred the Visual LS and the following learning styles: Active over Reflective; Sensing over Intuitive; Visual over Verbal, and Sequential over global, Males and females were found to have different learning styles, and that Visual/Verbal LS and Sequential/Global LS were good predictors of student GPA, all of which indicates that there were significant differences in learning styles according to gender and different fields of study.



### Learning Styles Data Collection

Chesborough, S. (2005). Do Athletes learn differently? Implications for improving the learning environment for athletes. *Journal of Psychological Type*, 64(4), 31-40.

Study	Problem Statement	Subjects	Instruments	Procedures	Findings
Chesborough, S. (2005). Do Athletes learn differently? Implications for improving the learning environment for athletes. <i>Journal of Psychological Type</i> , 64(4), 31-40.	team-sport scholarship athletes were compared with the general male college student population of their university and a composite sample of male college students to see if there were significant learning style differences between the groups	Seventy male scholarship athletes from football and basketball  White (45.7%) and nonwhite athletes (54.3%). The athletes ranged in age from 18–22	Using their Myers-Briggs Type Indicator® (MBTI®) results, MBTI instrument identifies four aspects of personality that influence how a student learns  Form F (research form) of the MBTI		<p>results showing differential preferences for S, T, and P among the athletes may help dispel the “dumb jock” stereotype often associated with athletes and suggest that many athletes may just learn differently from other college students.</p> <p>scholarship athletes in this study preferred S rather than N The scholarship athletes also strongly preferred T rather than F.</p> <p>Scholarship athletes in this study strongly preferred the P type.</p> <p>Athletes were almost equally divided between Es and Is.</p> <p>athletes, may merely have a different way of learning, and thus require a different learning environment</p>

In a study that investigated whether male, scholarship, team-sport athletes have different learning styles than the general population of male college students, it was reported that scholarship athletes in this study preferred S rather than N, the scholarship athletes also strongly preferred T rather than , scholarship athletes in this study strongly preferred the P type; and athletes were almost equally divided between Es and Is, all of which indicates that athletes may merely have a different way of learning, and thus require a different learning environment.

### Learning Styles Data Collection

Dobson, J.L. (2010). A comparison between learning style preferences and sex, status, and course performance. *Advances in Physiology Education*, 34, 197-204.  
doi:10.1152/advan.00078.2010.

Problem Statement	Sample Information	Context of the study	Learning Styles Identified	Conclusion Draw from Study
<p>The purposes of this investigation were to compare student perceived and assessed SMPs and examine the associations between those SMPs and status (i.e., undergraduates vs. graduates), sex, and course performance.</p> <p>directly compare sensory modality preferences in undergraduate and graduate physiology students because, to the best of the author's knowledge, no such comparison has been made before</p> <p>sensory modality preferences and both sex and academic performance, the author recently conducted an investigation of these issues using a large group of undergraduate human physiology students</p> <p>The goal of the present investigation was to attempt to replicate, and expand on, the results of the previous study</p> <p>one additional goal of this study was to compare the single sensory modality that students felt they preferred to use (i.e., their "perceived" sensory modality preference) with their result on the VARK assessment (i.e., their "assessed" sensory modality preference)</p>	<p>Age of the sample</p> <p>Sample composition</p> <p>There were 64 student respondents: 50 undergraduates and 14 graduates (40 women and 24 men).</p>	<p>Learning tasks</p> <p>Environment</p> <p>Domain of learning</p> <p>cognitive</p>	<p>Students have learning style preferences that are often classified according to their visual (V), aural (A), read-write (R), and/or kinesthetic (K) sensory modality preferences (SMP)</p> <p>According to Fleming, who is a learning style expert and the author of what is likely the most widely used sensory modality preference assessment, there are four major sensory modalities. Those four modalities are visual (V), aural (A), read-write (R), and kinesthetic (K).</p>	<p>When asked to select the single sensory modality they felt they most preferred to use when learning information, 36% of the respondents chose V, 28% chose R, 19% chose K, and 17% chose A.</p> <p>Most women indicated a preference for R learning (35%), followed by V (25%), A (22%), and K (18%), whereas men most preferred V learning (54%), followed by K (21%), R (17%), and A (8%)</p> <p>30% of the respondents preferred a single sensory modality, 22% preferred two modalities, 11% preferred three modalities, and 37% preferred all four sensory modalities</p> <p>59% of the respondents, there was a match between their perceived modality preference and the dominant modality preference indicated by their VARK assessment scores</p> <p>conclusion of the study is that students with K perceived sensory modality preferences tended to perform more poorly in their course</p>

The most significant limitation to this study was the number of participants.

### Learning Styles Data Collection

Gonzalez-Haro, C., Calleja-Gonzalez, J., & Escanero, J. F. (2010). Learning styles favoured by professional, amateur, and recreational athletes in different sports. *Journal of Sports Sciences*, 28(8), 859-866.

Study	Problem Statement	Subjects	Instruments	Procedures	Findings
(Gonzalez-Haro, Calleja-Gonzalez, & Escanero, 2010)	The aim of this study was to characterize the learning styles of different groups of athletes grouped according to level of performance and sport.	Seventy-one male athletes  28 professional, 32 amateur, and 11 recreational Athletes  All athletes played in Spanish sport leagues.	Honey-Alonso Learning Styles Questionnaire, and were also converted into learning styles described by Kolb  The results obtained from the Honey-Alonso Learning Styles Questionnaire were processed to convert them into Kolb learning styles	completed a questionnaire on learning styles at the beginning of the 2008–2009 training season  data collection procedure took place just before all participants began practicing their respective activity	No significant differences were observed in learning styles between different sports and physical activities.  Years of experience did not correlate strongly with learning styles.  With respect to level of performance, the pragmatic component was significantly lower in professional athletes than amateur and recreational athletes

### Learning Styles Data Collection

Hormati, Y., Sadegzadeh, M., Abdollahzadeh, F., & Ghorbanlo, Z. (2012). Comparing the Styles of Confronting Stress in the Athlete or Non- Athlete Girl and Boy Athlete and Non-Athlete Students. *Annals of Biological Research*, 3(1), 451-454.

Problem Statement	Sample Information	Context of the study	Learning Styles Identified	Conclusion Draw from Study
The study is retrospective and the researcher has the intention of determining the probable differences of the styles checking with stress in athlete and non-athlete students, and an investigational plan including two main pilot groups (athlete and non-athlete) and two anthropological groups (girl and boy) containing post-test has been used.	Age of the sample members of at least one of the sport teams of the university; and the employed students at the University of Tabriz in 2006-2007 are non-athletic statistical universe  Sample composition  80 boys and 50 girls as athlete students and 80 boys and 50 girls as non-athlete students were selected randomly	Learning tasks  Stress related tasks  Environment  University  Domain of learning  Affective	Endler and Parker (1990) questionnaire of the styles confronting stress	girl athlete use the problem-oriented method  In this study all of the styles contain emotion-oriented style except one case (non-athlete girls) and the rest is problem-oriented.  athlete and physical activities are effective in lowering stress and checking styles  this study intends determining the styles of confronting stress as a psychological feature and its relationship with participating in sport

In a study that investigated differences of the styles checking with stress in athlete and non-athlete students, it was reported that girl athlete use the problem-oriented method, all of the styles contain emotion-oriented style except one case (non-athlete girls) and the rest is problem-oriented, and athlete and physical activities are effective in lowering stress and checking styles, all of which indicated that dominant style of athlete group is problem-oriented.

### Learning Styles Data Collection

Ku, D., & Chang, C. (2011). The Effect of Academic Discipline and Gender Difference on Taiwanese College Students' Learning Styles and Strategies in Web-Based Learning Environments. *Turkish Online Journal of Educational Technology - TOJET*, 10(3), 265-272.

Problem Statement	Sample Information	Context of the study	Learning Styles Identified	Conclusion Draw from Study
The purpose of this study was to explore students' learning styles in relation to learning strategies in web-based learning environments, and in particular, how academic discipline and gender differences affect learning styles and learning strategies in web-based learning for college students in Taiwan	<p>Age of the sample</p> <p>Their age was 17 to 24 years old (mean of 19, SD=.82).</p> <p>Sample composition : 229 college students from three distance learning courses</p> <p>participants were assembled by the college of liberal arts (N=66), education (N=38), foreign languages (N=33), and management (N=57). 194 students participate to this study, 46 were males (23.7%), and 148 were females (76.3%).</p> <p>A total of 203 questionnaires were retrieved, and the retrieval rate was 88%. After the exclusion of 9 invalid questionnaires, 194 remained for data analysis</p>	<p>Environment</p> <p>Distance learning</p> <p>Domain of learning</p> <p>Cognitive</p>	<p>the Felder and Soloman Index of Learning Styles (ILS) was selected to investigate the correlation of learning styles and web-based learning</p> <p>Based on Felder and Silverman's learning style model, four learning style dimensions, each having two categories: Processing (<i>active/reflective</i>), Perception (<i>sensing/intuitive</i>), Input (<i>visual/verbal</i>), and Understanding (<i>sequential/global</i>) are measured in Felder and Soloman ILS</p> <p>To measure students' learning strategies, the Learning and Study Strategy Inventory (LASSI) (Weinstein, Palmer &amp; Schulte, 1987) was selected. the current study selected four scales from the Chinese version of LASSI, <i>anxiety</i>, <i>attitude</i>, <i>motivation</i>, and <i>information processing</i> to measure and analyze the correlation with learning styles</p>	<p>The result in learning styles showed that the most popular learning style is <i>visual</i> (98.45%, 1a~11a), the second is <i>sensing</i> (70.1%, 1a~11a), and <i>verbal</i> (1.55%, 1b~11b) is the lowest.</p> <p>The results of chi-square testing indicated that there are no statistically significant differences, in the four learning style dimensions, due to gender differences</p> <p>There was a significant effect on gender, <math>t = -2.527</math>, <math>p = .012 &lt; .05</math>, with motivations of females testing higher than male learners. However, the overall learning strategy showed no significant differences between males and females: <math>t = -.589</math>, <math>p = .557 &gt; .05</math>.</p> <p>adapting some related variables, such as instruction methods or satisfaction of instruction, could be further investigated for better understanding of students' learning behaviors in web-based learning environments</p>

In a study that investigated students' learning styles in relation to learning strategies in web-based learning environments, it was reported that there are no statistically significant differences, in the four learning style dimensions, due to gender differences, there was a significant effect on gender,  $t = -2.527$ ,  $p = .012 < .05$ , with motivations of females testing higher than male learners, and the result in learning styles showed that the most popular learning style is *visual* (98.45%, 1a~11a), the second is *sensing* (70.1%, 1a~11a), and *verbal* (1.55%, 1b~11b) is the lowest, all of which indicated that visualized presentation styles such as graphics, charts, and motion pictures are highly preferred and accepted by the majority web learners.

### Learning Styles Data Collection

Kumar, A., Smriti, A., Pratap, S., & Krishnee, G. (2012). An Analysis of Gender Differences in Learning Style Preferences among Medical Students. *Indian Journal of Forensic Medicine & Pathology*, 5(1), 9-16

Problem Statement	Sample Information	Context of the study	Learning Styles Identified	Conclusion Draw from Study
understanding individual learning styles, coaches may be better able to maximize their athletes' performance both in practice and in the game and also address development changes in their players as they mature through adolescences to adulthood	Age of the sample  Sample composition  No sample This is not a study.  Gives info about Learning styles from Kolb	Learning tasks  Environment  Coaching  Domain of learning	Four modes of input are most likely for information processing and should be considered when designing instructional input for practice and game situations. These four are vision, auditory, kinesthesia, and thinking (Braden & Zeitchick, 1991; Kolb. 1985; Semple, 1982; Barbe & Swassing, 1979)	Understanding learning styles and providing appropriate instruction utilizing strategies for each learning style (visual, auditory, kinesthetic, and thinking) can enhance a coach's ability to improve individual and team performance. By paying careful attention to the design of practice and providing opportunities to learn for all types of learners, coaches will increase the likelihood that all of their athletes are striving to their potential

### Learning Styles Data Collection

Marley, J. L. (2007). Gender Differences and Distance Education: Major Research Findings and Implications for LIS Education. *Journal of Education for Library & Information Science*, 48(1), 13-20.

Problem Statement	Sample Information	Context of the study	Learning Styles Identified	Conclusion Draw from Study
<p>This article reviews Representative studies from the disciplines of education and psychology, identifying six factors that gender differences may influence: (1) motivation for enrolling, (2) learning style, (3) attitude toward and use of technology, (4) communication style, (5) level of support/sense of community, and (6) dropout or failure rate.</p> <p><b><i>This article is a synthesis not a research article of its own</i></b></p>	<p>Age of the sample Different for each study All college students Sample composition</p> <p><i>This article has a very descriptive section on how the articles were found</i></p>	<p>Learning tasks  Environment Distance learning settings Domain of learning Cognitive</p>	<p>Depends on the article being discussed</p>	<p>This review of representative studies from the disciplines of education and psychology indicates that gender or gender-identity differences can affect student learning experiences at several different points within a distance education course, beginning with motivation for enrolling, and continuing on through communication styles within the class, use of technology, learning style, and even dropout or failure rates.</p>

### Learning Styles Data Collection

Miller, T. W., Ogilvie, B. C., & Branch, J. (2008). Sport psychology consultation: The influence of gender on learning style. *Consulting Psychology Journal: Practice and Research*, 60(3), 279-285. doi:10.1037/1065-9293.60.3.279

Study	Problem Statement	Subjects	Instruments	Procedures	Findings
(Miller, Ogilvie, & Branch, 2008)	The null hypothesis is that there would be no statistically significant differences between male and female athletes on the LSP. The purpose of this study was to evaluate the influence of learning style on gender of athletes at Division 1 universities and colleges with a standardized measure—the LSP.	348 male athletes and 302 female athletes  All were athletes from NCAA Division 1 universities, and all participated in basketball programs	The Learning Styles Profile (LSP; Ogilvie, Greene, & Baillie, 1997) provides information on how athletes learn new material and can be extremely helpful to the coaching staff in working with each player on the team	Tests given to subjects	learning styles of males and females differed at a statistically significant level on 9 factors athletes prefer less information at a time, a slower rate of change, and a more conservative approach to the game and new learning female athletes' learning preferences and performance attributes significantly distinguish them from male athletes on some factors

In a study that investigated the influence of learning style on gender of athletes at Division 1 universities and colleges, it was reported that learning styles of males and females differed at a statistically significant level on 9 and athletes prefer less information at a time, a slower rate of change, and a more conservative approach to the game and new learning, all of which indicates that female athletes' learning preferences and performance attributes significantly distinguish them from male athletes on some factors.

### Learning Styles Data Collection

Orhun, N. N. (2007). An investigation into the mathematics achievement and attitude towards mathematics with respect to learning style according to gender. *International Journal of Mathematical Education in Science & Technology*, 38(3), 321-333.  
doi:10.1080/00207390601116060

Problem Statement	Sample Information	Context of the study	Learning Styles Identified	Conclusion Draw from Study
<p>This study aimed to investigate whether there is a relationship between gender and learning style, mathematical achievement and attitude towards mathematics.</p> <p>The purpose of the study was to investigate whether mathematical achievement and attitude towards mathematics are dependent on students' preferred learning mode and learning style, according to gender</p>	<p>Age of the sample 5th-semester students from the Mathematics Department at Anadolu University</p>	<p>Learning tasks</p>	<p>concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (AE)</p>	<p>there were differences among learning modes preferred by female and male students, their mathematical achievements, and their attitudes towards mathematics</p>
	<p>Sample composition 42 females, 31 males</p>	<p>Environment University Math Department</p>	<p>The results of learning modes were then combined to classify each student into one of four learning styles: Accommodator, Assimilator, Converger, or Diverger</p>	<p>It was also noticed that while female students most preferred the Convergent learning style; male students most preferred the Assimilator learning style.</p>
	<p>The study involved collecting data from three sources: the Learning Style Inventory (LSI), Grades of Achievements Acquired in Mathematics (MA), and Attitude Towards Mathematics (ATM) Scale</p>	<p>Domain of learning Cognitive</p>	<p>The attitude towards mathematics was measured by the Attitude Towards Mathematics Scale (ATM) developed by As_kar</p>	<p>Mathematics achievement and attitude towards mathematics were not, themselves, dependent on gender. female students mostly preferred the Converger learning style</p>
	<p>Learning Style Inventory (LSI) developed and revised by Kolb</p>		<p>Grades of achievements acquired in mathematics (MA) is defined by the grade point average at the end of the 2002 academic year.</p>	<p>male students mostly preferred the Assimilator learning style</p> <p>Diverger was the least preferred style, by both female and male students</p>

In a study that investigated whether mathematical achievement and attitude towards mathematics are dependent on students' preferred learning mode and learning style, according to gender, it was reported that it was also noticed that while female students most preferred the Convergent learning style, male students most preferred the Assimilator learning style, all of which indicated that female students and male students have different learning styles.

### Learning Styles Data Collection

Ramayah, M., Sivanandan, P., Nasrijal, N., Letchumanan, T., & Lim Chee, L. (2009). Preferred learning style: Gender influence on preferred learning style among business students. *Journal of US-China Public Administration*, 6(4), 65-78.

Problem Statement	Sample Information	Context of the study	Learning Styles Identified	Conclusion Draw from Study
The purpose of this study is to determine the influence of gender on the learning style preferences of business students based on the VARK learning style survey	Age of the sample	Learning tasks	VARK (Fleming, 2002b) learning style survey, consisting of the V(visual), A(aural), R(read-Write) and K(kinesthetic) learning styles	study found that gender only influences the V(visual) and A(aural) learning styles of business students
	17-18 years - 139	Environment		
	19-20 years - 196			
	21-22 years – 57			
23 and above - 13	Business School	Our study setting is non-contrived as the researchers used present classroom setting without making any changes to serve the purpose of the study	female students were found to demonstrate slightly higher preference for the V(visual) and A(aural) learning styles as compared to the male students	
Fail to reveal - 1				
Sample composition	207 male students and 199 female students from the business school	Domain of learning	The results illustrate that gender influences the V(visual) and A(aural) learning styles of business students. In general both male and female students prefer aural learning style which indicates that the traditional teaching method is still preferred by undergraduate students of the business school	
		Cognitive		

In a study that investigated the influence of gender on the learning style preferences of business students based on the VARK learning style survey, it was reported that gender only influences the V(visual) and A(aural) learning styles of business students and female students were found to demonstrate slightly higher preference for the V(visual) and A(aural) learning styles as compared to the male students, all of which indicated that gender influences the V(visual) and A(aural) learning styles of business students. In general both male and female students prefer aural learning style which indicates that the traditional teaching method is still preferred by undergraduate students of the business school.

### Learning Styles Data Collection

Slater, J. A., Lujan, H. L., & DiCarlo, S. E. (2007). Does Gender Influence Learning Style Preferences of First-Year Medical Students?. *Advances in Physiology Education*, 31(4), 336-342.

Problem Statement	Sample Information	Context of the study	Learning Styles Identified	Conclusion Draw from Study
We were interested in developing teaching approaches to address the learning needs of all of our medical students, male and female. To better understand our learners and their learning style characteristics, and to assist in the development of teaching strategies that will maximize motivation and learning for students of both genders	Age of the sample  Sample composition 53 females, 41 males, and 3 unspecified  97 participants	Learning tasks  Environment  College  Domain of learning  Cognitive	visual, auditory, reading/writing, kinesthetic (VARK) learning preferences questionnaire	This study revealed gender differences in preferred methods of information delivery and suggests that the female student population is more diverse than the male population, encompassing a broader range of sensory modality preferences. Instructors need to be cognizant of these differences and broaden their range of presentation styles accordingly to be an effective educator.

### Learning Styles Data Collection

Williams, L. T., Anshel, M. H., & Quek, J. J. (1997). Cognitive style in adolescent competitive athletes as a function of culture and gender. *Journal of Sport Behavior*, 20(2), 232-246.

Study	Problem Statement	Subjects	Instruments	Procedures	Findings
Williams, L. T., Anshel, M. H., & Quek, J. J. (1997).	The purpose of this study was to examine the efficacy of cognitive style in sport as a function of two dimensions and six sub-dimensions, each derived from the extant literature. Primary dimensions were internal and external	Subjects (N=973) were competitive Australian athletes (N=395; 186 females and 209 males), New Zealand (N=167; 98 females and 69 males), and Singapore (N=411; 246 females and 165 males), ages 11 to 17 yrs	created by authors	Test given to participants	The results indicate that cognitive style in competitive sport settings is partially dependent on gender and culture, but that more similarities than differences exist between cultures and genders on the cognitive style measures depicted in this study, at least among adolescent-aged athletes

### Learning Styles Data Collection

Zeyer, A., & Wolf, S. (2010). Is There a Relationship between Brain Type, Sex and Motivation to Learn Science?. *International Journal of Science Education*, 32(16), 2217-2233.

Problem Statement	Sample Information	Context of the study	Learning Styles Identified	Conclusion Draw from Study
<p>Our research hypothesis was that there is an influence of one's brain type on the motivation to learn science, but that in a mixed group of students there is no influence of sex on this motivation.</p> <p>The research questions of our study therefore were twofold:            (1) Can we find an influence of sex on the motivation to learn science in a mixed group of science and non-science students?            (2) Can we find an impact of the brain type on this motivation in the same group of students?</p>	<p>Age of the sample : from 15 to 20 years old</p> <p>Sample composition</p> <p>77 upper secondary students (43 women and 33 men)            28 science students and 49 non-science students</p> <p>27 of our students were specialized in music studies (35.1%), 23 in biology /chemistry (29.9%), 17 in modern languages (22.1), five in mathematics /physics (6.5%), four in ancient languages (5.2%), and one in pedagogy /psychology/ philosophy (1.3%). If we summarize students specialized in mathematics/ physics or in biology /chemistry under the label of 'science', and the other ones under the label of 'non-science', then we can specify 28 science students (36.4%) and 49 non-science students (63.3%).</p>	<p>Learning tasks</p> <p>Environment</p> <p>at a science learning centre of a university in Switzerland</p> <p>Domain of learning</p> <p>Cognitive</p>	<p>The concept of brain type is reminiscent of the theory of cognitive styles in quite some aspects. In fact, Billington et al. (2007) sometimes call E (empathizing) and S (systemizing) 'cognitive styles'.</p> <p>In Part A of our questionnaire, we used the German version of the SQ and the EQ questionnaire by Baron-Cohen (2004). Both the SQ and the EQ questionnaire are 60-item, forced choice format, containing 40 cognitive style items and 20 control items.</p> <p>In Part B of the questionnaire, we asked students to respond to the 30 items of the SMQ (Glynn &amp; Koballa, 2006). SMQ: intrinsic motivation, extrinsic motivation, personal relevance, and self-efficacy students with a systemizing brain type tend to learn science more for its own sake, and also more as a means to certain ends, than more empathizing ones do</p>	<p>The SMQ of the male students is higher than the SMQ of the female students            The sex difference is not significant            The female students have a higher EQ than the male students            SQ of the male students is higher than the SQ of the female students</p> <p>the brain type of the female students on average is negative, that is on the empathizing side, whilst the brain type of the male students on average is positive, that is on the systemizing side</p> <p>data did not show a significant sex difference in motivation to learn science, neither for the whole sample nor for only the science students</p>

In a study that investigated that there is an influence of one's brain type on the motivation to learn science, it was reported that The SMQ of the male students is higher than the SMQ of the female students, the female students have a higher EQ than the male students, and SQ of the male students is higher than the SQ of the female students, all of which indicated that data did not show a significant sex difference in motivation to learn science. Limitation to the study is the small sample size.

APPENDIX B  
RESULTS SUMMARY CHART

## Results Summary

Pictures	Hearing/Speaking	Experience	Words	Subject	Study
			M	Athletes	Chesborough, 2005
	M	M		Athletes	Gonzalez-Haro et al., 2010
M/F		M/F		Athletes	Miller et al., 2008
M/F	M/F			Athletes	Williams & Anshel, 2000
M/F				Non-Athletes	Alumran, 2008
		M	F M	Non-Athletes	Dobson, 2010
M/F				Non-Athletes	Ku & Chang, 2011
F			M	Non-Athletes	Kumar et al., 2012
M		F	F M	Non-Athletes	Orhun, 2007
M/F F	M/F		F	Non-Athletes	Prajapati, 2010
F	F M		M	Non-Athletes	Ramayah et al., 2009
		F M		Non-Athletes	Slater et al, 2007
M/F		M/F	M/F	Non-Athletes	Tumkaya, 2012