

The Consistency of Learning Styles of Selected Undergraduate Sport Management Majors using Two Different Instruments

By Tim Robinson*

It was the ultimate purpose of this study to advance the breadth and depth of pedagogical knowledge concerning undergraduate sport management majors and their learning. More specifically, and for this study, the prime research question was: Do selected undergraduate sport management majors display consistency of preferred learning styles across institutions of varying Carnegie classifications and geographical boundaries? A testable null hypothesis was stated, H_0 : there will be no significant difference in learning style preference between sport management students at the University of New England (UNE), Cleveland State University (CSU), and California University of Pennsylvania (Cal U) as measured by Kolb's LSI 3.1 and Fleming's VARK inventories. Two hundred and twelve students participated ($N = 212$). Secondary data were gathered and assessments were conducted. Descriptive statistics and chi-square tests were used to evaluate significance across five measures. Data analysis revealed inconsistency of learning style preference across four of the five measures evaluated. In one measure, the VARK analysis, a trend toward consistency of learning style was observed with regard to the perception of environmental information, however, this tendency was not reflected by evaluation of Kolb's perceiving dimension. As might be expected of sport management majors, additional findings indicated a higher than normal frequency of Kinesthetic learners (42%) compared to Fleming's 4-year college VARK database (22%). This trend indicates the appropriateness and value of incorporating guest lectures, demonstrations, model construction, field trips, role playing, and other experiential learning activities into the sport management curriculum.

Keywords: *Experiential Learning, Sport Management, Learning Styles, Pedagogy, Learning Preferences.*

Introduction

In 2010, West reported that higher education is currently in a state of marked transition with two related forces prompting that change. The first is the ever-increasing popularity of distance education and the transition from the traditional classroom to an Internet-based class format. The second is the move from a teacher-centered learning paradigm (the didactic, lecture-based format where the emphasis is on dissemination of information) to a learner-centered paradigm or constructivist model (one in which the emphasis is placed on the learner constructing knowledge while the teacher acts as a facilitator or guide) (West

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2010: 1). West (2010: 128) reports that the increased attention to students needs will assist instructors in becoming a *guide on the side* instead of a *sage on the stage* in perpetuating a learner-centered environment. Remarkably, these two forces are creating a synergistic effect as the tremendous growth in Internet-based distance education has prompted educational research to focus on learner characteristics (Hills 2003, Kahn 2005). One characteristic of learners has been defined as learning style or learning style preference.

As defined by the HayGroup (as cited by West 2010: 70), learning style is simply a preferred way of learning, while Dunn (2000: 10) explains that, “a learning style is a biologically and developmentally determined set of personal characteristics that make identical instruction effective for one person and not another”. Dunn and Griggs (1998: 30) claimed that, “every individual has the capability to learn, regardless of academic aptitude; however each individual learns in a different manner”.

Neil Fleming is a teacher, educator, and instructor from New Zealand. He defines learning style as, “an individual’s characteristics and preferred ways of gathering, organizing, and thinking about information” (Fleming 2001: 1). His popular model and assessment tool *The VARK Inventory* is based on the preferred or dominant sense learners use to acquire information about their environment. His model acknowledges the use of the three senses (*Visual, Aural, and Kinesthetic*) in learning, and the fourth construct of *Read/Write*. According to Coffield et al. (2004: 1):

There is a strong intuitive appeal in the idea that teachers and course designers should pay closer attention to students’ learning styles-by diagnosing them, by encouraging students to reflect on them and by designing teaching and learning interventions around them.

This construct, the matching of instruction to fit the preferred learning style of the learner has come to be known as the *Meshing Hypothesis* (Pashler et al. 2008). For example and according to the Meshing Hypothesis, a visual learner would prefer class activities utilizing charts and diagrams, while the aural learner would prefer debate and discussion.

Consistent with and supportive of the Meshing Hypothesis is the work by Gardner (2011) who in his book *Frames of Mind* posits that intelligence should not be viewed as a single generalized ability, but a range of separate capacities. Additionally, Gardner suggests that traditional education caters nearly exclusively to linguistic and mathematical intelligences. His theory of *Multiple Intelligences* differentiates intelligence into seven (now eight or possibly nine) separate modalities. According to Gardner (2011), there are mathematical/logical, intrapersonal, interpersonal, musical, spatial, linguistic, naturalistic, kinesthetic, and possibly existential intelligences. Subsequently, Gardner (2011: xvi) suggests:

An educator convinced of the relevance of Multiple Intelligence Theory should individualize and pluralize. By individualizing, I mean the educator should know as much as possible about the intelligence profile of each student for whom he has responsibility; and, to the extent possible, the educator should teach and assess in

ways that bring out that child's capacities. By pluralizing I mean the educator should decide which topics, concepts, and ideas, are of greatest importance and then should present them in a variety of ways.

Peters, Peters, and Jones (2008) concede that very few recent investigations address the issue of learning styles in the sport-related disciplines of exercise science, coaching science, sport and leisure management, or outdoor recreation management. "Indeed, the research that has been published examining learning styles research in sport management programs is either dated or focused solely on physical education. . ." (Peters et al. 2008: 157).

Review of Literature

A complete review of learning style theories would easily exhaust the space limitations allotted for in this journal. Consequently, this paper will limit its review of literature to a brief history of learning style theory and related constructs, and to the two theorist and theories whose instruments were utilized in the study. Should any reader require further examination a thorough investigation on learning style theory has been offered by Coffield et al. (2004).

Coaches of athletes and instructors of sport management majors may have noticed that students differ in the ways they perceive and process information. According to Anderson (2014: par. 1), "Accounting for individual learning styles is not a new idea. As early as 334 BC Aristotle said that, 'each child possesses specific talents and skills' and he noticed individual differences in young children". In the early 1900s educational leaders and researchers displayed a passing interest in personality theories and learning style classifications. However, due to interest in student academic achievement and the rising popularity of the Intelligence Quotient (IQ) test, this interest was short-lived (Anderson 2014: par. 2).

In 1927, Carl Gustav Jung took note of personality differences in the way people perceive information, make decisions, and interact (Silver et al. 1997 par. 6). Jung theorized that individuals perceive and utilize information in different ways; constructs he termed *perception* and *judgment* (Silver et al. 1997: par. 9).

Jung's model distinguished between those individuals who process sensory information in serial fashion, utilizing one sense at a time, from those who process in parallel and incorporate data simultaneously from multiple senses. Jung's theory also accounts for what individuals do with sensory information once it is internalized, a process he termed *judgment* (Myers & Briggs Foundation 2014: par. 9). Two categories of *judgers* were conceived, those who make decisions based on their heart (i.e., *feelers*), and those who make decisions based on reason (i.e., *thinkers*) (Myers & Briggs Foundation 2014: par. 8).

During the Second World War Jung's contributions underpinned the work of Katherine Cook-Briggs and daughter Isabel Briggs-Myers, who developed the Myers-Briggs Type Indicator (MBTI) (Silver et al. 1997: 22). The MBTI utilized most of Jung's typology and terminology, albeit redefining some of Jung's terms and categories. According to the Myers and Briggs Foundation (2014: par. 4), the MBTI contains Jung's four dichotomous categories describing individual

preferences in the perception and processing of sensory information. The categories are: (a) *thinkers-feelers*, (b) *sensors-intuitors*, (c) *perceivers-judgers*, and (d) Jung's implicit fourth category of *introversion* and *extroversion*. This scheme allows for 16 possible combinations of temperament (e.g., an *extroverted, intuitive, feeling, and judging* personality would be ENFJ, while an *introverted, sensing, thinking, and perceiving* typology would be ISTP). Each of these personality types has been matched to corresponding professions that allegedly demand these characteristics in their application (e.g., ENFJ's are supposedly quality educators, while ISTP's make fine architects) (The Myers & Briggs Foundation 2014: par. 9).

By 2004, Coffield et al. identified no less than 71 learning style models, typologies, taxonomies, and theories (Coffield et al. 2004: 2).

Gender Differences in Learning Styles

A review of literature concerning gender differences of learning styles reveals mixed results. In 2012, Thon et al. evaluated and compared learning style preferences of both graduate and undergraduate athletic training students via the Marshall and Merrit student learning style questionnaire, a derivative of Kolb's LSI. Of the 498 students examined 75% (n = 373) were found to be Divergent, while no significant differences existed between males and females or undergraduate and graduate status. To the contrary, Shunk-Perkins (2010) posited that freshmen student-athletes at a NCAA Division I southern university would prefer an active approach to learning. She investigated learner preferences across four dimensions (i.e., *active-reflective, sensing-intuitive, visual-verbal, and sequential-global*). In addition, she queried: (a) whether or not there were differences in learning style preferences between male and female freshmen student-athletes, (b) whether or not there were differences in learning style preferences between student-athletes who participate in team sports compared to those who participate in individual sports, and (c) whether or not there was an interactive effect between gender, type of sport (individual or team), and preferred learning style. In contrast to her original premise, empirical data revealed that the student-athletes she studied exhibited a well-balanced range of preferred learning styles across all four dimensions. More specifically, and with respect to the active-reflective dimension, 21 showed an active preference, 92 showed a balanced preference, and 92 showed a reflective preference. Additionally, the study supported the findings:

- that males and females generally learn differently,
- that there was no significant difference concerning learning style preference between those who participated in individual or team sports, and
- the fact that particular fields of study or professions favor a particular learning style.

The VARK Model

Neil Fleming is a teacher, educator, and instructor from New Zealand. He defines learning style as, "an individual's characteristics and preferred ways of

gathering, organizing, and thinking about information” (Fleming 2001: 1). His model concerns instructional preferences because it deals with perceptual modes. VARK is an acronym for the *Visual* (V), *Aural* (A), *Read/Write* (R), and *Kinesthetic* (K) preferences for learning. Dunn (2003) reports, “that primary perceptual modes are those ways that learners prefer for quickly taking in new knowledge. Secondary and tertiary perceptual modes are those ways that learners use to enhance or strengthen existing knowledge” (p.30). According to Fleming (2001), “about 41% of the population who have taken the instrument online have single style preferences, 27% two style preferences, 9% three style preferences, and 21% have a preference for all four styles” (Hawk and Shaw 2007: 7). The VARK addresses all the senses with the exception of taste and smell.

The VARK inventory is composed of 13 statements that describe a situation and asks the participant to pick one or more of three or four actions that the respondent would take. Each action corresponds to a particular learning style preference (Hawk and Shaw 2007: 6). It is available free and online at www.vark-learn.com. The VARK questionnaire is self-administered, self-scored, and self-interpreted with scores for each category of learning preference ranging from 13 to 48. According to Hawk and Shaw (2007: 7):

Visual learners prefer maps, charts, graphs, diagrams, and brochures, flow charts, highlighters, different colors, pictures, word pictures, and different spatial arrangements. Aural learners like to explain new ideas to others, discuss topics with other students and their teachers, use a tape recorder; attend lectures and discussion groups, and use stories and jokes. Read/Write learners prefer lists, essays, reports, textbooks, definitions, printed handouts, readings, manuals, Web- pages, and taking notes. Kinesthetic learners like field trips, trial and error, doing things to understand them, laboratories, recipes and solutions to problems, hands-on approaches, using their senses, and collections of samples.

Table 1 contains suggested learning activities intended to match the VARK learning preferences.

Table 1. Learning Activities matched with VARK Modalities

Visual	Aural	Read/Write	Kinesthetic
Diagrams	Debates	Books	Real Life Examples
Graphs	Arguments	Texts	Guest Lectures
Colors	Discussions	Handouts	Demonstrations
Charts	Conversations	Reading	Physical Activity
Written Text	Audio Tapes	Written Feedback	Constructing
Spatial	Video and Audio	Note Taking	Models
Arrangements	Seminars	Essays	Role Playing
Fonts	Music	Multiple Choice	
Designs		Bibliographies	

Source: Kolb (1984).

Kolb's Experiential Learning Model

David Kolb was a professor emeritus of organizational behavior at Case Western Reserve University in Cleveland, Ohio and is widely recognized for his

groundbreaking publication *Experiential Learning: Experience as the Source of Learning Development*. Kolb (1984: 26) defines learning as the “process whereby knowledge is created through the transformation of experience”. Kolb (1999) also claimed “that an appreciation of differing learning styles can help people to work more effectively in teams, resolve conflict, communicate at work and at home, and choose careers” (Coffield et al. 2004: 60).

According to HayGroup (2005), in 1975, David Kolb, along with Roger Fry, developed one of the most influential and popular learning style theories. Kolb’s (1976, 1981, 1984) Experiential Learning Theory (ELT) was based on the previous work of John Dewey, Kurt Lewin, and Jean Piaget. Referring to Kolb, West (2010: 31) noted, “Piaget was influential with theories of cognitive development and the tradition of experiential learning”. “Piaget’s theory describes how intelligence is shaped by experience . . . [and] arises as a product of the interaction between the person and his/her environment” (Kolb 1984: 12). John Dewey also influenced Kolb’s work in the realm of higher education and the process that links education, work, and personal development (West 2010: 31). Dewey believed there was an “intimate and necessary relation between the processes of actual experience and education” (Dewey 1938 as cited in Kolb 1984: 20). Kurt Lewin impacted Kolb by discussing experiential learning in the environment of training and organizational development (HayGroup 2005: 2).

Kolb’s model of underlying structure of the learning process is based on research in psychology, philosophy, and physiology. It stems from the work of the Russian cognitive theorist L.S. Vygotsky, who supported the notion that human development occurs from the process of learning from experience. (HayGroup 2005: 2). According to Kolb (1984):

Learning is the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping information and transforming it...learning, and therefore knowing, requires both a grasp or figurative representation of experience and some transformation of that representation. (Kolb 1984: 41-42)

West (2010) explained that in Kolb’s view, (a) learning is a process of adaptation as opposed to an emphasis on content or outcomes, and that (b) the acquisition of knowledge be viewed as a transformational process, knowledge being continuously created and recreated, not an independent entity to be acquired or transmitted, (c) learning transforms experience in both its objective and subjective forms, and (d) to understand learning we must understand the nature of knowledge and vice versa (Kolb 1984: 38). Kolb’s Experiential Learning Theory (1984) stresses the role of experience in learning.

Kolb’s Experiential Learning Model (ELM) proposes that learning is a two-step process. The first process is that of perceiving, inputting, or collecting of information, and the second is the processing or internalization of that information. Kolb proposes that the perceiving of environmental information is done in an autonomic fashion relying heavily on either intuitive information (feeling) or rationally received data (thinking). Additionally, he posits that the processing of this information occurs by either doing or watching. Further, he suggests that

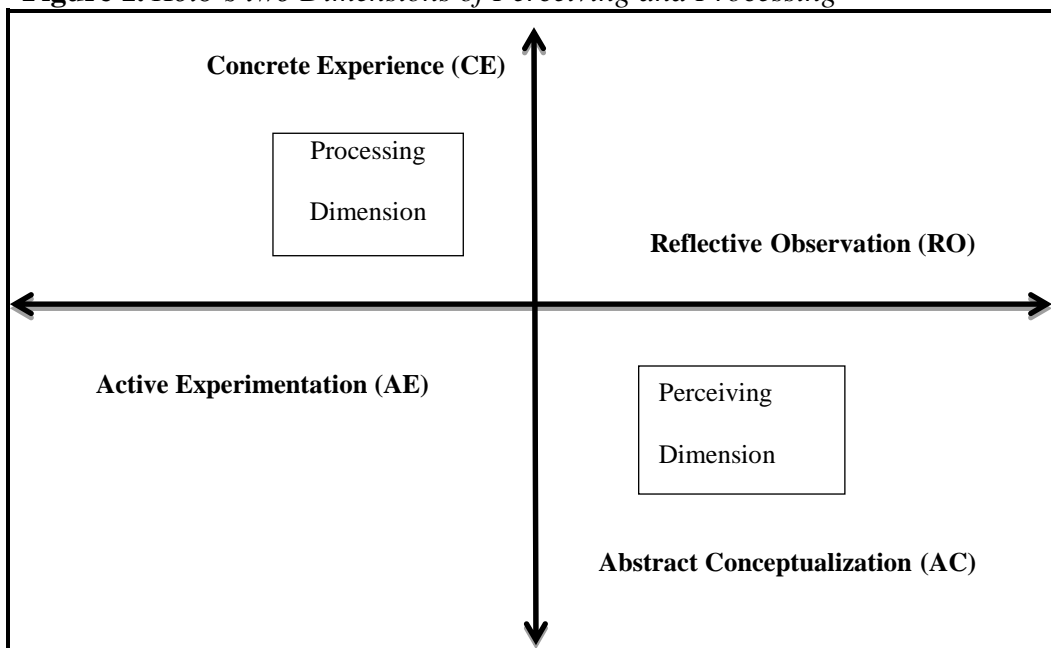
learners have a natural inclination or preference in both the way they perceive information and the way they process it.

Kolb labeled the dichotomous poles of the perceiving continuum as Concrete Experience (CE) at one end, and Abstract Conceptualization (AC) at the other end; while suggesting that the processing of information can occur predominantly through Active Experimentation (AE) or Reflective Observation (RO). Figure 1 is an illustration of Kolb's two dimensions.

According to Cassidy (2004: 430), "The four learning dispositions form two orthogonal bipolar dimensions of learning".

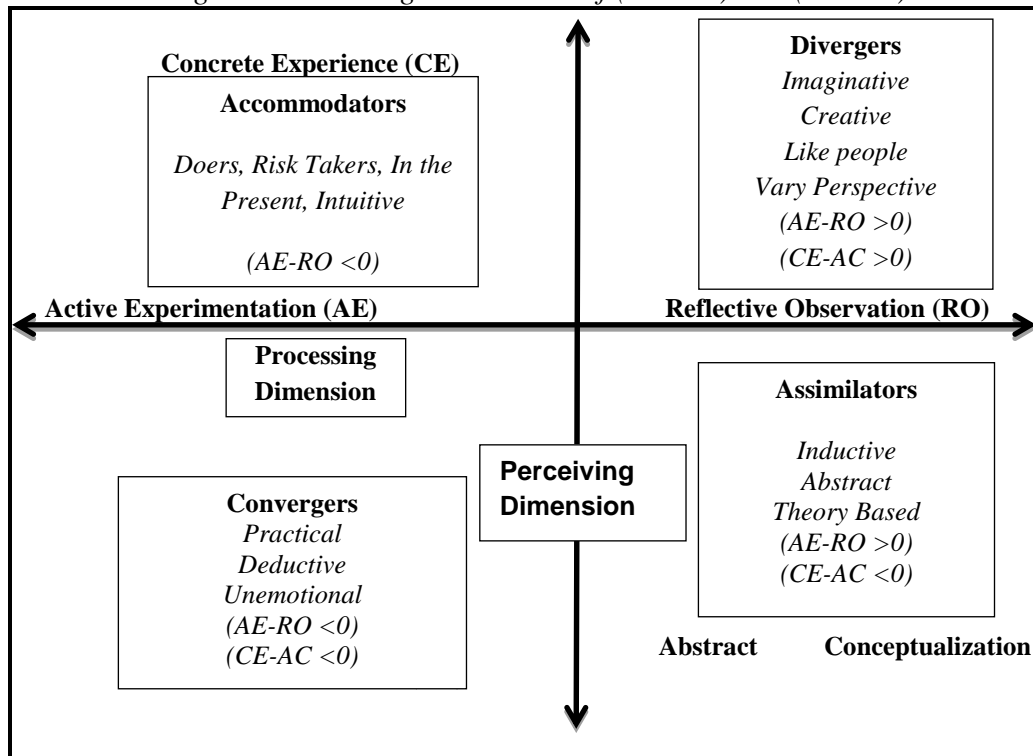
Kolb envisions experiential learning as a cyclical process, one in which the learner may grasp information from the environment through the senses (concrete experience [CE]), filter information through reflective observation (RO), and analyze by abstract conceptualization (AC) or active experimentation (AE) (Hawk and Shaw 2007: 3). According to Kolb the learning cycle is continuous and the learner may enter the cycle at any point along the continuum although a learner's *preferred learning style* may predict point of entry and prominence concerning the use of that learning disposition (Coffield et al. 2004: 60). Figure 2 is an illustration of Kolb's model where individual learning styles result from a combination of two adjacent dispositions or modes (Hawk and Shaw 2007: 3).

Figure 1. Kolb's two Dimensions of Perceiving and Processing



Source: Author.

Figure 2. Kolb's Ultimate Learning Style Categories and Their Relationship to the Perceiving and Processing Dimensions of (AE-RO) and (CE-AC)



Source: Author.

For example the dispositions (RO and AC) combine to form the *Assimilator* learning style, while (AC and AE) form the *Converger*, (AC and CE) the *Accommodator*, whereas (CE and RO) form the *Diverger* type. Hawk and Shaw (2007: 4) further explain Kolb's model:

Divergers have a strong imaginative ability, are good at seeing things from different perspectives, are creative, and work well with people. Assimilators have abilities to create theoretical models, prefer inductive reasoning, and would rather deal with abstract ideas. Convergents have a strong practical orientation, are generally deductive in their thinking, and tend to be unemotional. Accommodators like doing things, are risk takers, are in the here and now, and solve problems intuitively.

The Learning Style Inventory

This study utilized Kolb's Learning Style Inventory (LSI) 3.1 developed in (1976) and revised in 1984, 1999, and 2005 as one of the psychometric instruments used for the assessment of learning styles in sport management students. The LSI is a 12-question instrument incorporating a forced-choice ranking method to assess an individual's preferred mode of learning (i.e., AC, CE, AE, and RO) (Coffield et al. 2004: 64). It is described by Mainemelis, Boyatzis, and Kolb (2002: 8) in the following way:

Individuals are asked to complete 12 sentences that describe learning. Each sentence (e.g., I learn best from?) has four endings (AC = rational theories, CE = personal relationships, AE = a chance to try out and practice, and RO = observation). Individuals rank the endings to what best describes the way they learn (i.e., 4 = most like you, 1 = least like you). Four scores AC, CE, AE, and RO measure an individual's relative preference for one pole or the other of the model.

According to Coffield et al. (2004: 64) Kolb does not view a learning style as a fixed trait or as something that is used for individual selection purposes. Kolb states, "For this reason we do not refer to the LSI as a test but rather as an experience in understanding how you learn" (Kolb as quoted by Delahoussaye 2002: 30). Additionally, according to Kolb (1981: 290-291):

When it is used in the simple, straightforward, and open way intended, the LSI usually provides an interesting self-examination and discussion that recognizes the uniqueness, complexity, and variability in individual approaches to learning. The danger lies in the reification of learning styles into fixed traits, such that learning styles become stereotypes used to pigeonhole individuals and their behavior.

West (2010: 38) explains that the LSI's use has been primarily limited to educational, management, and medical settings where it has been used for a variety of training purposes. In the educational realm the LSI has benefited both instructors and students. Learners gain an understanding of the learning process and their preferences for differing educational activities, while instructors have an opportunity to design corresponding educational experiences. "The LSI has been especially useful when used by teachers and learners to develop a shared understanding of the educational venture and the contributions to it of both parties" (HayGroup 2005: 2). Numerous classroom activities have been suggested to accommodate diverse learning styles (see Table 2).

Table 2. *Matching of Classroom Activities and Kolb's Learning Dimensions*

Concrete Experience	Reflective Observation	Abstract Conceptualization	Active Experimentation
Lecture Examples Problem Sets Readings Films Simulations Laboratories Observation Field Work	Thought Brainstorming Discussions Logs Questions Personal Journals	Lecture Papers Analogies Text Readings Projects Model Building Model Critique	Lecture Examples Laboratories Case Studies Homework Projects Fieldwork

Source: Kolb (1984).

LSI's Validity, Reliability, and Popularity

Numerous studies have tested the validity and reliability of experiential learning theory (and its assessment via the LSI) with about half of the research

supporting the test-retest reliability and validity of the LSI (Coffield et al. 2004: 64). It should be noted that test-retest reliability did improve over the years when successive versions of the instrument were introduced. "This caused one set of critics Veres et al. (1991) to detract their initial opinion when the question endings of the LSI were reordered to eliminate potential response bias" (as cited in Coffield et al. 2004: 149). Hawk and Shaw (2007) offered solid support for the validity and reliability of the LSI (along with the PEPS and RASI inventories) although no empirical evidence was tendered.

A more serious criticism of the LSI was levied by De Ciantis and Kirton (1996: 816) citing two substantial weaknesses with the instrument. First, they argued that Kolb (via the LSI) is attempting to assess three unrelated aspects of cognition: process, level, and style. By *process*, they mean the four discrete stages of the learning cycle through which the learners pass; by *level*, the ability to perform well or poorly at any of the four stages; and by *style*, the manner in which each stage in the learning process is approached and operationalized (De Ciantis and Kirton 1996: 817). They concluded that each stage can be accomplished in a range of styles and at a range of levels and that the separation of these three elements (style, process, and level) is a significant advance in the precision of Kolb's Model and his conflation of styles, abilities, and stages (De Ciantis and Kirton 1996: 817).

Despite the controversy surrounding the LSI, there can be no doubt as to its popularity. "In 2000, Kolb produced a bibliography of research on his Experiential Learning Theory and the LSI which contains details of 1004 studies" (Coffield et al. 2004: 65). This included 430 in the field of education, 207 in management, 104 in computer studies, 101 in psychology, and 72 in medicine.

Methodology

Statement of the Problem

It was the ultimate purpose of this study to advance the breadth and depth of pedagogical knowledge concerning undergraduate sport management majors and their learning. More specifically, and for this study, the prime research question was: Do selected undergraduate sport management majors display consistency of preferred learning styles across institutions of varying Carnegie classifications and geographical boundaries? A testable null hypothesis was stated, H_0 : There will be no significant difference in learning style preference between sport management students at the University of New England (UNE), Cleveland State University (CSU), and California University of Pennsylvania (Cal U) as measured by Kolb's LSI 3.1 and Fleming's VARK inventories. Subjects were selected ($N = 212$), and secondary data gathered ($N = 101$) from a previous study (West 2010) and Neil Fleming's VARK database.

Research Questions

Once permission was obtained and the appropriate instruments were selected the following sub-problems were addressed:

1. What is the prevalence of Accommodating, Assimilating, Converging, and Diverging learning preferences, as assessed by the Kolb LSI 3.1, in sport management majors at the CSU, UNE, and Cal U?
2. What is the prevalence of Visual, Aural, Read/Write, and Kinesthetic preferred learning modalities as measured by Neil Fleming's VARK in sport management majors at UNE and CSU?
3. Do chi-square (χ^2) evaluations of Kolb LSI 3.1 sport management student learning preferences between (Cal U and CSU) and (Cal U and UNE) reveal statistically significant differences?
4. Do chi-square (χ^2) evaluations of Kolb LSI 3.1 sport management student learning preferences between Cal U and (UNE and CSU data combined) reveal statistically significant differences?
5. Do descriptive statistics of VARK comparisons among UNE, CSU, and the VARK databases indicate any statistical trends?

If indeed sport management majors from varying institutions exhibit statistically similar learning style profiles, guarded inferences may be drawn concerning generalization of results, and possible classroom activities that may be most meaningful for all sport management majors. On the contrary, and if significant statistically differences exist, further evidence will be presented in support of the individualization and pluralization of instruction to these sport management majors.

The Carnegie Classification of Institutions of Higher Education

The Carnegie Classification is the framework for classifying colleges and universities in the United States. Created in 1970, it is named after and was originally created by the Carnegie Foundation for the Advancement of Teaching, but responsibility for the Carnegie Classification was transferred to Indiana University's Center for Postsecondary Research, in 2014. Table 3 compares some potentially meaningful group variables as defined by the Carnegie Classification system.

Table 3. A Comparison of Carnegie Classification Variables Between the University of New England, Cleveland State University and California University of Pennsylvania

	CSU	UNE	Cal U
Control	Public	Private (Non-profit)	Public
Population	16,216	4,493	9,400
Setting	Urban	Suburban	Suburban
Undergraduate Graduate Profile	Mostly Full-time, 4 year, Inclusive	Primarily Full-time, 4-year, Selective	Full-time, Selective
Living Arrangements	Non-Residential	Residential	Residential

Ex Post Facto Research

Groves (n.d.: 7) explained that there are three types of ex post facto research: research that is concerned with the exploration of causes; that which is concerned with the exploration of effects; and that which is concerned with the exploration of consequences.

In this investigation the independent variable is the cause and it is a predetermined and hence a stable factor (i.e., selection and attendance in a specific sport management program at a specific university), and the effect (dependent variable) is the group variation or consistency of participant scores on learning style assessments (Kolb's LSI 3.1 and Fleming's VARK). This study explored this cause and effect relationship. According to Goes and Simon (2013: 14):

Ex post facto research is an ideal method for conducting social research when it is not possible or acceptable to manipulate the characteristics of human participants. It is a substitute for true experimental research and can be used to test a hypothesis about cause and effect, where it is either not practical or ethical to apply a true experimental or quasi-experimental research design. Ex post facto research, then, is a method of teasing out possible antecedents of events that have happened, but cannot be manipulated by the investigator.

Despite studying facts that have already occurred, ex post facto research shares with experimental research some of the basic logic of inquiry, for example:

Attempts are made to explain a consequence based on an antecedent condition; to determine the influence of one variable on another variable; and test a claim using statistical hypothesis testing techniques. Ex post facto research uses data already collected but not necessarily amassed for research purposes. Ex post facto literally means from what is done afterward. Ex post facto research can be viewed as experimental research in reverse. (Goes and Simon 2013: 1-2)

Cohen et al. (2000: 123) noted that instead of taking groups that are equivalent and subjecting them to different treatments to determine differences in the dependent variables, an ex post facto experiment begins with groups that are already different in some respect, and searches in retrospect for factors that

brought about those differences in the dependent variables. In this way, ex post facto research transforms a non-experimental design into a pseudo-experimental design.

The Research Design

This investigation was largely quantitative in nature and utilized an ex post facto research design. The independent variable for this study was enrollment in either the CSU, UNE, or Cal U undergraduate sport management program. The dependent variable was learning style preference as assessed by the Kolb LSI 3.1 or Fleming's VARK. Primary data, assessed by the LSI 3.1 and VARK, were collected from CSU in the spring of 2016, and from UNE in the spring of 2016. Secondary LSI 3.1 data was available from Cal U and provided by permission from West (2010). Figure 3 illustrates the research design.

Figure 3. *Symbolic Illustration of the Research Design*

N (Cal U)	T ₁	O _{1(fall, 2010)}	
N (UNE)	T ₂	O _{1(spring, 2015)}	O ₂
N (CSU)	T ₃	O _{1(spring, 2016)}	O ₂

Source: Author.

Note: N represents nonrandom assignment of participants; T₁, T₂, & T₃ = the antecedent treatment of institutional affiliation; O₁ = evaluation by use of Kolb's LSI; and O₂ evaluation by Fleming's VARK.

Selection of Participants

Approximately 58 LSI questionnaires and 58 VARK questionnaires were distributed to sport management majors at the University of New England (30 males and 28 females), while 56 LSI 3.1 and 56 VARK inventories (32 males and 24 females) were distributed to sport management majors at Cleveland State University. These numbers exhausted the total population of sport management students at each institution. The majority of participants were traditional college-age students ($\mu = 21$ years old). Inception of this study took form in the fall of 2013 while the primary researcher was an instructor at the University of New England. Initial steps included applying for a grant from the HayGroup foundation concerning acquisition and use of the LSI 3.1; applying for permission to utilize the VARK inventory; writing a letter of introduction to the Chair of the Department of Business at the University of New England, and applying to the University of New England's Institutional Review Board (IRB) for permission to administer the learning style inventories to sport management students. In the spring of 2015, and after UNE IRB permission was granted, a pilot study was conducted with 13 sport management majors (six males and seven females) at UNE. All student participants were informed that their participation was

completely voluntary and a letter of informed consent was read and distributed. Additionally, they were informed that participation or nonparticipation would not in any way affect their grades. The pilot study served as a review of survey distribution and collection procedures as well as a way to make sure that the questions were clear and understandable. The same ethical procedures were followed in the fall of 2015 at Cleveland State University (CSU) and CSU IRB permission was granted in the spring of 2016.

As previously mentioned, and due to limitations of time, resources, and the number of sport management students at each university, a non-probability convenience sample was used for this study. Appointments were made with the department chairs and instructors of sport management courses at each university concerning the administration of the surveys. In general the inventories were administered, (a) during required classes for sport management majors, (b) during normal class hours, and (c) by classroom instructors or graduate assistants acting on behalf of the primary researcher. Collectively, the inventories took approximately 10-15 minutes to complete.

In 2010, West conducted a study of sport management students at Cal U ($N = 248$) comparing the learning preferences (via the LSI 3.1) of online students to those in a traditional (face-to-face) classroom. Secondary data from her study concerning those sport management majors who were traditional students ($n = 101$) were used as a baseline for this investigation.

The University of New England is a private non-profit college of approximately 2,653 undergraduate students. It is categorized as a regional suburban institution with its athletic programs competing in the NCAA's Division III. Its two campuses are located in Biddeford, Maine and Portland, Maine. The university offers a variety of programs and majors with over half of its students enrolled in either medically related programs or allied health programs. Some program examples are pharmacy, physical therapy, dentistry, dental hygiene, and osteopathic medicine. The current sport management program resides in the Department of Business in the College of Arts and Sciences.

In contrast, Cleveland State University is a public institution located in the urban area of downtown Cleveland, Ohio. It has an undergraduate enrollment of 12,376 and its athletic teams compete in the NCAA Division I. It offers more than 200 undergraduate and graduate majors. Cleveland State University (CSU) has a high percentage of commuters and students who maintain full or part-time employment while attending school. Approximately 60 students are currently pursuing an undergraduate sport management degree under the auspices of the Department of Health and Human Performance within the College of Education and Health Sciences. The department offers majors in sport management, health and physical education, community health, and exercise science. There are a higher percentage of non-traditional students at CSU than at the UNE, and many of the CSU undergraduates are first generation college students. According to West (2010) and with regard to the California University of Pennsylvania:

As part of the PASSHE, Cal U serves a broad range of students from diverse educational backgrounds and, often, limited financial resources for higher education. As an institution that traces its roots in the region to 1852, California State was an

academy and then a normal school. It became state owned in 1914, and in 1928 it was renamed California State Teachers College. . . (California University of Pennsylvania [Cal U] 2005).

Instrumentation

Hawk and Shaw (2007: 15) recommend the “coupling of learning style instruments to extend the diagnostic range available to both faculty and students”. In search of a complete and universal model they suggested that an ideal composite model would need to measure all of the following learning style dimensions:

1. The concrete and abstract dimension (Gregorc 1979, Kolb 1984).
2. The active and reflective dimensions (Dunn 1990, Felder–Silverman 1988, Kolb 1984).
3. The sequential and random/global dimensions (Dunn 1990, Felder–Silverman 1988, Gregorc 1979).
4. The visual, aural, read/write, and kinesthetic dimensions (Felder–Silverman 1988, Fleming 2001).
5. Three intuitive and sensing dimensions (Felder–Silverman 1988).
6. The sociological elements of learning through self, pairs, peer, with a teacher, and mixed (Dunn 1990).
7. The environmental elements of sound, light, temperature, and room design (Dunn 1990).
8. The emotional elements of motivation, persistence, responsibility, and structure (Dunn 1990).
9. The physical elements of perceptual, intake, chronology, and mobility (Dunn 1990).
10. The psychological element of hemisphericity (Dunn 1990: 12).

Due to time constraints and the limited availability of resources concerning acquisition of the test only two inventories were used in this study. Hawk and Shaw (2007: 13) acknowledge, “A combination of the Kolb, Felder–Silverman, and the VARK Models or the Gregorc, Felder–Silverman, and VARK would cover the first five, but only the Dunn and Dunn instrument would allow coverage of the last five”. The Dunn and Dunn model is commercially available yet expensive. Consequently two learning style inventories served to assess the dependent variables for this study. They were Kolb’s Learning Style Inventory 3.1, and Fleming’s VARK.

The Kolb LSI

The Kolb LSI 3.1 is a commercially available psychometric inventory with 12 items where respondents rank-order four sentence endings that correspond to the four learning styles (Hawk and Shaw 2007: 2).

The VARK inventory

According to Hawk and Shaw (2007: 7) Fleming reported, “that about 41% of the population who have taken the instrument online have a single style preference, 27% two style preferences, 9% three style preferences, and 21% have a preference for all four styles”. The VARK addresses all the senses with the exception of taste and smell. The VARK inventory is composed of 13 statements that describe a situation and asks the participant to pick one or more of four actions that the respondent could hypothetically take. Each action corresponds to a particular learning style preference (Hawk and Shaw 2007: 6). It is available free and online at *vark-learn.com* and there is a specific version for athletes. The VARK questionnaire is self-administered, self-scored, and self-interpreted. According to Hawk and Shaw (2007: 7) “Fleming (2001) discusses the validity of the instrument, presenting research that supports the use of the instrument in identifying learning preferences of students. Beyond his reports, there is no other research on validity or reliability”. “Fleming also presents the results of research that indicate higher student performance in courses when faculty match learning activities with students’ learning styles as determined by the VARK instrument” (Hawk and Shaw 2007: 8).

Procedures

Inception of this study started in the fall of 2013 while the primary researcher was an instructor at the University of New England and continued throughout a two-year stint at a visiting instructor of sport management at Cleveland State University. Although this research is ongoing the data acquired and reported in this paper were completed by 2017. Initial steps included applying for a grant from the HayGroup foundation concerning acquisition and use of the LSI 3.1; applying for permission to utilize the VARK inventory; writing a letter of introduction to the chairs of the Department of Business at the University of New England, and the Department of Health and Human Performance at Cleveland State University, and receiving permission from both affiliated institutional review boards to administer the inventories to sport management students. In the spring of 2015, and after UNE IRB permission was granted, a pilot study was conducted.

By September of 2016, 212 psychometric inventories were distributed, completed, collected, and tabulated from the University of New England and Cleveland State University.

Results

The first sub-problem was to assess the prevalence of accommodating, assimilating, converging, and diverging learning preferences at the UNE and CSU through the administration of the Kolb LSI 3.1. Secondary data gleaned from West (2010) of 101 traditional face-to-face sport management students at Cal U was also utilized. Results are listed in Table 4.

Table 4. Raw Data of Results of the Kolb's LSI 3.1 Samples

	UNE (n = 54)	CSU (n = 54)	Cal U (n = 101)
Accommodating	13	13	38
Assimilating	13	20	16
Converging	14	9	6
Diverging	14	12	41

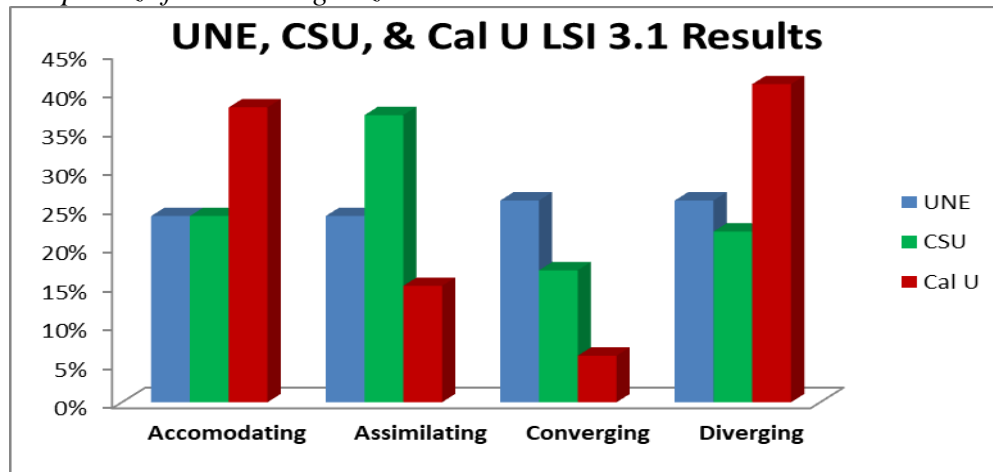
Source: Author.

Table 5 lists the results expressed as a percentage of the sample size (n), and Figure 4 is a histogram and provides a visual representation of data.

Table 5. Prevalence of Learning Style based on Kolb's LSI, expressed as a percentage

	UNE (n = 54)	CSU (n = 54)	Cal U (n = 101)
Accommodating	24%	24%	38%
Assimilating	24%	37%	16%
Converging	26%	17%	6%
Diverging	26%	22%	41%

Source: Author.

Figure 4. Comparison of the Prevalence of Accommodating, Assimilating, Converging, and Diverging Learning Styles between UNE (n = 54), CSU (n = 54), and Cal U (n = 101) Sport Management Majors based on Percentage of Total Sample Size for Each Organization

Source: Author.

The prevalence of learning styles among sport management students at the UNE revealed a very balanced result with nearly equal numbers across all four of Kolb's learning styles. Nearly half the students from the CSU sample demonstrated a preference for the Assimilating style, while secondary data obtained from West (2010) at Cal U demonstrated high preferences for the diverging and accommodating learning preferences.

Significance

The magnitude of differences between groups was found to be significant for comparisons between UNE and Cal U, $\chi^2(1, n=155) = 1.43E-09, p < .001$; a significant difference was also found between CSU and Cal U, $\chi^2(1, n=155) = 3.39E-07, p < .001$. As expected, when data from CSU and UNE were combined and compared to Cal U, $\chi^2(1, n=155) = 5.11E-14, p < .001$ it was also significant. Chi-square values were also calculated for differences between UNE and CSU with results significant at the 0.2 level but not the 0.001 level, $\chi^2(1, n=108) = .13, p < .2$.

When chi-square (χ^2) analysis was conducted using the SAS utility, and the expected frequency was 25% for each of the four learning style categories, no significant differences between the expected and observed frequency distributions were found for UNE ($\chi^2 = .138$). However, significant differences were found for CSU ($\chi^2 = 8.9$) and Cal. U. Pa. ($\chi^2 = 33$).

VARK Analysis

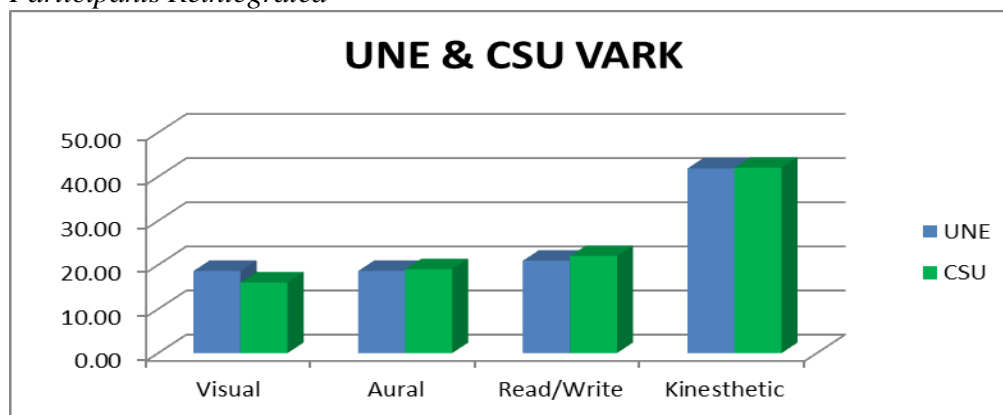
Neil Fleming's VARK questionnaire was used as the second dependent variable for evaluating consistency of learning style preference for this investigation. The 16-item VARK questionnaire assesses learner preference for Visual, Auditory, Read/Write, and Kinesthetic learning modes. On each of the VARK's 16 questions participants are encouraged to circle as many of the answers as they feel apply to them. Consequently one survey may have only 16 answers circled, while another may have as many as 64. Many of the participants who took the VARK displayed a balanced learning preference exhibiting no dominant learning mode and were subsequently classified as multimodal. Any given participant may be classified as bimodal, tri-modal, or exhibit balance across all four learning modalities. Fleming's latest research algorithm combines bimodal, tri-modal, and balanced learning styles into one multimodal category. Individuals displaying a balanced learning profile across all four VARK categories were dropped from the dataset since they would only add comparable weight to each category.

The VARK assessment for the remaining participants from UNE ($n = 52$) was expressed as a percentage of the total sample size and revealed that 19% of the respondents favored the visual learning mode, while 19% of the respondents favored the Aural, 21% utilized the Read/Write mode, and 42% preferred the Kinesthetic.

The VARK assessment for participants from CSU ($n = 52$) revealed that 16% of the respondents favored the Visual learning mode, 19% of the respondents favored the Aural, 22% utilized the Read/Write mode, and 42% preferred the Kinesthetic learning modality. Sub-problems two and five explored the differences between CSU and UNE sport management students as measured by Fleming's VARK. Fleming's international database also served as a baseline for comparison of VARK results. As one might intuitively expect of sport management majors a trend toward the Kinesthetic learning preference was observed in both the CSU

and UNE data. Additionally, the UNE and CSU VARK scores demonstrated a trend toward consistency of learning style preference. Figure 5 reflects a near mirror image between these two samples.

Figure 5. Comparison of Visual, Aural, Read/Write, and Kinesthetic Learning Styles between UNE (N = 52) and CSU (N = 52) with Bimodal and Tri-Modal Participants Reintegrated



Source: Author.

Sub-problems two and five explored the differences between CSU and UNE sport management students as measured by Fleming's VARK. Fleming's international database also served as a baseline for comparison of VARK results. Table 6 compares primary data with secondary data from the VARK database.

Table 6. Comparison of Primary Data to the VARK Cumulative Database

	UNE (N = 52)	CSU (N = 52)	VARK 4-Year College (N = 7,801)	VARK SPORT (N = 1,754)
Visual	19%	16%	22%	23%
Aural	19%	19%	25%	26%
Read/Write	21%	22%	24%	21%
Kinesthetic	42%	42%	29%	31%

Source: Author.

Conclusions

This investigation has assessed the learning preferences of sport management students at two geographically disparate universities through the use of two different learning style instruments. Third and fourth sets of secondary data served as a baseline for comparison to bolster the meaningfulness of results. The prime research question was: Do selected undergraduate sport management majors display consistency of preferred learning styles across institutions of varying Carnegie classifications and geographical boundaries? A testable null hypothesis was stated, H_0 : There will be no significant difference in learning style preference between sport management students at the University of New England (UNE),

Cleveland State University (CSU), and California University of Pennsylvania (Cal U) as measured by Kolb's LSI 3.1 and Fleming's VARK inventories. Assessments were conducted, and descriptive statistics and chi-square tests were used to evaluate significance across five measures. They were:

- Comparisons of CSU, UNE, and Cal U LSI prevalence data by tables, charts, and graphs.
- Comparison of UNE data to Cal U data by chi-square.
- Comparison of CSU data to Cal U data by chi-square.
- Comparison of (UNE and CSU) data combined compared to Cal U data by chi-square.
- Comparison of VARK scores between CSU and UNE by tables and charts.

Four out of five assessments revealed significant difference in the data examined, and although the VARK scores between UNE and CSU revealed some consistency of learning preference a relatively low sample size coupled with the fact that the VARK inventory only measures perceptual faculties mitigates this result. Consequently, it is the decision of this investigation that sport management majors at UNE, CSU, and Cal U are not consistent in their preferred learning styles as measured by Kolb's LSI 3.1. Therefore the null hypothesis must be rejected.

Discussion

Admittedly, there could be a myriad of variables responsible for variations in learning style preference that were outside the scope and limitations of this study. Variables such as social economic class, genetic disposition, cultural influences, parental encouragement, concern, and involvement in K-12 education were not directly assessed as part of this investigation. However, the variables that served as independent variables for this study were program affiliation, college attended, and other Carnegie classification attributes.

Strong differences in LSI 3.1 scores were found between UNE and Cal U, and CSU and Cal U, while a statistically weak but interesting difference ($\chi^2 = .13$) was found between UNE and CSU. The UNE LSI 3.1 data displayed a remarkably balanced profile, with approximately 25% of respondents neatly dispersed among the LSI's four learning categories. The Cal U and CSU data were heavily skewed, and each institution's results favored a few learning categories. The University of New England held the distinction of being the only private school among the three institutions, raising the question of a possible correlation between private school attendance and a balanced learning style.

Kolb defined Experiential Learning Theory (ELT) as a social psychological concept that is only partially determined by personality. There is no doubt that personality plays an essential role in individual learning style; however, it is only one of five variables affecting learning style. According to ELT, equally important are the environmental factors of educational specialization, career, job, and tasks skills (HayGroup 2005: 6). In the past empirical evidence has demonstrated that

educational specialization tends to shape learning as individuals' progress through the educational process and become exposed to the values, norms, and beliefs of that field's culture. For example:

People specializing in the arts, history, political science, English, and psychology tend to have Diverging learning styles, while those majoring in more abstract and applied areas such as medicine and engineering have Converging learning styles. Individuals with Accommodating styles often have educational backgrounds in education, communications, and nursing, and those with assimilating styles in mathematics and physical sciences. (HayGroup 2005: 7)

The same type of influence is demonstrated by choice of professional career. According to the HayGroup (2005: 7):

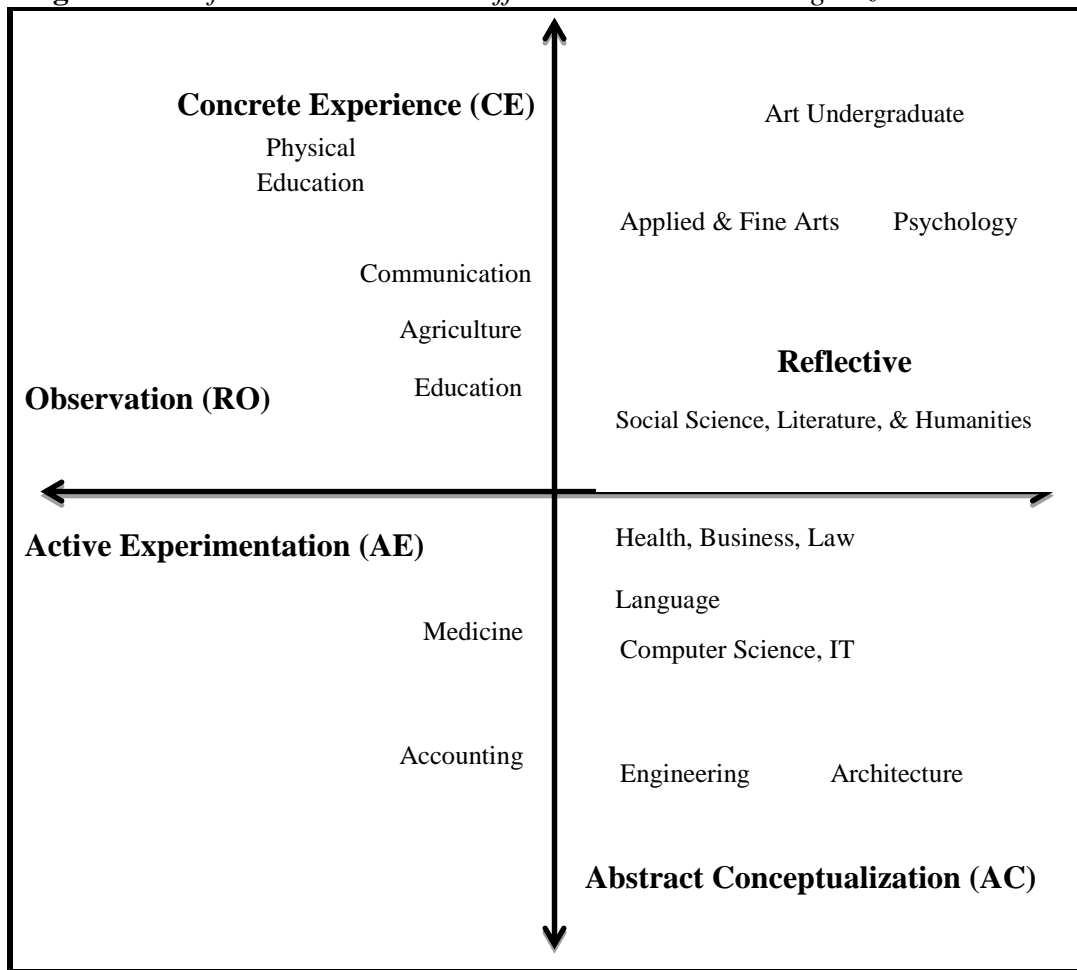
One's professional career choice not only exposes one to a specialized learning environment, but it also involves a commitment to a generic professional problem, such as social service, that requires a specialized adaptive orientation. In addition, one becomes a member of a reference group of peers who share a professional mentality and a common set of values and beliefs about how one should behave professionally. This professional orientation shapes learning style through habits acquired in professional training and through the immediate normative pressures involved in being a competent professional.

Student participants from UNE made the choice to go to a private school. Most private colleges cost more than public colleges. Consequently, it would be logical to assume that if one is willing to pay more for a pricier commodity (than the basic "no frills" commodity that is available for a lesser price) one highly values that commodity. If a person comes from an environment where education is highly valued, it is likely that one would receive more resources, tutoring, attention, support, and encouragement, related to this value, than a person from an environment where education is not as highly valued. Jones et al. (2003) explored learning styles across the four disciplines of English, math, science, and social studies using Kolb's LSI as the assessment instrument. Their results indicated that:

Eighty-three (81%) of the 103 participants switched learning style modes for two or more disciplines. These learning styles are subject area sensitive, that a majority of the students perceive different disciplines require different learning strategies and that they are able to adapt or style-flex to meet the requirements of the learning task. This finding is consistent with previous research. (Jones et al. 2003: 372)

Figure 6 displays some popular professional fields and associate Kolb affiliation.

Figure 6. Professional Fields and Affiliated Kolb’s LSI Categorizations



Source: Author.

According to CSU’s internal statistical reports approximately 53%-58% of CSU’s students are classified as first generation college students (i.e., neither a parent nor a grandparent attended college), a situation in which they may rely heavily on one or two learning style modes, while the balanced learning style displayed by the UNE students, may in fact be due to earlier and greater exposure to educational indoctrination and the normative demands of the field of sport management.

The Meshing Hypothesis

At present there is no irrefutable empirical evidence supporting the Meshing Hypothesis. Pashler et al. (2008: 110) argue that:

Until a study is conducted where subjects have been first classified as having Learning Style A or B, and then randomly assigned to Learning Method 1 or 2, and later, all subjects have taken the same test, the learning-styles hypothesis is supported if and only if the learning method that optimized the mean test score of one group is

different from the learning method that optimized the mean test score of the other group.

Although they concede that identifiable differences in learning preferences exist, Pashler et al. (2008) do not support learning style testing in the educational environment, nor do they support the attempted matching of instructional methods to learner preference. In short, they contend that limited educational resources would be better spent elsewhere. Others disagree and have supported the individualization and pluralization of instructional methods (Gardner 2011, Hawk and Shaw 2007). Felder (2010: 2) stated:

The Center for Applications of Psychological Type database lists 292 publications and dissertations relating students' MBTI profiles to their academic performance and attitudes, and many studies have also been carried out using other common learning styles assessment instruments. The findings of Pashler et al. (2008) notwithstanding, significant and predictable performance differences have been found in many of these studies. The engineering education literature alone provides numerous examples. In several studies based on the MBTI, intuitors in theoretical/analytical engineering courses with examinations that rewarded problem-solving speed predictably did better on average than their sensing classmates, while in courses taken by the same students that stressed engineering practice and required careful observation and attention to detail, the sensors predictably did better. Also consistent with type theory, intuitors were three times more likely than sensors to give themselves high self-ratings for creative thinking; extraverts initially reacted more positively to team assignments than did introverts; thinkers consistently outperformed feelers in the impersonal environment of the engineering curriculum and the feelers were more likely to drop out, even if they were doing well academically. Similar correlations have also been found between engineering students' performance and attitudes and their learning styles as assessed by the Index of Learning Styles and the Kolb Learning Styles Inventory.

The reality is that learning style assessment by one of the more popular inventories can be an inexpensive and time efficient process. The total assessment is effectively completed in less than 20 minutes. This includes time for both the survey's completion and evaluation. Setting questions of validity aside, there may still be benefits in conducting this process, namely, a placebo effect and a possible Pygmalion effect. Participants may simply respond to the instructors concern and appreciation for taking the time to discern their individual differences. If this concern is coupled with high performance expectations, a Pygmalion effect may result. Felder (2010: 3) elaborates:

There is at least one good reason not to attempt to teach all students in their preferred manner, but it has nothing to do with the validity of the meshing hypothesis. It is, rather, that doing so is for all practical purposes impossible. As long as the students have more than one learning style among them, whenever students with one style receive matched instruction, the other students will automatically be taught in a mismatched manner. This does not mean that learning styles have no place in instructional design, however: there is another view of their utility that the debunkers have chosen to ignore. The point is not to match teaching style to learning style but

rather to achieve balance, making sure that each style preference is addressed to a reasonable extent during instruction. From this viewpoint, instruction is ineffective if it heavily favors one set of learning preferences (and hence one set of students) over another.

Assuming that West (2010) and Cavanagh et al. (1995) have presented findings that are valid and reliable, the empirical evidence indicates that 80% of sport management students prefer to learn at least in part by concrete experience (CE). If the *meshing* hypothesis (i.e., the construct that matching learning activities to learning preferences) is also valid and reliable, efficiency in instructing sport management students should be increased by the use of learning activities that match the CE dimension. It was traditionally thought that the following class activities required concrete experience: (a) lecture examples, (b) problem sets, (c) films, (d) simulations, (e) laboratories, (f) observations, and (g) field work.

The least preferred and consequently the least motivating to sport management majors would include those learning activities associated with the abstract conceptualization category (AC). According to Kolb (1984) this would include lecture, papers, analogies, text readings, projects, model building, and model critique. Consequently, with relation to the majority of sport management majors, the learning activities of in-class lectures, papers, text readings, model building, and projects may be the least motivating, and therefore the least productive learning activities concerning these students.

As previously cited Colvey (2014) evaluated 231 junior and senior undergraduates who were enrolled in the professional programs of the Department of Health, Physical Education, and Sport Science at Arkansas State University. Each student completed the Computerized Assessment Program-Styles of Learning (CAPSOL) inventory. The results indicated that the individual, sequential, and the bodily kinesthetic learning styles were most popular. In 2002, while under the auspices of the United States Sports Academy, Wesley utilized the Inventory for Learning Styles (ILS) instrument to evaluate the learning style preferences of 490 high school student-athletes at nine Mobile County, Alabama high schools. Wesley's study indicated 447 (91.2%) preferred an active learning style, while 27 (5.5%) of the student-athletes showed a balanced learning preference, and the remaining 16 (3.3%) a reflective learning preference. Kolb's research shows that a preference for learning by abstraction increased with age and educational level, while a preference for learning by action increased until about middle age and then decreased (HayGroup 2005: 24-25). Consequently, as a student progresses through the educational spectrum there is a balancing effect occurring (i.e., an increase in the use of the learning style mode of abstract conceptualization, and less reliance on active experimentation).

Similar to the Colvey (2014) and Wesley (2002) studies previously mentioned, this study also demonstrated a high concentration for the Kinesthetic learning style preference as assessed by Fleming's VARK with 42% of respondents possessing a Kinesthetic preference. In 1984, Kolb identified role playing, constructing models, physical activity, demonstrations, guest lectures, and real life examples as classroom activities consistent with this preference.

Throughout learning style literature two recurring themes continue to arise. Namely, that the learner who receives information via their primary learning style have increased motivation; and secondly, increased motivation is correlated with higher learning outcomes (Maushak et al. 2000, Robinson 2011).

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