Profiling the learning style preferences of students at a sport university in Vietnam

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This thesis is dedicated to my wife Chung and our children, Hoa and Minh.

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Statement of authentication

This thesis is submitted in fulfilment of the requirements of a Doctor of Philosophy degree at the School of Education, Western Sydney University. To the best of my knowledge and belief, the work presented in this thesis is original except as acknowledged in the text. I hereby declare that I have not previously submitted this material for an award at this or any other higher education institution.

Signature

Minh Huu Doan

Date

30 December 2022

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Acronyms

ANOVA: Analysis of Variance

DSU: Danang Sport University

EFA: Exploratory Factor Analysis

ELT: Experiential Learning Theory

ILS: Index of Learning Styles

KMO: Kaiser-Meyer-Olkin Measure of Sampling Adequacy

LSI: Learning Style Inventory

LSQ**:** Learning Style Questionnaire

MANOVA: Multivariate Analysis of Variance

PE: Physical Education

PLSPQ: Perceptual Learning Style Preference Questionnaire

SC: Sport Coaching

SM: Sport Management

SPSS: Statistical Package for the Social Sciences

VARK: Visual/Auditory/Read-Write/Kinesthetic

Abstract

Evidence-based research has repeatedly shown that adjusting instruction to accommodate students' learning styles can positively impact student learning. The purpose of the study was to identify the preferred learning styles of students taking undergraduate courses in Physical Education, Sport Coaching, and Sport Management at Danang Sport University (DSU). The relationships between students' learning styles and gender, age, year of study, major, and student type were also examined. Additionally, the study explored lecturers' understanding of learning styles and their application in teaching to best fit individuals' learning styles.

A total of 586 students completed the Honey and Mumford Learning Styles Questionnaire (2006) to identify preferences from the four learning styles: Reflector, Activist, Theorist, and Pragmatist. Individual interviews with 16 students were conducted to gain deeper insights into their learning styles as well as their perceptions of lecturers' teaching styles. Interviews with 19 lecturers explored their understanding and knowledge about learning styles. Observations of eight practical sessions were undertaken to gain a better understanding of how lecturers applied their knowledge of learning styles in their instruction.

The findings revealed that preference for the Reflector learning style was the most dominant among DSU students, followed by the Pragmatist, Activist, and Theorist. Additionally, students showed a strong preference for the Reflector and Pragmatist learning styles and exhibited a moderate preference in both the Theorist and Activist learning styles. There was a statistically significant relationship between the Reflector style and gender, age, and year of study, and between the Theorist style and student type, but there was no statistically significant relationship between learning styles and major. The lecturers in this study demonstrated only a limited understanding of student learning styles. They did not clearly and frequently adapt to the different learning styles of students and from the perspective of the university lecturers, students' preferred learning styles was not their primary concern. Based on the evidence drawn from this research, recommendations on learning styles and teaching styles are proposed. These include enhancing students' awareness of their own learning styles, increasing teachers' understanding and knowledge of a variety of learning styles, and providing training sessions on learning styles for lecturers.

Chapter 1: Introduction

Author's narrative

As an educator

My career in teaching English as a foreign language has spanned 22 years, and I have worked with English major students and non-English majors in areas including medicine, economics, agriculture, accounting, forestry, and sport. From my observations and experience, students in each area of study had a typical learning style. As an educator I wanted to identify students' learning style preferences, so I could effectively tailor my teaching style to their learning styles. However, despite my efforts, I could not accommodate all students' needs in a classroom of 50–70 students. For example, some students preferred listening, while others learned best when they were provided with visual stimulus. There were also some students who liked working individually, while others enjoyed groupwork or interactions with their peers.

In 2006, learning styles started to attract my attention when I attended a three-month training course on English language and teaching methodology at Carleton University in Canada. Apart from theoretical sessions, participants had the chance to observe classes where English was taught as a second language. To my surprise, students physically grouped together (as peers) by nationality and each group had their own learning styles. For instance, Asian students liked reading and writing and seemed to be quiet in the classroom. By contrast, European students were active, extroverted, and talked a lot during discussion. Thus, it seemed evident ethnicity and cultural norms greatly influence learning styles. It also became clear to me that an individual's learning style is also affected by other factors such as education background, personality, and learning experiences. These differences in learning styles then result in different levels of achievement in learning a foreign language. Xu (2011) proposed that "with different educational and cultural background, different personalities, and different learning experience, everybody differs in his ways of learning a foreign language, which leads to different degrees of success" (p. 413).

As a parent

Pait (2011) argued that a person's personality is formed during his/her childhood and shaped through the interaction of two factors. Firstly, his/her parents and secondly, the environment, meaning the surroundings people grew up in, events that occurred, as well as relationships with family members and others. I have two children who are very different in personality and

interests, which may lead to different learning styles. In fact, our seven-year-old daughter in Year 2 at a primary school is reserved with those she has never met before or people she seldom sees, but she talks readily to her parents and her friends at school. Preferring to watch TV and look at pictures, she also loves listening to stories or music. Our son is five years old and is very active with a strong personality. In contrast to my daughter, he likes touching, doing, and playing with objects and toys.

Learning styles are often regarded as innate for individuals (Ehrman & Oxford, 1988). By contrast, Tatarinceva (2006) argued that not all of the elements of learning styles are biologically inherited and stable. They say information processing, and perceptual preferences such as auditory, visual and so on are stable, while motivation, love of learning, responsibility for learning and social preferences, which are also considered to be learning styles factors, can be developed and remain flexible as an individual grows and develops. From a parent's perspective and through my own experience, it is crucial to take responsibility for paying special attention to children and identifying their learning styles. It is important to understand that some of the elements of learning styles of children are biological while others can be developed through training in accordance with their preferences. Such understanding can assist parents to provide their children with better directions and opportunities in learning activities. One of the roles of parents is to identify the learning styles of children in their early years and as they progress through their development stages and notice what elements of learning styles might or might not change throughout their life. This may help to maximise children's learning potential and minimise their weaknesses. The experience and responsibility of a parent drive my interest in the research of learning styles.

As a researcher

In 2003, as part of my Master's in the English language, I completed a thesis titled: 'A preliminary survey on the learning style preferences of English major students' at Tay Nguyen University. I explored the learning style preferences of students learning English as a second language in Australian, Asian, and Vietnamese contexts. The results of my research study showed that students at Tay Nguyen University were highly auditory, meaning that auditory learning was identified as their major preferred learning style, while visual and group learning were their minor learning style preferences. These findings were important as they inspired my continued interest in pursuing learning styles as the basis of my current research.

As my teaching has been involved with sport students for over 10 years at Danang Sport University (DSU) in Vietnam, I am particularly interested to learn more about students' preferred learning styles in a physical education context. From my experience as a teacher, it is critically important to be aware of students' learning styles and to enable students to identify their preferred learning styles. Once the learning style preferences of students are determined, teachers may be able to tailor their instructional strategies to the different learning styles of students. Similarly, if students are aware of their own learning styles, they can use appropriate learning strategies with the support and assistance of the teacher to enhance their learning potential. Thus, my various roles as researcher, parent, and educator have all driven my interest in the research area of learning styles.

1.1: Introduction

Learning takes place from right in the early age until people get old, and in a variety of ways. According to Kolb (1984), learning is a continual process which is grounded in experience. A child learns by observing and exploring the world around them and imitating what they can hear and see. At this stage, family is the first school in their life and parents are their first teachers; they provide the most valuable and meaningful lessons to form and develop their child's behaviour, characteristics, and personality. An important period in their life is when children start school. This is a critical stage as children step beyond the family boundary and begin to communicate and connect with the world outside, including the school environment, teachers, and friends. Not only do they continue to develop their cognition and emotions, but they also begin to acquire the most basic knowledge in relation to natural and social sciences provided by the teachers. Indeed, learning takes place not only through schooling or instruction, but also through self-studying such as reading books and newspapers, as well as by exchanging practical experiences from one person to another.

Through learning, people not only acquire knowledge in different areas but also master skills which are essential to their life. Schmeck (2013) described learning as a gain of knowledge through repetition and reference, and as a process to understand the world. He emphasises the importance of acquiring knowledge as a pathway to providing a deeper insight into, and exploration of people, nature, and many other social, political, cultural, and economic issues across the globe. Coupled with the knowledge people attain through learning, teaching, and experience, the mastery of skills is also a fundamental component of learning. Pritchard (2014) included these two key areas of learning in his definition and describes learning as a process of acquiring knowledge and skills through experience, practice, study or instruction. He also identifies learning as "a process by which behaviour is changed, shaped or controlled" and "a process of constructing understanding based on experience" (p. 1). As such, learning plays a vital part in forming an individual's behaviour and personality and contributes to building up background knowledge and understanding in all aspects of life.

Educators have long known that learners learn differently. Some are enthusiastic about acquiring new knowledge and experiences, while others are cautious about coming to conclusions. Some prefer to adapt and integrate observations into complex but logically sound theories, while others enjoy experimenting with theories and techniques (Honey & Mumford, 2006). Such differences in the ways of learning represent people's preferred learning styles,

and their approaches to learning activities. Baldwin and Sabry (2003) indicated that "Learners are different and approach learning tasks differently and that individual differences can significantly affect an individual's learning processes" (p. 325). Each learner has a preferred learning style, and this affects the acquisition of knowledge and the mastery of skills in their learning activities.

Individual learning styles play a crucial role in students' ability to acquire knowledge and develop skills. Heffler (2001) stated that an individual's learning style has strengths and limitations based on what is needed to be learned. It is essential to note that there is no good or bad learning style (Jester & Miller, 2000). It is also important to understand that the goal of identifying a person's learning style preferences is not to classify, but rather to assist the learner by using their strengths and improving on their weaknesses (Felder & Spurlin, 2005).

Research has shown that adjusting instruction to accommodate students' learning styles can positively affect student learning (Boyle & Dunn, 1998; Farkas, 2003). Popescu (2010) recommended that teachers should create all learning environments to enhance student motivation, satisfaction, and a positive attitude towards learning and that a fundamental part of this objective is the adaptation of learning environments to meet the requirements of different learning styles. By employing the theories of learning styles proposed by Kolb, Honey and Mumford, and others, teachers can identify students' learning style preferences, as well as how to tailor instruction to maximise student performance.

Students may make significant progress in their studies when instructional strategies match their learning styles (Kahn, 2007; Moallem, 2007; Ritschel-Trifilo, 2009). To be effective, it is important for teachers to employ a broad range of teaching methods to meet the varying needs and diverse learning styles of their students, and also to engage them in the learning process (Gazin, 1999; Stevens-Smith & Cadorette, 2012). The employment of learning styles research together with the development of instructional techniques could be of great benefit to students (Caudill, 1998).

Felder and Spurlin (2005) stated:

> when the learning styles of most students in a class and the teaching style of the professor are mismatched, the students are likely to become bored and inattentive in class, do poorly on tests, get discouraged about courses, the curriculum, and themselves, and, in some cases, change to other curricula or drop out of school. (p.103)

By contrast, when teaching style matches learning style, students are provided with a more comfortable learning environment, enhancing greater success and promoting better classroom behaviour (Butler, 1987; Searson & Dunn, 2001). The topic of learning styles is of great interest to researchers and educators (Andrea et al., 2015; Butler, 1987; Çaglayan, 2011; Cassidy, 2004; Coffield et al., 2004; Croft, 2013; Gilakjani, 2012; Griffiths, 2012). While there exists a significant amount of research on learning styles, research involving learning style preferences in association with sport students and student-athletes is lacking (Wesley, 2003). Cid et al. (2018) revealed that few studies on learning styles of students as well as professionals in the area of physical education were published from 2010 to 2017.

The authors of studies on learning styles have generally examined their relationships to one, two or three particular variables such as: **gender** (Andrea et al., 2015; Bostanci, 2020; Bowman et al., 2000; Braakhuis, 2015; Brown, 2013; Çaglayan, 2011; Cetin, 2014; Hansen, 2000; Holland & Mills, 2015; Lowdermilk, 2016; Perkins, 2010; Peters et al., 2005; Taylor, 2001); **age** (Bostanci, 2020; Lowdermilk, 2016; Peters et al., 2005); **major** (Colvey, 2014; Wagner et al., 2014); **academic achievement** (Braakhuis, 2015; Colvey, 2014; Peters et al., 2008; Taylor, 2001); **level of performance** (Andrea et al., 2015; Brown, 2013; González-Haro et al., 2010); **sport** (Braakhuis, 2015; Brown, 2013; González-Haro et al., 2010; Perkins, 2010); and **year of study** (Brown, 2013; Peters et al., 2005). In addition, the authors of these studies only centred on one type of subject: professional/amateur athletes (Braakhuis, 2015; Brown, 2013; González-Haro et al., 2010), student-athletes (Perkins, 2010; Wesley, 2003) or students majoring in physical therapy, health, and sport sciences (Croft, 2013; Holland & Mills, 2015; Lowdermilk, 2016). These studies provide a foundation for this research on learning style preferences of sport students at DSU. Although there has been significant research on the learning styles in the sport setting, no research had been undertaken in the sport education context in Vietnam.

While the above researchers investigated the relationship between learning styles and a limited number of variables, this research set out to examine the relationships between learning styles and gender, age, year of study, major, and student type. Using DSU as a case study, the research considered students who first enter the sport environment when they enrol at the university, and those who started their training at an early stage in their life and were labelled as ‘student athletes’. These two types of students attend the same theory classes and practice sessions under the training program of the university which thus provided two categories of

students to participate in the study, again creating a point of difference to other research. This thesis provides a better understanding of the learning experiences and learning styles of these two types of students.

1.2: Purpose and significance of this study

This research study was undertaken in the first term of the academic year during 2018. The intent of the study was to identify the preferred learning styles of students taking undergraduate courses in Physical Education (PE), Sport Coaching (SC), and Sport Management (SM) at DSU. The relationships between students' learning styles and age, gender, major, year of study, and student type (i.e., student or student-athlete) were also examined. In addition, the study explored sport education teachers' understanding of learning styles and their application in teaching and training to best fit individuals' learning styles. Based on the research results, recommendations are made for developing instructional strategies and designing curriculum, with an emphasis on tailoring teaching styles to students to enhance motivation, engagement, and learning outcomes. These results of the research are relevant not only to other sport universities across Vietnam but also within the broader teaching community.

Here are four potential benefits of this research. First, this study extends the knowledge of students' learning styles so that teachers and coaches can employ appropriate instructional approaches and strategies tailored to individual learning styles once students' and athletes' learning style preferences are identified. This would assist in improving student motivation and attitudes towards learning activities as well as learning outcomes. Secondly, it could assist students to be more aware of their preferred learning styles and to choose appropriate learning strategies to enhance their learning. Thirdly, findings from this research would aid in designing curriculum and materials which emphasised the accommodation of different learning styles in teaching and learning practices. Finally, the study results would help school administrators and policy makers in education to enhance the learning environment and learning experience to respond to the needs of individual students and their unique learning styles.

1.3: Research questions

Learning styles is a topic which has greatly interested many scholars, researchers, and educators. A plethora of research on learning styles has been conducted in different disciplines but few studies have been undertaken in the context of physical education or sport in Vietnam. Determining the learning styles of sport students and identifying factors affecting these

learning styles provide a major contribution to knowledge in this area. Also, the knowledge and understanding of learning styles by sport education teachers and information about how they accommodated learning styles in their instructional practices, could be applicable to other sport colleges and universities, not only in Vietnam, but in sport institutions throughout the world.

To explore learning styles in sports education, the overarching main research question that guided this study is: **What are the factors that contribute to sport student learning styles?** The following three sub Research Questions (RQs) were posed to focus the research further:

- **RQ1.** Is there a relationship between students' learning styles and age, gender, major, year of study, and student type (i.e., student or student-athlete)?
- **RQ2.** What is the current level of knowledge of learning styles amongst sport education teachers?
- **RQ3.** In what ways do sport education teachers adapt their teaching styles to individual learning styles?

Hypotheses related to Research Question 1 of the study

Hypotheses have been developed to investigate the learning style preferences as they relate to theory learning and practice sessions:

1. The null hypothesis states that there will be no statistically significant difference in the means of learning styles between gender groups. The alternate hypothesis states there will be a significant difference.
2. The null hypothesis states that there will be no statistically significant difference in the means of learning styles between student type. The alternate hypothesis states there will be a significant difference.
3. The null hypothesis states that there will be no significant difference in the means of learning style between age groups. The alternate hypothesis states there will be a significant difference.
4. The null hypothesis states that there will be no statistically significant difference in the means of learning styles between major groups. The alternate hypothesis states there will be a significant difference.

5. The null hypothesis states that there will be no statistically significant difference in the means of learning styles between years of study. The alternate hypothesis states there will be a significant difference.

1.4: Theoretical framework

Kolb's Experiential Learning Theory (ELT) (1984) based on the theories of Lewin (1951), Dewey (1970), and Piaget (1970) formed the theoretical framework for this study. Experiential learning is a notion that participating actively in learning activities optimises student learning. When people are experiencing new things, their bodies play a vital part in the learning. These experiences may be positive with happiness or pleasure, or negative with worries or fears, but the results can all significantly affect how their bodies respond to the circumstance. Based on previous work of Dewey (1970) and Lewin (1951), Kolb (1984) deemed that learning is "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience" (Kolb, 1984, p. 41). The notions of experience, understanding, reasoning, and behaviour are characterised as a unifying, aggregate depiction of learning (Kolb, 1984).

Kolb's experiential learning model is a learning cycle with four stages representing a process of learning experiences with learning is depicted as a continuous, interactive process. The stages are: grasping experience – concrete experience (CE; experiencing); abstract conceptualisation (AC; thinking); transforming experience – reflective observation (RO; reflecting); and active experimentation (AE; doing) as can be seen in Figure 1.1.

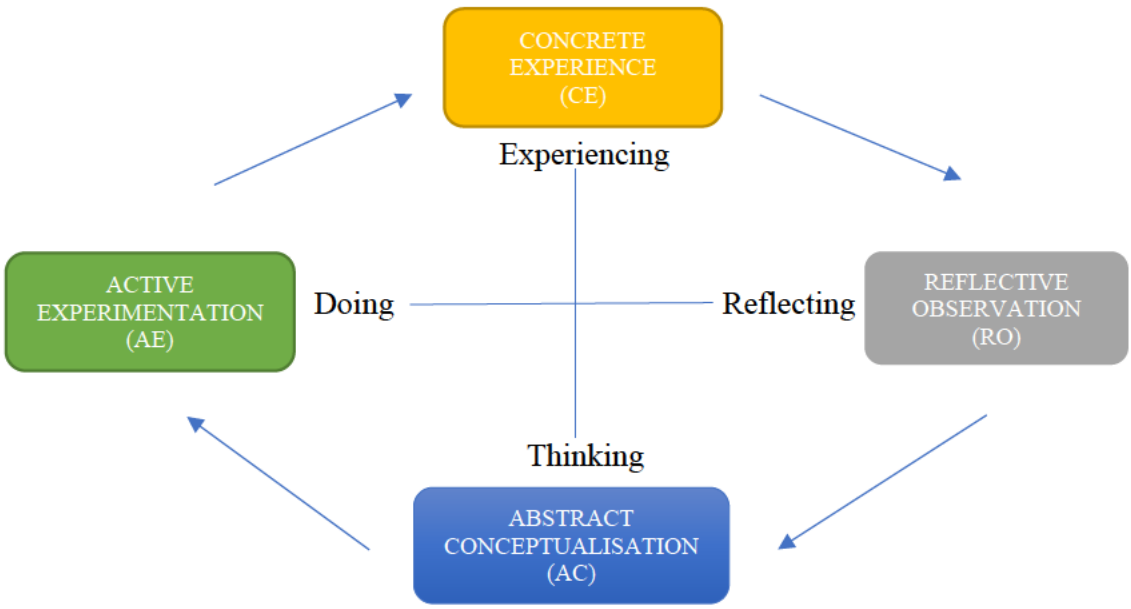

Figure 1.1 Kolb's experiential learning model. Adapted from Kolb (1984)

These four dimensions of learning comprise two pairs of opposite poles – CE and AC, as well as RO and AE. According to the model, a learner needs to undergo these stages in building up knowledge, by experiencing, reflecting, thinking, and doing. In grasping experience, a learner can use their senses and involve themselves in concrete situations to acquire new information. The learner also experiences abstract conceptualisation to perceive new information through analysis and systematic planning. In transforming experience, those with reflective observation ability are likely to collect data by observing others engaging in the experience and contemplate what happens. The active experimentation stage supports learners to experiment. The learner can enter the model at any stage (Kolb, 1984).

Honey and Mumford (2006) constructed their learning styles model based on Kolb's ELT in alignment with the four stages in the learning cycle, with new terminology for learning style preferences. Honey and Mumford's learning styles include Activist, Reflector, Theorist, and Pragmatist (as shown in Figure 1.2). The Activist style corresponds to Kolb's concrete experience stage, the Reflector style resembles Kolb's reflective observation stage, the Theorist style matches Kolb's abstract conceptualisation stage, and the Pragmatist style conforms to Kolb's active experimentation stage (Boydell et al., 2005). Many theorists and practitioners were primarily inspired by Kolb's original ideas to develop their own questionnaires. Of these, Honey and Mumford (2006) developed their own Learning Styles Questionnaire (LSQ) as an alternative to Kolb's (Cassidy, 2004), as they recognised that Kolb's Learning Style Inventory (LSI) had low face validity. The LSQ developed by Honey and Mumford included two versions: a 40 and an 80 item questionnaire, each representing four dimensions of learning styles – Activist, Reflector, Theorist, and Pragmatist (Pritchard, 2014). The 40-item version was used in this study to identify the preferred learning styles of students since it is simple to complete with 40 items in which students select either 'Agree' or 'Disagree'. This questionnaire is suitable for helping students to initially get to know about learning styles and become aware of their own learning style preferences.

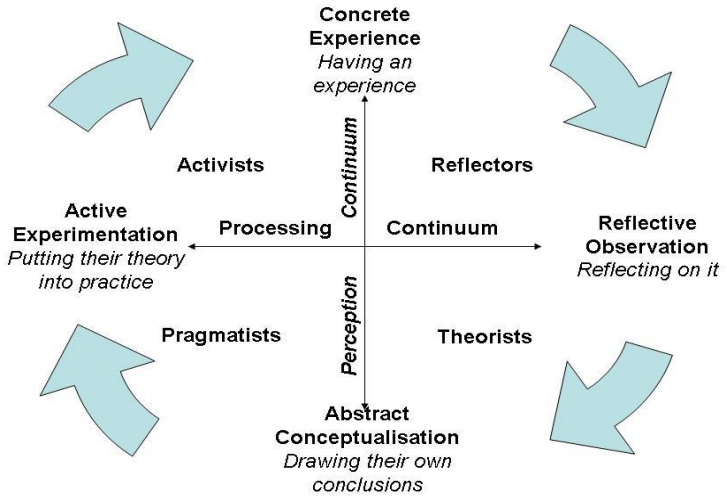

Figure 1.2 The Interactions between Kolb and Honey and Mumford as depicted in Clark (2008)

1.5: Methodology

The research was conducted, employing a single case study approach (Merriam, 1998; Stake, 2006; Yin, 2003) as DSU was the focus of this research. A case study requires boundaries and in this study teaching and learning practices within the sport environment at DSU were investigated. Focusing on a specific area when working within this boundary assisted in the collection of deep and rich descriptions. Case studies allow for the exploration of knowledge, understandings, perceptions, and experiences of people at the site. To explore this case study, the researcher used an explanatory sequential mixed methods design which "involves a two-phase project in which the researcher collects quantitative data in the first phase, analyses the results, and then uses the results to plan (or build on to) the second, qualitative phase" (Creswell, 2014, p. 224). In the first phase, quantitative data was collected, using the Honey and Mumford LSQ (2006) to identify students' preferred learning styles. At the same time, demographic information of students was also gathered regarding age, gender, year of study, major, and student type as a foundation to examine the interrelationships between their learning style preferences and those variables. Of the 982 students at DSU, 586 students participated in the survey, providing a 60% response rate. In the second phase, individual in-depth interviews with 16 students across the three faculties of PE, SC, and SM were conducted to gain deeper insights into their learning styles as well as their perceptions of teachers' teaching styles.

Qualitative research with the teacher group involved interviews and observations. Nineteen one-on-one interviews with sport education teachers provided a rich and detailed exploration of their understanding and knowledge about learning styles and about how they accommodated students' preferred learning styles in their teaching practices. In addition to interviews, the researcher undertook observations of a total of eight practical sessions involving students and teachers in relation to eight sports which were categorised as: two individual sports (Gymnastics and Table-tennis); two team sports (Soccer and Volleyball); two periodical sports (Athletics and Swimming); and two antagonistic sports (Martial Arts, including Taekwondo and Traditional Martial Arts). Of the eight lecturers who were involved in observations, four of them were both interviewed and observed. They delivered practice sessions in Swimming, Volleyball, Gymnastics, and Table-tennis. These observations aimed to gain a better understanding of how sport education teachers applied their knowledge of learning styles in their instruction or how they adapted their teaching styles to individual learning styles.

1.6: Research site

Sport training is delivered at DSU located in Danang City, which is in the centre of Vietnam. The university offers courses in PE, SC, and SM and is the only learning institution for sport students within central Vietnam. Whilst courses in PE are delivered by schools of Physical Education in some colleges and universities, in the researcher's opinion, those provided by DSU are regarded as the best in quality, most specialised and prestigious in central Vietnam. My role as a teacher within the university provided me with more favourable conditions to undertake the research on the learning style preferences of sport students at this site. Being inside gave the researcher easy access to information and participants, but it made it hard for the researcher to be objectice about what was being seen. As an insider researcher, the complications in the relationships with participants could be resolved effectively.

1.7: Outline of the study

The thesis comprises nine chapters. Following this introductory chapter, Chapter 2 provides a literature review, which includes: a critical examination of learning styles, learning style models and instruments; learning styles in higher education; learning styles in physical education and sport; teachers' teaching styles and other concepts of teaching styles; matching teaching styles to learning styles; and critiques of Kolb's ELT, his learning model and the Honey and Mumford LSQ.

Chapter 3 provides a detailed understanding of the context in which the research was conducted. This includes: geographic context; university situational analysis; faculty staff; students; organisation into classes; teaching and learning practices; training objectives; and infrastructure and facilities.

The thesis employs different case study designs – a mixed method design for students and a qualitative design for teachers. These enabled the researcher to identify students' learning style preferences, explore sport education teachers' knowledge and understandings about learning styles, and investigate how they applied this knowledge in their teaching practices. These methods are discussed in detail as part of the methodology chapter which is Chapter 4.

Chapter 5 presents quantitative data about the identification of students' learning style preferences and provides an analysis of the relationships between learning styles and the variables: age, gender, year of study, major, and student type. Qualitative data was also used to elaborate, extend, and support the quantitative findings.

Qualitative data in relation to exploring sport education teachers' knowledge and understandings of learning styles, and its analysis, are detailed in Chapter 6. This data set is based on individual interviews with teaching faculty members.

Chapter 7 includes an analysis of data from the observation of a total of eight practice sessions associated with eight different sports, to gain a better understanding of how teachers used their teaching styles and how they adapted to different student learning styles in their teaching practices.

Chapter 8 forms the discussion section of the thesis. In this chapter, in addition to the summary of major quantitative and qualitative findings, there is a discussion of preferred learning styles in relation to the literature and of relationships between learning styles and demographic information of the students. Also, there is a comparison between quantitative and qualitative data in relation to single learning styles, and similarities and differences in teaching styles used by sport education teachers are highlighted. Finally, Chapter 9 concludes the thesis by highlighting educational implications for practice in sport education contexts. Additionally, it outlines the contributions of the research, as well as its limitations, and identifies areas for future research. Finally, a summary of key findings and some final comments conclude the thesis.

Chapter 2: Literature review

2.1: Introduction

Investigation of students' learning styles has become the focal attention of many researchers and practitioners. This review of literature begins with definitions of learning, learning styles and terms related to learning styles. In addition, the existing literature on learning styles in higher education is reviewed with a specific focus on the area of physical education and sport. A number of models used to measure students' learning styles are also discussed. Furthernore, there is a review of teachers' teaching styles and other concepts of teaching styles. Finally, the review looks at matching teaching styles to learning styles and discusses critiques of Kolb's Experiential Learning Theory (ELT), his learning model and the Honey and Mumford Learning Styles Questionnaire (LSQ).

2.2: Learning

Learning is an activity of gaining knowledge and skills through a variety of means. Kolb's ELT defines learning as "the process whereby knowledge is created through the transformation of experience" (Kolb, 1984, p. 41). From the Kolb perspective, learning takes place through schooling and by exchanging practical experiences with other people, whereas Schmeck (2013) described learning as a gain of knowledge through repetition and reference and as a process to understand the world. Another important aspect of learning is skills which people gain through practice together with knowledge they acquire through instruction. Pritchard (2014) defined learning as a process of acquiring knowledge and skills through experience, practice, study or instruction and learning is "a process by which behaviour is changed, shaped or controlled" and "a process of constructing understanding based on experience" (p. 1). Learning plays a vital part in forming an individual's behaviour and personality and contributes to building up background knowledge and understanding in every discipline and in all aspects of life.

As stated previously, Kolb's ELT and his development of the Learning Style Inventory (LSI) to test the theory have resulted in a substantial body of research. His idea originated from what he regarded as defects in traditional teaching methods employed for management students. These prompted him to test experiential methods of teaching. He also observed that some students demonstrated their preference for some activities (exercises) rather than others (formal lectures). Kolb's theory of experiential learning was also inspired by earlier work (Dewey, 1970; Lewin, 1951; Piaget, 1970) and it draws them together into one theory.

Sugarman (1985) regarded Kolb's ELT "as a model of effective teaching" (p.264). She is also concerned about whether all courses should start with concrete experience because this is the first phase in Kolb's learning cycle, which states that a person's effective learning derives from personal experiences.

2.3: Learning styles and related terms

In reading through the extensive body of literature on learning style, a wide range of definitions have been used. Because a learning style involves perception, cognition, conceptualisation, affect, and behaviour, they have been defined in a variety of ways. According to Anderson (2016) learning styles are defined as how learners start to focus on, handle, and recall new and complicated information. Auditory learners prefer listening while visual learners learn best when seeing images and written information. Some learners are tactile, preferring hands-on approach, whereas kinaesthetic learners prefer physical activities (Helena, 2017). Students may demonstrate more than one of these learning styles but most possess a preferred learning style (Buşan, 2014; Ibrahim & Hussein, 2016). Thus, Merrigan and White (2010) proposed that everyone has a preferred learning style. Each individual has different personalities, cultural background, background knowledge, and different learning experiences, which leads to differences in their ways of learning. Pritchard (2014) described learning styles from different perspectives: "a particular way in which an individual learns", "an individual's preferred or best manner(s) in which to think, process information, and demonstrate learning" and "an individual's preferred means of acquiring knowledge and skills" (p. 46).

Some researchers primarily focus on innate characteristics of learning styles and consider them to be fixed traits. Wintergerst and DeCapua (2001) defined learning styles as inherent preferences of individuals in learning. With respect to this point, learning styles are regarded as stable traits not influenced by exterior factors. Thus, Loo (2002, p. 252) described learning style as "the consistent way in which a learner responds to or interacts with stimuli in the learning context". From another point of view about the characteristics of learning styles, Anderson (2016) argued that a learning style is an inclination rather than something that is stable, and is affected by prior learning experiences. Learning experiences help learners form learning styles but more importantly, they need to make some changes in alignment with the present learning context. Manochehr (2006) defined learning styles as "an individual's inherited foundation, particularly past life experiences, and the demands of the present environment that emphasise some learning ability over others" (p. 11).

Besides the biological features of learning styles, a person's learning styles include developmental characteristics (Dunn & Griggs, 1988; Kinsella, 1995) and are subject to change "with a certain range of individual variability" (Cornett, 1983, p. 9). Each learner has different characteristics and personality, so they have their own typical learning styles which are affected by "culture, environment, age and experience" (Anderson, 2016, p. 55). Thus, students' preferred learning styles have a propensity for changing over time under different learning situations. Also, students are persistently different from each other in their learning style preferences and knowledge acquisition due to the differences in their motivation, attitudes towards teaching and learning as well as their perception levels (Inal et al., 2015). Teachers need to take responsibility for recognising these differences to individualise their instructional strategies for students.

The question may arise here is: Which elements of learning styles are stable and which ones can be easily affected by other factors for change? Learning styles are constructed like the 'onion ring' model with many concentric rings including cognitive personality style in the innermost layer, then information processing, next social interaction and lastly instructional preference in the outermost layer (Cassidy, 2004; Curry, 1983). According to Curry (1983), cognitive personality style is least affected by exterior factors, so it is regarded as the most stable of the learning styles whereas the middle and outermost layers are less stable; exterior factors easily affect the outermost layer.

Other key terminology

Cognitive styles and learning styles are important concepts in the study of education. Cassidy (2004, p. 420) suggested that "the terms *learning style* and *cognitive style* are, on some occasions, used interchangeably, whilst at other times they are afforded separate and distinct definitions" (italics added for emphasis). To illustrate this point, Armstrong et al. (2012) proposed that *cognitive styles* refer to an individual's preferred ways of processing information, including taking in, organising, and analysing information whereas *learning styles* are involved in learners' best ways of responding to learning activities. The other differences between these two terms which should be considered are that while cognitive styles are comparatively consistent and inherent and can affect a person's behaviours, learning styles are likely to alter depending on conditions, settings, and situations and may affect learners' motivation, attitudes towards learning, and accomplishment.

Another key term, *learning strategies*, is also related to the *learning styles* which students adopt when studying. Hartley (2008, p. 149) explained that "different strategies can be selected by learners to deal with different tasks. *Learning styles* might be more automatic than *learning strategies* which are optional" (italics added for emphasis). Learning styles can be defined as general approaches to learning activities, while learning strategies are specific ways learners choose to solve tasks in particular contexts. The strategies a student uses to learn depend greatly on their own learning style. For instance, visual learners visualise what they are learning by writing down key facts or drawing mind maps showing important key words. Auditory learners benefit from hearing presentations, reading aloud, and recording lectures. Kinaesthetic learners' learning strategies are related to hands-on activities such as making models, copying demonstrations, and walking around.

The term "'learning preferences' is also widely used to refer to what we refer to as 'learning style'" (Pritchard, 2014, p. 46). These two terms refer to a person's preferred ways of approaching learning tasks. Environmental, emotional, sociological, and physical elements influence an individual's preferred ways of learning. Some of the terms defined above, have a certain level of commonality. Throughout the education research literature, the terms learning styles, preferred learning styles and learning style preferences are used interchangeably.

2.4: Learning style models and instruments

Many instruments have been designed to assess learning styles (Griffiths & İnceçay, 2016). Much literature about teaching and learning styles, and the tools for determining these styles was written and developed from the 1970s to the 1990s (Anderson, 2016). Hall and Moseley (2005) identify 71 learning styles instruments for assessing students' learning styles. Those most widely used by researchers are listed below.

2.4.1: Dunns' model

The Learning Style Inventory (LSI) by Dunn et al. (1975) was one of the earliest in which learning style was divided into five areas of preference. These were:

1. Environmental (sound, light, temperature and design)
2. Emotional (structure, motivation, persistence and responsibility)
3. Sociological (self, pairs, peers, in teams and with an adult)
4. Physical (perceptual preferences: auditory, visual, tactile, kinaesthetic, intake, time of day and mobility)
5. Psychological (global/analytic and impulsive/reflective).

This Inventory covers all factors affecting a learner's learning style preferences but comprises a lot of items to be completed. The LSI of Dunn et al. (1989) is a questionnaire with 100 items which asks respondents to respond to items regarding the primary components of the construct (Cassidy, 2004). This was a revised version of the 1975 LSI by Dunn et al. (1975). Griffiths (2012) mentioned that the 1975 LSI experienced many adaptations. For example, De Bello (1990) described its application as follows:

> That instrument, in different forms, is intended for youngsters in Grades 3 through 12. The LSI Primary version, (Perrin, 1983), developed by Dr. Janet Perrin, is an adaptation essentially for young non-readers. The Productivity Environmental Preference Survey (PEPS) is a version intended for adults and may have applications outside of the school setting. (p. 205)

In a review of 21 learning/cognitive style models that use psychometric analyses Curry (1987) reported that the LSI by Dunn et al. (1989) had one of the highest reliability and validity ratings. It has also been identified as practitioner oriented and the most widely used measure for learning style in elementary and secondary schools (Keefe, 1982).

2.4.2: The Perceptual Learning Style Preference Questionnaire

Griffiths (2012) stated that the Perceptual Learning Style Preference Questionnaire (PLSPQ) designed by Reid (1987) was one of the first well-known applications of the style concept to language learning and it was based on six modes of preference: Visual (learning by seeing), Auditory (learning by hearing), Tactile (learning by hands-on experience), Kinesthetic (learning by moving), Individual, and Group preference. Reid (1987) explained that:

> a self-report questionnaire consisted of randomly arranged sets of 5 statements on each of the six learning style preferences to be measured: visual, auditory, kinesthetic, tactile, group learning, and individual learning. Validation of the questionnaire was done by the split-half method. Correlation

analysis of an original set of 60 statements (10 per learning style) determined which 5 statements should remain within each subset. (p. 92)

The PLSPQ was not only used "to identify language learners' learning styles" but also "to examine the possible relationship between the participants' identified learning preferences and the variables of gender and achievement" (Inal et al., 2015, p. 54). For example, the PLSPQ was adapted and employed in a study by Peters et al. (2008) who investigated learning styles and their relationship with grades for students undertaking sports-related courses at a higher education institution in the UK. It was shown that the instrument had good internal consistency for the subscales of Tactile, Group, Kinaesthetic, and Individual but not for the Auditory and Visual subscales Peters et al. (2008). This PLSPQ was commonly used in the identification of the learning styles of students learning English as a foreign language and in the sport setting as well. The latter was because whilst learning sport skills in the sport setting, students normally displayed their preference for visual, group, individual, and kinesthetic learning. This PLSPQ provided valuable and important information for the current study in identifying the learning styles of sport students.

2.4.3: Kolb's Learning Style Inventory

According to Klein et al. (2007), Kolb's LSI based on Kolb's structural model of experiential learning (1976, 1984), and the LSQ of Honey & Mumford (1986, 1992) are two of the most widely used in measuring student learning styles. Kolb (1984) designed his LSI to assess general learning styles based on the four components of his original experiential learning cycle. These were Concrete Experience (CE) mode, Abstract Conceptualisation CA) mode, Active Experimentation (AE) mode, and Reflective Observation (RO) mode. From these, Kolb identified four general learning styles—people who were: Divergers (CE and RO); Assimilators (AC and RO); Convergers (AC and AE); and Accommodators (CE and AE).

People with the diverging style are open-minded and imaginative and like groupwork (Kolb, 1984; Kolb et al., 2001). Croft (2013) stated this style plays a significant role in sport because of the collaboration with other athletes. Students with assimilating learning style tend to reflect on theories (Kolb et al., 2001) and according to Croft, this is suitable for those who follow science careers when they want to put theory into enhancing athletes' performance in practice. Kolb et al. (2001) suggested that the converging learning style is essential for sports science students to carry out experiments as students with this style show preference for practice and techniques (Croft, 2013). The accommodating learning style involves learners who

are dependent on others to get information, and hands-on experience is also vital in this style. With careers in sport and health requiring teamwork, this style is important because experts share their experience in aiding athletes and patients.

Cano-Garcia and Hughes (2000) showed that the LSI uses experience as the primary component of learning in a process in which knowledge is created through the transformation of experience. De Bello (1990) pointed out that the Kolb's model and instrument were intended for and have been employed in management training for adults, and at least four different modifications of Kolb's model are utilised today. Curry (1987) showed that the instrument had only fair validity but strong reliability.

2.4.4: The VARK

Hawk and Shah (2007) stated that the VARK questionnaire developed by Flemming (2001) extends the earlier neuro-linguistic model of Eicher (1987). Mitchell et al. (2015) explained that VARK is an abbreviation for the four senses by a learner to obtain information. 'V' represents visual, 'A' signifies aural, 'R' represents read/write, and 'K' symbolises kinaesthetic (Mitchell et al., 2015). Pritchard (2014) described visual learners as those who prefer learning by seeing graphs, diagrams, charts, tables, maps, and posters. Auditory learners learn best by listening to discussion, lectures, interviews, stories, and audio tape. Read/Write learners like reading or writing things down. Kinaesthetic learners prefer to learn by doing; for example, physical activities, field trips, working on objects, and experimenting. The VARK instrument characterises students as unimodal (using one of the four modes) or multimodal (bimodal, trimodal or quadmodal) in their preferred ways of learning (James et al., 2011). Twenty-three possible combinations of unimodal and multimodal learners exist (Fleming, 2009). Leite et al. (2010) stated that the questionnaire shows initial validity and sufficient reliability.

The VARK designed by Flemming (2001) was closely related to the PLSPQ developed by Reid (1987) in terms of modes of preference, including Visual, Auditory, and Kinesthetic. These tools were significant in determining the learning styles of students. They were also foundational for the researcher to gain a deeper understanding of the learning styles of students in the sporting context.

2.4.5: The Learning Style Questionnaire

Ehrman and Leaver (2003) produced the LSQ based on a superordinate construct of ectasis (conscious control) and synopsis (subconscious processing). This LSQ also uses other styles, including random/sequential (prefer learning in any order versus in a sequence),

analogue/digital (prefer learning in a qualitative or metaphoric approach to interpreting experience versus in a quantitative or literal approach to interpreting experience), and concrete/abstract (prefer learning through actual documents versus learning based on theory). As a self report, LSQ is similar to the LSQ of Honey and Mumford; however, the LSQ of Ehrman and Leaver (2003) is used to 'determine cognitive style preferences' (Ehrman & Leaver, 2003, p. 405).

There are six learning styles which are grouped into three pairs of styles related to an individual's preferred styles of absorbing and processing information. This LSQ is primarily used for those studying subjects which focus on theory, not for sport students who are keen on physical and hands-on activities. However, in the context of physical education and sport in this current study, both aspects of learning—theory-based learning and the practice sessions in the clinical setting—were investigated. Despite this, more focus was directed to the learning styles of students whilst being involved in sporting and physical activities outside the classroom rather than theory learning.

2.4.6: The Learning Style Questionnaire of Honey & Mumford

Honey and Mumford's (2006) LSQ instrument of 40 and 80 agree or disagree questions represents four dimensions of learning styles including Activist, Reflector, Theorist, and Pragmatist (Pritchard, 2014). Honey and Mumford (2006) described the typical characteristics of each type of learner as well as the activities they find easiest to learn. The ***Activists*** like facing problems and challenges and want to solve them by interacting with other people. These learners are very enthusiastic and welcome experiences, try out new things and are ready to take risks. The ***Reflectors*** like thinking back to what has happened or what they have learned before, listening, and observing carefully before taking an action or coming to a conclusion. This means that these people need time to read to have good preparation for learning something. The ***Theorists*** are logical, analytical, pay attention to details, and tend to be perfectionists. This kind of learner needs to probe relationships between ideas, events, and situations, which are structured and complex with a clear purpose. Last of all, ***Pragmatists*** like experimenting with what they have learned or are learning. These people are very practical and want to try new ideas to see how they work in practice. They want to learn from someone acting as a model, or see demonstrations and then practise themselves (Honey & Mumford, 2006).

Klein et al. (2007) stated that the LSQ is a self-report with 80 items; another version with 40 items version is also existing and works as an effective substitute for the 80-item version.

According to Coffield et al. (2004), LSQ explores the attitudes and behaviours which identify an individual's learning style preferences and it is not a psychometric tool, but provides an understanding of how people learn. Cassidy (2004) mentioned that though the LSQ was designed for management training, it has been employed in a variety of settings including education; however, there have been issues with the psychometric qualities of the LSQ. Duff and Duffy (2002) reported that the LSQ has modest levels of internal consistency.

Of all learning style models and instruments previously outlined, the researcher employed the 40-item version of the Honey and Mumford LSQ (2006) in this study. This instrument was chosen due to its suitability in education, essentially for students at a sport university in Vietnam for whom it provided a good opportunity to think about how they had learned before. Students need not spend much time completing this questionnaire and after completing the questionnaire and scoring, students can identify their preferred learning styles. Finally, the words used in this tool are easy to understand, particularly for sports students. Both the 40-item and 80-item LSQ versions have been used in many studies (e.g.Aziz et al., 2013; Brown, 2013; Czepula et al., 2016; Guraya et al., 2014).

2.5: Learning styles in higher education

This section focuses on studies on the learning styles of students in higher education majoring in different subject areas. The Maudsley Personality Inventory and the Jeffery Barsch LSI were used by Erton (2010) to measure the learning styles of 102 first-year students who learned English as a foreign language. The results showed that 49% of students showed preference for visual learning, while auditory learners accounted for 43%. To learn a foreign language well, learners need audio-visual equipment to facilitate their learning and that is the reason visual and auditory learning are normally major learning styles for foreign language learners. The results also indicated that students with different characteristics had different learning style preferences while learning a foreign language.

In a study conducted by Clark et al. (2010), the Index of Learning Styles Questionnaire (ILS) (Soloman & Felder, 2005) was used to research 95 graduate students specialising in education. "The instrument classifies participants as having a preference for one category or the other in each of four dimensions: perception (sensing/intuitive), input (visual/verbal), processing (active/reflective) and understanding (sequential/global)" (Clark et al., 2010, p. 841). The findings indicated that Master's students showed a greater preference for sensing and sequential than PhD students, which means that the different levels of education lead to

difference in learning styles. At a high level of education, students tend to be intuitive, preferring to take in information that is abstract, original, and oriented towards theory. At a lower level, students are more likely to be sensing learners who prefer concrete and practical information. They are oriented towards details, facts, and figures. Also, PhD students prefer to organise information in a holistic and random manner (global learners) whereas sequential learning is preferred by Master's students who are more likely to organise information in a linear, orderly fashion.

The VARK questionnaire was used by Boatman et al. (2008) to measure the learning style preferences of 211 college students in an introductory economics course. The results showed that students with a major visual learning style got a higher final grade by 0.6 of a point. Economics students prefer to work with tables, diagrams, and charts, which helps to form their preferred learning styles as visual learners. This is an example of the close connection between an area of study and the typical learning styles of successful students. Teachers should diversify their instructional methods to allow for a variety of learning styles. In this way, some students can have the opportunity to use their major learning styles as a strength and the others can feel comfortable since their learning styles are, to some extent, matched with their teacher's.

An assessment of the learning styles of 193 students in an online management course was carried out by Rogers and McNeil (2009) using the Myers-Briggs personality test. The findings revealed that learning styles affect students' performance. Sensing-Thinking and Intuitive-Thinking students performed well in an online course. Helping students to be aware of their learning styles will allow them to choose a suitable course and gain academic success more easily. Therefore, students' learning styles should be assessed before entry into university or before they decide to take any course. However, sometimes, an individual's learning styles can be changed, extended, or developed in a subject area, depending on the teachers' instructional styles for delivering lessons in that field.

To sum up, there are several studies on the learning styles of students in higher education specialising in a variety of disciplines. By using different self-reported questionnaires, students' learning style preferences are identified. It is important to note that students possess their own typical learning styles in alignment with the major subject area they take. Therefore, in the instructional practices, teachers might utilise appropriate teaching styles to accommodate these preferred learning styles of students.

2.6: Previous learning style research in a sporting environment

2.6.1: Learning styles and age, gender, majors, and performance levels

A survey was conducted by Andrea et al. (2015) on 93 athletes from 24 sports at various achievement levels. Participants were recruited in both New Zealand and the United States of America. The findings demonstrated that very few athletes showed preference for visual learning; there was a close connection between gender and VARK (Visual/Auditory/Read-Write/Kinesthetic) preference and between achievement levels and VARK preference. Learning style preferences varied between men and women and between athletes with different performance levels (Andrea et al., 2015).

Another study by Peters et al. (2005), asked 450 students undertaking sport-related undergraduate programmes, at three levels, at the University College of Worcester and its partner colleges to complete two questionnaires: Approaches to Studying (Richardson, 1990) and the PLSPQ developed by Reid (1987). Auditory, kinaesthetic, and group were students' learning style preferences regardless of differences in gender or age. This may be due to the fact that most course programmes focused on practical, kinaesthetic, and experiential learning. The third-year students showed a significantly greater auditory preference in their learning styles than their first-year counterparts, and the outdoor recreation students were more tactile and less auditory than students of sport studies and sport and exercise science (Peters et al., 2005).

Bostanci (2020) conducted a study, using the VARK LSQ (Fleming, 2009) to find out the learning styles of 169 undergraduate students studying at the faculty of Sport Sciences, Ondokuz Mayıs University, Turkey. It also investigated the relationships of learning styles with different variables. The findings of the study demonstrated that there was no statistically significant differences between students' learning styles and gender. This was consistent with Güneş and Erkan (2017) but contradicted with Braakhuis et al. (2015) and Park et al. (2014). The research also revealed no statistically significant relationships between learning styles and age groups.

The current research study was directly linked to the above-mentioned studies in terms of identifying students' learning style preferences and the relationships between learning styles and age, gender, and major using the Honey and Mumford LSQ (2006). However, the researcher desired to look at one more independent variable, that is student type (i.e., student or student-athlete).

2.6.2: Learning styles and environment

Dunn (2009) differentiated between the traditional classroom where students "have time to process information presented in a modality outside their primary preference" and the clinical setting where "coaches and athletes speak a common language of instructions, verbal cues and appropriate motor responses" (p. 31). In another study, Coker (2000) investigated the preferences of the learning styles of undergraduate athletic training students in traditional classroom versus clinical settings. A total of 26 students who were given clinical practice as part of their academic program served as subjects. The findings showed a change in students' learning styles from traditional classroom to clinical settings.

Students have various ways of gaining information, approaching tasks, and learning skills. Depending on the circumstance, everyone can display their own preferred learning style in response to the environment. For example, in the traditional classroom, students tend to demonstrate an auditory learning style whereas they seem to prefer kinaesthetic learning while participating in sport with their teammates in the clinical setting. Coker (2000) suggested teachers should know how to vary their teaching strategies to suit each setting since there must be a shift in learning styles depending on the area where learning activities occur. In addition, teachers and coaches should spend time considering their teaching methods and students' learning style preferences; this will assist in improving their capacity in providing new materials, instructional strategies, and technical skills in the two distinct and challenging environments of physical education and athletics (Dunn, 2009). Based on the literature, sport students' learning styles will be best demonstrated in the clinical setting (Coker, 2000; Dunn, 2009; Holland & Mills, 2015). In the current study, all observations of practice sessions were conducted in this environment to perceive how teachers' teaching styles were displayed and how they accommodated students' learning styles. This provided an insight into how teachers' knowledge and understanding about learning styles were applied in their teaching practices.

2.6.3: Learning styles and coaching

To enhance performance, Dunn (2009) recommended coaches and athletes follow five steps. The first step is to evaluate the learning styles of coaches and athletes. Thinking about successful coaching methods is the second step coaches and athletes should follow. Next, coaches need to create a variety of coaching methods for each learner's learning style. The fourth step is to fit coaching methods with athletes' learning style preferences. Finally, coaches must evaluate successful new approaches for the athletes' performance, coaching

communication, and motivation. The study undertaken by Dunn (2009) was of great importance to coaching/teaching and learning practices and directly informed the research being conducted in the field of physical education and sport. An assessment of learning styles of students and athletes is always the first job and is essential for teachers and coaches in adopting appropriate instructional and coaching strategies that accommodate individual learning styles.

Each person has a preferred way of taking in information and learning from the world. "A dominance profile is a personal assessment technique that gives information about how we take in and process new learning experiences developed through the work of Hannaford (2005) and Dennison (1985)…and is one method of determining learning style preferences" (Stevens-Smith & Cadorette, 2012, p. 362). Using dominance profiles may assist coaches in defining their athletes' learning style preferences, knowing more about the different ways athletes think, act and learn, and predicting students' reactions to a variety of sport situations (Stevens-Smith & Cadorette, 2012). The authors conclude the dominance profile is just one tool that may help in the instruction of sport skills and provide a way to understand differences between learning and actual sport achievement.

In a journal article titled *Accommodating students' learning styles in Physical Education,* Coker (1996) recommended that teachers identify their students' and athletes' learning styles. The determination of students' learning style preferences is particularly essential for teachers and coaches since "in the coaching/teaching environment, knowledge about how athletes take in information and learn is vital in helping athletes improve skills and knowledge about sport." (Stevens-Smith & Cadorette, 2012, p. 367). This is a key point sport education teachers and coaches should address to motivate students/athletes and to enhance their achievement. Identifying students' preferred learning style may be of great importance not only for learners to maximise learning opportunities and perceive their strengths and development fields, but also for teachers to determine the need to add further activities to guarantee the soundness and effectiveness of the learning experience (Anderson, 2016).

2.6.4: Students' perceptions on teaching styles

Examining students' perceptions about teaching style will help teachers develop a greater understanding of students' ways of learning, the good points and bad points of teaching styles, the relationships between the styles and different disciplines, and student style preferences (Sanchez et al., 2012). Sanchez et al. (2012) conducted a study on students' perceptions of

command, practice, and inclusion styles of teaching. The findings showed more physical and cognitive involvement in the inclusion-style lessons than in the command- and practice-style lessons. There was no distinction in social involvement. Regarding learning style preferences, the inclusion and command styles were chosen most often. The authors suggested the command, practice, and inclusion styles could influence students' involvement level in physical activity lessons. Whenever students like teachers' teaching styles, they will feel more comfortable and motivated, show good attitudes towards learning, and participate more actively in activities.

Research undertaken by Kirby et al. (2015) investigated the impact of the two teaching styles of practice and inclusion on students' basic psychological needs satisfaction and self-determined motivation. One hundred and forty-nine college-aged students participated in two badminton lessons taught under the conditions of the practice and inclusion styles. The findings revealed that the students' perceptions of autonomy and competence, identified motivation in badminton, and their perceptions of fun, learning, motivation and experience with the two teaching styles all increased due to the teaching styles intervention. The authors pointed out that the teaching methods in both the practice and inclusion styles were equally effective in having a positive impact on students' basic psychological need satisfaction and level of self-determined motivation. The study by Kirby et al. (2015) demonstrated a useful research approach in identifying the impact of the teaching styles upon student learning as well as on other factors such as motivation, satisfaction, and self-determination.

Students have different perceptions about teachers' teaching styles. If they prefer the way the teachers deliver their instruction, they feel more motivated, interested and engaged in all learning activities. This will, in turns, result in better capacity in acquiring knowledge and in their study performance.

In summary, the previous studies revealed a close connection between learning styles and age, gender, majors and performance levels of students or athletes. In addition, the learning styles of students varied from the classroom-based setting to the practical setting. Therefore, it is of note to observe the relationships between the preferred learning styles and those variables as this assisted teachers and coaches to modify their instructional styles to suit students' learning styles.

2.7: Learning styles in physical education and sport

Like students of other specific subjects, physical education students have their own learning style preferences. These learning styles vary depending on gender, achievement, and learning environments and have a great influence on their performance levels, not only in the classroom setting but also in competitions. This section focuses on the relationships between learning styles and the factors mentioned above.

2.7.1: The relationship between learning styles and achievement

There has been a significant amount of research on the relationship between learning styles and academic achievement of students. Taylor (2001) used the Kolb's LSI (1993) to study learning style preferences and academic success of graduate and undergraduate athletic training students. The results showed that learning style preferences were roughly equally divided among the whole cohort, which consisted of Accommodators (28%), Assimilators (28%), Convergers (26%), and Divergers (18%). Whilst examining the learning style preferences of athletic training students in relation to the four types of self-reported grade point average: level 1 (0.00–2.99), level 2 (3.00–3.49), level 3 (3.50–3.99), and level 4 (4.00), the findings were revealed as follows. Of the overall sample of students at Level 4, 44% demonstated their preference for the assimilating style whereas graduate students of Level 3 preferred the diverging learning style (40%). Accommodating was the Level 2 graduate students' preferred style (40%). The findings also indicated that undergraduate students at Levels 3 and 4 chose abstract conceptualisation and abstract conceptualisation/concrete experience as their preferred learning styles while those at Level 2 preferred reflective observation and active experimentation/reflective observation. The results are consistent with a sports trainer who is creative to enhance their athletes' performance (Colvey, 2014).

A study on the relationship between learning styles and grade profiles for undergraduate students undertaking sports-related courses was conducted by Peters et al. (2008). By asking students to complete the PLSPQ (Reid, 1987) with six preferred learning styles (visual, auditory, kinaesthetic, tactile, group and individual), the results revealed that their major learning styles were auditory (54%), kinaesthetic (50%), group (46%), individual (37%), tactile (21%), and visual (20%). The findings also indicated that individual learning style was positively correlated with academic achievement (correlation coefficient = 0.247) ($p < .001$) and there was a negative correlation between group learning and students' grade profiles (correlation coefficient = −0.178) ($p < .01$). The study is very helpful in discovering learning

and teaching strategies which match the learning style preferences of sport students (Peters et al., 2008). Despite the weak correlations, there may be a strong relationship between learning styles and achievement, although in practice it is hard to demonstrate. This might be because the evaluation or testing methods do not align with how teachers organise learning activities; for example, teachers frequently focus on group work but testing is mainly based on individual capacity. The question is should instructional methods be adapted to students' preferred learning styles to help them get higher grades?

To sum up, many studies have been conducted on the relationships between students' learning styles and their academic achievement. However, in the current study, academic achievement was not included in examining relationships between different factors and learning styles. This was due to the fact that the examination and testing practices in the research setting were not adequately standardised.

2.7.2: The relationship between learning styles and learning environments

Matching teachers' teaching strategies to students' learning styles enhances students' performance in the classroom setting (Dunn et al., 2002; Dunn & Dunn, 1975; Price et al., 1981). According to Coker (2000), if there is a match or alignment between teaching styles and individual learning styles, the training of physical education students will succeed. Therefore, it is important to investigate the typical features of the learning environment in physical education training. It is suggested that there should be a corporation between the classroom setting and experiential learning since these two environments are different (Brockhaus et al., 1981). Coker (2000) explained that students can complete tasks assigned by teachers successfully in the classroom, but in the clinical setting students are provided with practical and real-life situations. Therefore, students' preferred learning styles for absorbing and processing new things vary in each setting.

Coker (2000) examined learning style preferences of 26 athletic training students at university level in the classroom and in the clinical setting. Kolb's (1985) LSI was used to evaluate students' preferred learning styles. The participants completed the Inventory twice in the two settings. It was found that 65% of students preferred the assimilating learning style, followed by 15% of Convergers in the classroom (25% of Assimilators and 42% of Convergers in the clinical setting). The prevailing learning styles in experiential learning outside the classroom varied, with 42% preferring the converging style, followed by 30% Accommodators (13% of Accommodators in the classroom). This is evidenced that learning style preferences

vary from one environment to another. Therefore, the author recommended that teachers' teaching styles should be adaptive to each setting.

The findings of the above-mentioned studies informed the current research in identifying students' learning styles in the classroom-based learning and during practice sessions.

2.7.3: The relationship between learning styles and gender

The results of Taylor (2001) study showed that there was a significant relationship between gender and students' learning styles. However, in another study by Hansen (2000), it was found that there was no relationship between students' learning styles and gender but there existed a relationship between gender and teachers' learning styles. This is in contrast with what Çaglayan (2011) found when investigating faculty members' learning styles in a school of physical education and sport in Turkey. It was determined that there was no relationship between their learning styles and gender. A study by Cetin (2014) revealed no significant relationship between learning styles and gender which is different from Taylor's.

Holland and Mills (2015) conducted a study on the learning style preferences of 32 final-year students (14 males and 18 females) of sports therapy in the context of clinical education. The Kolb LSI was used to collect data. The results showed there was no relationship between gender and students' learning styles, but when comparing the AC-CE scores, it showed a big difference ($p = 0.03$). The male students had a preference for more abstract styles while female students showed a likeness for more concrete learning styles (Holland & Mills, 2015). Also, males preferred the Assimilating learning style whereas females displayed equal preference for the Accommodating and Diverging styles. These results differ from a study by Bowman et al. (2000) who investigated 212 physical therapy students and professionals. The female participants demonstrated a predilection for the Assimilating style while the males were Convergers (Holland & Mills, 2015). Holland and Mills explained that these differences were due to the difference in settings (classroom education and clinical education).

Whilst there were similarities and differences across studies which explored the relationships between learning styles and gender, the current study took this issue into account. After identifying the learning styles of students, this relationship was investigated for comparison with the previous studies. This contributed to the knowledge of learning styles in the area of physical education and sport.

2.8: Teachers' teaching styles and other concepts of teaching styles

2.8.1: Verbal cues

A cue can be understood as a kind of short instruction that forces the students to focus their attention to important factors for successful performance (Fronske & Heath, 2008; Pasetto et al., 2021). PE teachers use this common action in their teaching, especially during practice of a technique, collective or individual tactics of defense or attack, or even during a game, they continually direct students to some fundamental elements to perform successfully (Silveira et al., 2022). These authors also stated that teachers can offer a cue through drawings, figures, or gestures (visual cues), use of specific body parts (kinaesthetic cues) and/or succinct phrases, often one or two words (verbal cues). As verbal cues are short and concise, they give students more time to perform a task rather than listening to long directions (Pasetto et al., 2021). This may enable students to invest time in practicing and performing better.

2.8.2: Visual

Visuals are an important means used in teaching concepts, motor skills in physical education classes and in further improving prior knowledge for students (Nguyen & Watanabe, 2013). Visual means include pictures, charts, posters, web images, or technology devices which are utilised along with the teacher's oral commands for clarity. In addition, gestures, body language, and facial expressions are effective visual supports teachers use to make directions clear, which is called total physical response (Asher, 1966).

Physical education teachers can use visuals to provide instructions to students by showing the visual and demonstrating the skill. The use of the visual, demonstrations, and physically executing the skill enable students to gain a better understanding of techniques in the PE context (Nguyen & Watanabe, 2013).

2.8.3: Demonstration

Demonstration is commonly used in educational setting, in combination with verbal explanations, especially in physical education as many skills in PE need specific movement patterns which can be effectively taught through demonstration (Holst, 1997). Demonstrations can improve student learning as they provide an essential visual picture of the movement needed and how all the elements of the skill fit together (Ryan et al., 2016). Through demonstration, students can learn actions and movements that cannot be mimicked) by simply explaining them verbally (Graham, 2008). Also, it is often easier for students to grasp

information by observing something and acting, rather than by hearing about it (Valentini, 2004).

2.8.4: Differentiated instruction

Differentiated instruction is an instructional approach that caters to the diversity of students by dealing with student diversity; utilising specific teaching strategy; arousing a variety in learning activity; scrutinising individual student needs, and achieving peak learning outcomes (Suprayogi & Valcke, 2016). It is described as a proactive approach, which ensures access for all students regardless of their needs (Griful-Freixenet et al., 2020). In this way, an effort is made to respond to the group-specific needs of students within a class.

Students enter the classroom with a range of differences in their readiness, conceptions, interests, and learning profiles (Trinter et al., 2015). It is important to take into account students' learning needs and learning styles to support their ongoing studies and to help them achieve their goal.

The philosophy of differentiated instruction (Tomlinson, 2004) provides a framework for addressing the diversity of students' needs which is based on five elements (Tomlinson & Moon, 2013): (1) high-quality curriculum with clear learning goals, (2) ongoing assessment, (3) respectful tasks, (4) flexible grouping, and (5) learning environment focused on students' readiness, interests, and learning profiles. In the teaching process, teachers need to consider these factors to differentiate their instruction in accordance with differences in students' learning styles.

This style of teaching enables students to independently work in the classroom and design lessons based on a variety of learning styles of students. In other words, this style of teaching provides students with their ability to use their learning experiences in a way that best accommodates their learning styles.

2.8.5: Individualised instruction

A change in teaching methodology from the traditional 'one-size-fits-all' approach to individualised instruction provides a starting point for equity in the educational context (Bondie et al., 2019). Individualised instruction means that each learner learns differently and to tailor to these differences, instruction should be personalised, matched, or adapted to the experiences, capacities, and interests of individual students (Waxman et al., 2013).

In addition, students have a wide range of learning needs and the teachers emphasise the need to pay attention to these needs of individual students. Lindner and Schwab (2020) indicated that individualisation values individual needs of students and is accommodated to the educational needs of individual students. In other words, individualised instruction focuses on the needs of individual students, and therefore, the teachers should focus specifically on one need at a time. Students who receive individualised instruction from teachers may understand and learn more easily and feel more motivated in their learning.

2.8.6: Learner-centred

McCombs and Whisler (1997) defined learner-centeredness as a viewpoint that centres both on the learner (i.e., his/her cognitive structure) and on learning, described by the authors as "the best available knowledge about learning and how it occurs and about teaching practices that are most effective in promoting the highest levels of motivation, learning, and achievement for all learners" (p. 9). In a student-centered classroom, students are provided with space, tools, and support they need to monitor their own learning.

2.8.7: One-size-fits-all

One-size-fits-all model can be understood as the same teaching styles applied to students regardless of differences in their capacity or interest (Ohanian, 1999). However, in practice, students have a variety of learning styles as well as different strengths and weaknesses (Kolb, 1976). This teaching style may be inappropriate as it supposes that students learn similarly. Therefore, teachers need to cater to a wide variety of students by differentiating to suit the individual needs of each student.

2.8.8: Inclusion

In many classrooms, learners may meet a number of difficulties including language, a lack of abilities or sports performance (Chatzipanteli & Dean, 2020). This leads to stress in participation in physical activities as well as problems in building relationships with their partners (Sylvestre et al., 2013). The inclusion of students having those difficulties into the teaching program has been a research topic for researchers. A good design in physical education integration programs would be efficient for such students (Cipani, 1995).

In the sports context, if the teachers always ask students to follow their orders, students will lose their creativity, will be afraid and bored with the teaching style of teachers (Rusdi et al., 2020). In other words, students' motivation and likeness to learn are affected by teachers'

teaching style. In order to limit the drawbacks of the command teaching style, there are other styles that make students more interested and engaged in learning, that is inclusion style (Rusdi et al., 2020). This inclusive teaching style provides students with opportunities to further develop those with good capabilities and those who lack abilities (Mosston & Ashwort, 1994).

2.8.9: Gender sensitivity

Gender biases have often been examined in school environments (Azzarito & Solomon, 2005; Opotow et al., 2013; Sarvanaraj et al., 2012), influencing teachers' assessment of students' performance (Tiedemann, 2002). Physical Education classes have often been deemed as more suitable for male than female students (Flintoff & Scraton, 2001; Koivula, 2001; Lentillon et al., 2006; Scraton et al., 1999). This might be attributed to the fact that sports and most activities taking place in PE classes are described as masculine (Klomsten et al., 2005). In addition, more masculine teaching approaches are utilised by PE teachers (Hutchinson, 1995; Napper-Owen, 1994) and the language teachers use when addressing students "you guys" regardless of their gender (Davis, 2000).

Research revealed that PE teachers asked male students to demonstrate more frequently, and utilised more gender-biased norms for grouping students (Castillo et al., 2012; Davis, 2000; Hannon & Ratliffe, 2007). Other studies indicated that PE teachers gave more positive feedback and attention to males (Drudy & Chatháin, 2002; Duffy et al., 2001) and interacted less with females, either verbally or nonverbally (Castillo et al., 2012; Hannon & Ratliffe, 2007). In practice, in PE classes and sport courses, the number of male students participating normally account for the majority of the population as compared to their counterparts. As there are biological and physical differences between the genders, the teachers need to adopt appropriate teaching styles to minimise the issue of gender sensitivity while conducting teaching and learning activities.

2.9: Matching teaching styles to learning styles

Gilakjani (2012) stated that alignment between teaching styles and learning styles helps to enhance students' learning motivation and improve their study results. For this reason alone, teachers should be cognisant of their own teaching styles and help students to identify their preferred ways of learning. If teachers do not have this crucial knowledge, conflicts in classrooms will negatively influence students' performance and learning attitudes. Thus, it is of paramount importance for teachers and students to ensure teaching and learning styles are

harmonious. However, teachers' instructional styles are normally based on their own preferred ways of learning since they feel comfortable with this, and they may not be conscious of students' various learning style preferences (Stewart et al., 1999). To effectively adapt to different learning styles of students, it is suggested that teachers create a relaxing learning environment, helping to enhance students' better study performance and learning attitudes (Butler, 1987; Searson & Dunn, 2001).

Although some researchers assert that a mismatch between teaching and learning styles results in serious distress and reduced learning for students (Felder & Brent, 2005; Koch, 2007; Minotti, 2005) and recommend adapting instructional strategies to students' preferred learning styles (De Jesus et al., 2007; Dunn et al., 2001; Lovelace, 2005; Minotti, 2005; Morrison et al., 2006), other educators argue against the gains of a match due to a lack of empirical evidence (Barber, 2007; Hall & Moseley, 2005; Karns, 2006; Krätzig & Arbuthnott, 2006; Loo, 2004; Olson, 2006; Pashler et al., 2008) or that a mismatch brings real benefits (De Jesus et al., 2007). Some support neither the match or the mismatch and suggest addressing differences between teaching and learning styles by using a wide variety of teaching methods to be adaptive to each individual's needs, lessening students' weaknesses and promoting the potential and success of students (Felder, 1996; Karns, 2006; Kolb & Kolb, 2009; Loo, 2004).

Although there are some who support the match between the teaching styles and learning styles and those who are for the mismatch, the author of this thesis strongly believe that the match between the learning styles and teaching styles brings numerous benefits for students. This helps to increase students' levels of motivation, interest and performance in their learning. Thus, it is crucial for teachers to cater for individual learning styles of students and make every effort to best suit their preferred learning styles.

2.10: Critiques of Kolb's experiential learning theory, his LSI and Honey and Mumford's LSQ

Kolb's (1984) ELT and his model of learning styles are foundational to Honey and Mumford's development of their learning styles instrument (Dantas & Cunha, 2020). These authors state that the Honey and Mumford LSQ forms learning styles from the strategies used by learners for the acquisition and transformation of information. The Honey and Mumford learning styles include Activist, Reflector, Theorist, and Pragmatist which correspond to the AE, RO, AC, and CE strategies of the Kolb cycle, respectively.

Hall and Moseley (2005, p. 247) regard the Honey and Mumford LSQ as one of "the thirteen potentially influential models of learning styles." Chen and Chen (2018) state the LSQ offers an informal measurement of students' preferred approaches to learning, and shows the extent to which learners find it easy to learn through each approach (Activist, Reflector, Theorist, and Pragmatist). Amponsah (2020) asserts that learning style instruments such as the Honey and Mumford LSQ allow students to evaluate their strengths and weaknesses and also classify them into various learning styles. Although the Honey and Mumford questionnaire has been used as an acceptable alternative tool to Kolb's, it is still critiqued as an unsatisfactory tool due to its low reliability and poor factor structure (Zwanenberg et al., 2000).

The term experiential learning theory, used by David Kolb, has substantially affected the conceptualisation of adult learning styles (Amponsah, 2020). He further added "though Kolb's work has been influential with regard to adult learning styles, it, too, has been challenged" Amponsah (2020, p. 536). For instance, Jarvis (1987) stated that it is excessively simple and that adult learners are not obliged to track the processes in his cycle spontaneously, with some even skipping aspects of his four processes. There has been much criticism in association with Kolb's ELT and his LSI. Garner (2000) criticised Kolb for stating that his learning styles were identical to Jung's (1971) personality types. He pointed out that there are "only weak connections" (p. 343) between the two approaches; furthermore, he claimed that Kolb had not noticed the support capabilities that are essential in Jung's work. In a psychometric analysis, De Ciantis and Kirton (1996) discussed a more critical issue related to Kolb's theory and his instrument. In the LSI, Kolb attempted to measure "three unrelated aspects of cognition: style, level and process" (De Ciantis & Kirton, 1996, p. 816). They also had doubts about Kolb's two bipolar dimensions of reflective observation (RO)–active experimentation (AE) and concrete experience (CE)–abstract conceptualisation (AC). From their factor analysis, Kolb's four learning styles occurred, but in a different structure, with CE at one pole and RO at the other; and AC at one pole and AE at the other (De Ciantis & Kirton, 1996).

Wierstra and De Jong (2002) argued that there has been indefinite indication for the presence of Kolb's two dimensions of AC–CE and RO–AE. Other researchers have established dissimilar two-dimensional constructs or no structure with two dimensions (Cornwell et al., 1991; Geiger & Pinto, 1992). Wierstra & De Jong's preferred structure was a one-dimensional bipolar representation: (AC+RO) versus (AE+CE) or "reflective learning versus learning by doing" (Wierstra & De Jong, 2002, p. 439).

A key critique of Kolb's experiential learning cycle is that any or all the four stages he classified could happen concurrently (Jeffs & Smith, 1999). In addition, the model does not provide adequate acknowledgement for the strength of reflection on learning (Boud et al., 1996). The most fundamental criticism of the cycle is that a learner can skip some stages of the process or iterate a number of times in any cycle, depending on the learner as well as the activities they are involved in (Jarvis, 1987).

It is argued that there are strong points relating to Kolb's LSI and Honey and Mumford's LSQ. However, there is also criticism from different authors. Despite this, Kolb's LSI and Honey and Mumford's LSQ have been extensively employed in research studies on learning styles of students in a wide variety of disciplines (Bakar & Ali, 2016), particularly in business settings. However, there are few published studies that have systematically examined the learning styles of sport students. Therefore, the current study was conducted, with a focus on identifying the learning styles of sport students, not only in the classroom but also in practical settings.

The 40-item version of the LSQ (2006) was used in this study for several reasons. Firstly, it provided students with an opportunity to think about how they had learned before. Secondly, as compared to the 80-item version, it took the respondents less time to complete and score the questionnaire which was aimed at maximising participation. Finally, it assisted the participants to stay focused as there were fewer suggestions for action to choose between, and the language was accurate and clear (Honey & Mumford, 2006). Finally, upon completion of this questionnaire, students were able to identify their preferred learning style based on the points they scored on each style.

2.11: Chapter summary

This chapter has highlighted research into the learning styles associated with physical education, the relationships between learning styles and demographic information, teachers' teaching styles and other concepts of teaching styles as well as the matching of teaching styles and learning styles. Further research and investigation to determine the extent and application of learning styles theories in the area of physical education and sport would provide a better understanding of learning styles in this environment and assist in improving student learning when instruction is tailored to students' learning styles. The following chapters will present the case study context and the research design adopted to investigate the research problem.

Chapter 3: Case study context

3.1: Introduction

This section provides an overview of Danang Sport University (DSU) where the research was conducted. The chapter contains information from the University, along with the researcher's observations having been teaching at the institution for many years. A detailed description of the location and a situational analysis of the research site are provided. Additionally, the faculty staff, students, organisation of classes, and teaching and learning practices at DSU are also detailed. Finally, information on training objectives and the facilities serving the teaching and learning practices contributes to a contextual understanding of the research setting.

3.2: Geographic context

Danang Sport University is located in Danang City, which is situated on the coast of the South China Sea at the mouth of the Han River in central Vietnam. Danang is the most dynamic city in central Vietnam between the capital city of Hanoi in the North and the economic centre Ho Chi Minh City in the South. Danang City is the fifth largest city in Vietnam with a population of approximately 1.1 million and an area of 1,285 km² . Danang City, as the largest city in the region, is a commercial and educational centre of Central Vietnam (UN, 2020), and is as an international transport and tourism centre (Ostojic et al., 2013).

3.3: University situational analysis

Along with Bac Ninh Sport University in the North and Ho Chi Minh City Sport University in the South, DSU is an institution of Vietnam's Ministry of Culture, Sports, and Tourism and is under state management by the Ministry of Education and Training in terms of education and training. The University offers undergraduate and master's courses in the field of sport. In relation to teaching staff, 79% of faculty members at DSU hold doctoral or master's degrees. Many lecturers are experienced in the fields of sport management, sport coaching, and sport event organisation. With respect to international cooperation, the university collaborates with several sport universities and institutes of China and Thailand in training, scientific research, and academic exchange (Danang Sport University, 2018).

Developments at DSU are providing modern facilities for teaching and learning, meeting the requirements of training, coaching, and scientific research at university. Currently, the university has two campuses. An older campus where the research was conducted is situated

in Thanh Khe District, Danang City and has 982 students enrolled. This campus is being used for all teaching and learning activities at the university as well as for administrative offices. A new campus is located in Lien Chieu District and managed by the Centre for Defence Education which offers compulsory short-term courses in defence education for students at DSU, and college and university students across Danang City.

This case study focuses on the three faculties: Physical Education (PE), Sport Coaching (SC), and Sport Management (SM) at DSU that are primarily associated with the study of physical education, sport coaching, and sport management. It is worthwhile mentioning that students in these three majors have to learn a variety of sports available at the university. Students from the faculties of PE and SC major in different sports. Therefore, the university has 10 different sport departments: Department of Tennis and Badminton, Department of Basketball and Handball, Department of Gymnastics and Chess, Department of Swimming, Department of Martial Arts, Department of Athletics, Department of Soccer, Department of Volleyball, Department of Table-tennis, and Department of Recreational Sports. All faculty staff in these departments are involved in instructing practice sessions whilst most faculty staff in faculties deliver theoretical subjects related to sport management and sport theory. These primary faculties and departments function independently and undertake professional operations in physical education and sport at university.

3.4: Faculty staff

Details of staff across the three faculties: PE; SC; and SM are presented in Table 3.1.

Table 3.1 Number of faculty staff across faculties

Faculties	No. of staff		Total
	Male	Female	
Physical Education	6	5	11
Sport Coaching	5	1	6
Sport Management	3	4	7
Total	14	10	**24**

Source: Personnel Department, DSU, 2018

As depicted in Table 3.1, there are 24 faculty staff across the three faculties, while the number of faculty staff in each sport department at DSU is demonstrated in Table 3.2.

Table 3.2 Number of faculty staff across departments

Departments	No. of staff		Total
	Male	Female	
Soccer	8	0	8
Volleyball	5	0	5
Table-tennis	3	1	4
Gymnastics–Chess	2	4	6
Martial Arts	4	2	6
Badminton–Tennis	6	2	8
Recreational Sport	2	1	3
Swimming	2	2	4
Athletics	3	2	5
Basketball–Handball	7	0	7
Total	**42**	**14**	**56**

Source: Personnel Department, DSU, 2018

Generally, there is a Head in each department and all faculty staff are lecturers who deliver instructions concerning practical sessions related to their major sport across faculties and departments.

3.5: Students

In the year 2018 when the research was conducted, the university had a student enrolment of 982 students in the old campus undertaking 4-year courses in the three faculties of PE, SC, and SM. Table 3.3 depicts the number of students in each faculty.

Table 3.3 Number of students in each faculty

Faculties	N^0 of students	Percentage
Physical Education	728	74%
Sport Coaching	204	21%
Sport Management	50	5%
Total	**982**	**100%**

Source: Office for Student Affairs, DSU, 2018

Of the 982 undergraduate students at DSU, the majority of students were in the faculty of PE (n = 728, 74%). These students majored in one of the different sports offered at DSU. The second largest group included students from the faculty of SC with 204 students (21%). Only a small number of students (n = 50, 5%) specialised in SM.

Of the 982 undergraduate students at DSU, males account for 82% (n = 808) and females make up the minority with 18% (n = 174). Table 3.4 depicts the number and percentage of males and females across faculties.

Table 3.4 Number of males and females in each faculty

Faculties	Males		Females	
	No.	Percentage of total males	No.	Percentage of total females
Physical Education	597	82%	131	18%
Sport Coaching	169	83%	35	17%
Sport Management	42	84%	8	16%
Total	**808**	82%	**174**	18%

The distribution of males and females in each faculty is similar, and closely resembles the ratio with respect to the total number of students. This is also closely aligned with the percentage of males and females across the whole university enrolment (82% male and 18% female). Males account for the vast majority of students in all three faculties.

3.6: Ratio of faculty staff and students

Figure 3.1 provides an overview of the number of staff and students in each of the three faculties at DSU.

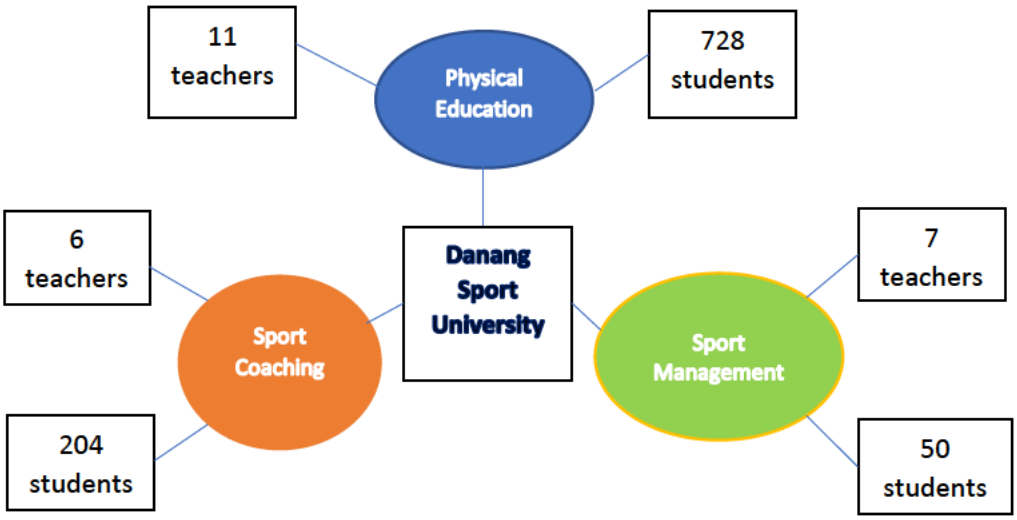

Figure 3.1 Number of teachers and students across faculties

Source: Office for Student Affairs and Personnel Department, DSU, 2018

Physical Education is the largest faculty with 728 students but only 11 teachers (66 students per teacher). It is followed by 204 students and six teachers in the faculty of SC (34 students per teacher), while the faculty of SM has the smallest number of students (n = 50) and seven teachers (7 students per teacher). The staff to student ratios in each faculty reveal significant differences among faculties for the following reasons. Firstly, faculty staff are grouped in faculties for personnel management and administration purposes, not depending on the number of students within each faculty. Secondly, lecturers from these faculties deliver their theoretical and practical instructions across faculties, not simply for students in their own faculty. In addition, as stated previously, the 56 lecturers from the 10 different sport departments are also involved in the teaching of practice sessions across departments and faculties.

3.7: Organisation into classes

The total number of students (n = 982) at DSU were organised into 33 classes, across the four year levels, in accordance with their faculties, departments, and major sports. These classes were formed in line with the decision of the university and were for theoretical instruction. Sometimes, for some theoretical subjects occurring in the classrooms, students from different sport major areas (more than one class) within the faculty join together to cut down on the

budget paid for the lecturers. However, within a class with different sport major areas, they are divided into separate groups for practical instruction. Table 3.5 shows the numbers of students and classes across faculties.

Table 3.5 Number of students and classes

Faculties	No. of classes	No. of students
Physical Education	23	728
Sport Coaching	6	204
Sport Management	4	50
Total	**33**	**982**

Source: Office for Student Affairs, DSU, 2018

As the number of PE students was significantly higher than those in the faculties of SC and SM, there were more classes. Additionally, students in the faculty of PE specialise in a wide variety of sports as compared to those in SC, which leads to more classes. With respect to SM students, they did not major in a specific area of study and there were not many students in this faculty; therefore, there were only four classes ranging across the four years of study.

The university offers undergraduate courses which last for four years. In the context of this study, the first-year students are called freshmen and sophomore refers to the second-year students. Third and fourth-year students are called juniors and seniors, respectively.

3.7.1: Freshmen

Depending on the number of students applying for each course of study, as well as their registration for their field of study, students were organised into classes according to each year of study. The number of freshmen and classes across the three faculties is shown in Table 3.6.

Table 3.6 Number of freshmen students and classes

Faculties	No. of classes	No. of students
Physical Education	3	103
Sport Coaching	3	98
Sport Management	1	15
Total	**7**	**216**

Source: Office for Student Affairs, DSU, 2018

The total number of students in this year of study were 216 and divided into seven classes. With 15 students in SM, they were placed into one class. Meanwhile, the numbers of PE and SC students were significantly higher and majored in different sports; therefore, they were grouped into more classes. It is worthwhile noting that students in each faculty studied theory sessions together in the classroom with one lecturer within or outside their faculty depending on the subjects, but during practice sessions, they studied separately according to their major sport area with instruction by two teachers. SC students were divided into three classes, as can be seen in Figure 3.2.

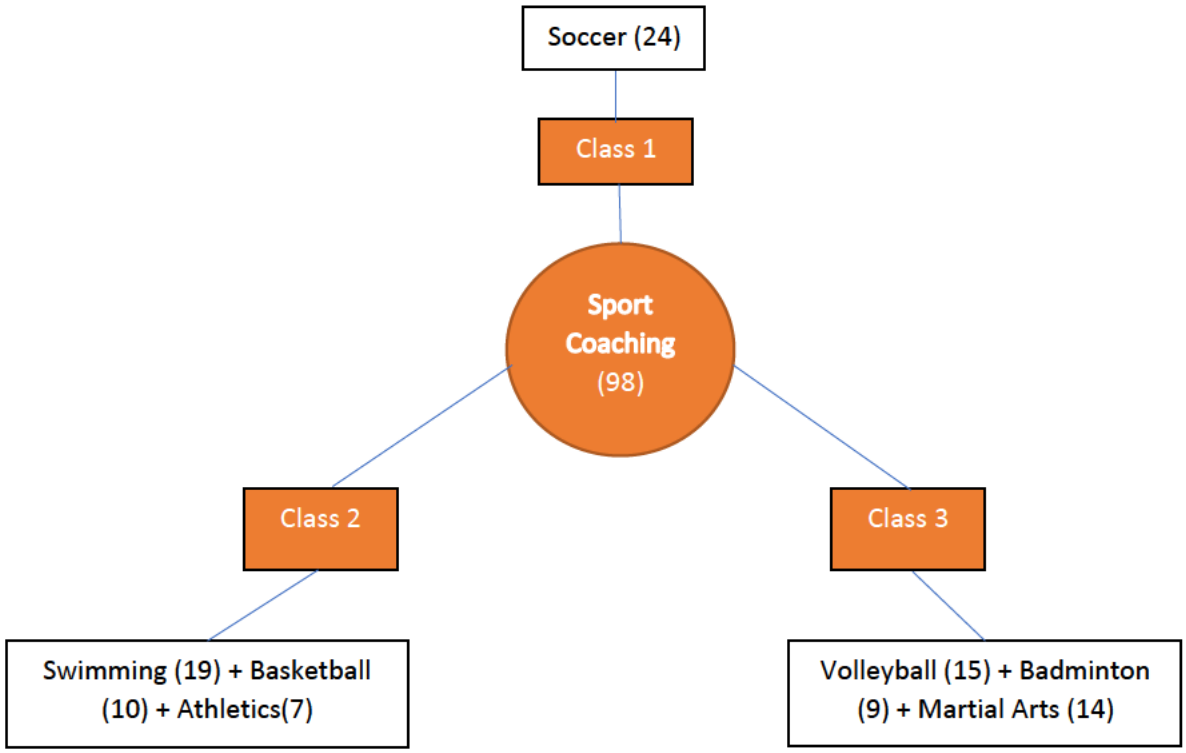

Figure 3.2 Number of students and classes in Sport Coaching

The number of freshmen and classes, as well as their major sports in PE are presented in Figure 3.3.

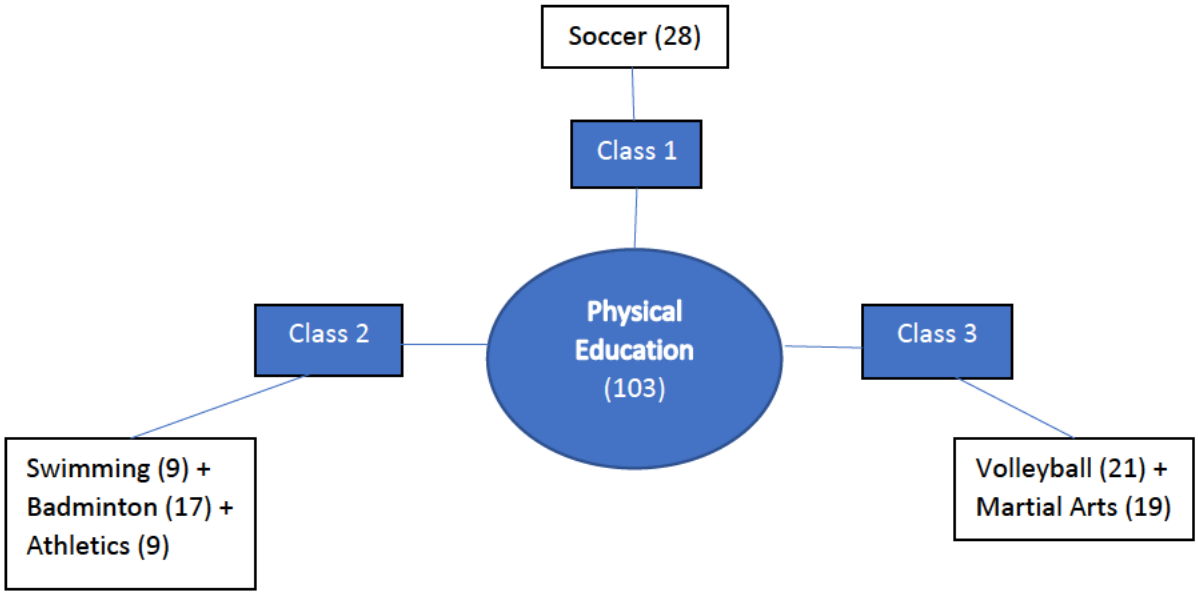

Figure 3.3 Number of students and classes in Physical Education

The number of PE students were also divided into three classes with five major sports. Class 1 had 28 Soccer students, there were nine students of Swimming and 17 Badminton students, and nine Athletics students in Class 2, while 40 students majoring in Volleyball and Martial Arts were placed into Class 3.

3.7.2: Sophomore students

The number of second-year students and classes across faculties is illustrated in Table 3.7.

Table 3.7 Number of sophomore students and classes

Faculties	No. of classes	No. of students
Physical Education	6	154
Sport Coaching	1	28
Sport Management	1	14
Total	**8**	**196**

Source: Office for Student Affairs, DSU, 2018

With an enrolment of 196 students in the university in this year of study, they were grouped into eight classes: one for SM students, one for SC students, and six classes for PE students. In particular, twenty-eight SC students were organised into one class, as depicted in Figure 3.4.

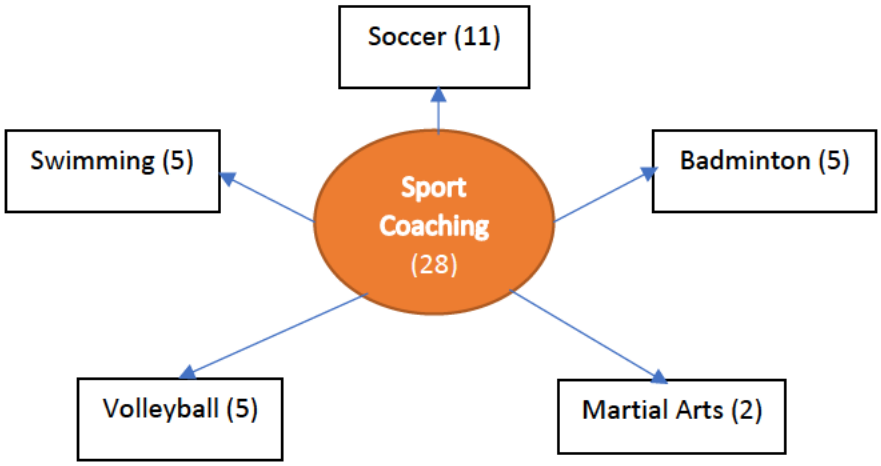

Figure 3.4 Number of students in each major in Sport Coaching

As the figure shows, Soccer, Swimming, Volleyball, Martial Arts, and Badminton were popular major sports students chose in this year of study. Figure 3.5 depicts the number of classes and students according to their major sports in PE.

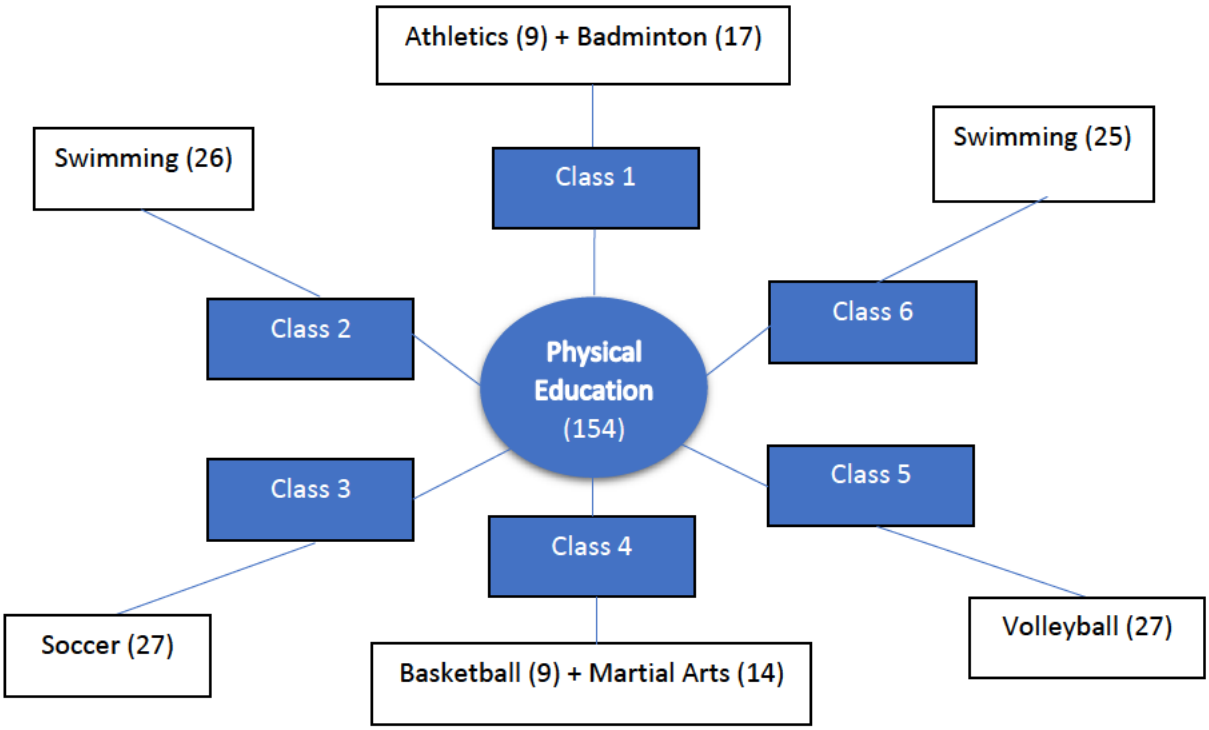

Figure 3.5 Number of students and classes in Physical Education

As depicted in Figure 3.5, 154 students of seven different major sports were placed into six classes. Students of Athletics and Badminton were grouped into Class 1 and students of Basketball and Martial Arts in Class 4 because there were a few students in each of those sports.

3.7.3: Junior students

The number of juniors and classes across faculties is depicted in Table 3.8.

Table 3.8 Number of junior students and classes

Faculties	No. of classes	No. of students
Physical Education	6	206
Sport Coaching	1	53
Sport Management	1	8
Total	**8**	**267**

Source: Office for Student Affairs, DSU, 2018

There were 267 students in DSU in this year of study, with six classes for PE students, and one class for SM students. The number of students enrolled in SC in this year of study had more sport areas chosen and were also organised into one class. Badminton, Martial Arts, Soccer, Volleyball, and Swimming were selected as major sports by SC students. As shown in Figure 3.6, SC students of the five different majors were grouped into one class for theoretical instruction.

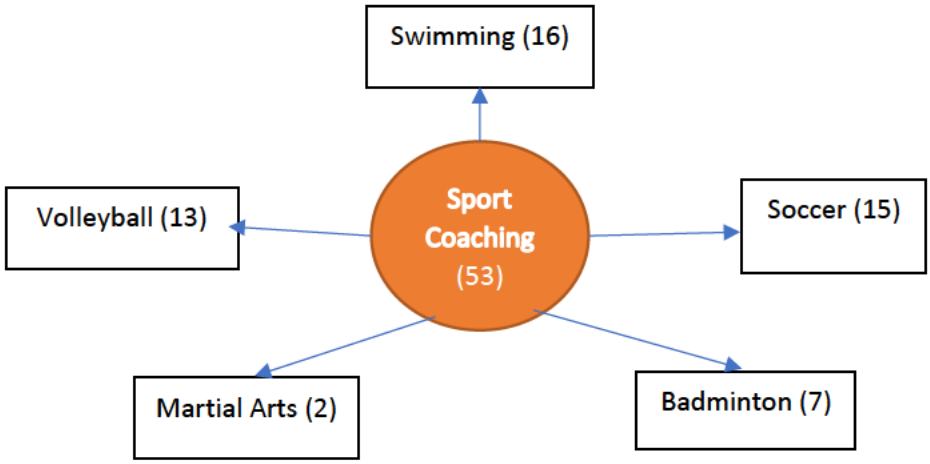

Figure 3.6 Number of junior students in each major in Sport Coaching

Physical Education students were organised into six classes with different major sport areas, as presented in Figure 3.7.

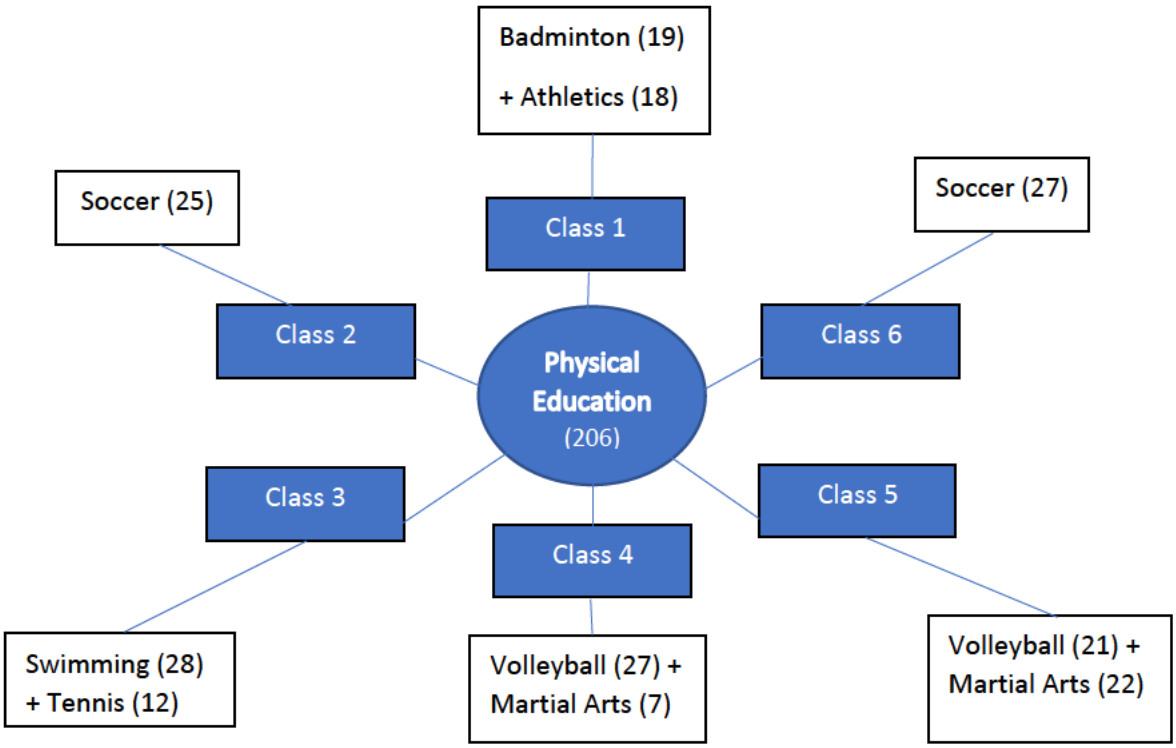

Figure 3.7 Number of junior students and classes in Physical Education

3.7.4: Senior students

The number of seniors and classes across the three faculties is shown in Table 3.9.

Table 3.9 Number of senior students and classes

Faculties	No. of classes	No. of students
Physical Education	8	265
Sport Coaching	1	25
Sport Management	1	13
Total	**10**	**303**

Source: Office for Student Affairs, DSU, 2018

As depicted in Table 3.9, there were only 13 students in one class in the faculty of SM. Also, 25 SC seniors were in one class, but they majored in three different areas, including Volleyball, Soccer, and Athletics. Since there was a small number of students enrolling in Volleyball (9 students), Soccer (11 students), and Athletics (5 students), they were grouped in the same class. The number of students in each class in PE is presented in Figure 3.8.

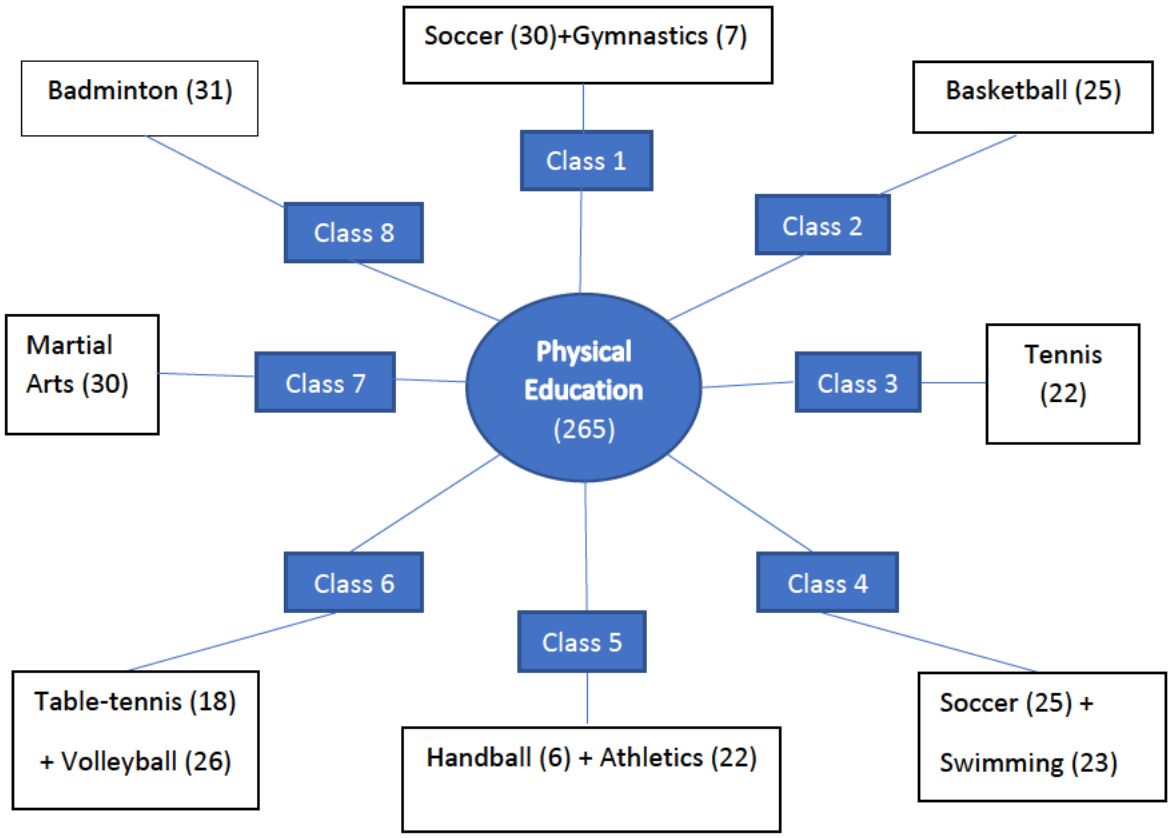

Figure 3.8 Number of students and classes in Physical Education

3.8: Teaching and learning practices

This section provides information about teaching and learning practices at DSU. Some of the significant features outlined in this section, including the timetable, background to DSU students, theory in the classroom, and practice sessions outside the classroom.

3.8.1: Timetable

According to the Department of Training, DSU students start classes at 7:00 am and finish a morning session at 11:00 am. An afternoon session runs from 1:00 pm until 5:00 pm. As required by regulation, for a half-day, they have a maximum of two classes, each class lasting for 100 minutes incorporating a 5-minute break. After the first class, students have a 30-minute break to prepare for the second class. Hence, for a full day, they may have four classes. Even in a half-day, students may have both a theoretical class and a practice session. For example, they may study theory in the first class and have a practice session in the second class or vice versa. Many students complain about having both theoretical and practice sessions in one half-day.

There are three terms in an academic year. Term one starts in August and ends in January. Currently, students have a 3-week break for the TET holiday (Lunar New Year) before Term two which starts in February and finishes in July. Term three during the summer holiday is for those who had to pay for extra classes because they failed exams or did not sit for exams or did not attend classes regularly in the previous terms.

3.8.2: Background to Danang Sport University students

From the researcher's observations as well as personal experiences, there are a number of reasons why students decide to enrol at DSU. Many students choose sport as their field of study due to their passion for sport. They started playing their favourite sport with other friends when they were children. When they reached school age, they became more interested in that kind of sport and spent more time playing at home, in schools or in clubs. Many of them did not even want to learn other subjects at school and got more engaged in sport activities. Lack of attention to high school subjects leads to their poor performance, and this reduced their options for further study. In Vietnam, at the end of high school (Year 12), students must take a national graduation exam. The results of this exam, together with students' academic performance during high school, are used by universities to select their students. Outstanding students have more opportunities to choose fields of study such as medicine, pharmacy, business, and IT, which are popular major areas in Vietnam. Meanwhile, sport universities are accessible to students with lower academic performances.

However, those who want to enter the sport university must be physically adept for sport participation and show their capacity for sport in the university entrance exam. Generally, parents of these students wish their children to continue with university education and find a job after graduation. They argue that learning in physical education assists their children in promoting active lifestyles, building movement capacity and confidence, and developing teamwork and leadership, as well as physical and interpersonal skills. Additionally, many athletes want to obtain a bachelor's degree by entering university. This is a wise decision they make because they need to be well-qualified to get a job as a coach after graduation. To fulfil the two roles of student and athlete, they have to be involved in training sessions in addition to spending time in the classroom. Furthermore, they also participate in competitions at all levels to help sustain their performance.

The above-mentioned issues provide an overview of students' backgrounds as well as their motivation when entering DSU. They learn theory in the classroom and practise skills on

courts/playing fields. Many students, before entering university, assume that at sport university they just participate in physical activities and do not have to learn any theory. However, according to the regulations of the Ministry of Education and Training, two areas of knowledge a university student needs to master are general knowledge and specialised knowledge. Sport students are not an exception, as there is mandatory attendance in theoretical classes which encompasses general knowledge and theory associated with their majors. These classes provide a great deal of knowledge including foreign languages, Informatics, Philosophy, Political Economy as well as subjects closely related to their majors such as Anatomy, Biochemistry, Biomechanics and Sport Medicine. At the same time, they get engaged in the acquisition of a variety of sports skills through practice sessions which are conducted outside classrooms.

The integration of theory and practice sessions into the training programs at DSU aims to assist in promoting the development of all-round graduates. This is in accordance with the training objectives of the Ministry of Education and Training. However, due to the background of students enrolling at DSU, many of them do not take an interest in learning theory and show a preference for physical involvement in learning sports.

3.8.3: Theory in the classroom

For sport students, there is a need to distinguish between two areas of theory. Firstly, students are provided with general knowledge in the areas of Political Theory, Social Sciences, English, Statistics, General Informatics, and National Defence Education. Secondly, students from different faculties learn a great deal of professional knowledge associated with their fields of study. Subjects that provide more in-depth knowledge must be mastered by students within their particular field, as listed in Table 3.10.

Table 3.10 Subjects related to professional knowledge across faculties

Faculties	Subjects
Physical Education	Physical Education Theory and Methods Sport School Theory and Methods Teaching Methods and Practice for Athletics Teaching Methods and Practice for each of the sports taught at the university Sport Psychology Sport Education Pedagogical Communication
Sport Coaching	Coaching Theory and Methods

	Sport Coaching Physiology Sport Science Methods Athletes Selection and Training Coaching Methods and Practice for Athletics Coaching Methods and Practice for each of the sports taught at the university
Sport Management	Management Science Management Psychology Sport Management for Masses High-performance Sport Management Journalism Management and Sport Communications Sport Management for Recreational Sport Sport Economy Sport Planning Sport Marketing Sport Sociology Sport Competition Organisation Sport Laws Informatics in Management Intellectual Management

Source: Department of Training, DSU, 2018

3.8.4: Practice sessions outside the classroom

Apart from learning in theoretical classes, students do practice sessions, under the instructions of two teachers, in a variety of sports venues—track and field, courts, swimming pools, gyms, playing fields, depending on the specific sport they are learning. Generally, students from the three faculties need to learn the 10 different sports at DSU throughout the course in line with the training program. However, PE and SC students specialise in a specific sport, so more class hours for this sport are provided throughout the course as compared to other sports. In contrast, SM students are evenly allocated the number of class hours for every sport in their course of study. They primarily focus on theory in relation to sport management. In some SC classes with different sport majors, students practise separately in accordance with their major sport based on the timetable of the university.

3.9: Training objectives

As regulated by DSU, students within each faculty must achieve objectives in relation to skills and knowledge. PE students are trained to have professional qualifications and pedagogical skills, which meet the needs of renewing knowledge content, teaching methods, and forms of

teaching, testing, and evaluation. They are able to be involved in managing sport movement in sport departments at local and provincial levels. They are capable of undertaking research activities in the field of sports, meeting the needs of educational development, and serving the causes of industrialisation and modernisation of the nation. They are able to self-study and continue to further educate themselves at higher levels (Decision N^0 563/QD-TDTTDN, 18 June 2018, concerning the promulgation of the training program for PE students at DSU by the President). This Decision highlights all the objectives PE students need to achieve.

The training program for SC students is aimed at training coaches at university level to meet the needs of enhancing athletic achievement for athletes at sport clubs, sport training centres, and training institutions within the national education system, which contributes to serving Vietnam's overall sport development (Decision N^0 560/QD-TDTTDN, 17 June 2018, concerning the promulgation of the training program for SC students at DSU by the President).

The training program for SM aims to equip students with: practical knowledge within the field of sport management; skills in national and international sport management; skills in how to apply the knowledge into practice such as through organising the management of sport movement, business management, teaching, and research in the field of sports; skills to disseminate knowledge in the field of sports; the ability to orient themselves and adapt to a changing professional environment; the ability to instruct others to perform tasks; and, the ability to manage, evaluate, and improve the efficiency of sports activities (Decision N^0 557/QD-TDTTDN, 15 June 2018, concerning the promulgation of the training program for SM students at DSU by the President).

3.10: Infrastructure and facilities

As the research is concerned with the learning styles of students in both the theoretical learning and practice sessions, some information related to the classrooms and sport facilities outside the classroom is provided. All these facilities are in the old campus where the research was undertaken. The Department of Administration, DSU has provided all this information.

3.10.1: Classrooms

There are a variety of classrooms of different sizes used for theoretical classes, including two lecture halls with more than 200 seats for meetings, conferences, and classes. There are eight lecture rooms that can seat 100–200 students and nine lecture rooms with 50–100 places. For a single class, as previously defined in line with Decisions by the university for theoretical

instruction, one of 11 lecture rooms are used. A single smaller room can accommodate 30 students and the bigger ones can hold up to 70–80 students. Normally, for some subjects, there is a combination of two or three different classes attending theoretical lectures together delivered by a lecturer in one lecture hall to minimise the amount of money paid for the faculty staff. However, for subjects which need more practice and interaction between the teacher and students such as English and Informatics, the teacher runs a single class. This also applies to more in-depth professional subjects which are uniquely designed for students of different departments and faculties.

In addition, there is a language lab and a multi-functional room for seminars. Currently, most classrooms are not in good conditions as they were constructed a long time ago. Furthermore, they are not equipped with good audio-visual equipment. The tables and chairs are old and fixed. There is no air-conditioning, just a few ceiling fans, which makes students uncomfortable during the summer. In winter, it is very cold as no classrooms are equipped with heaters. Last, but not least, heavy rain normally occurs during the winter. Due to this, several rooms on the third floor become really wet due to the leaking water from the roof. Because the classrooms have open doors and windows, the noise and views outside greatly distract students from listening to the teachers and learning.

3.10.2: Sports facilities outside the classroom

The University has built additional facilities suitable for various kinds of sports. There are: two indoor Swimming-pools, a Table-tennis house, three indoor Volleyball courts, two beach Volleyball courts, two indoor Tennis courts, two Martial Arts houses, one Dance Sport room, two indoor Basketball courts, nine Badminton courts, one Billiards room, one Gymnastics court, one indoor Handball court, one Track and Field playing field, two Soccer playing fields, and a Gymnasium. Of these facilities, the Martial Arts house, the Handball court, and the Gym were newly built. Although the others have existed for a long time, the University makes every effort to renovate them annually to meet students' learning needs.

As a sport university, the facilities outside the classroom have a significant impact on the teaching and learning practices. Students are more motivated and passionate to learn a variety of sports taught at the university. Additionally, the provision of good facilities and services provides the most favourable environment for students to develop their sport skills, physical and mental health, and their personality through physical activities.

3.11: Chapter summary

The chapter has provided an overview of the research site concerning its location as well as a university situational analysis. The numbers of students and faculty staff in the three primary faculties of PE, SC, and SM were also presented. Then, this chapter detailed how classes in each year of study were organised. In addition, some information relating to infrastructure including classrooms and sport facilities outside the classroom were highlighted. Finally, this chapter discussed the current teaching and learning practices, with a focus on both theory learning and practice sessions. All this information assists readers to develop a better understanding of DSU and the context in which the research was conducted. In the next chapter, a detailed description and explanation of the research design and data gathering instruments and procedures are provided.

Chapter 4: Research methodology

4.1: Introduction

This chapter details the mixed method for data collection and analysis (Creswell, 2009) adopted to address the research questions related to the identification of students' learning styles. The methods used to explore relationships between learning styles and other variables, including gender, age, major, year of study, and student type (such as student or student-athlete) are also described. Additionally, the chapter considers ways to investigate sport education lecturers' knowledge and understandings of learning styles, and how they are applied to best suit students' learning style preferences.

This chapter first provides an overview of the research questions and discusses the research design. There is a description of methods and data gathering procedures, along with a rationale for choosing them, followed by the methods of data analysis. The chapter concludes with a discussion of ethical considerations.

4.2: Research questions

From the researcher's background and experiences, it is essential that teachers/lecturers increase their students' levels of motivation and engagement. More importantly, the teacher/lecturer has the responsibility to provide support and assistance with the acquisition of knowledge and skills by organising a variety of learning activities and using different teaching strategies. Like many other educators, the researcher desired high levels of student progress and excellence in his students' academic performance. To achieve this, it was noted that students needed to be aware of the importance of learning and dedicate themselves to acquiring knowledge and skills related to their discipline. There might be many factors affecting student learning; however, within the scope of this thesis, the researcher attempted to identify aspects which significantly impacted upon student learning, particularly preferred learning styles. This study sought to address the following main research question: **What are the factors that contribute to sport student learning styles?**

Identifying students' learning styles and helping them to be aware of their own learning style preferences is critically important in the practices of teaching and learning. Being mindful of the essence of learning styles in adult learning practices as stated by Knowles (1980) that

adult learners learn differently and approach learning differently, the researcher formed the first sub research question.

- **RQ1.** Is there a relationship between students' learning styles and age, gender, major, year of study, and student type (i.e., student or student-athlete)? If so, what are they?

Acknowledging the significance of the teaching styles in relation to students' learning styles, the second and third sub research questions were developed.

- **RQ2.** What is the current level of knowledge of learning styles amongst sport education teachers?

In addition to determining the preferred learning styles and examining the relationships between learning styles and demographic information, the researcher placed a greater emphasis on the knowledge and understanding of learning styles by teachers. This was central to the teaching process; teachers' ability to tailor their instruction to different learning styles depended on how much they understood about learning styles and the extent of their knowledge about their students' learning styles. This led the researcher to establish the third sub research question.

- **RQ3.** In what ways do sport education teachers adapt their teaching styles to individual learning styles?

4.3: Research design

Creswell (2009) states that "research designs are plans and the procedures for research that span the decisions from broad assumptions to detailed methods of data collection and analysis" (p. 3). In the context of this research, a single case study research design was adopted, with an explanatory sequential mixed method. These will be discussed in the following paragraphs.

Creswell (2013) described a case study as the detailed study of a specific topic within one or more cases bordered by their context. A case can be a person, group, organisation, community, place, event, or phenomenon. In this research, a case is the learning styles being investigated from students' and teachers' perspectives in a sport university. A case study involves responding to research questions, using information that is accessible in the case setting (Gillham, 2010). A significant amount of rich data was collected to identify and explore students' learning styles and teachers' knowledge of learning styles through the survey

questionnaire administered to students, individual interviews with students and teachers, and observations of practical sessions.

There are different meanings given to the term case study. For example, Yin (2003) identified case studies as a process of experimental-based research and Stake (2006) described the case as a unit of study, while Merriam (1998) regarded a case study as a final product. Although case studies are defined in a variety of ways, they are all described as a bounded system. A case study requires boundaries and this study looked at teaching and learning practices at Danang Sport University (DSU). Centering on a particular topic whilst working within this boundary enabled the collection of deep and rich descriptions. Also, case studies allow for the discovery of knowledge, understandings, perceptions, and experiences of people at the site.

This research employed a mixed methods research design to address research questions in relation to student learning styles, teachers' knowledge of learning styles, and teaching and learning practices. A mixed methods research design is seen as a process of data collection, analysis, and integration of both quantitative and qualitative methods (Creswell & Clark, 2011). Additionally, mixed methods research is concerned with the merging, connecting, building, and embedding of data to promote new and deeper understandings (Creswell & Clark, 2011; Fetters et al., 2013). Creswell (2009) highlighted the need for collecting statistical data based on survey and text information through interviews and observations for a representation of quantitative and qualitative data in the ultimate database. The reason for using these two methods was to incorporate the strengths of quantitative data and qualitative data, together with compensation for the weaknesses of each method (Punch & Oancea, 2014). The research used a combination of survey questionnaires, face-to-face interviews, and observations, to gain a better understanding of students' learning styles, teachers' teaching styles, and the adaptability of teaching styles to different learning styles.

According to Creswell (2009), there are three basic mixed methods research designs – convergent, exploratory sequential and explanatory sequential designs. Each research design serves different functions and purposes in responding to research questions and solving research problems. In a convergent mixed methods design, researchers "simultaneously collect both quantitative and qualitative data, merge the data, compare the results, and explain any discrepancies in the results" (Creswell & Guetterman, 2019, p. 551). In this design, researchers collect and analyse data at the same time. In contrast, in sequential designs, the intent is to

gather quantitative and qualitative data in two phases, with one form of data collection building on and explaining the other. In the exploratory sequential design, the collection and analysis of qualitative data can be undertaken in the first stage prior to proceeding with the quantitative component in the second stage. By contrast, in the explanatory sequential design, the quantitative phase is conducted before the qualitative phase. Of the three foundational designs outlined by (Creswell, 2009), the researcher based this study on an explanatory sequential design that is discussed in the next section.

4.3.1: Explanatory sequential mixed methods research design

An explanatory sequential mixed methods research design "involves a two-phase project in which the researcher collects quantitative data in the first phase, analyses the results, and then uses the results to plan (or build on to) the second, qualitative phase" (Creswell, 2014, p. 224). The researcher first gathered quantitative data by administering the survey questionnaire to the whole university population. The data was then analysed, and the results helped to develop interview questions.

Using this design, the researcher placed priority on the collection and analysis of quantitative data (Creswell & Clark, 2011) to identify the learning styles of a large sample of students. The overarching reason for choosing the explanatory sequential mixed methods was that through the survey in the first phase, the researcher could have an overview of the learning styles across the university student population. In order to further explore and gain a better understanding of the students' learning styles, the researcher selected a small number of students to be involved in the interviews.

4.3.2: Procedure for implementing the research design

Mixed methods research design is further categorised as fixed or emergent (Creswell & Clark, 2011). In this study, the mixed methods used were identified as fixed since the researcher predetermined and pre-planned the quantitative and qualitative methods when commencing the research process. In alignment with the research design, the two phases of the research were conducted.

Phase 1:

In the first phase, quantitative data was collected by using the Honey and Mumford Learning LSQ (2006) to identify the learning style preferences of students from the three faculties: Physical Education (PE), Sport Management (SM), and Sport Coaching (SC) at DSU. Whilst

identifying the learning style preferences of the students across DSU, the researcher examined the relationships between learning styles and other demographic information: gender, age, major, year of study, and student type (student and student-athlete). As such, the quantitative component of the study responds to Research Question 1:

- **RQ1.** Is there a relationship between students' learning styles and age, gender, major, year of study, and student type (i.e., student or student-athlete)? If so, what are they?

Phase 2:

Once the quantitative findings from Phase 1 were analysed, the researcher continued with the second phase; referred to as the qualitative phase of the study. One-on-one interviews were conducted with a small sample of student participants to obtain rich and additional information as well as insights into the learning style preferences of sport students. The qualitative results from this phase were used to interpret, describe, and support the quantitative data in the first phase.

The second and third research questions focused on learning styles from the teachers' perspectives:

- **RQ2.** What is the current level of knowledge of learning styles amongst sport education teachers?

- **RQ3.** In what ways do sport education teachers adapt their teaching styles to individual learning styles?

These research questions addressed the knowledge and understandings about learning styles of sport education teachers and how they applied this knowledge in their teaching practices. In responding to these research questions, qualitative research was conducted, using one-on-one interviews with teachers and observations of teachers in practice sessions.

The observations of lecturers and students occurred for eight practice sessions, covering a range of different kinds of sports, including Volleyball, Soccer, Table-tennis, Gymnastics, Athletics, Swimming, and Martial Arts (Karate and Traditional Martial Arts), were conducted to provide a deeper understanding of the practices of accommodating teaching styles to learning styles. The qualitative findings from the teachers involved in the interviews and observations were compared and contrasted. In other words, their interview responses about their teaching

styles and their adaptability to students' learning styles were compared with those in their observed teaching practices.

As previously stated, the primary purpose of the study was to determine the students' learning style preferences. Thus, a large proportion of students needed to be involved in the survey. This meant that the lecturers were not the main subjects, and they were required to simply engage in one-on-one interviews and be observed in practice sessions. The details of the research design for the study are illustrated in Figure 4.1.

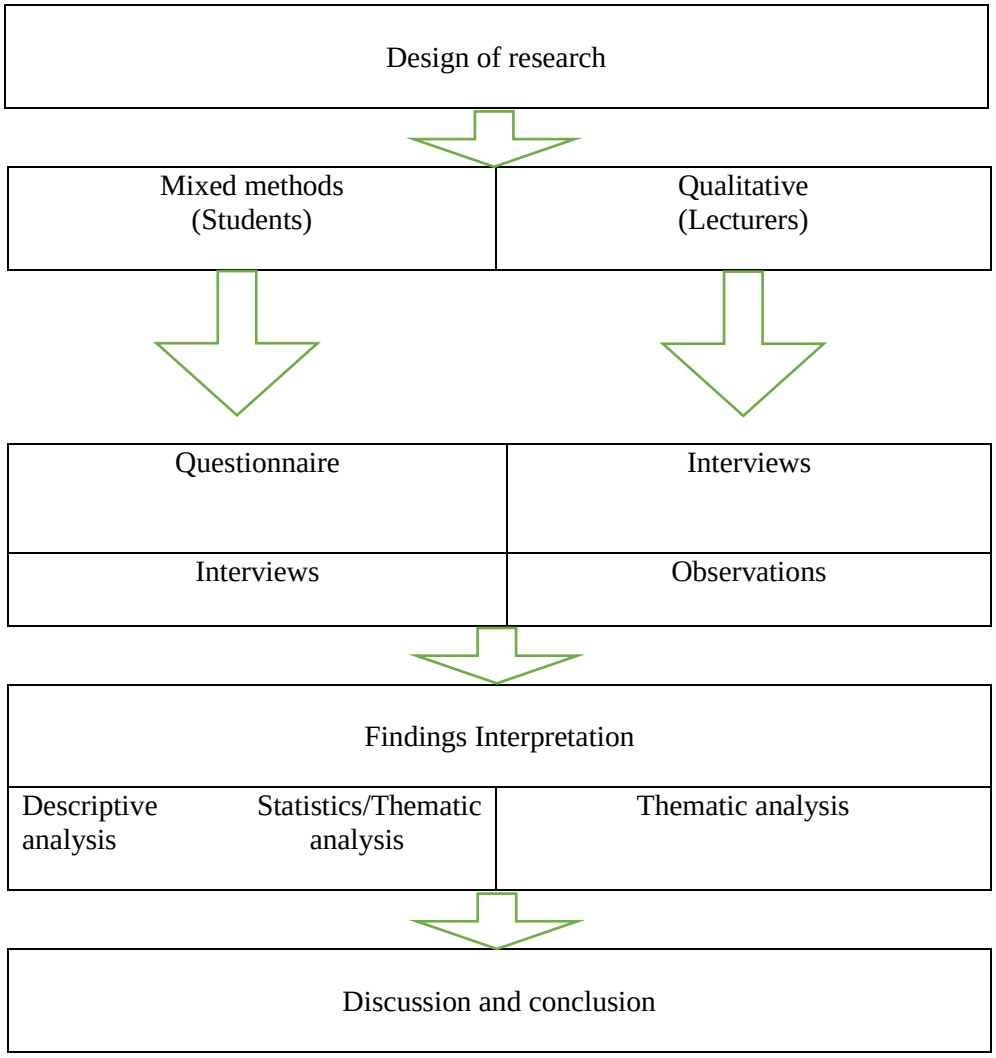

Figure 4.1 Research design

4.3.3: Rationale and purpose of the research design

The general purpose of adopting this research design was to use a qualitative component to provide more information about the quantitative findings. The combination of quantitative and qualitative data can greatly improve the significance of mixed methods research (Bryman,

2006; Creswell et al., 2011). Integrating these two forms of data has a number of benefits as outlined by (Fetters et al., 2013, p.2135), who stated "The qualitative data can be used to assess the validity of quantitative findings. Quantitative data can also be used to generate the qualitative sample or explain findings from the qualitative data".

The rationale for using a mixed methods research design in this research was for the quantitative data collection and analysis to provide a general understanding about students' learning styles for the first research question. The qualitative findings were used to refine, elaborate on, and further explain those quantitative findings by exploring students' preferred learning styles in more depth (Creswell, 2003; Tashakkori & Teddlie, 2010). The notions of *elaboration* or *expansion*, *corroboration*, *development* and *complementarity* (Brannen, 2005) provide a rationale for using a mixed methods approach in this study, guiding the researcher in integrating the two sets of data in an attempt to answer the first research question.

The following sections elaborate on the quantitative and qualitative research methods used in this research study as well as the procedures for gathering data. Before commencing collecting data, the research questions were mapped in alignment with the methods of data gathering and when the data was to be gathered (see Table 4.1).

Table 4.1 Data collection methods

Research questions	Data collection methods	Timelines
1. Is there a relationship between students' learning styles and gender, age, major, year of study, and student type?	**Phase 1**: Use of the demographic questionnaire and the Honey and Mumford Learning Styles Questionnaire (2006) **Phase 2**: Semi-structured interviews with students	Sep–Oct 2018 Dec 2018
2. What is the current level of knowledge of learning styles amongst sport education teachers?	Structured interviews with sport education teachers: **Stage 1**: Face-to-face interviews with 10 department heads (conducted in Vietnam) **Stage 2**: Interviews with nine lecturers from PE faculty and sport departments via social media platforms (conducted from Australia)	Oct–Nov 2018 Aug–Sep 2019
3. In what ways do sport education teachers adapt their teaching styles to different learning styles?	Observations of practice sessions	Nov 2018

4.4: Student survey

Participants

The participants in this survey were all undergraduate students (n = 982) enrolling in PE, SC, and SM at DSU during the first term of the 2018–2019 academic year. To recruit students from these faculties, firstly, permission from the President of DSU (Appendix 1) was sought in writing. Secondly, recruitment was carried out by the researcher. This was implemented by going to all classes to introduce the researcher, explain the research and encourage participation (refer to Recruitment script in Appendix 2). At this time, the researcher provided students with documents related to the study, including a Participant information sheet (Appendix 3), and Consent form (Appendix 4) which were stapled together and a separate Student survey (Appendix 5) so that students could not be identified from the completed surveys. All data collected would remain confidential.

Students had one week to consider their participation and complete the questionnaire. If students were agreeable to the researcher contacting them for an interview, there was a space at the bottom of the survey for them to provide their contact details. Finally, 586 survey questionnaires were collected, representing a response rate of 60% of the total student population.

Data collection procedures/Instrument

The researcher's survey instrument included two questionnaires. They were: 1) Demographic questionnaire; and 2) the Honey and Mumford LSQ (2006).

Demographic questionnaire

The demographic questionnaire was designed by the researcher to determine the participants' age, gender, major, year of study, and student type (i.e., student or student-athlete). The participants were asked to choose one of three age groups 18–21, 22–25, 26–29 or "Others". Since students undertook 4-year undergraduate courses, they were asked to identify their year of study as freshman, sophomore, junior or senior. With respect to the discipline of the participants, they majored in three different areas of study including PE, SC, and SM and they were asked to select one of these. The final question related to the type of student at DSU—student or student-athlete. Students are those who first enter sport university after finishing their high school and have a passion for sport. Student-athletes also have a passion for sport but are those who started playing their favourite sport in the early stages of their life and became

athletes. Not only do they attend training sessions as athletes with their coaches and take part in competitions, but they are also students participating in normal practice sessions and theoretical classes like any other student at DSU.

The Honey and Mumford Learning Styles Questionnaire (2006)

The second questionnaire was the Honey and Mumford LSQ (2006). According to Coffield et al. (2004), the LSQ by Honey and Mumford (2006) explores the attitudes and behaviours which identify an individual's learning style preferences, and it is not a psychometric tool, but provides an understanding of how people learn. Forty statements in this questionnaire relate to the four learning styles: Reflector, Activist, Theorist, and Pragmatist (10 statements per one learning style) (Pritchard, 2014). For each learning style the statements describe the typical characteristics of each type of learner as well as the learning activities they find easiest. In completing the questionnaire students had to agree or disagree with each statement. If they ticked on 'Agree' in a statement, they would obtain one point and if they chose 'Disagree', they would get zero points. This means that the maximum points for each learning style was 10 points, and the minimum was 0 point.

The 40-item version of the LSQ (2006) was used in this study for several reasons. Firstly, it gave students an opportunity to think about how they had learned before. Secondly, as compared to the 80-item version, it took the participants less time to complete and score the questionnaire which was aimed at maximising participation. Thirdly, it assisted the respondents to stay focused as there were fewer suggestions for action to choose between, and the language was accurate and clear (Honey & Mumford, 2006). Finally, upon completion of this questionnaire, students were able to identify their preferred learning style based on the points they scored on each style.

There were several additional purposes for using the survey questionnaire in this study. Firstly, it provided scores in association with the learning style preferences of students. Secondly, based on the nature of the research question as well as the purposes of the research, data from the questionnaires could be used to examine the relationships between learning styles and other variables such as gender, age, major, year of study, and student type (student and student-athlete). Thirdly, the survey questionnaire identified participants who were willing to be involved in interviews. From the 586 students who participated in Phase 1 (survey questionnaire), 177 (30%) expressed an interest in being involved in Phase 2 (interviews). Finally, methods and procedures in quantitative research enable researchers to gather a broad

and generalised set of findings (Yilmaz, 2013). The survey questionnaire was completed by a large sample of all students at DSU (n = 982). Creswell (2012) highlighted that survey questionnaires are an effective data collection method when trying to capture many responses.

The demographic questionnaire and the Honey and Mumford LSQ (2006) were translated from English into Vietnamese by the researcher. In practice, the English proficiency of most sport students was too limited for them to understand all the questionnaire items clearly. With the Vietnamese version, they found it easier and more comfortable to respond to the questions, and the researcher could obtain more accurate data from the respondents. Participant information sheets, Consent forms, and other related documents were also translated into Vietnamese to assist students in better understanding the information provided.

Pre-testing and piloting were conducted in Vietnamese to test the learning styles questionnaire before using it to collect data. Five students (two females and three males) from each faculty of PE, SC, and SM at DSU were involved in the pre-test. In addition to completing the questionnaire, they were requested to give comments on the items of the instrument in terms of the content and form and which items they thought were ambiguous. There were a number of questions which were short and simple, but the participants did not understand what they meant. The researcher added some illustration/explanation in brackets after the items, which assisted students in better understanding the context and providing more accurate responses. For example, for Question 1. 'I quite like taking risks' and Question 3. 'I like to be absolutely correct about things', the researcher suggested situations students could be in such as: practicing difficult techniques; engaging in risky sports during practice sessions; or doing a test, assignment or groupwork during theoretical classes. Then, a pilot study was conducted on a sample of 28 students to receive further feedback from them about the question wording, structure, content, and suitability to students' contexts, before starting actual data collection. This time, the students did not raise any concerns about the survey, and they completed the questionnaires without any difficulty. Those who had participated in the pre-test and pilot study were not involved in the actual survey.

4.5: Student interviews

The study was primarily based on the quantitative data to identify the students' learning styles. However, to provide further information about the learning style preferences of students, a small number of participants were involved in interviews. Prior to conducting the survey, the researcher decided to select a sample of 16 students from across the three faculties to participate

in individual interviews. They were to be representative of the overall student population within faculties and across the university. The purpose of these interviews was to gain more in-depth understandings about students' learning style preferences and their perceptions of teachers' teaching styles. This assisted the researcher to collect rich and additional data after the survey questionnaires were collected and analysed.

The number of interviewees was based on the total number of students in each faculty across all majors and years of study. As the number of students from the faculty of PE was significantly higher, eight students from the faculty of PE (two per year of study) were interviewed along with four students from the faculty of SC (one per year of study) and four students from the faculty of SM (one per year of study). This is depicted in Figure 4.2.

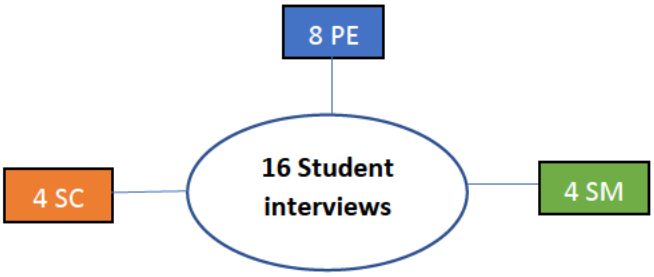

Figure 4.2 Student interviewees across faculties

Of the 586 students participating in the surveys, 177 had provided their contact details, meaning they agreed to be involved in interviews. The strategy for selecting the interviewees was that the questionnaires on which students had provided their contact details were split up into the three faculties and the researcher chose those who were eligible based on their demographic information. This continued until the researcher had an adequate number of students (16) to be involved in the interviews. All 16 students when contacted were willing to be involved in the interviews and so there was no need to contact more students. Participants were interviewed at a convenient time at a coffee shop close to DSU. This setting provided both a relaxed and accessible location.

One-on-one interviews were conducted with the 16 students. These resembled a conversation between an interviewer (the researcher) and an interviewee (the participant) with a particular research purpose. Meeting and hearing from them face to face provided essential and unique understandings about the participants. In this qualitative research, a small number of participants were selected and studied for purposeful sampling and to provide rich and additional information by exploring in-depth understanding of the participants. In addition,

"the interviewer has better control over the types of information received because the interviewer can ask specific questions to elicit this information" (Creswell & Guetterman, 2019, p. 218).

Open-ended questions were employed in semi-structured interviews (Gillham, 2005), with a focus on specific topics and to promote flexible interaction between the researcher and participants. They also allowed the researcher and participant to explore more deeply into issues based on the list of questions (Bergin, 2018). The interview questions were provided in advance enabling the interviewees to be prepared and provide thought-out responses. More importantly, the respondents had the freedom to express their perspectives, feelings, and experiences in their own words that the researcher could not obtain just through the survey. Finally, semi-structured interviews provided reliable, comparable qualitative data.

Instrument

The interview questions were developed after the researcher collected and analysed quantitative data from the survey. Focal points for the interviews with students were divided into two sections. The first section was to gain a better understanding about the students' preferred learning styles when participating in practice sessions and theoretical classes. The second section was primarily concerned with the student perceptions of the teachers' teaching styles (see Appendix 6).

The interviews were conducted in Vietnamese, the first language of both the researcher and the participants. Méndez and Font (2013) suggested using participants' first language when developing questions for interviews. This assisted in the data collection process as they had a good command of the language. As previously stated, many participants lacked an adequate knowledge of English, which would have made it difficult for the researcher to conduct interviews in English. With their mother tongue, students felt more comfortable, and were able to freely and fully expressed their thoughts, understandings, and experiences on the questions. Before the interviews, the researcher explained the purpose of the interview and provided an overview of the interview topics.

4.6: Teacher interviews

Nineteen sport education teachers who are heads of sport departments and lecturers participated in structured interviews. These interviews provided a deeper understanding of what teachers knew about learning styles and how they employed this knowledge in their teaching practices.

The followings will discuss issues surrounding the recruitment, the justification for the sample, and the instrument.

With respect to the recruitment process, the researcher sent an email (see Appendix 7), along with Participant information sheet (see Appendix 8) and Consent form (see Appendix 9) to 86 lecturers from the three faculties, 10 sport departments, and other administrative departments and institutes, inviting them to be part of the study. Potential participants' rights to participate or not were respected and the recruitment process allowed participation to be voluntary. Potential teacher participants were given one week to decide on their participation. They gave consent to participate in the interviews and observations for the proposed study by email. Sixty-two out of the 86 lecturers agreed to take part, representing a response rate of 72%.

Initially, 10 heads of sport departments at DSU were selected to be involved in one-on-one interviews while the researcher was collecting data in Vietnam. These 10 heads were chosen to participate in interviews because they were experienced lecturers. As is the norm in the Vietnamese workplace setting, males generally account for much of the staffing. Additionally, in Vietnamese higher educational institutions, it is commonplace that more senior positions are primarily held by males. As a direct result, sport education teachers are disproportionately males. At DSU, the 10 senior faculty staff were all males. Therefore, it was deemed appropriate to have additional interviews from the faculty of PE and from sport departments to obtain perspectives from female teachers. Three female teachers from PE and six teachers (three males and three females) from sport departments (including Athletics, Gymnastics, Badminton, Tennis, Handball, and Chess) were contacted to participate in the interviews. These additional interviews with nine lecturers were conducted via a social media platform as the researcher had completed his data collection in the study site in Vietnam and returned to Australia.

Collectively, 19 sport education teachers at DSU participated in individual interviews to explore their knowledge and understandings about learning styles and to examine how they accommodated different learning styles in their teaching practices. Figure 4.3 provides information in relation to the number of teacher participants across departments and faculties.

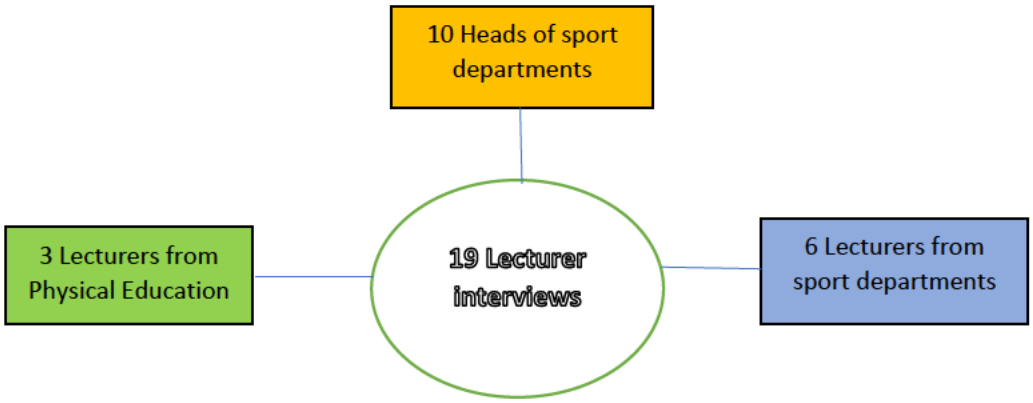

Figure 4.3 Teacher interviewees across departments and faculties

Structured interviews were used to collect data from the teacher participants. Questions in such interviews have been described as an accurate list of questions with little variation (Bergin, 2018). In structured interviews, each participant is asked the same questions using the same wording and in the same order as all the other participants (Corbetta, 2003) and no more questions are posed. There are several strengths related to structured interviews. According to Holloway and Galvin (2016) a structured interview is efficient with regards to time, it limits researcher subjectivity and bias, and the researcher controls the topics and format of the interview, making it easier to code, compare, and analyse data.

Instrument

As originally designed, the structured interviews included three sections. The first section of the interview consisted of questions related to the teachers' highest level of education as well as certificates obtained, athlete experience, and teaching/coaching experience. In the second section of the interview, the researcher wanted to know what teachers understood about the term 'learning styles', how students learned in real-life practice sessions and what possible factors might affect students' learning styles. In the last section, there were four more specific questions aimed at understanding what instructional methods the teachers employed to suit students' learning styles. And the fifth question related to the teachers' views on whether the match/mismatch between teachers' teaching styles and students' learning styles affected student learning. For the last part of the interview, the researcher wanted to find out if the teachers thought there were any relationships between learning styles and gender or year of study. A final question gave teachers an opportunity to provide further information related to the study. A list of these questions is included in the Interview schedule (Appendix 10).

As with students, the interviews with teachers were conducted in Vietnamese since they did not feel confident and comfortable to respond to interview questions in English. Prior to the interviews, the researcher explained the purpose of the interview and provided an overview of the topics. After all the interviews were finished, the researcher transcribed the information back into English.

The researcher had two colleagues who are teachers of English check translations from Vietnamese to English. Then, the accuracy of the English versions including spelling, grammar and meaning was checked by the two PhD students whose English is their mother tongue.

4.7: Observations

To see how teachers applied the knowledge and understandings about learning styles into their teaching practices, observations on eight practice sessions were conducted. “Observation is the process of gathering open-ended, firsthand information by observing people and places at a research site” (Creswell & Guetterman, 2019, p. 214). Observations provide a better understanding of the research context, to see things that have become routine to those being observed themselves, to record behaviours as they are occurring (Creswell, 2012), and to explore things that might not be obtained by questionnaires or interviews (Cohen et al., 2013).

In qualitative research, researchers often think about the process of collecting observational data in a specific setting. The observations for this research were undertaken in natural settings; more specifically, these practice sessions occurred on courts, playing grounds, sports halls, and swimming-pools. During observation, the researcher normally takes field notes on the behaviour and activities of participants at the setting (Creswell, 2014). For researchers, this method can involve “different roles in the process” (Creswell & Poth, 2016). These may involve acting as a non-participating observer and a participant observer. In this study, the researcher played the role of a non-participant observer and took notes during the observation process.

Classes for observations were selected, using simple random sampling within each faculty. There existed four classes (one class per grade level) in the faculties of SM and SC and 26 classes (eight classes for seniors, six classes for juniors, six classes for sophomores, and six classes for freshmen) in the faculty of PE. Therefore, one class from each of the faculties of SM and SC and six classes from the faculty of PE (three for seniors, one for junior, one for sophomore and one for freshmen) were randomly selected for observations. This selection

represented the overall spread of classes across the faculties and the university. This information is summarised in Table 4.2.

Table 4.2 An overview of classes observed

Faculties	Year of study	Subject	Number of students	Observation Time/Date
Sport Management	Sophomore	Soccer	12 (2 females + 10 males)	3.15 pm-4.05 pm, 9 November 2018
Sport Coaching	Senior	Volleyball	14 (3 females + 11 males)	7 am-7.50 am, 7 November 2018
Physical Education	Senior	Athletics	18 (5 females + 13 males)	7 am-7.50 am, 8 November 2018
	Senior	Traditional Martial Arts	10 (2 females + 8 males)	7 am-7.50 am, 13 November 2018
	Senior	Table-tennis	15 (8 females + 7 males)	7 am-7.50 am, 6 November 2018
	Junior	Karate	8 (8 males)	7 am-7.50 am, 9 November 2018
	Sophomore	Swimming	23 (6 females + 17 males)	1 pm-1.50 pm, 15 November 2018
	Freshman	Gymnastics	30 (6 females + 24 males)	3.15 pm-4.05 pm, 8 November 2018

Eight lecturers delivering practice sessions in Athletics, Swimming, Volleyball, Gymnastics, Table-tennis, Soccer, Karate, and Traditional Martial Arts were observed. Of these, four teachers were the heads of sport departments, meaning that they were in the same group who were interviewed. Their practice sessions were in Swimming, Volleyball, Gymnastics, and Table-tennis. Although teachers for the other four practice sessions (Athletics, Soccer, Karate, and Traditional Martial Arts) were not the heads of sport departments, they had at least 10 years of teaching experience. The sports chosen did represent a range of types of sports including

individual sport (Gymnastics and Table-tennis), team sport (Soccer and Volleyball), periodic sport (Athletics and Swimming), and antagonistic sport (Martial Arts).

The observations of the eight practice sessions were undertaken, with the researcher playing the role of a non-participant observer. Field notes (Appendix 11) were taken by the observer concerning physical setting, interactions between the teacher and students, demonstrations, verbal/non-verbal cues, practice time, assistance, skill correction, and feedback provided by the teacher as well as teaching strategies and the accommodation of instructional styles to different learning styles. Field notes were both descriptive and reflective. Descriptive field notes described what was happening during the observation time. Reflective field notes were written during and after the observation.

Each class observation was conducted for approximately 50 minutes. The researcher sat at a table at the site and sometimes moved around to have a better view of the students. This assisted the observer to take more detailed and comprehensive field notes on the teaching and learning activities. These observations were mainly on practical sessions about a specific sport in which students were provided opportunities to learn techniques and skills with the instruction of the teacher, as well as to engage in practice, games, and competitions with their peers. However, sometimes, the teachers integrated theory related to concepts while instructing a new technique, which aids students to gain a better understanding of the technique and find it easier to apply it in practical situations.

4.8: Methods of data analysis

The primary sources of data from the mixed-methods research study were from questionnaire surveys, teacher and student interviews, and observations of practice sessions. Data from the surveys was analysed quantitatively while interview and observation data were analysed qualitatively. The methods of analysing quantitative and qualitative data are highlighted in this section.

4.8.1: Quantitative data

With respect to data analysis in quantitative research, researchers employ a system of measurements, mathematical models and statistics related to numbers. Numerous researchers have used descriptive statistics to analyse quantitative data about learning styles (Hewitt, 2015; Koslo, 2010; Perkins, 2010; Wagner, 2016; Zeng, 2016). Gall et al. (2007) defined descriptive statistics as “mathematical techniques for organising, summarising and displaying a set of

numerical data" (p. 638). In this study, the researcher first identified students' learning style preferences by using self-reported questionnaires. Then, the relationships between learning styles and the demographic information related to gender, age, major, year of study, and student type were examined. Two quantitative analytical approaches were used—descriptive statistics and a one-way test of multivariate analysis of variance (MANOVA). The items in the survey questionnaire were analysed using descriptive statistics that consisted of frequencies and percentages, means and standard deviation. The MANOVA was conducted to evaluate the relationship between a solitary between-subjects factor and two or more dependent variables (Brown, 2013; Perkins, 2010; Uzuntiryaki et al., 2004; Whillier et al., 2014; Zeng, 2016). A series of one-way MANOVA was undertaken in this research between the dependent variables of degree of preference for Activist, Reflector, Theorist, and Pragmatist learning styles and gender, age, year of study, major, and student type.

After coding the data and numbering the questionnaires, all independent variables about the participants, together with results of the 40 forced-choice questions were entered into an Excel spreadsheet. The Statistical Package for the Social Sciences (SPSS) Version 21 was used to conduct analyses on the survey questionnaire variables.

Multivariate analysis of variance is a variation of an analysis of variance (ANOVA), which consists of multiple dependent variables. In this study, a one-way MANOVA was conducted between a solitary between-subjects factor and the four dependent variables of Activist, Reflector, Theorist, and Pragmatist learning styles. If the significance level of the homogeneity tests was less than 0.05, Welch tests were conducted and a one-way ANOVA was run to test for the relationships between the learning style and independent variables. Nicol and Pexman (1999) state that one-way ANOVA "is used when there is one independent variable and one dependent variable and is used to assess the differences between two or more group means" (p. 15). Gall et al. (2007) described an ANOVA as "a procedure for determining whether the difference between the mean scores of two or more groups on a dependent variable is statistically significant" (p. 632).

4.8.2: Qualitative data

Upon completion of the interviews, they were translated into English, transcribed and loaded into NVivo 12 to assist the researcher to process the qualitative data in an effective and efficient way (Bazeley & Jackson, 2013). This software was primarily employed for data storage and management and the researcher coded it manually in the NVivo environment.

The researcher was the person who conducted all interviews with teachers and students and observed all practice sessions and took notes. This assisted the researcher in becoming familiar with the data, gaining a better understanding of it and exploring the data thoroughly. Open coding was undertaken in the first stage of analysis on each transcript, producing as many codes as possible (Glaser, 1978). This allowed the researcher to compare data across multiple codes to gain a better understanding of common themes in qualitative data.

To capture a better look and critically examine these codes, through NVivo, a codebook was exported and printed with multiple nodes and child nodes. An example of the next steps follows. The first question was coded to identify whether students liked theoretical classes and the reasons why they liked/disliked them. It was easy to figure out those who preferred theoretical classes, and these were put on one side separately from those who disliked them. Next, segments of texts representing different reasons were coded with different highlighters. For students who preferred theoretical classes, two themes emerged (1) Provision of additional knowledge and (2) Synergy between theory and physical activities. Similar or related categories across all the interviews were combined for emerging themes. This coding process was conducted across all interview questions, using thematic content analysis described as "a foundational method for qualitative analysis" (Braun & Clarke, 2006, p. 4). After discovering themes in each interview question across interview transcripts, the researcher presented key findings under each main theme, using appropriate quotes to demonstrate those findings.

The interview data with students provided an in-depth insight into students' learning styles and was compared with the quantitative data. Also, the field notes made by the researcher during the practice sessions were compared to the qualitative data from the sport education teachers' interviews for triangulation. "Triangulation is the application of different data analysis methods, different datasets, or different researchers' perspectives to examine the same research question or theme" (Bergin, 2018, p.29). Triangulation was used to trace areas of concord and disparity from the quantitative and qualitative data collected. Data triangulation critically allowed for data synthesis (Jick, 1979), and meaningful explanation of quantitative data, which makes a mixed method study very useful.

4.9: Ethical considerations

The researcher is a lecturer and a colleague of sport education teachers at the university. The researcher was directly involved with some of the participants who were juniors and seniors since he taught some of them. There existed a few risks arising from these dependent

relationships. Participants might feel uncomfortable while sharing their teaching and learning experiences with the researcher during the interviews. In addition, although the researcher did not intervene with teaching and learning activities in the observations of practice sessions, being observed might cause discomfort and anxiety for the participants and the teachers might be concerned about their teaching being judged. However, the research was conducted with great concerns for the safety of the participants and to ensure there was no risk of physical and psychological harm to them in relation to any cultural, political, legal, or social factors that could affect their safety.

The topic area of the research had nothing to do with Vietnamese politics and security, so there was no potential harm to the researcher as well as the participants. With respect to the conduct of interviews and observations, they took place in the faculty and department offices on campus and in public places (interviews) as well as on courts, playing fields and swimming-pools within the university (observations), which minimised any potential harm to the researcher through accusations of inappropriate behaviour.

In terms of the dependent relationships, some student participants in Year 3 and Year 4 were the researcher's former students in the previous academic years. However, freshmen and sophomores were unfamiliar with the researcher as he had not previously worked with them. Moreover, the researcher might not have been able to teach the students after completing his PhD because they would be graduating from university over the next few years. Thus, relationships with students could have only minimal impact on their option to participate in the study or not. Also, they did not get any better study results in return for being part of the research. In Vietnamese culture and traditions, students pay great respect for their teachers and hence were willing to participate in the research. The researcher did not coerce students to participate in the study. Also, the researcher had to respect students' privacy and confidentiality and all information in the survey was anonymised (providing contact details at the end of the survey was optional for students). The researcher was not directly involved with teaching the students during his PhD program in Australia, meaning the researcher was not responsible for any direct assessment, reporting or communication with teachers for the student participants.

With respect to the relationship with teacher participants, they were the researcher's colleagues, but were in different faculties. The sport department heads were higher than the researcher in terms of professional hierarchy, while some lecturers were at the same

level. Thus, the researcher had no power, influence, or pressure over them to be involved in this study. The researcher maintained a professional relationship with the participants by focusing on just collecting data relevant to the study. It was important that participation in this research was voluntary with ability to withdraw from the study at any time without affecting students' academic performance or teachers' professional development. All information from teachers was kept confidential. Also, student participants' identities would always be kept confidential.

It was important to acknowledge that being an insider researcher could have produced certain limitations for the current study (Barbour, 2008; Greene, 2014). However, several steps were taken to ensure issues of insider research, such as potential bias, or being too subjective, as well as issues with confidentiality, were addressed. The researcher ensured that all participants were fully aware of the anonymity and privacy provisions. To help ensure this, students were asked not to write down their names on the questionnaire survey. Also, students' identities were coded when analysing and presenting the qualitative data. For teacher participants, confidentiality was stressed to mitigate the risk of fear of comparison or of being evaluated and criticised.

4.10: Chapter summary

This chapter has explained the research design in relation to the aims of the research. The explanatory sequential mixed-methods approach was employed for the student group, with the survey conducted in the first phase to identify students' learning styles and examine the relationships between learning styles and demographic information. The qualitative component was undertaken in the second phase to further explore students' learning styles. Qualitative research was also used for the teacher group to gain a better insight into their current knowledge of learning styles and how they applied this to their teaching practices. In addition, this chapter has discussed details of the research methods and procedures as well as the analysis of data. The quantitative and qualitative results will be presented in the next three chapters.

Chapter 5: Students' learning style preferences

5.1: Introduction

This chapter is underpinned by an explanatory sequential mixed methods approach (Creswell, 2014), with both quantitative and qualitative methods undertaken to investigate students' perceptions of learning styles. In the first phase of the research, the survey was conducted to identify students' learning styles (Reflector, Activist, Theorist, and Pragmatist) using the Honey and Mumford Learning Styles Questionnaire (LSQ) (2006). This data was then used to examine the relationships between students' learning styles and age, gender, major, year of study, and student type. Using the results of the survey, additional qualitative research was undertaken in the second phase of the study. The second phase of the research involved qualitative findings used to further describe, explain, and understand the four learning styles identified in the quantitative phase, and provided insights into how students at Danang Sport University (DSU) demonstrated their preference for these learning styles in their learning activities. Both the quantitative and qualitative methods used to explore students at DSU are outlined throughout this chapter.

5.2: Quantitative results

5.2.1: Introduction

The quantitative data was collected during Term one of the 2018–2019 academic year at DSU. An academic year at university level in Vietnam normally commences in August and ends in June the following year. In Term one of this academic year, the participating students at DSU were requested to complete the two questionnaires. The first being a demographic questionnaire which was designed by the researcher and gathered information in relation to students' gender, age group, year of study, major, and student type. The second questionnaire was the Honey and Mumford LSQ (2006) which was used to identify the learning style of students (Activist, Reflector, Theorist, and Pragmatist). In addition, the frequency of single and multiple learning style preferences, as well as the degree of preference for each learning style were determined. Finally, the relationships between learning styles and gender, age group, year of study, major, and student type were also examined.

5.2.2: Methods

Of the 982 students at DSU, 586 students (60%) participated in the survey. The data was collated using Excel and transferred into the Statistical Package for the Social Sciences (SPSS)

21.0 version to assist with the data analysis. The Honey and Mumford LSQ (2006) was employed to identify the learning styles of students and the frequency of learning styles for this cohort. This information is presented in bar charts (refer to Section 5.2.4).

A percentage analysis was used to analyse the demographical information of respondents (Section 5.2.3) and descriptive statistics were used to summarise the data with variables expressed as the mean ± standard deviation (mean ± SD) (Section 5.2.9). Internal consistency of the data was computed through reliability analysis using Cronbach's alpha value (Section 5.2.7). Exploratory factor analysis (EFA) was conducted on each of the four sets of 10 questions using SPSS version 21, representing the four factors of learning styles namely Reflector, Activist, Theorist, and Pragmatist to establish the pattern of structure (Section 5.2.8). This study used linear regression to investigate the relationships between the dependent variables: the four learning style scores and the independent variables: the five demographic information variables including gender, age, major, year of study, and student type. Multivariable linear regression models were used to see if the five demographic variables had independent effects on the four learning style scores (Section 5.2.10).

5.2.3: Description of the sample

In this section, an overview of the student sample is provided. Of the 982 students at DSU, 586 students (60%) participated in the survey (see Table 5.1).

Table 5.1 Statistics of study sample

Total	Respondents	Response rate
982	586	60%

Of those students surveyed, female students accounted for the minority of the total sample (see Table 5.2). The sample of males and females participating in the survey was reasonably representative of the whole cohort of 982 students at DSU (82% of males and 18% of females).

Table 5.2 Gender of participants in the study

	Frequency (n)	Percentage (%)
Male	457	78
Female	129	22
Total	**586**	**100**

Student participants indicated their age group through the demographic questionnaire. These results showed that the 18–21 years old comprised the largest group with 462 participants (78.8% of total sample), which is comparable with the overall university population where this age group represented 83.8% of the whole population. The 26–29 age group was the smallest with four participants (0.7% of total sample) in comparison with 1.3% for all university students. Those aged 22–25 made up 120 participants (20.5% of total sample), which is slightly higher than the 14.9% for the whole student population. Overall, the student sample who completed the survey was comparable with the overall university population as shown in Table 5.3.

Table 5.3 Frequency of age distribution of the students

Age group	Study sample		All Danang Sport University students	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
18–21	462	78.8	823	83.8
22–25	120	20.5	146	14.9
26–29	4	0.7	13	1.3
Total	**586**	**100**	**982**	**100**

The sample of undergraduate students at DSU was made up of first-year (freshman), second-year (sophomore), third-year (junior) and fourth-year (senior) students. Of the 586 participants, 191 respondents (33%) were seniors while sophomores made up the smallest group with 110 participants (19%). The participants were almost evenly distributed between freshmen (24%) and juniors (24%). The sample of freshman, sophomore, junior, and senior participating in the survey was reasonably representative of the whole cohort of 982 students (31% senior, 27% junior, 20% sophomore and 22% freshman). A comparison of the year of study for the sample and the overall university student population is shown in Figure 5.1.

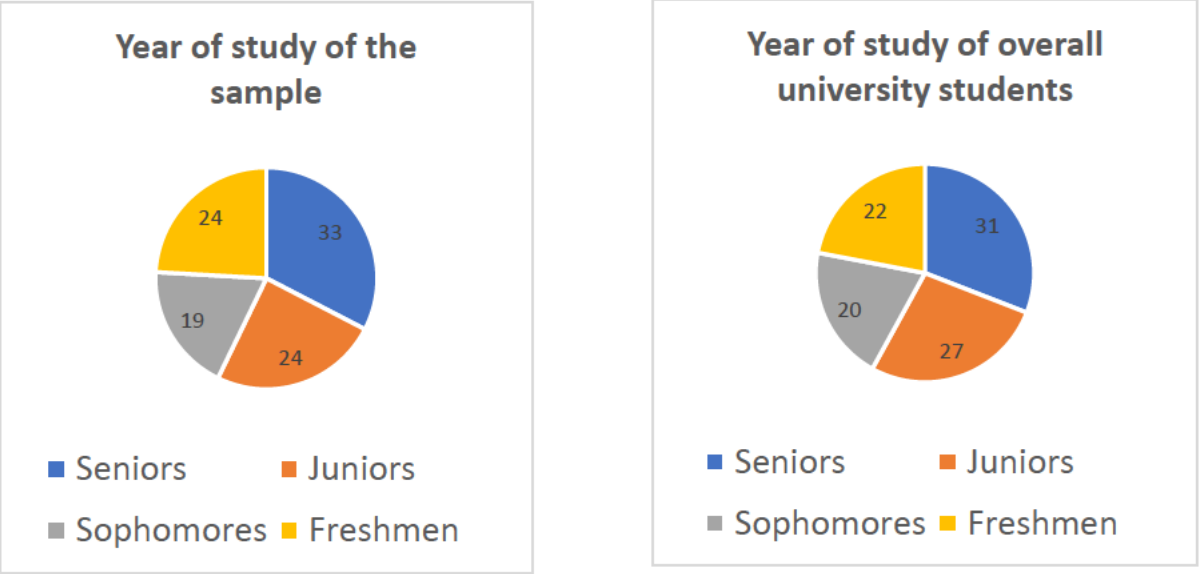

Figure 5.1 Comparison of year of study of the sample and the whole population

At DSU there are three faculties: Physical Education (PE), Sport Coaching (SC), and Sport Management (SM). Of the 982 students, the majority of students specialise in PE (74%), followed by SC (21%), and SM (5%). The breakdown by faculty for students in the sample closely resembled the breakdown of the overall student cohort. The majority of respondents (75%) majored in PE. A fifth of participants (20%) were from the faculty of SC, and a small number of students majoring in SM participated in the survey (5%). The information related to participants' major is displayed in Table 5.4.

Table 5.4 Students who responded by faculty

	Frequency (n)	Percentage (%)
Physical Education	436	75
Sport Coaching	119	20
Sport Management	31	5
Total	**586**	**100**

The last characteristic of the demographic information was student type, with two categories of sport students at DSU: student and student-athlete. A 'student' is one who enters university with a passion for sport and limited knowledge as well as skills. This is the majority of the cohort (n = 892, 91%) whilst student-athletes accounted for 9% (n = 90). A 'student-athlete' plays two roles at the same time: They are an athlete and also a student. These athletes have

spent time at sport training centres at provincial or national levels. Often, when their sport performance is below the required level, they will be dismissed from a team and many then go to university to qualify as a coach after graduation. However, their previous training is important as they are aware of the regulations and discipline required to maintain sporting performance at provincial, national, and international levels.

Of the total sample, 547 (93%) were students and 39 (7%) were student-athletes. This closely resembled the total university population as compared and displayed in Table 5.5.

Table 5.5 Comparison of student type between sample and total university students

Student type	Study sample		Total university students	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Student	547	93	892	91
Student-athlete	39	7	90	9
Total	**586**	**100**	**982**	**100**

5.2.4: Students' learning style preferences

The Honey and Mumford LSQ (2006) was employed to identify the learning styles of students. They included Reflector, Activist, Theorist, and Pragmatist. This section provides a detailed explanation of how students' learning styles were determined. In addition, the overall results in relation to single and multiple (double and triple) learning styles of students at DSU are outlined.

5.2.4.1: Determination of learning styles

The Honey and Mumford LSQ (2006) required respondents to respond to 40 statements representing the four learning styles of Reflector, Activist, Theorist, and Pragmatist. Students obtained a maximum of 10 points and a minimum of 0 point for each learning style. The learning styles of the students were analysed using the raw scores; each student's preferred learning style was calculated using the highest points they scored and this was regarded as their preferred learning style (Honey, 2006). Also, according to Honey (2006), when a student had the same high scores for two or more learning styles, he or she was considered to be using multiple learning styles. For example, if a student scored eight for the Activist learning style and seven, five, and two for the Reflector, Theorist, and Pragmatist, respectively, the Activist was deemed to be their preferred learning style. If a student had the same high scores for the

two learning styles of Activist and Reflector and scored four and six for Theorist and Pragmatist, respectively, they possessed multiple learning styles (Activist and Reflector). A student may have had three learning style preferences of Reflector, Theorist, and Pragmatist if they scored eight points for each learning style and four points for the Activist.

Some students may show a single learning style preference while others demonstrate their preference for two or three learning styles. As depicted in Figure 5.2, over half of the total sample (n = 337, 57.5%) exhibited a single learning style preference (Activist, Reflector, Theorist or Pragmatist); 42.5% of the participants scored multiple learning styles, of which 33.1% possessed two preferred learning styles and only a small number of respondents (9.4%) showed a preference for three learning styles. These results are visually represented in Figure 5.2.

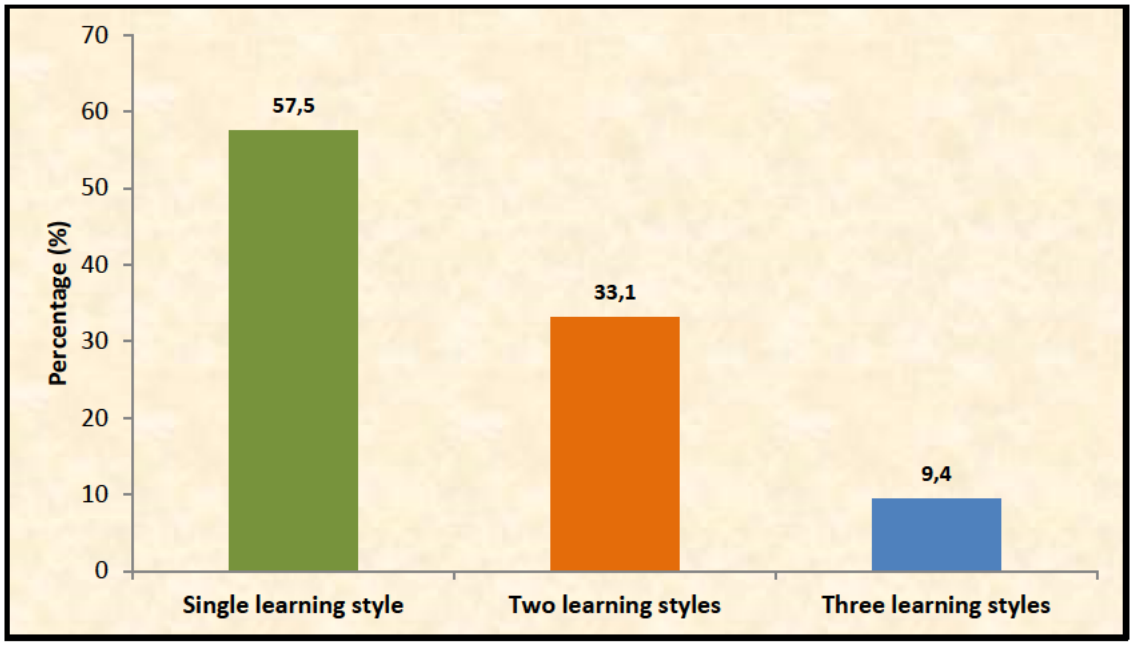

Figure 5.2 Percentage of types of learning styles

5.2.4.2: Single learning styles

Of the 337 students whose results indicated a single learning style, the Reflector learning style was the most prevalent single style with 185 participants (31.6% of the total sample) having it as their highest preference; this was double the number of those who preferred the Pragmatist learning style (15.9%). The Activist and Theorist learning styles were much lower with 42 participants (7.2%), and 17 participants (2.9%) respectively (see Figure 5.3).

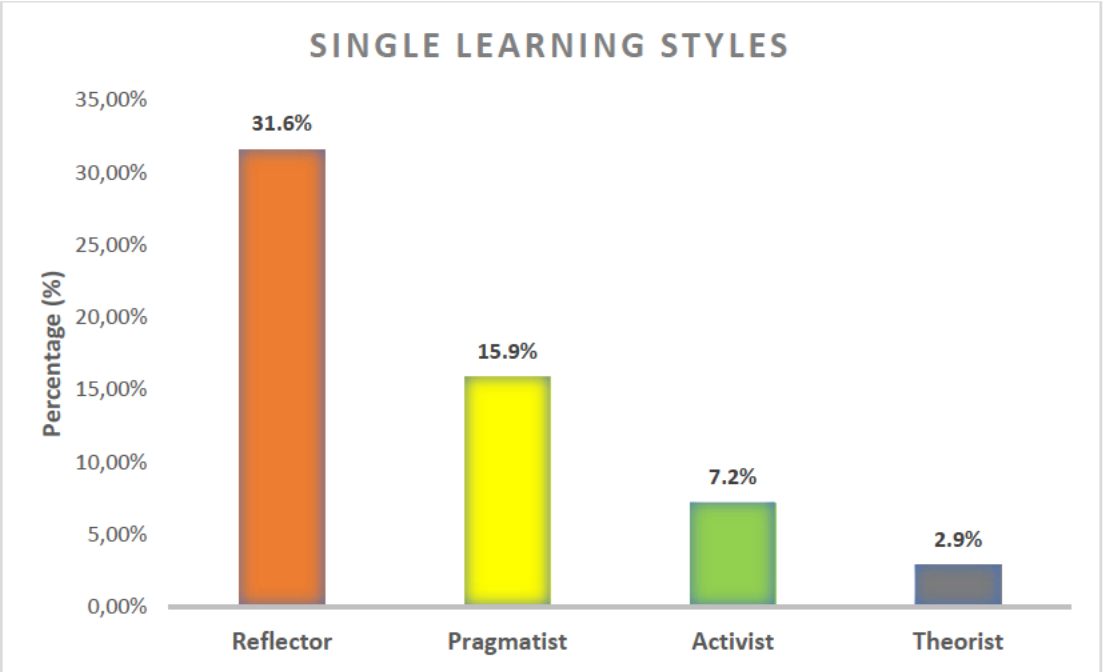

Figure 5.3 Frequency of single learning styles

5.2.4.3: Multiple learning styles

After analysing multiple learning style preferences, there were six combinations of two learning styles: Activist-Pragmatist, Activist-Reflector, Activist-Theorist, Reflector-Pragmatist, Reflector-Theorist, and Theorist-Pragmatist. As shown in Figure 5.4, the Reflector-Pragmatist was the highest combination of multiple learning style preferences with 128 participants (21.8%). All of the other learning style combinations were significantly smaller with 4.3% of students preferring an Activist-Pragmatist learning style. The other four combinations of learning styles demonstrated a very small number of respondents: Reflector-Theorist (2.4%), Activist-Reflector (1.9%), Theorist-Pragmatist (1.5%), and Activist-Theorist (1.2%).

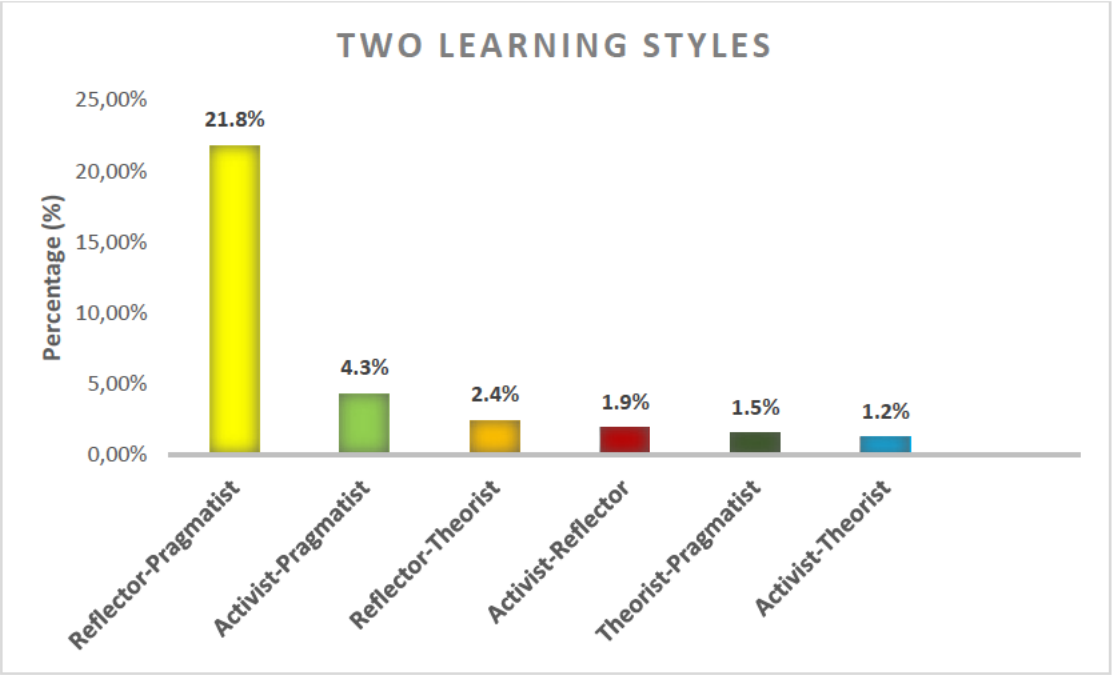

Figure 5.4 Frequency of two learning styles

With regard to the combinations of the three learning styles, the Reflector-Theorist-Pragmatist was the highest (n = 30; 5.1%) of the survey sample. The Activist-Reflector-Theorist learning style preference was the lowest (n = 4; 0.7%), while 15 participants (2.6%) showed their preference for the Activist-Reflector-Pragmatist, and six participants (1.0%) demonstrated a preference for the Activist-Theorist-Pragmatist learning styles. These results are visually represented in Figure 5.5.

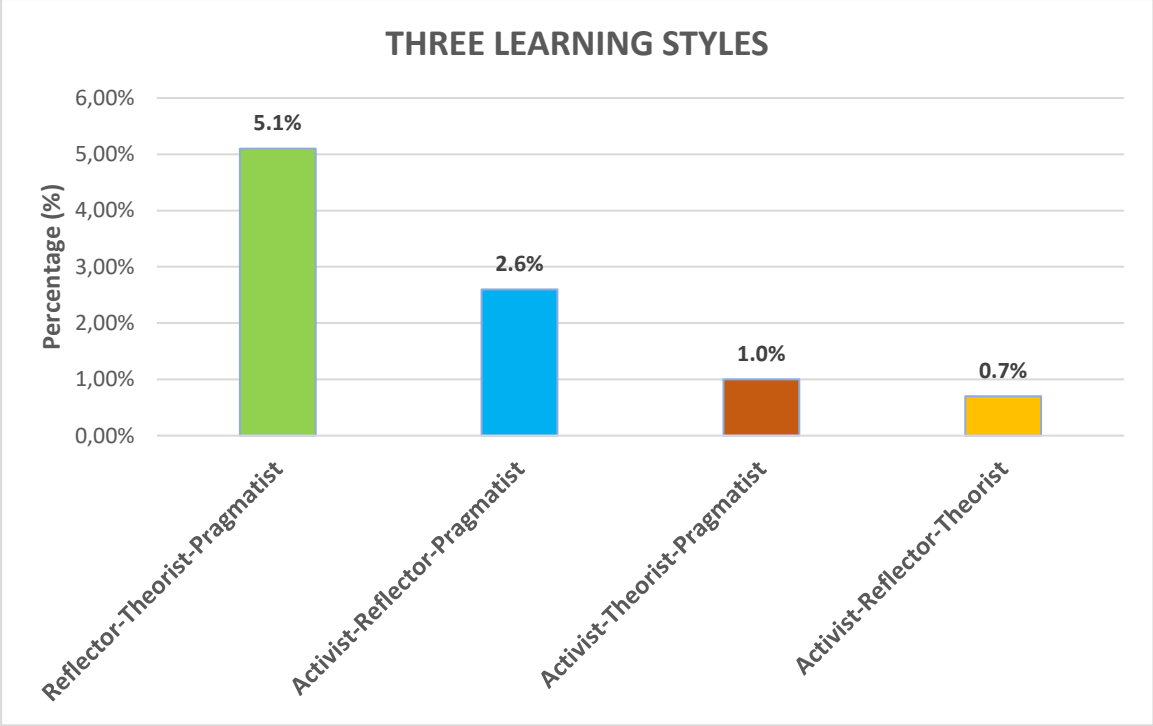

Figure 5.5 Frequency of three learning styles

In summary: the Reflector learning style was the most prevalent of all of the learning styles amongst students at DSU. It was identified by 31.6% of the student sample as being their preferred learning style. The second most prevalent learning style was the combination of Reflector and Pragmatist, with 21.8% of the survey sample demonstrating this combination of learning styles. This was followed by the Pragmatist learning style as a single learning style being preferred by 15.9% of respondents. Furthermore, the combination of the Reflector, Pragmatist, and Theorist was the learning style preference of 5.1% of the students surveyed.

5.2.5: Degree of preference of each learning style

According to Honey (2006), the points scored by students on each learning style can be compared to the results of another sample group who also completed the same questionnaire. In this way, students demonstrated their preference for a particular learning style based on their score compared to other people. In this study, the results of the learning style survey were compared to a norm provided by Honey and Mumford from a sample of over 13,000 surveys which reported by the degree of preference for each learning style (see Table 5.6).

Table 5.6 Norms for Honey and Mumford Learning Styles Questionnaire (40-item)

Top 10%	Very strong preference
Next 20%	Strong preference
Middle 40%	Moderate preference
Next 20%	Low preference
Bottom 10%	Very low preference

The criterion of interpretation is the relativity of the scores obtained in each learning style. Honey and Mumford (2006) proposed five preference levels from 'very low preference' (10% of the people with very low scores), 'low preference' (20% of the people with low scores), 'moderate preference' (40% of the people with median scores), 'strong preference' (20% of the people with high scores) to 'very strong preference' (10% of the people with the highest scores) for each learning style. The range of scores in each of the four learning styles in alignment with the five preference levels is displayed in Table 5.7.

Table 5.7 General scale of preference levels for the four learning styles

Learning styles	Very low preference 10%	Low preference 20%	Moderate preference 40%	Strong preference 20%	Very strong preference 10%
Activist	0-4	5	6-7	8	9-10
Reflector	0-6	7	8-9	8	10
Theorist	0-3	4-5	6-7	8	9-10
Pragmatist	0-5	6-7	8	9	10

The DSU students' scores could be assigned different levels of preference from very low to very strong preference in each learning style, using the norm provided by Honey and Mumford (2006). The results in relation to the five levels of preference of the four learning styles are presented in this section.

5.2.5.1: Reflector learning style

Figure 5.6 depicts the preference degree of the Reflector learning style for the whole sample who responded to the questionnaire survey. The participants showed a strong preference for the Reflector learning style, which accounts for 44.9%, followed by 38.1% of the participants

who displayed a very strong preference for the Reflector learning style. 15.7% of the participants exhibited a moderate preference, 1.2% of the participants showed a low preference, and 0.2% of the sample indicated a very low preference for the Reflector learning style.

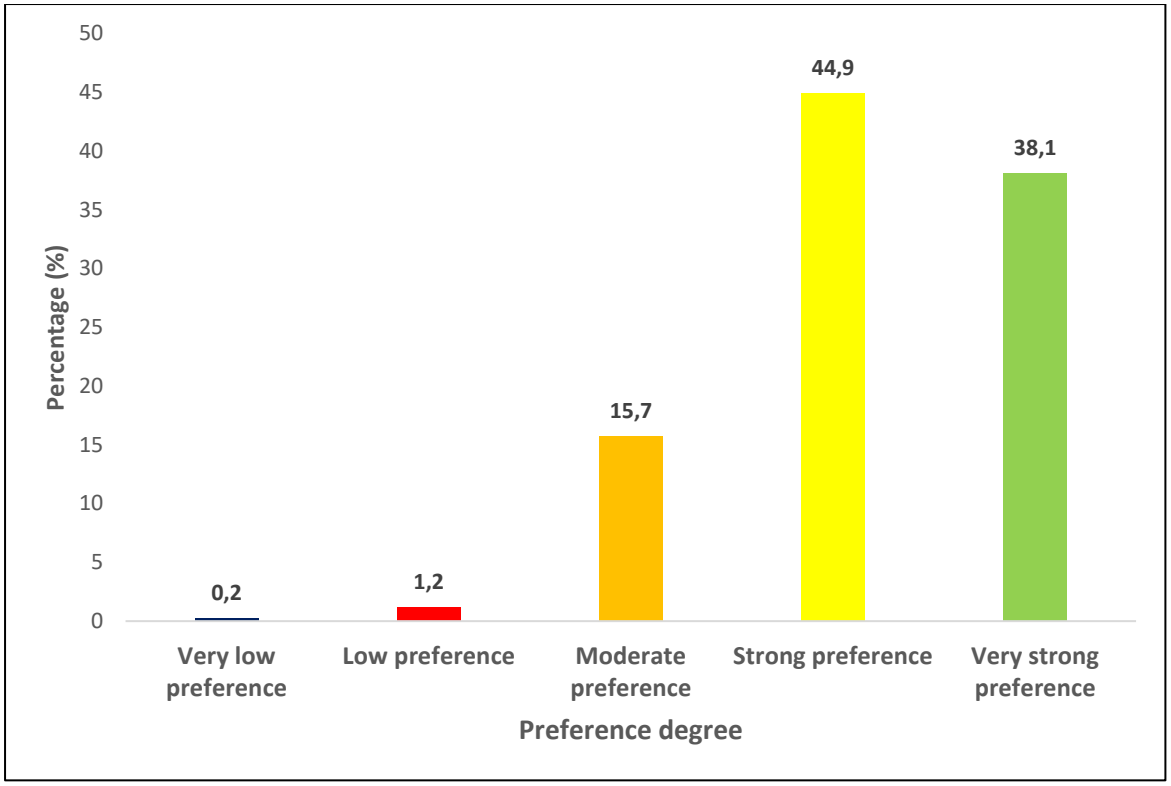

Figure 5.6 Preference degree for Reflector learning style

5.2.5.2: Pragmatist learning style

The results of the five preference levels of the Pragmatist learning style for all the students who were involved in the survey are displayed in Figure 5.7. Notably, 49.7% of the participants showed a strong preference for the Pragmatist learning style. This was followed by 27.8% of the participants who indicated a very strong preference while 21.2% of the participants exhibited a moderate preference, 1.2% of the participants showed a low preference, and 0.2% a very low preference for this learning style.

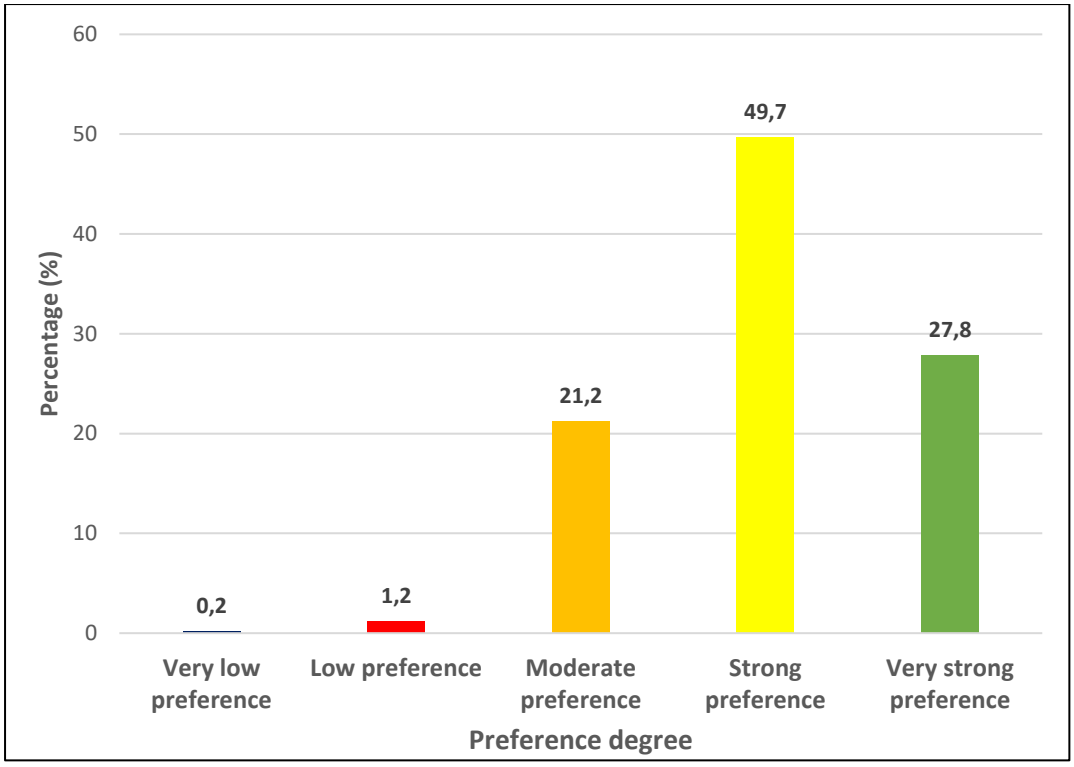

Figure 5.7 Preference degree for Pragmatist learning style

5.2.5.3: Activist learning style

The five preference levels for the Activist learning style for those who responded to the questionnaire survey are demonstrated in Figure 5.8. As can be seen, 57.5% of the participants displayed a moderate preference for the Activist learning style. This was followed by 31.4% of the participants showing a strong preference, with 7.8% showing a very strong preference, 2.7% of the participants exhibiting a low preference, and 0.5% a very low preference for this learning style.

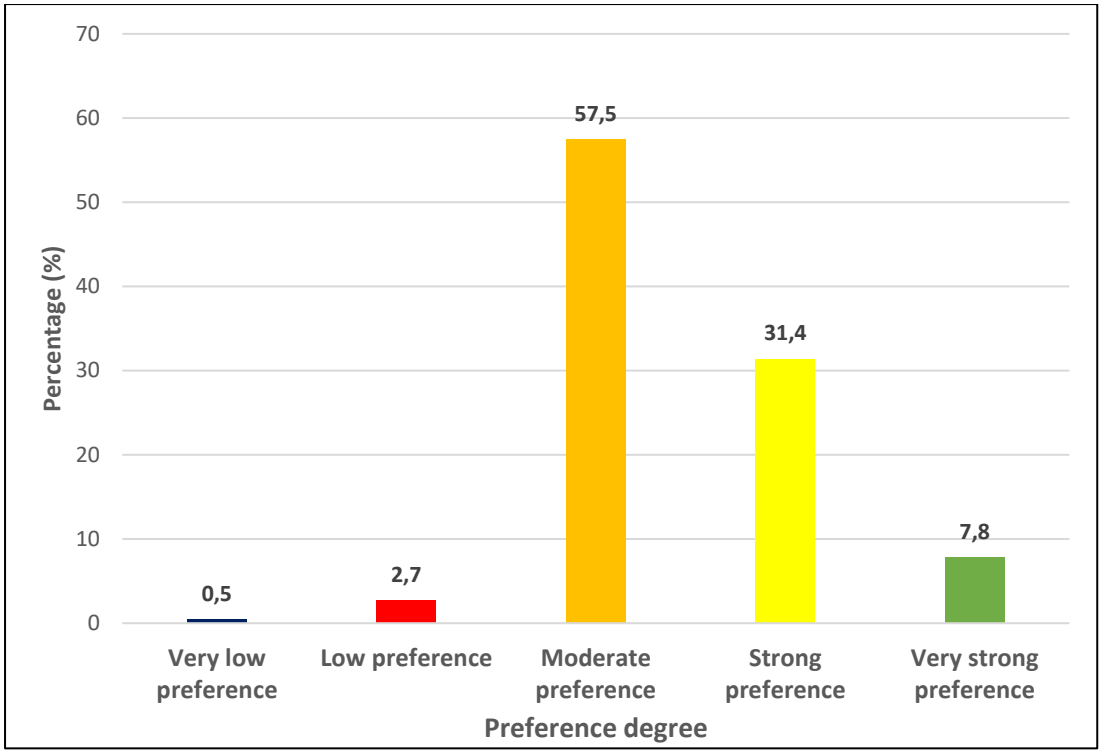

Figure 5.8 Preference degree for Activist learning style

5.2.5.4: Theorist learning style

The preference degrees for the Theorist learning style for the whole sample are illustrated in Figure 5.9. Interestingly, 50.2% of the participants showed a moderate preference for the Theorist learning style, followed by 35.5% who showed a strong preference. A total of 8.9% of the participants exhibited a very strong preference, 4.8% a low preference, and 0.7% a very low preference for this learning style.

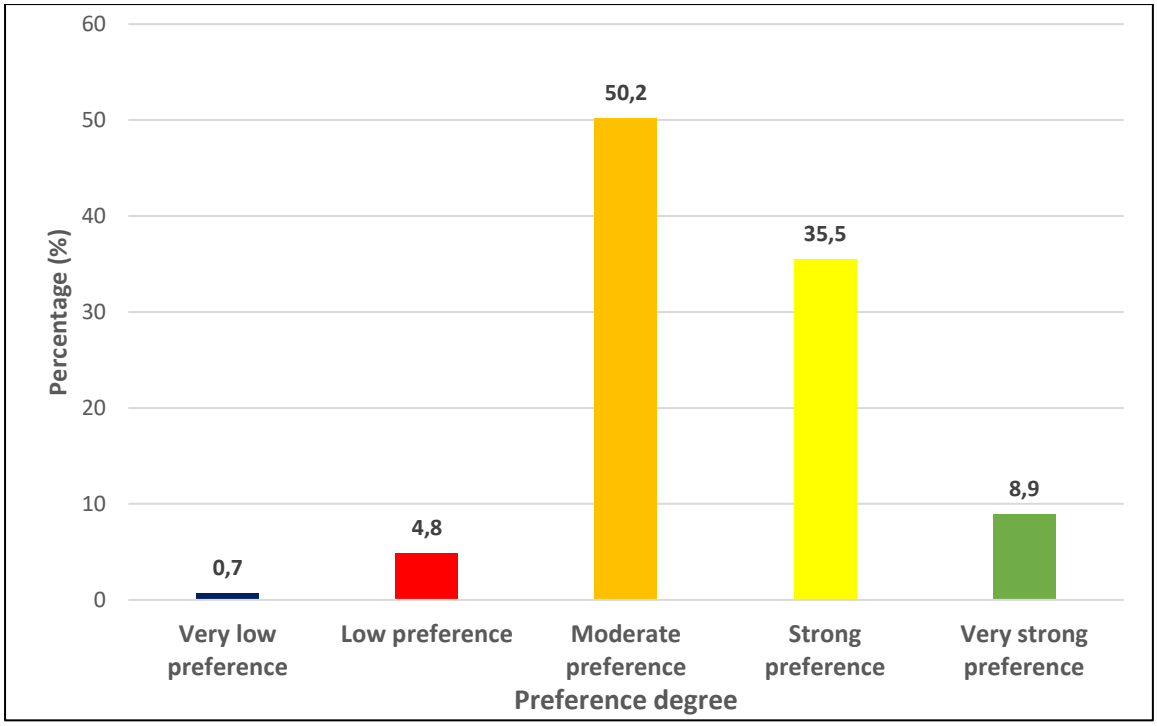

Figure 5.9 Preference degree for Theorist learning style

A summary and comparison of the five preference levels of the four learning styles of the students at DSU is shown in Table 5.8. Although the median (moderate preference) obtained for the Activist learning style was the highest (57.5%) in relation to other learning styles within the same level of preference, the Activist learning style was identified as being less prevalent as the addition of the strong and very strong preferences was the lowest compared to other learning styles. If these two preference levels are summed for all learning styles observed, the following results are obtained: 83.0% for Reflector, 77.5% for Pragmatist, 44.4% for Theorist, and 39.2% for Activist. With these results, the Reflector learning style was the most dominant among DSU students, followed by the Pragmatist, Theorist, and Activist learning styles.

Table 5.8 Distribution as a percentage of the Activist, Reflector, Theorist, and Pragmatist learning styles across different levels of preference

Learning styles	Very low preference (%)	Low preference (%)	Moderate preference (%)	Strong preference (%)	Very strong preference (%)
Reflector	0.2	1.2	15.7	44.9	38.1
Pragmatist	0.2	1.2	21.2	49.7	27.8
Theorist	0.7	4.8	50.2	35.5	8.9
Activist	0.5	2.7	57.5	31.4	7.8

5.2.6: Descriptive statistics of four learning styles

Descriptive statistics summarise and organise data, either through numerical calculations, graphs or tables (Donges, 2018). The main function of descriptive statistics is to summarise large amounts of data into information that is significant. Descriptive statistics provide a summary that may allow for comparisons across data sets in a study. The following table provides descriptive statistics of learning styles including the mean score and standard deviation of each learning style. As depicted in Table 5.9, the Reflector style had the highest mean of 8.66 with standard deviation of 1.62. It was followed by the Pragmatist with a mean of 8.41 and standard deviation of 1.57. The Theorist had a mean of 7.02 with standard deviation of 1.96 and the Activist had the lowest mean of 6.94 with standard deviation of 1.76. The results indicated Reflector was the most dominant learning style, followed by the Pragmatist, Theorist, and Activist learning styles.

Table 5.9 Descriptive statistics of learning styles

Learning styles	Mean	Standard deviation	Max.	Min.
Activist	6.9437	1.76536	10.00	0.00
Reflector	8.6621	1.62412	10.00	0.00
Theorist	7.0239	1.96885	10.00	0.00
Pragmatist	8.4096	1.56877	10.00	0.00

5.2.7: Reliability analysis

The consistency, stability, and dependability of the scores ensure the reliability of a survey questionnaire (McMillan, 2007). For this reason, to determine if items of the survey were consistent with each other, the internal consistency was tested, using Cronbach's alpha coefficient. If the alpha value is higher than 0.9, the internal consistency is excellent (Blunch, 2008). Excellent internal consistency means the survey items tend to be in perfect agreement with each other. In other words, a participant who answers a survey item positively is more likely to answer other items in the survey positively (Blunch, 2008). The criteria to assess Cronbach's alpha scores are demonstrated in Table 5.10 (Zhang & Xiang, 2019).

Table 5.10 Cronbach's alpha

Cronbach's alpha	Internal consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor

Haron (2010) argues that alpha value should be .70 or higher for a set of items to be regarded as a scale, but some items should be .75 or .80, while others are as benign as .60. However, according to Zulkepli et al. (2017), Cronbach's alpha values are susceptible to the number of items in the scale, and they will reduce below .60, and therefore, in this case, these are regarded to be proper.

Cronbach's alpha technique was used in the study for evaluating the internal consistency of data within each factor. Table 5.11 presents the reliability analysis along with descriptive statistical measures for the study variables. Cronbach's alpha values ranging for Activist, Pragmatist, and Theorist are .512, .526, and .586 respectively, which indicates that there is poor internal consistency among each and every statement. Cronbach's alpha value for Reflector is .632 which indicates there is questionable internal consistency among each and every statement for this style. Despite the poor internal consistency within Activist, Pragmatist, and Theorist and questionable internal consistency within the Reflector style items, these are deemed as appropriate as these figures indicate acceptable internal consistency (Zulkepli et al., 2017).

Table 5.11 Reliability analysis

Learning styles	Number of items	Mean	Standard deviation	Cronbach's alpha
Activist	10	6.944	1.765	0.512
Reflector	10	8.662	1.624	0.632
Theorist	10	7.024	1.968	0.586
Pragmatist	10	8.409	1.568	0.526

5.2.8: Factor analysis

Factor analysis is generally employed in the areas of psychology and education (Hogarty et al., 2005) and is regarded as the best method for the interpretation of self-reporting questionnaires (Bryant et al., 1999). Factor analysis is a multivariate statistical process with many uses (Gorsuch, 1983; Tabachnick et al., 2007; Thompson, 2004) , three of which are mentioned below. First, factor analysis decreases many variables into a smaller set of variables, also known as factors. Second, it creates primary dimensions between measured variables and underlying constructs, thus enabling the formation and refinement of theory. Third, it provides evidence of the construct validity in relation to self-reporting scales.

Exploratory factor analysis (EFA) is a data reduction technique used to reduce a large number of variables to a small set of underlying factors that summarise the essential information contained in the variables (Richard & Dean, 2007). This procedure is employed to identify, reduce, and organise many survey items into a specific construct for independent variables in a study. In this research, EFA was undertaken on each of the four factors of learning styles: Reflector, Activist, Theorist, and Pragmatist, to establish the pattern of structure. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's Test of Sphericity were the two tests used to demonstrate the appropriateness of the data for structure detection. The KMO measure and Bartlett's Test of Sphericity were assumed to confirm the sample considered for the study was adequate and appropriate to conduct factor analysis. When considering KMO, its measure must be greater than 0.5 and Bartlett's Test of Sphericity should have the p-value less than 0.05. Further, it is recommended that while a KMO value greater than 0.5 is acceptable, values within 0.5 and 0.7 are average, values ranging from 0.7– 0.8 are fine, and more than 0.8 are very good (Hutcheson & Sofroniou, 1999; Kaiser, 1974). The results of KMO were above the acceptable limit of 0.5: Activist (.639), Reflector (.761),

Theorist (.709), and Pragmatist (.655) (see Table 5.12). In addition, the Bartlett's Test of Sphericity was highly significant for all four learning styles, p-value < .001). This indicated that the correlations between items were sufficiently large for EFA to occur.

Table 5.12 KMO results

Learning style factors	KMO
Activist factor (10 items)	.639
Reflector factor (10 items)	.761
Theorist factor (10 items)	.709
Pragmatist factor (10 items)	.655

To ensure that all factors extracted from factor analysis are reliable as recommended by MacCallum et al. (1999), the value of factor loading for each item must be within 0.30 range. Also, Field et al. (2009) argue the most preferred loading value for each item must surpass 0.30. In the questionnaire survey employed in this research, the loading value for all items was over 0.30, and therefore, they were all usable in this study.

5.2.8.1: Analysis of Activist factor

The following table 5.13 provides the factor analysis for the Activist factor, with all ten items incorporated in the analysis. For this first factor, loading for the items ranged from 0.304 to 0.576. The Activist factor accounted for 19.442% of the total variance.

Table 5.13 Factor analysis of Activist

	Factor	% of variance
	1	
I actively look for new things to do.	.576	19.442
I am usually the 'life and soul' of the party.	.553	
I like the challenge of trying out different ways of doing things.	.548	
I prefer to jump in and do things as they come along rather than plan things out beforehand.	.518	
In discussions, I usually come up with lots of spontaneous ideas.	.408	
I quite like taking risks.	.373	
I find rules and procedures take the fun out of things.	.364	
I enjoy the excitement of a crisis situation.	.326	

	Factor	% of variance
	1	
I often do things just because I feel like it, rather than thinking about them first.	.320	
Usually, I talk more than I listen.	.304	

5.2.8.2: Analysis of Reflector factor

Table 5.14 reveals the factor analysis for the Reflector factor. The ten items were used in the factor analysis. Factor loading for these items ranged from 0.372 to 0.644. The Reflector factor accounted for 23.846% of the total variance.

Table 5.14 Factor analysis of Reflector

	Factor	% of variance
	2	
I prefer to establish the facts and think things through before reaching a conclusion.	.644	23.846
Before taking part in a discussion or meeting, I like to read the appropriate papers and prepare carefully.	.546	
I make decisions only after weighing up the pros and cons of different possibilities.	.516	
I prefer to look at a problem from as many different angles as I can before starting to solve it.	.502	
I prefer to have as many bits of information about a subject as possible. The more I have to sift through the better.	.484	
I prefer to base decisions on hard evidence rather than on hunches or intuition.	.455	
I usually do more listening than talking.	.448	
If I have to write a report or a formal letter, I prefer to have several rough drafts before settling on the final version.	.439	
I like to consider many options before I make up my mind.	.425	
I like to think through the consequences before taking action.	.372	

5.2.8.3: Analysis of Theorist factor

Table 5.15 indicates the factor analysis for the Theorist factor. The ten items were included in the factor analysis. This third factor had items with loading ranging from 0.303 to 0.588. The Theorist factor accounted for 21.983% of the total variance.

Table 5.15 Factor analysis of Theorist

	Factor	% of variance
	3	
I like to be absolutely correct about things.	.588	21.983
I like meetings and discussions to be structured and orderly.	.566	
I like to understand the assumptions, principles and rationale upon which things are based.	.557	
I am quite keen on sticking to fixed routines, following procedures and keeping to timetables.	.544	
I believe that careful, logical thinking is the key to success.	.457	
I prefer to evaluate the soundness of my ideas before sharing them.	.456	
I like to fit things into some sort of pattern, framework or model.	.414	
I prefer to solve problems using a systematic approach that reduces guesswork and uncertainty.	.390	
I am rather fussy about how I do things – a bit of a perfectionist.	.307	
I like to check things out for myself rather than take them for granted.	.303	

5.2.8.4: Analysis of Pragmatist factor

Table 5.16 presents the factor analysis for the Pragmatist factor. The ten items were used in the factor analysis. Factor loading for items in this factor ranged from 0.396 to 0.553. The Pragmatist factor accounted for 19.895% of the total variance.

Table 5.16 Factor analysis of Pragmatist

	Factor 4	% of variance
In my opinion, it doesn't matter how you do something, as long as it works.	.553	19.895
In meetings and discussions, I put forward ideas that I know are down-to-earth and realistic.	.535	
When I hear about a new idea or technique, I immediately start working out how to apply it to my situation/problems.	.521	
I find that I can often work out more practical ways of doing things.	.507	
What matters most to me is whether something works in practice.	.496	
I like practical, tried and tested techniques.	.434	
I tend to judge people's ideas on their practical merits.	.423	
I prefer ideas with an obvious relevance to my life and work.	.404	
I do whatever I need to, to get the job done.	.401	
In discussions, I like to get straight to the point.	.396	

The percentages accounted for by each factor were 19.442% (Activist), 23.846% (Reflector), 21.983% (Theorist), and 19.895% (Pragmatist), respectively, giving a total of 85.166% of the variance in the pattern of relationships among the items, for the 40-item structure.

5.2.9: The relationships between learning styles and gender, age group, year of study, major, and student type

This section presents the correlations between the four learning styles of Activist, Reflector, Theorist, and Pragmatist and other independent variables including gender, age group, year of study, and student type. Linear regression analysis is a set of statistical procedures, studying the relationships between two or more variables and is normally undertaken to identify if any relationship between two or more variables actually exists or to comprehend the nature of the relationship between two or more variables (Johnstone et al., 2010). To investigate these associations, the independent sample t-test, analysis of variance (ANOVA), and multivariate analysis of variance (MANOVA) were undertaken. The independent sample t-test is an inferential statistical test that determines whether there is a statistically significant difference between the means in the two unrelated groups. Of these five categorical variables, gender and student type comprised only two groups (male/female and student/student-athlete); therefore, independent sample t-test was performed to examine the relationships between the learning

styles, and gender and student type. The t-value is the test statistic for the two-sided independent samples t-test. The p-value was calculated from the t-value, and was used to infer significance when $p < .05$.

5.2.9.1: Learning styles and gender

To investigate the relationship between the learning styles and gender groups, the independent sample t-test was conducted. More particularly, the test was undertaken on the four learning styles of Activist, Reflector, Theorist, and Pragmatist across 457 males and 129 females. The hypotheses regarding the difference in means of the learning styles and gender were also established.

H_0: There is no significant difference in means of learning styles between gender groups.

H_1: There is a significant difference in means of learning styles between gender groups.

The difference in means of learning style between gender groups is shown in Table 5.17. The p-value for Reflector is less than .01 and the t-value is -3.656. However, when the test was performed between the Activist, Theorist, and Pragmatist learning styles and gender, a relationship was shown ($p = .967$, .098 and .091, and $t = 0.042$, -1.663 and -1.700) but the differences between the means for male and female students were not significant. Thus, when considering gender, female students (9.05±1.28) strongly preferred the Reflector as compared to male students (8.55±1.69) and for this style the difference in means between genders is significant.

Table 5.17 Difference in means of learning styles between gender groups

Learning styles	Gender		t value	p value
	Male (n = 457)	Female (n = 129)		
	Mean ± SD**			
Activist	6.95±1.78	6.93±1.74	0.042	.967
Reflector	8.55±1.69	9.05±1.28	-3.656	**.000****
Theorist	6.95±1.96	7.28±1.97	-1.663	.098
Pragmatist	8.53±1.58	8.16±1.52	-1.700	.091

**$p < .01$

**Standard deviation

Thus, the hypothesis H_1 is accepted.

H_1: There is a significant difference in means of Reflector between gender groups.

Figure 5.10 presents differences in means for the four learning styles between males and females.

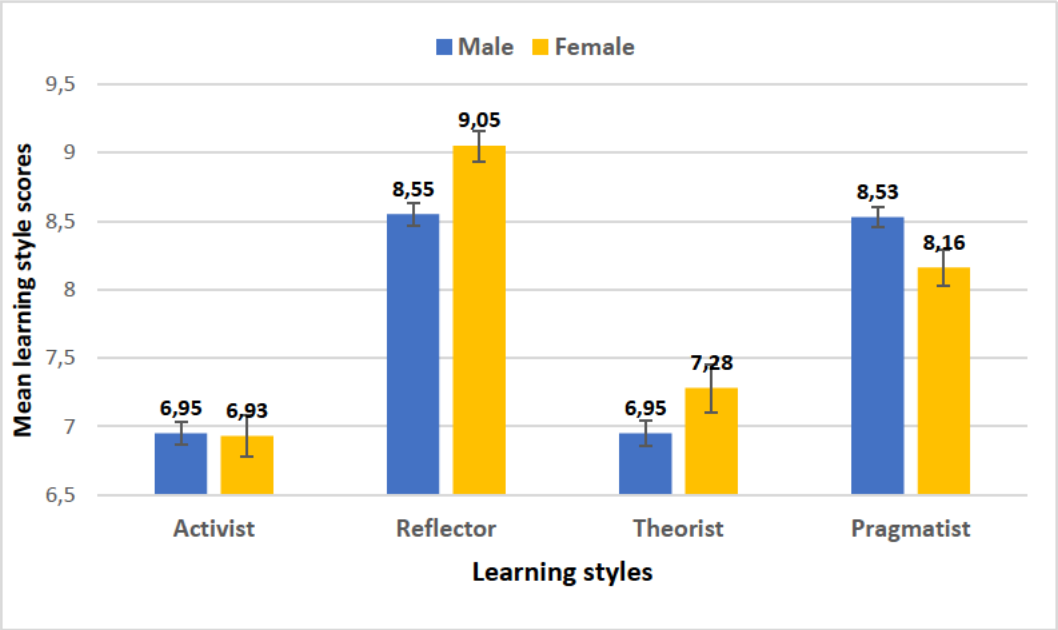

Figure 5.10 Difference in means of learning styles between gender groups. Standard error bars have been added

As demonstrated in Figure 5.10, of the four learning styles, Reflector had the highest mean scores and Activist had the lowest mean scores for both males and females, but only the Reflector learning style had a statistically significant association with gender (see Table 5.16), where females had a higher average reflector score than males.

5.2.9.2: Learning styles and student type

To examine the relationship between the four learning styles and student type, the independent sample t-test was also undertaken across 547 students and 39 student-athletes. The hypotheses in relation to the difference in means of the learning styles and student type were also formed.

H_0: There is no significant difference in means of learning styles between student type.

H_2: There is a significant difference in means of learning styles between student type.

The difference in means of learning styles between student type is revealed in Table 5.18. The p-value for Theorist is within the significant level of .05 and the t-value is -2.220. However, when the test was carried out between the Activist, Reflector and Pragmatist learning styles and student type a relationship was found ($p = .795$, .344 and .120, and $t = 0.261$, -0.957 and -1.585, respectively), but not to a level of significance. Thus, when considering student type,

student-athletes (7.72±2.02) showed a stronger preference for the Theorist learning style than students (6.97±1.95). The difference between these means is significant.

Table 5.18 Difference in means of learning styles between student type groups

Learning styles	Student type		t value	p value
	Student (n = 547)	Student-athlete (n = 39)		
	Mean ± SD**			
Activist	6.95±1.76	6.88±1.78	0.261	.795
Reflector	8.64±1.63	8.89±1.57	-0.957	.344
Theorist	6.97±1.95	7.72±2.02	-2.220	**.032***
Pragmatist	8.38±1.57	8.77±1.46	-1.585	.120

*p < .05

**Standard deviation

Thus, the hypothesis H_2 is accepted.

H_2: There is a significant difference in means of the Theorist between student type.

The difference in means for the four learning styles between students and student-athletes is exhibited in Figure 5.11.

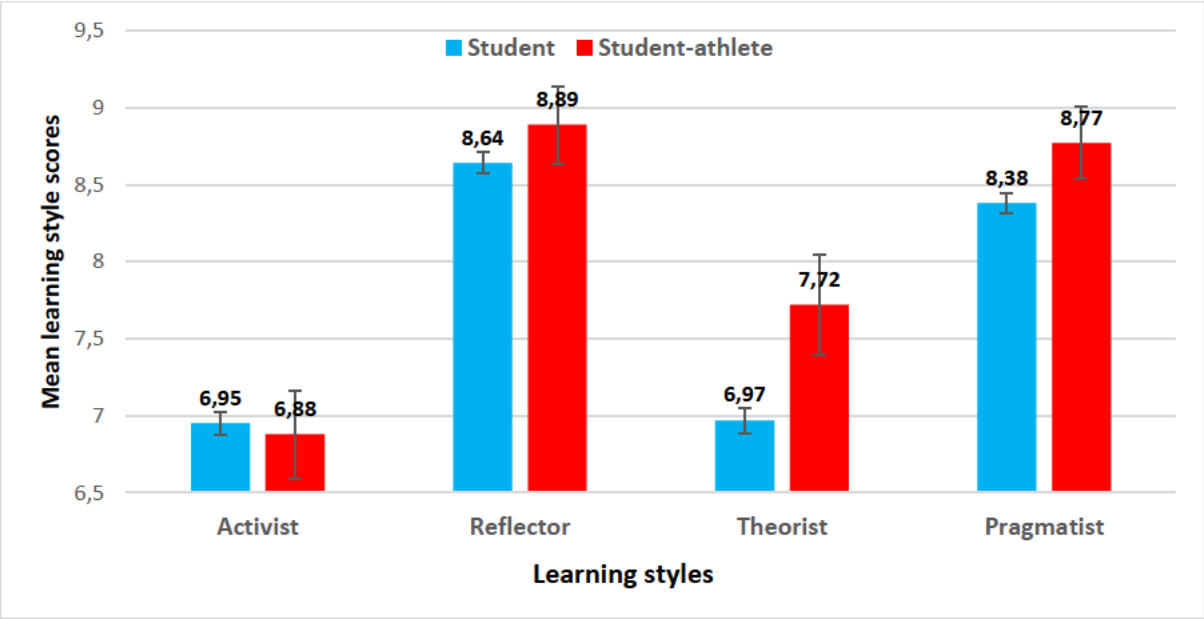

Figure 5.11 Difference in means of learning styles between student type groups. Standard error bars have been added

As displayed in Figure 5.11, the most preferred style by the students and student-athletes was the Reflector with a mean score of 8.64 for students and 8.89 for student-athletes. This was followed by the Pragmatist with mean scores of 8.38 and 8.77 for students and student-athletes, respectively. The Theorist style was less favoured by students (6.97) than student-athletes (7.72). The Activist was the least preferred learning style with a small difference of 0.07 in terms of mean scores by students over student-athletes. Of the four learning styles, there was a significant association between the Theorist and student type (see Table 5.18), where student-athletes had a much higher mean score than students. Along with the Theorist, and Pragmatist, student-athletes tended to be more reflective and pragmatist but less activist than students. The fact that Reflector and Pragmatist were higher than the other two learning styles of Activist and Theorist further clarified the dominance of these two learning styles across the study participants. A significant difference in means of the Theorist learning style between students and student-athletes helped to confirm the hypothesis accepted.

Whilst the t-test is a method that determines whether two populations are statistically different from each other, essentially with gender (male and female) and student type (student and student-athlete), ANOVA identifies whether three or more populations are statistically different from each other. Across the five independent variables, there are three groups within each of the two variables of age (18–21 years, 22–25 years, and 26–29 years) and major (PE, SC, and SM), and four groups within year of study (freshman, sophomore, junior, and senior).

Therefore, ANOVA was undertaken to examine the relationships between the learning styles and age, major, and year of study.

5.2.9.3: Learning styles and age

To investigate the relationship between the learning styles and age, the ANOVA was conducted. More particularly, ANOVA was undertaken on the four learning styles of Activist, Reflector, Theorist, and Pragmatist across three age groups of 18–21, 22–25, and 26–29 years. The hypotheses regarding the difference in means of the learning styles and age groups were also established.

H_0: There is no significant difference in means of learning style between age groups.

H_3: There is a significant difference in means of learning style between age groups.

The difference in means of learning styles between age groups is displayed in Table 5.19. The p-value for Reflector is significant (p = .013 < .05) and f-value = 4.381, and is therefore considered as part of these results. However, when the test was carried out between Activist, Theorist and Pragmatist learning styles and age groups, a relationship was shown (p = .421, .096 and .380, and f = 0.868, 2.349 and 0.969, respectively), but not to a level of significance. When considering age, the 22–25 year old group of students (9.05±1.22) demonstrated a stronger preference for the Reflector style than the 18–21 year old group of students (8.56±1.72) and the 26–29 year old group of students (8.75±1.26).

Table 5.19 Difference in means of learning styles between age groups

Learning styles	Age			f value	p value
	18-21 years (n = 462)	22-25 years (n = 120)	26-29 years (n = 4)		
	Mean ± SD**				
Activist	6.91±1.78	7.10±1.69	6.25±1.50	0.868	.421
Reflector	8.56±1.72	9.05±1.22	8.75±1.26	4.381	**.013***
Theorist	6.93±1.99	7.37±1.81	7.25±2.22	2.349	.096
Pragmatist	8.37±1.63	8.52±1.33	9.25±0.96	0.969	.380

*p < .05

**Standard deviation

Thus, the hypothesis H_3 is accepted.

H_3: There is a significant difference in means of the Reflector between age groups.

The difference in means for the four learning styles among age groups is demonstrated in Figure 5.12.

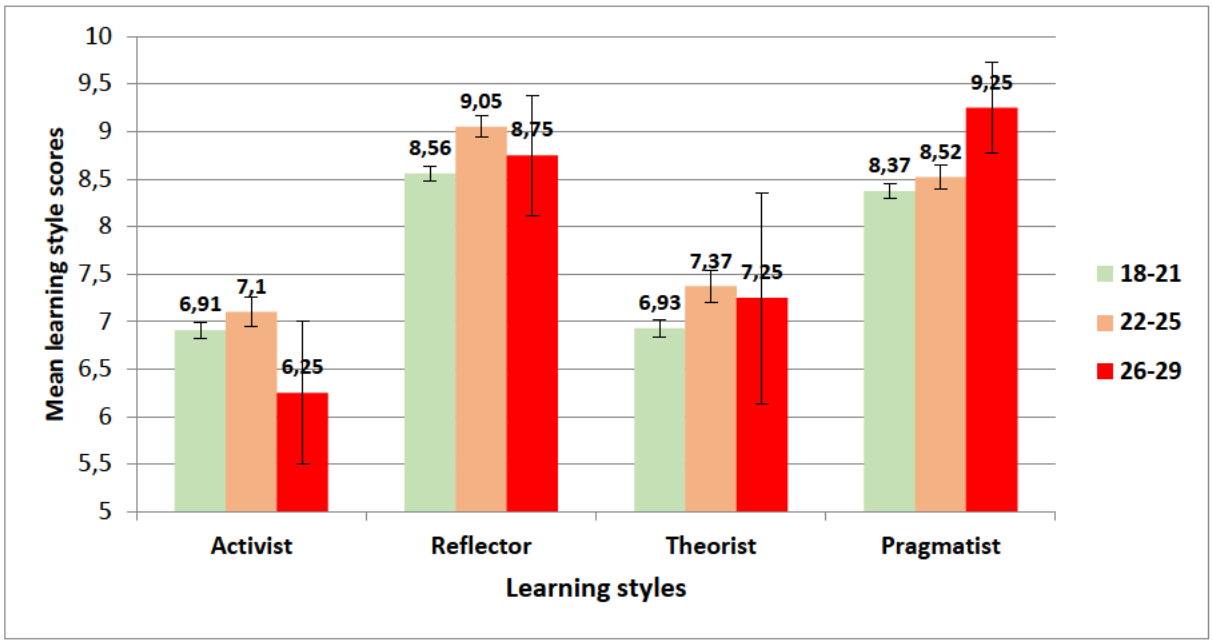

Figure 5.12 Difference in means of learning styles between age groups. Standard error bars have been added

Figure 5.12 presents the mean scores among the four learning styles of Activist, Reflector, Theorist, and Pragmatist across three age groups of 18–21, 22–25, and 26–29 years. The participants obtained high mean scores ranging from 8.37 to 9.25 in the Reflector and Pragmatist learning styles whilst the Activist and Theorist showed lower mean scores of 6.25 to 7.37 across age groups. In the Activist, Reflector, and Theorist learning styles, the 22–25 age group had higher mean scores than the other two groups. Another important point was that the mean scores for the Pragmatist learning style increased from 8.37 to 8.52, then to 9.25 in line with age groups of 18–21, 22–25, and 26–29 years, respectively. Of the four learning styles, the Reflector style had a significant relationship with age groups (see Table 5.19), with the 22–25 year age group having a higher mean score than the other two groups.

5.2.9.4: Learning styles and major

To investigate the relationship between the learning styles and major, the ANOVA was undertaken. More particularly, ANOVA was conducted on the four learning styles of Activist, Reflector, Theorist, and Pragmatist across the three majors: PE, SM, and SC. The hypotheses regarding the difference in means of the learning styles and major were also formed.

H_0: There is no significant difference in means of learning styles between major groups.

H_4: There is a significant difference in means of learning styles between major groups.

The difference in means of learning styles between faculty groups is illustrated in Table 5.20. When the test between major groups and the Activist; Reflector; Theorist; Pragmatist learning styles was conducted, a relationship was shown (p = .354, .504, .810 and .408, and f = 1.041, 0.685, 0.210 and 0.898, respectively), but not to a level of significance.

Table 5.20 Difference in means of learning styles between faculty groups

Learning styles	Faculty			f value	p value
	Physical Education (n = 436)	Sport Coaching (n = 119)	Sport Management (n = 31)		
	Mean ± SD**				
Activist	6.95±1.79	7.02±1.74	6.52±1.44	1.041	.354
Reflector	8.62±1.64	8.70±1.64	8.96±1.25	0.685	.504
Theorist	7.02±2.00	7.09±1.95	6.84±1.46	0.210	.810
Pragmatist	8.46±1.59	8.24±1.54	8.35±1.28	0.898	.408

**Standard deviation

Hence, the hypothesis H_0 is accepted.

H_0: There is no significant difference in means of learning styles between major groups.

The difference in means for the four learning styles among major groups is displayed in Figure 5.13.

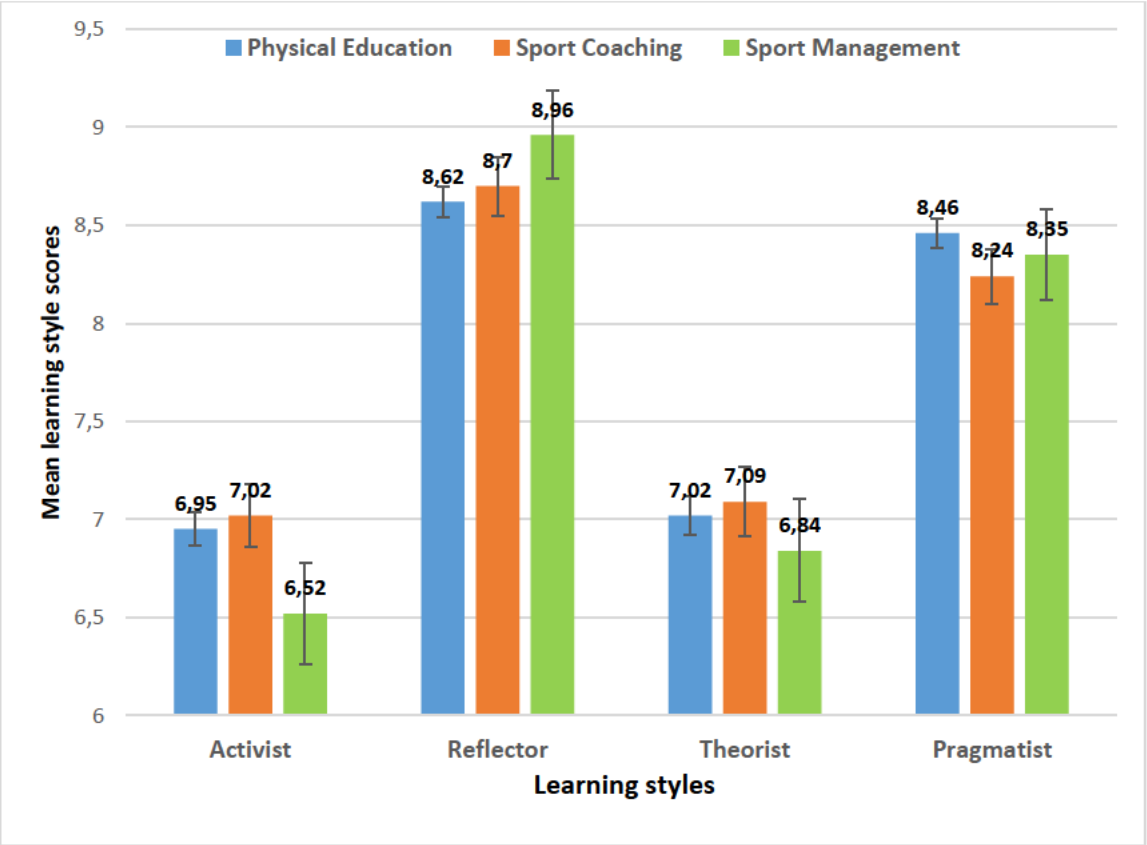

Figure 5.13 Difference in means of learning styles between faculty groups. Standard error bars have been added

Of the four learning styles, the Reflector was the most prevalent among students in PE, SC, and SM, followed by the Pragmatist, Theorist, and Activist. There was no statistically significant association between the learning styles and majors (see Table 5.20).

5.2.9.5: Learning styles and year of study

To examine the relationship between the learning styles and year of study, ANOVA was undertaken. More particularly, ANOVA was conducted on the four learning styles of Activist, Reflector, Theorist, and Pragmatist across the four grade levels. The hypotheses regarding the difference in means of the learning styles and years of study were also established.

H_0: There is no significant difference in means of learning styles between years of study.

H_5: There is a significant difference in means of learning styles between years of study.

The difference in means of learning styles between years of study is exhibited in Table 5.21. The p-value for the Reflector style is .014 (< .05) and f-value = 3.593; hence, there is a significant difference in the means of learning styles between years of study. However, when the test was conducted between years of study and the means of Activist; Theorist; and

Pragmatist learning styles, a relationship was shown (p = .428, .759 and .349, and f = 0.925, 0.392 and 1.099, respectively), but not to a level of significance. The sophomores and seniors (8.82±1.60 and 8.82±1.21) displayed a stronger preference for the Reflector style than juniors (8.29±2.03) and freshmen (8.68±1.63).

Table 5.21 Difference in means of learning styles between years of study

Learning styles	Grade level				F value	p value
	Freshman (n = 141)	Sophomore (n = 110)	Junior (n = 144)	Senior (n = 191)		
	Mean ± SD**					
Activist	6.98±1.69	6.70±1.91	6.95±1.72	7.04±1.76	0.925	.428
Reflector	8.68±1.63	8.82±1.60	8.29±2.03	8.82±1.21	3.593	**.014***
Theorist	6.98±2.08	7.11±1.97	7.13±1.93	6.93±1.92	0.392	.759
Pragmatist	8.27±1.48	8.28±1.68	8.45±1.81	8.54±1.35	1.099	.349

*p < .05

**Standard deviation

Hence, the hypothesis H_5 is accepted.

H_5: There is a significant difference in means of the Reflector between years of study.

The difference in means for the four learning styles among years of study is demonstrated in Figure 5.14.

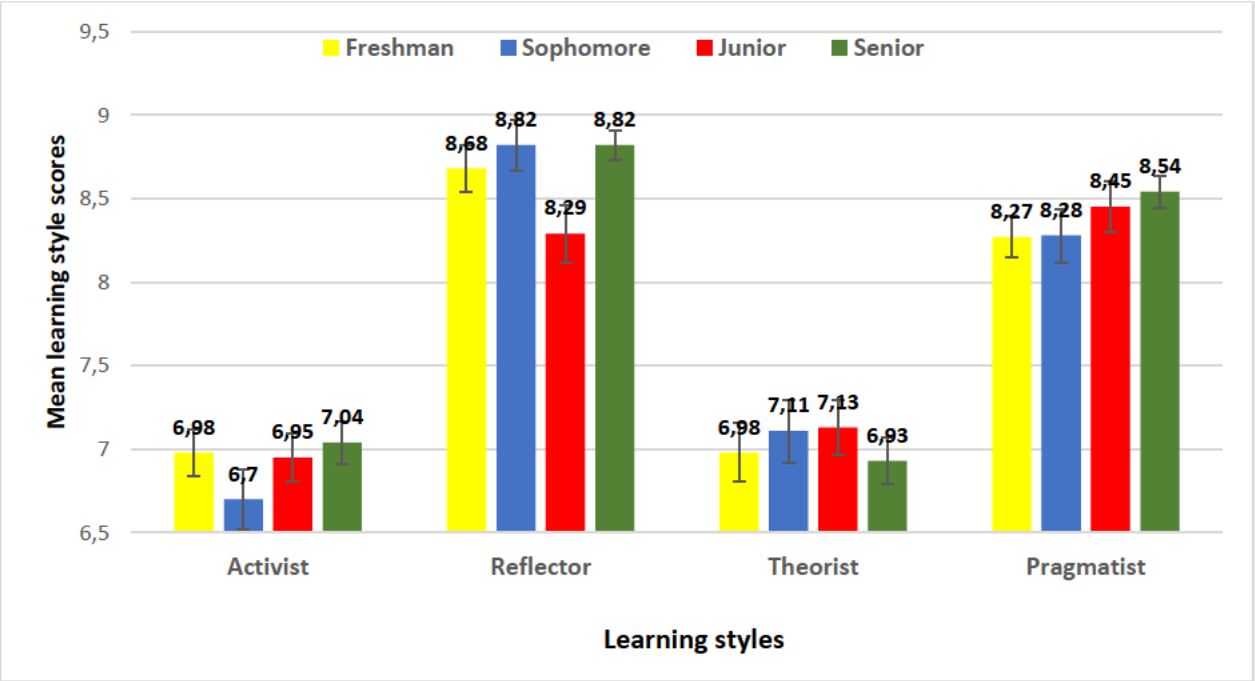

Figure 5.14 Difference in means of learning styles between grade level groups. Standard error bars have been added

As shown in Figure 5.14, the Reflector was the most popular learning style with high mean scores ranging from 8.29 to 8.82 among participants in the first to fourth years. This was followed by the Pragmatist style with mean scores of 8.27 to 8.54. By contrast, the Activist and Theorist learning styles showed much lower mean scores among the students who participated in the survey. There was no significant difference in the mean scores among students from year 1 to year 4 for Activist, Theorist, and Pragmatist learning styles, but there was a significant association between the Reflector style and year of study (see Table 5.21), where junior students scored a much lower mean score than their counterparts.

MANOVA was also undertaken to examine the associations between learning styles and gender, age, major, year of study, and student type and similar results were provided (see Appendix 12).

5.2.10: Multivariable model

The findings showed significant differences between the Reflector learning style and gender, age group, and year of study. A three-way ANOVA was run to test for independent effects of gender, age group, and year of study on the Reflector style. In other words, multivariable analysis was used to observe if gender effected the Reflector learning style, independently of age group and year of study. Similarly, the statistical analysis was employed to see if age group

affected the Reflector learning style, independently of gender and year of study, and if year of study affected the Reflector learning style, independently of the other two predictor variables.

Table 5.22 Tests of between-subjects effects

Dependent variable: Reflector						
Source	**Type III sum of squares**	**df*** **	**Mean square**	**F**	**Sig.**	**Partial eta squared**
Corrected model	70.925[a]	6	11.821	4.649	.000	0.046
Intercept	2600.539	1	2600.539	1022.781	.000	0.639
Gender	23.572	1	23.572	9.271	.002	0.016
Age group	18.823	2	9.412	3.702	.025	0.013
Year of study	25.262	3	8.421	3.312	.020	0.017
Error	1472.174	579	2.543			
Total	45512.000	586				
Corrected total	1543.099	585				
a. R Squared = .046 (Adjusted R Squared = .036)						

***Degree of freedom

As displayed in Table 5.22, the significance level p was .002, .025 and .020 for gender, age group, and year of study, respectively. This means that gender affected the Reflector learning style, independently of the other variables of age group and year of study. Also, age group affected the Reflector learning style, independently of gender and year of study. Similarly, year of study affected the Reflector style, independently of gender and age group.

Table 5.23 Estimated marginal means

Dependent variable: Reflector				
	Mean	Std. error	95% Confidence interval	
			Lower bound	Upper bound
Gender				
Male	8.716	.278	8.170	9.263
Female	9.204	.304	8.607	9.801
Age				
18–21 years	8.710	.088	8.538	8.883
22–25 years	9.206	.170	8.872	9.541
26–29 years	8.964	.803	7.386	10.542
Year of study				
Freshman	9.074	.313	8.460	9.688
Sophomore	9.201	.321	8.571	9.831
Junior	8.613	.303	8.018	9.209
Senior	8.953	.282	8.399	9.507

Table 5.23 depicts the model-estimated marginal means of gender, age, and year of study and the Reflector learning style as a dependent variable. This table is useful for exploring the differences between the levels of gender, age, and year of study. When considering gender, female students had the higher mean of 9.20 compared to male students with a mean of 8.72. It could be concluded that females showed a stronger preference for the Reflector learning style than their counterparts. When age group was taken into account, 22–25 age group students had the highest mean of 9.21 and 18–21 age group students had the lowest mean of 8.71. Thus, students of the 22–25 age group tended to prefer the Reflector learning style more than other groups. In terms of year of study, sophomores scored the highest mean of 9.20 and juniors scored the lowest mean of 8.61. This demonstrated that the second-year students strongly preferred the Reflector learning style, followed by the first-year, fourth-year, and third-year students.

5.3: Qualitative results from students

The research was conducted, using the explanatory sequential mixed methods approach with two phases focusing on students. In the first phase, data was obtained in relation to the learning

styles of students, employing the Honey and Mumford LSQ (2006). Interviews were conducted in the second phase of the study, after the quantitative data were gathered and analysed, to gain a better understanding of students' learning styles. The interview findings were also used to further describe, explain, and clarify the four learning styles investigated by the survey. The use of a mixed-methods approach essentially strengthened this research, with the conduct of the survey to identify noteworthy data, and then the adoption of the qualitative method to explore additional information.

5.3.1: Students' demographic information

This section provides information about students, who participated in one-on-one interviews, about their learning style preferences. As part of this investigation, demographic details of the students were collected and are also reported in this section. In the previously administered survey, students were asked if they were prepared to participate in an interview to gain further insight regarding their preferred learning styles. Of the 586 students who were surveyed, 177 students (30%) indicated they would be willing to participate in an interview. Of those who expressed an interest to be involved in interviews, 16 students were selected to be contacted for interviews. It is important to note that the primary focus of the individual interviews was to further explore students' learning styles identified through the questionnaire survey. Thus, the minimum number of students was selected based on the total number of students in each faculty across the four years of study.

As the number of students in the faculty of PE was significantly higher than those in the faculties of SM and SC, eight students from the faculty of PE (2 students per year of study) were selected for interviews, while four students from each faculty of SM and SC (one student per year of study) were chosen. Student demographic information including gender, age group, major, year of study, and student-type had been identified using the Honey and Mumford LSQ (2006). Detailed descriptions and explanations of the participants within each demographic are presented in the following sections.

5.3.1.1: Gender

Of the 16 students interviewed, 81% of participants (n = 13) were males and 19% (n = 3) were females, as shown in Table 5.24. While it is acknowledged that there is a discrepancy in the distribution, it is also acknowledged that the sample is somewhat representative of the whole cohort of 982 students at DSU (82% of males; n = 808 and 18% of females; n = 174). This was also closely aligned with the quantitative sample (78% of males and 22% of females).

Table 5.24 Number of males and females interviewed

Gender	Count	Percentage (%)
Female	3	19
Male	13	81
Total	**16**	**100**

5.3.1.2: Age group

The 16 male and female participants fell within two age groups, with the majority of participants in the 18–21 age group (69%, n = 11) and 31% (n = 5) in the 22–25 age group, as illustrated in Figure 5.15. While this sample did not align as closely with the total student population at DSU, it captured the insight of student age bracket which represents a majority of the student cohort. Of the 982 students, 84% (n = 822) of students belonged to the 18–21 age group, 15% (n = 147) of students were in the 22–25 age group, and 1% (n = 13) of students aged 26–29.

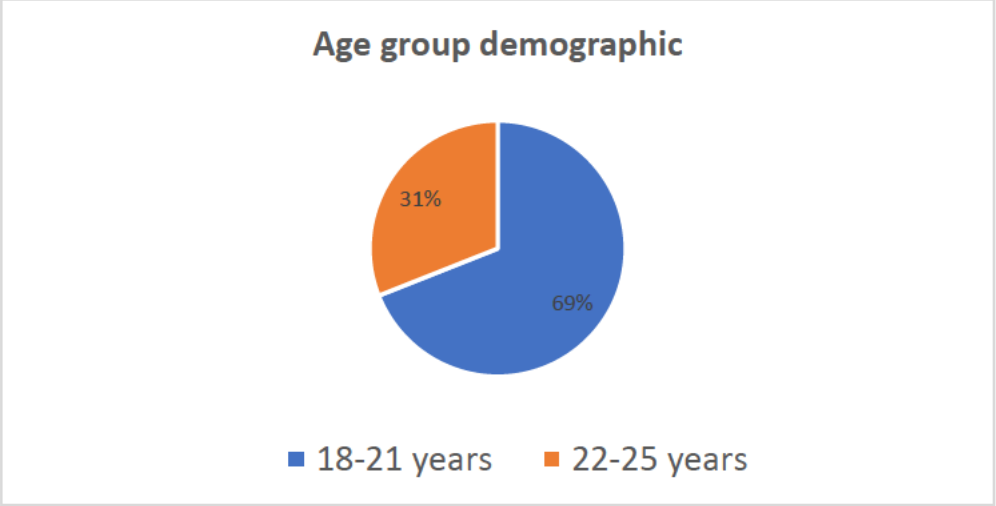

Figure 5.15 Age distribution

5.3.1.3: Major

The breakdown of students into faculties is shown in Figure 5.16. In comparison with the whole cohort of 982 students, the sample did not align with the percentage of students in each faculty (74% PE, 21% SC, and 5% SM). However, it was important to gain important insights of students from across the different faculties.

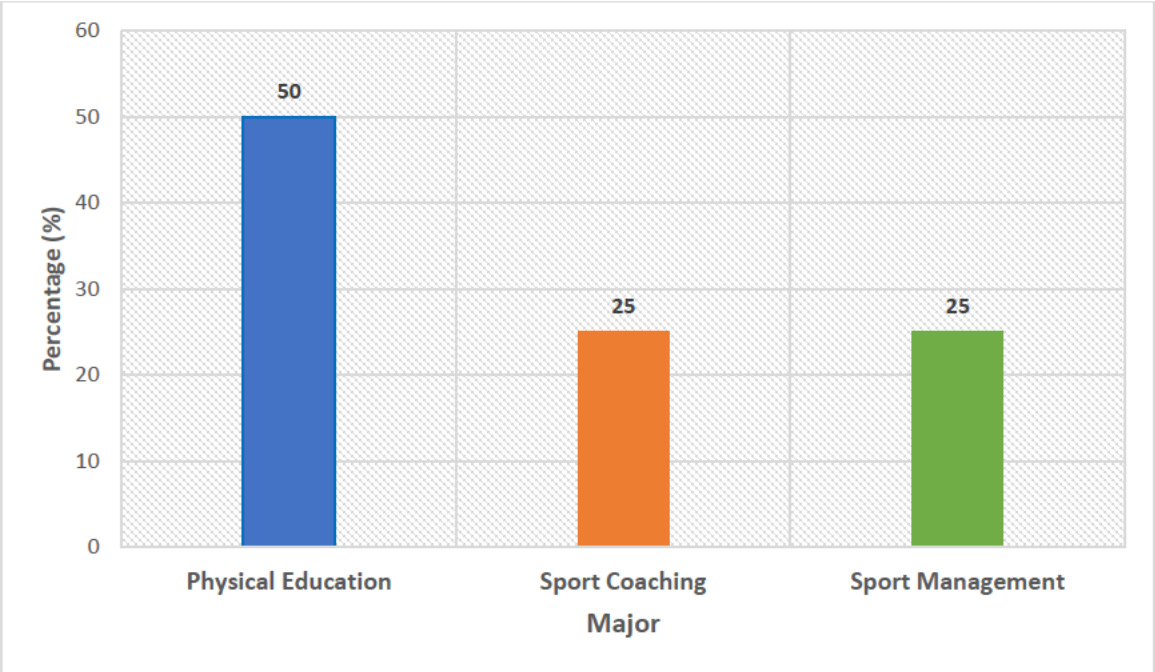

Figure 5.16 Percentage of faculty students

5.3.1.4: Year of study

The number of participants was equally distributed across all years of study. Of the eight PE participants, two were in each year of study – two freshmen, two sophomores, two juniors, and two seniors. This was replicated with SC and SM: one SC or SM participant per year of study. This assisted in gaining a greater understanding of learning experiences and learning styles of students at different professional stages. Table 5.25 indicates that the number of interviewees in each grade level accounted for 25% of the sample—four participants per year of study. This was not significantly different to the overall student population of 982 students (31% senior, 27% junior, 20% sophomore and 22% freshman) at DSU.

Table 5.25 Grade levels

	Freshmen	Sophomore	Junior	Senior	Total
Physical Education	2	2	2	2	**8**
Sport Coaching	1	1	1	1	**4**
Sport Management	1	1	1	1	**4**
Total	**4**	**4**	**4**	**4**	**16**

5.3.1.5: Student type

While students accounted for the majority, with 81% (n = 13), there were a small number of student-athletes (n = 3, 19%) participating in the interviews, as can be seen in Figure 5.17. This sample of interviewees was comparable to whole university students, with 91% of students and 9% of student-athletes.

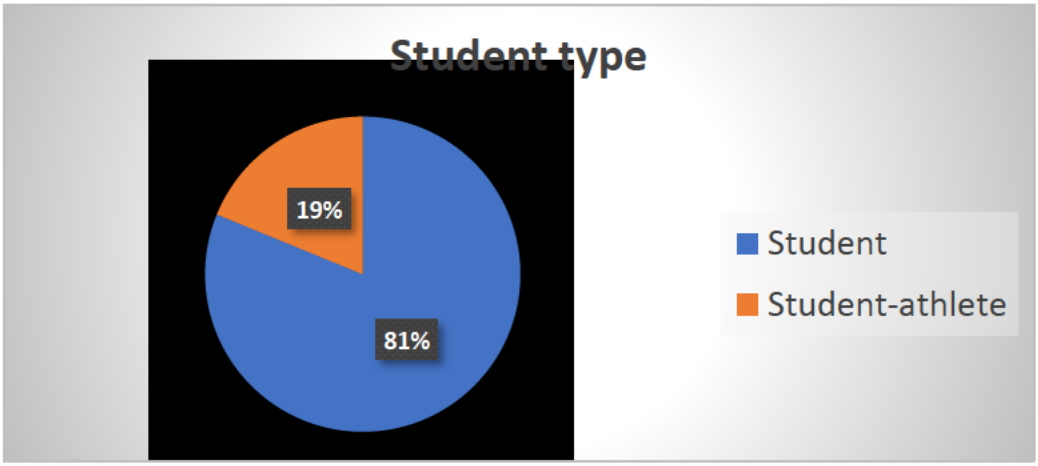

Figure 5.17 Percentage of student type

The primary focus of this section is to explore the learning style preferences of students in theoretical learning and practical sessions. Prior to investigating this issue, the researcher desired to provide an insight into students' preference for the two different components of theory and practice at DSU. The reasons why students preferred or disliked these sessions are also outlined and discussed.

5.3.2: Preference for theoretical classes

The participants of the study revealed varying perceptions of the theoretical learning. The majority (n = 12, 75%) demonstrated their preference for learning theory, while 25% (n = 4) negatively responded to theoretical classes. Differences in students' perspectives and attitudes towards learning theory are highlighted and discussed in the next section.

5.3.2.1: Positive response to theoretical classes

The majority of students interviewed showed their preference for attending theoretical classes. Participants across the three different faculties of PE, SC, and SM demonstrated this positive response. Also, the students who responded favourably were found across all years of study, and the gender of the participants did not impact on their preference. The results indicated that the students liked theoretical components of study regardless of these variables. Investigations

as to why students valued theoretical classes revealed four predominant reasons which are listed below and then discussed in more detail:

- provision of additional knowledge
- synergy between theory and physical activities
- impact of teachers' teaching styles and qualities
- impact of subjects on students' engagement level.

Provision of additional knowledge

The participants indicated that theory in classroom settings augmented their knowledge base which was essential to deepening their understandings of sport. In addition to attending practice sessions of different kinds of sports, the students were required to learn theory content which was closely associated with sport such as anatomy, sport medicine, and sport physiology. This was highlighted by PE student # 7 – male, who stated, *"theoretical classes provide additional knowledge for the sport I am learning."* It is clear that the students were aware of the necessity and significance of the supportive knowledge that was provided by the university, along with education about the different kinds of sports they were learning. This knowledge was foundational to better understanding sport theories and principles and how to apply them in acquiring, mastering, and practicing sport skills. The students expressed an interest in the provision of this knowledge not only in early theoretical subjects but also across all the training programs.

While all participants were students studying some form of sport, there was an acknowledgement that other areas of theory were equally important. The students were mindful that theory was also able to provide fundamental background in relation to socio-economic and cultural aspects of life. SM Student # 3 and PE Student # 5 referred to this perspective:

> *"Generally, at university, theory classes provide us with general knowledge in Economics, General Laws." (SM Student # 3 – male)*

> *"These are social subjects which provide basic and useful knowledge for a student in particular and for citizens in general." (PE Student # 5 – male)*

Being a sport student, they not only learnt sports and a number of subjects related to sport theory, but they also had to learn general subjects as stipulated by the Ministry of Education and Training. Such classes assisted students to gain deeper understandings and knowledge of

different aspects of life which were essential to students. This closely aligned with the goal of training: developing all-round students with good professional capacities and broad understandings of different areas of knowledge.

Synergy between theory and physical activities

The interview respondents identified the importance of incorporating theory and practice in learning activities, particularly in the sport learning environment. These two elements are regarded as fundamental, supportive, and closely connected with each other. The interviewees highlighted the need for linking theory to provide a basis for physical activities. The following are typical responses:

> *"A combination of theoretical classes and practice sessions assists learners in being more flexible and perceiving knowledge better." (PE Student # 7 – female)*

> *"Basically, I prefer studying subjects which combine practice with theory because this combination helps students to better understand the lessons." (SM Student # 15 – male)*

The students asserted that it was hard to execute and perform techniques without acquiring the core elements of techniques and basic skills. This point was reinforced by PE Student # 5 – male, who stated:

> *"Theory is the foundation to do practical exercises. Once we are provided with basic theory, we are able to practice correctly and then we perform well."*

Therefore, in order to be a good student or athlete, it was critical to gain a better understanding of the theory, which was regarded as the first and foremost priority to acquiring practice skills. The participants in the study indicated that if the teachers knew how to explain concepts in practice sessions, the students would find it much easier to acquire skills and techniques. Holistically, the combination of theory and practice in teaching assists students in perceiving knowledge and skills better.

Impact of teachers' teaching styles and qualities

Teachers play an important role in delivering and transmitting knowledge to students. They are known as a controller, prompter, assessor, organiser, and tutor (Oybekovna & Ahmadjonovna, 2019). Sometimes, they are participants who may be involved in all learning activities occurring in the classroom. The personality and the teaching styles of the teachers profoundly affect students' interest in the subject, motivation, and attitudes towards learning.

The interview findings showed that the teacher significantly affected the value students placed on theoretical classes. In particular, the students indicated the teachers who were humourous and enthusiastic had a more positive impact on the value they placed on theoretical learning. For example, when asked what theoretical subjects students liked, PE Student # 10 – male responded, *"Pedagogic communication and Anatomy"*. The reason why he preferred these subjects was *"because the teachers are humourous."* Another student from the faculty of PE who was in her first year enjoyed learning "*English, Law, Marxism-Leninism"*, when asked why she liked these subjects, said:

> *"… the teachers are enthusiastic. I find it easy to perceive knowledge." (PE Student # 11 – female)*

Knowing how to deliver knowledge content to students effectively is the most important quality of the teacher as stated by SC Student # 12 – male:

> *"As a sport student, I do not like long and boring lectures, but those that are interesting and delivered in an understandable manner with practical examples".*

Also, the students desired to grasp significant knowledge through the transmission from the teacher in a way that demonstrated a passion for and dedication to teaching. This was demonstrated through a quote from PE Student # 10 – male:

> *"Learning with teachers with many years of teaching experience not only provides me with good lessons due to their good teaching styles, but they also seem to express a great desire and devotion to their career."*

Furthermore, the students in this study reported that other essential qualities of the teachers including a sense of humour and friendliness impacted upon student learning as they expressed their desire to learn in a relaxing atmosphere and to have a sense of connection between the teacher and students. To illustrate this point, SM Student # 15 – male responded:

> *"Good communication skills of the teacher help to create a good relation between the teacher and students, a comfortable learning environment for the good learning of students."*

This contributed to increasing students' motivation and engagement levels and promoting better understanding of the knowledge.

One participant recommended that teachers delivering theoretical classes:

> *"tell interesting stories, pose questions for students and interact with students more frequently." (SM Student # 9 – male)*

This SM student stated the need to be involved in activities whilst learning theory in the classroom. This was perceived as the positive learning style involving reflections and interactions in the process of knowledge acquisition. In the learning environment of theory, it is crucial for students to develop some critical thinking and problem-solving skills. This allows for the operations and performance of the brain; likewise, in the clinical setting, physical movements are fundamental to developing sport skills. Therefore, it is critical for the teachers, in their teaching practices, to be aware of their own teaching styles as well as their qualities, which help to best meet the student needs.

Impact of subjects on students' engagement level

Additionally, the interview findings indicated the subjects impacted upon student learning. Some students may prefer learning some particular subjects because they are practical and applicable to their future career, or because they are within their area of interest. Others like studying subjects providing that *"the lessons are short enough to understand and learn by heart"* (PE student # 10 – male). The students might be better positioned to gain greater understanding of the knowledge content with several subjects. However, a significant amount of information within the subjects considerably affected students' motivation and ability to acquire knowledge.

Meanwhile, PE Student # 11 thought that she had a great interest in several subjects *"because they are interesting. I find it easy to perceive knowledge"* (PE Student # 11 – female). This student indicated she was keen on learning the subjects that she found interesting, and this was essential to acquiring and understanding knowledge more effectively. This provided an opportunity and promoted the students to increase their levels of engagement in learning these subjects, which assists to further explore the knowledge content.

Overall, the students preferred units which have a higher proportion of physical activities as opposed to theory sessions. In fact, they desired to participate in physical education and sport activities, coupled with practice sessions during class time and extracurricular activities. Their primary focus was on physical activity rather than theory, which causes feelings of exhaustion, and this was a challenge for them to focus on learning theory in the classroom and at home. Therefore, students appeared to desire theoretical subjects which did not provide abundant and extensive knowledge and information. However, for some students, no matter how long or short the subject was, if that was the subject they were keen on or aware of the

importance and its application in real life situations, they displayed a preference for exploring it in-depth.

5.3.2.2: Negative response to theoretical classes

Even though the majority of students demonstrated their preference for the theoretical component of learning, a small number revealed negative responses to learning theory. This section provides the underlying reasons why these students did not value theoretical learning including feelings of boredom and impact of teaching styles. Additionally, recommendations proposed by the participants to enhance their learning interest, motivation, and engagement levels, such as the combination of theory and practice and the provision of audio-visual means, are presented in this section.

Feelings of boredom

Some respondents described theory learning in the classroom as tedious. From their perspectives these classes were extremely boring, especially for sport students who tended to prefer participating in physical activities. Students outlined this perspective:

> *"Theory classes in my university are not interesting and attractive to students." (SC Student # 12 – male)*

> *"For sport students who are very active, theoretical classes are considered to be really boring." (PE Student # 16 – male)*

This made it *"hard for students to focus on and understand the lessons when the teachers deliver long and boring lectures"* (PE Student # 10 – male), particularly with subjects which are not closely related to students' field of specialisation and/or their future careers. The students in the sport environment tended to prefer engaging in practice sessions to learning theory in the classroom. Furthermore, the scheduling of theoretical classes often occurred, after a practice session which meant the students were tired by the time they had to study the theoretical components. This caused feelings of exhaustion and boredom among the students, and therefore, they were unable to acquire, memorise, and process knowledge efficiently.

In terms of learning styles, these students did not show a preference for the theoretical learning. They had a propensity for engaging in kinesthetic activities during practice sessions rather than sitting in a fixed place and listening to lectures. Generally, the students had feelings of boredom with several subjects which were indirectly associated with their major field. These subjects normally related to general knowledge areas and were presented through long lectures. In contrast, the students felt more motivated and interested in professional knowledge content

which was closely linked to their discipline. Additionally, sport students tended to prefer participating in sport activities to learning theory; hence, it seemed that they did not like to learn too much theory in a session.

Impact of teaching styles

Participants also pointed out that the way the teachers delivered instructions significantly impacted their motivation and commitment to learning theory. For example, PE Student # 10 emphasised that:

> *"These subjects are, by nature, boring, but the teachers don't know how to change their teaching styles to arouse students' interest." (PE Student # 10 – male)*

Some teachers appeared to adopt teacher-centred approaches rather than regarding learners as the centre in the teaching and learning processes, as pinpointed by one student:

> *"They [teachers] are attached to a framework that the teachers provide knowledge and students perceive it. They don't let students study themselves and their lectures don't attract students' attention." (SC Student # 12 – male)*

Even though these students found the subjects boring, if the teacher attempted to change the teaching styles, the students may be more interested in learning and perceive knowledge more readily. Students also raised their awareness of independent learning at university, coupled with knowledge provided by the teacher. This allowed for an exploration of knowledge in more depth in combination with the knowledge acquired from the teacher. Part of the teacher's responsibility is to develop students' capacity for self-study rather than trying to force them to absorb as much knowledge as possible in a passive way. Therefore, the teacher's teaching styles has a profound effect on students' learning.

Whilst discussing how to facilitate the theoretical component of learning, the students provided several recommendations. These include the combination of theory and practice, and the provision of audio-visual materials in the processes of teaching and learning. The students thought they would gain significant benefits from these and optimise their learning.

Combination of theory and practice

Student interviewees believed that theory would be more interesting if theory was integrated with practice in the one session. This was perceived as being more beneficial and efficient for

students to acquire practical and theoretical knowledge, and skills. The following students outlined their preference for theoretical and practical components:

> *"I want the teachers to integrate theory into practice at the same time. I mean that I like to study both theory and practice in one session. This is more helpful and more effective to put theory into practice." (SC Student # 14 – male)*

> *"Basically, I prefer studying subjects which combine practice with theory because this combination helps students to better understand the lessons." (SM Student # 15 – male)*

The students in the study reported that this assisted them in gaining a more profound understanding of the knowledge content delivered by the teacher. More importantly, this gave students ample opportunity to acquire practical experiences and situations that were fundamental to achieving their future career goals.

Provision of audio-visual materials

Coupled with the integration of theory and practice, students expressed the desire for audio-visual materials as additional resources in class to assist them in better comprehending knowledge. As an illustration, a participant highlighted that for students to be more engaged and gain a better understanding of the lesson, teachers should use audio-visual means while delivering instructions in theory. He stated:

> *"While delivering theory, audio-visual means should be used to attract students' attention and enhance their understanding." (SM Student # 15 – male)*

Moreover, SC Student # 14 – male stated that watching video clips was an efficient way to lead to learning theory during practice sessions. He responded that: *"I like practice sessions provided with video clips, then study theory."*

In addition to the primary role of the teacher, technology was identified as being essential to provide further support and assistance with student learning. These tools not only created a significant difference in terms of sound and image, which attracted students' attention, but they were also effective means to further illustrate the teacher's lecture. Knowing how to use technology in instructional practices would help to increase students' levels of motivation and engagement as well as to promote their learning. In reality, however, technical issues are likely to happen with the equipment and technology which is frustrating for both the teacher and students. Additionally, some valuable teaching and learning time is taken away as the teacher is trying to get technology to work.

5.3.3: Preference for practice sessions

All interviewed students responded positively to the practical sessions which occurred on courts, in playing grounds, swimming pools, gyms and so on, depending on the specific sport in which students were involved. There are a variety of different sports that students needed to learn at DSU in accordance with the study program. These included Football, Volleyball, Table-tennis, Badminton, Tennis, Swimming, Martial arts, Athletics, Basketball, Handball, Chess, Dance Sport, and Gymnastics. The students placed a high value on practical sessions for a number of reasons which are discussed below including sport engagement, mental and physical health, interaction, provision of theory, and skills learning and enhancement.

Sport engagement

The interview respondents indicated that practice sessions provided them with opportunities to participate in physical activities. They expressed their desire to be involved in practical sessions, as illustrated in the following responses:

> *"I have the opportunity to experience kinesthetic learning." (PE Student # 13 – male)*

> *"Playing sport is one part of my life. I have played sport since my childhood. So, whenever I get physically engaged in practice sessions, I feel excited." (SC Student # 14 – male)*

> *"They provide us with opportunities to study, get involved in physical activities." (SM Student # 6 – male)*

As demonstrated by the students above, they displayed a preference for practice sessions as this was an opportunity for them to participate in physical education and sporting activities. They also reported that physical activity was essentially important to their life, and therefore they started being involved in these activities in the early stage of their life. When growing up, they pursued their interest in sport and entered the sport university. In this environment and through these physical activities, they not only learnt sport skills and techniques from their peers and the teacher, but they also increased their levels of pleasure and passion. These students could maximise their learning potentials within this environment where the primary focus was on physical activities which best suited their preferred learning styles. Also, in the sport setting, by participating in such activities, the students demonstrated the opportunity to develop interaction, cooperation, and collaboration not only with their peers, but also with the teachers.

Interaction

The participants reported that practice sessions provided them with opportunities to interact with their peers and the teacher. For example, after the introduction of new techniques, analysis, and demonstration, students were divided into pairs or groups in which they would *"play with each other for professional development"* (SM Student # 6 – male). SM Student # 9 – male added: *"I have more chance to interact with my friends during practice."* Students played and practiced with their friends and also their teacher, as highlighted by PE Student # 16 – male:

> *"I like practice sessions because I have the chance to … practice with my friends and the teacher. I really enjoy participating in such practice sessions."*

Interaction between students and the teacher and among students was vital in assisting students to perceive knowledge and skills and to promote an exciting and effective learning environment. Within this environment, students learnt not only from the teacher, but also from each other. Also, they received support and assistance from the teacher and their friends during the training process. Therefore, the study participants were cognisant of the importance of teamwork in practicing and playing a variety of different sports, which reinforced the students' preference for practical sessions.

Mental and physical health

Participants valued the practice sessions due to the benefits they provided in relation to their mental and physical health. These two components are closely associated with each other in maintaining a healthy lifestyle. Three interviewees highlighted the importance of physical fitness when engaging in sport activities. For instance, SC Student # 8 – male stated: *"I become healthier when participating in these physical activities."* Additionally, after learning theory in classroom settings, students felt the need to relax by participating in outdoor activities and reported that it was time for them to experience feelings of comfort and relaxation. The following are typical responses:

> *"I feel comfortable, lots of fun." (SC Student # 1 – male)*
>
> *"I feel more relaxed when getting involved in physical activities." (SC Student # 8 – male)*
>
> *"They make me more active and have no feeling of tiredness and stress." (SM Student # 9 – male)*

Students were aware of the significant impacts of physical activities on the quality of their life. Through practical sessions students were engaged in, they experienced increasing levels of

vigorousness, contentment, and recreation. Furthermore, participants indicated that practice sessions played a fundamental part in developing qualities which were essential to sport as well as physical activities such as flexibility and agility.

Provision of theory

Another significant finding was that participants identified the necessity and importance of practical sessions in relation to understanding and learning sport theory. In fact, students recognised practical sessions were necessary to "*understand more about the sport I am interested in*" (PE Student # 16 – male). Additionally, students outlined this perspective by stating that:

> *"The teachers both instruct [in] techniques and skills and transmit theory, which assists me to perceive knowledge better than sitting and learning only theory." (SC Student # 14 – male)*
>
> *"Kinesthetic learning gives me a chance to perceive knowledge better than learning theory only." (SM Student # 15 – male)*

Students' preference for practice sessions was because through these practice sessions they could acquire theory as well as sport skills and techniques delivered by the teacher. They asserted that the learning of theory would be more meaningful and significant if it was conducted along with the instructions of techniques and skills during practice sessions. This also enabled the students to acquire the theoretical knowledge more effectively than just focusing on theory in the classroom. As compared to students whose study program was primarily on theory, this was one of the unique and distinctive characteristics of sport students. They were more prepared for learning theory while being involved in physical activities and enjoying new experiences.

Skills learning and enhancement

The interviews revealed students preferred engaging in practice sessions to learn and enhance skills in sports from their peers, as well as from the instructor. Students from the faculty of SC pinpointed the need to *"learn skills from teachers"* (SC Student # 12 – male). Particularly, in sport settings, it was crucial to do continuous and constant practice for a specific sport to *"enhance skills"* (SC Student # 1 – male). Students made the best use of practical sessions and dedicated themselves to practice in order to improve their skills and performance, as illustrated by PE Student # 5 – male:

"In a sport university, practice sessions account for most of the study program and provide the best opportunities for students to do the training."

Being sport students, knowledge and skills in a sport were the top priorities they needed to master as it was the foundation to learn other related sports. This was particularly critical for PE students as they were trained to be physical education teachers from elementary to high school education. They might teach not only the sport they specialised in, but also multiple sports as required by the school program.

5.3.4: Students' preferred learning styles

Individual interviews with students further explored and provided insights into students' learning style preferences. Responses from participants to questions concerning their preferred learning styles in theoretical classes and practical sessions added to an understanding of the Activist, Reflector, Theorist, and Pragmatist learning styles.

5.3.4.1: The Activist learning style

According to Honey and Mumford (2006), activists are open-minded and flexible learners who are passionate about acquiring new knowledge. They are open to a range of diverse learning activities such as brainstorming, problem solving, puzzles, task group, group discussion, role-play, competitions, games and actively engage in new experiences and opportunities from which to learn. Honey and Mumford claim that activists act first and consider the consequences afterwards. They enjoy interacting with others and seek to be in the centre of activities. Some students in this study demonstrated the Activist learning style through theoretical learning and practice sessions.

The interview findings indicated that some students showed their preference for the Activist learning style when dealing with theory. Students with this learning style preferred groupwork and interactions. With respect to groupwork, students identified significant impact that groupwork had on their knowledge absorption and the learning environment. The following are typical responses:

"I like groupwork which makes the class more exciting and attractive to students." (SC Student # 12 – male)

"Groupwork helps to establish close connection with friends." (PE Student # 11 – female)

"I like working in groups in advance so that I have a chance to think about an issue rather than listening to teachers' lectures passively." (PE Student # 5 – male)

"The teachers should provide students with materials for group discussion. This will help to create a fun learning environment and students gain more knowledge." (PE Student # 10 – male)

The students placed an emphasis on groupwork that provided a foundation for better understanding, collaboration and building a positive learning environment. When involved in groupwork, students had the opportunity to practise the skills of working in teams, independently presenting their own viewpoints, and sharing with others in the group. Participants also highlighted the importance of interactions between the teacher and students in the teaching and learning processes. They indicated that this process was more effective when students were provided opportunities to discuss with the teacher about issues in relation to the subject content. Three students outlined this perspective:

"I like the teachers to tell stories related to the lessons and raise questions for students to answer." (SM Student # 9 – male)

"I enjoy listening to teachers' lectures and there is an interaction between the teacher and students." (PE Student # 7 – female)

"I want to have an interaction between the teacher and students. While delivering instruction, if students have a chance to discuss with the teacher about tough issues, they'll remember them longer." (PE Student # 10 – male)

Interaction was essentially one of the most important characteristics of those who preferred the Activist learning style. It was of paramount significance for the students to gain knowledge through teacher-student interactions rather than passively perceiving knowledge from the teacher. In this way, the students could deepen their understanding of the issue and foster the development of their communication, critical thinking, and memorisation skills.

The interviews also revealed a preference for the Activist learning style in practice sessions. These students preferred to be physically engaged in activities. As stated by PE Student # 2 – male: "*I like to get physically involved and play sports."* Furthermore, passive learning situations such as lectures or observing procedures were not their preferred activities, as indicated by SC Student # 14:

"I don't like to sit in a fixed place listening to the teachers. I prefer the teachers to deliver theory and demonstrate a specific technique at the same time." (SC Student 14 – male)

Students with this learning style emphasised a need to actively participate in task groups and role play in which they could learn and support each other during practice. This was done not only during practical sessions but also through extracurricular activities to facilitate their

learning in relation to the enhancement of sport specific skills and techniques. Students across the three faculties highlighted this issue:

> *"For practice skills, if I find that I am still not good at basic acts, I need to practise a lot during the session or extracurricular activities." (SM Student # 3 – male)*

> *"In my free time, I participate in extracurricular activities to improve my skills and techniques. In Badminton, I normally find my friends to practise with or sometimes, I practise with my teachers." (PE Student # 11 – female)*

> *"With respect to practice sessions, I try my best to do a lot of practice to better techniques. In class, I practise myself and with my friends. I also practise with others in extracurricular activities." (SC Student # 1 – male)*

Students with the Activist learning style expressed their desire for engaging in practical sessions and extracurricular activities; these were identified as their learning needs. This Activist learning style was perceived as being appropriate and popular among sport students as they tended to be kinesthetic learners.

5.3.4.2: Reflector learning style

Honey and Mumford (2006) define reflectors as learners who examine experiences from many different angles. These learners learn best from any activity that enables them to observe and contemplate. Honey and Mumford (2006) note that reflectors stress the importance of collecting data, both directly and from others, and prefer to consider it carefully before making any conclusions. Reflectors are generally thoughtful learners who prefer listening during conversations prior to providing their viewpoints (Honey & Mumford, 2006). They are happy to listen to lectures, watch demonstrations, and welcome feedback from others. The students in this study with the Reflector learning style demonstrated this preference through theoretical classes, practice sessions, and their learning experiences.

The interview findings indicated some of the notable characteristics which were representative of the Reflector learning style among the students during theoretical classes. One student from the faculty of SC showed his preference for listening and observing prior to acting, features regarded as distinctive of this learning style. When asked about what he normally did in group discussions, he stated that:

> *"I often listen and observe other members in my group and present my ideas later" (SC Student # 12 – male).*

This student needed time to collect information and evidence, think, and observe carefully before presenting his viewpoints or coming to any conclusions. Students with this learning style are good listeners and observers in their learning activities.

The interview responses also revealed a preference for the Reflector learning style while learning in practice sessions. For instance, PE Student # 13 expressed his desire for careful observation and thorough thinking before acting or performing an action. He stated:

> *"I prefer observing and thinking while getting involved in physical activities to sitting in a fixed place." (PE Student # 13 – male)*

During practice sessions, students with this learning style spent time listening to the teacher's analysis of techniques and observing their demonstrations. Also, learning from their peers was essential during practicing time before conducting their own performance. In other words, they did not want to run risks and avoid mistakes while undertaking exercises.

Students with the Reflector learning style tended to stand back and carefully observe the teacher demonstrate. They also liked to watch performances by professional athletes to learn and analyse techniques and they based their own performance on the skills and competence of others. For instance, PE Student # 5 – male said:

> *"It's better to observe many people perform one technique, and we'll see the differences in their performance. From what we watch, we can draw the most basic technique."*

Not only did this participant observe the teacher demonstrate during class time, but he also watched the implementation of a specific technique by other professional athletes to form and develop his own performance. Looking into the issue from different perspectives and angles was a critical characteristic of the Reflector learning style.

On the other hand, some students had difficulty undertaking exercises provided by the teacher and made common mistakes frequently. However, they were able to be cognisant of those errors during training and attempted to revise them. SC Student # 1 – male outlined this perspective: *"I myself reflect on the mistakes I make and correct them."*

Students with the Reflector learning style also looked back to their performance, coupled with the performance of others, to discover errors in conducting exercises. It was important that they could make necessary modification and improvement in relation to incorrect techniques or performance during the training. This could be done by themselves or with the assistance of their peers or the teacher. Revision and review were considered important

elements of the Reflector learning style as these helped ensure the understanding, application, and adaptability of knowledge in practical situations.

Learning experiences have an impact on an individual's learning style preferences Tatarinceva (2006) argues that not all of the elements of learning styles are biological and stable. Some can be developmental and flexible due to an individual's growth and development. The interview findings revealed significant changes in the students' learning experiences to best adapt to the university teaching and learning environment. A number of respondents in the study demonstrated changes in their learning experiences in relation to several traits within the Reflector learning style. With regard to the learning of theory, the students employed note taking, memorisation, and listening to lecture as their preferred ways of taking in and processing information and knowledge.

Some interviewees stated that they actively listened to the teacher delivering theoretical instructions in classroom settings, coupled with note taking and memorisation. These skills were essential for a university student to master while learning theory. The followings are typical responses:

> *"Most of knowledge is in textbooks and books. In class, I listen to teachers' lectures and take notes." (SC Student # 8 – male)*

> *"In class, I focus on listening to lectures and do the memorisation so that I don't have to study at home or it doesn't take a lot of time to review for exams." (SC Student # 1 – male)*

> *"With respect to theory subjects, I just try to take notes in my own way while listening to teachers' lectures and memorise the key points." (PE Student # 5 – male)*

> *"With respect to theory subjects, I listen to teachers' lectures attentively and take notes. This helps me to better grasp the knowledge. I memorise what the teachers have taught and review the lessons before going to school." (PE Student # 11 – female)*

In the education system of Vietnam, the teachers play a dominant part in classroom activities; thus, students become passive learners. The teachers are likely to read, and students listen and write down notes, which is called dictation. This generally occurred at high schools. However, when students entered university, there was a pressing need to change their learning styles to accommodate teachers' teaching styles, where students tried to note down the most important points whilst listening to lectures. If students knew how to write using their own words, they would find it easy to memorise their notes. Whilst doing this kind of activity, they might develop their critical thinking skills which are the fundamental characteristic of the Reflector learning style.

The interview findings also indicated some participants favoured the Reflector learning style while being involved in practical sessions. Students emphasised the need to do more listening and observation while describing their learning styles. Particularly, for students who just entered sport university, they might follow step-by-step instructions from a teacher demonstration. They could also gain a better insight into the knowledge associated with the skills and techniques. Students outlined this perspective:

> *"With respect to my learning styles, I prefer listening and seeing. This helps me to understand things easily. It means that while the teacher is talking and performing, I observe to get images in my mind together and listen to the teacher, which aids me to remember things better." (PE Student # 7 – female)*

> *"According to my learning styles, as I said earlier, I prefer seeing the teacher's demonstration, imitating the teacher's acts and practicing and adjusting." (PE Student # 16 – male)*

> *"I learn by listening because listening to teachers' instructions helps me a lot." (SM Student # 6 – male)*

Additionally, students invested a significant amount of time in training themselves through watching video clips about competitions and performance. This provided them with a great opportunity to acquire and master skills and techniques needed in combination with what they perceived from the teacher during practical sessions. Then they needed support from the teacher and others in providing feedback so that they could make appropriate amendments. When addressing this issue, PE Student # 13 pointed out:

> *"Concerning practice skills, first, I spend time training myself. Second, I watch video clips about competitions. Third, I find someone who performs techniques well to observe and get them to correct mistakes I make during extracurricular activities." (PE Student # 13 – male)*

As demonstrated by the response above, whilst it was important to dedicate to practicing, the student underlined the need to learn from watching and receiving assistance from others. By looking into the issue from different perspectives, students could gain a better understanding of the skills and techniques. This assisted them to be more confident and achieve high levels of performance.

5.3.4.3: Theorist learning style

According to Honey and Mumford (2006), theorists modify and incorporate observations into complicated but logically robust theories. Honey and Mumford indicate that theorists are perfectionists who prefer to analyse and synthesise data. Theorists tend to be analytical and

detailed and prefer to maximise certainty. The students in this study with the Theorist learning style demonstrated their preference through learning activities which are discussed below.

The interview findings revealed that the students expressed a strong need to do more reading to better engage in the learning process. Along with reading, they attempted to maximise certainty of their understandings of the issues by asking the teacher to provide further explanation. The following excerpts highlighted the characteristics of the Theorists:

> *"I want to gain more knowledge by reading books and materials from the internet and ask teachers for help regarding difficult issues." (PE Student # 10 – male)*

> *"I can further investigate the contents of the lessons by reading; more importantly, I need to understand what these subjects require." (SM Student # 3 – male)*

> *"I normally read for further information related to the lesson. I can ask the teachers what I have not understood." (PE Student # 7 – female)*

In addition to the knowledge students acquired through the lectures delivered by the teacher in the classroom, those with the Theorist learning style were mindful of the importance of further exploring the issues in relation to the knowledge content. Reading could assist students in gaining significant amount of knowledge in their area of interest. Additionally, it was critical for them to raise any issues that might be hard to understand and ask for teacher support in providing further explanation.

The analysis and synthesis abilities were found among students with the Theorist learning style. They demonstrated these preferences through seeking and reading books and journal articles in a bid to conduct mini projects. SM Student # 3 outlined this perspective:

> *"I normally search materials in the library and the internet, which helps to complete assignments assigned by the teachers." (SM Student # 3 – male)*

In order to carry out an assignment successfully, students had to undergo a process. This included the search for the documents relevant to the topic and reading for comprehension. The analysis and synthesis of these materials were closely associated with the Theorist learning style and identified as fundamental capabilities in research.

More specifically, they expressed their desire for better engaging in the learning process by reading materials in advance, as well as being critical, detailed and perfectionist. Students highlighted this issue:

> *"I normally review the old lessons and finish my homework before going to school as well as read the new lessons in advance." (SC Student # 12 – male)*

"I normally prepare the lesson before going to school, especially what is new to me or difficult to understand, I invest time and effort in gaining an insight into the issue. It would be better to connect the knowledge I gain by myself with what I learn from the teachers' lectures at school." (PE Student # 7 – female)

Some participants preferred to doing the review before and after school hours. They wanted to make good preparations for what they were going to learn in theoretical classes at university. This assisted them in better understanding the content area provided by the teacher. These students invested a significant amount of time in self-studying and desired to compare what they learnt from teachers' lectures with knowledge they perceived from reading. Some students retained the learning styles that were formed and developed before they entered university. As a common practice in the education system in Vietnam, students were requested to revise the previous lesson, do the homework, and prepare for the next lesson. Whilst being at university, students habitually undertook these tasks as they had done previously. However, at university level, they seemed to be more critical in linking the knowledge being acquired with what was provided by the teacher.

5.3.4.4: Pragmatist learning style

As described by Honey and Mumford (2006), pragmatists are interested in experimenting with new ideas, theories, and techniques to ascertain if they work in practice. Honey and Mumford suggest that learners with the Pragmatist learning style are prepared to practise using new concepts and are open to situations that promote progress. From the interviews, some students exhibited a preference for the Pragmatist learning style through theoretical classes, their engagement in activities, and their learning experiences.

Some respondents demonstrated a predilection for the Pragmatist learning style while learning theory. They highlighted the need to be provided with practical examples and real-life situations by the teacher, which assisted them in gaining a better understanding of the practicality within their discipline. In this regard, two students from the faculty of PE stated:

"For me, there's no need to provide too much knowledge. The teachers should give more practical examples which assist students in better understanding rather than theory-based teaching." (PE Student # 5 – male)

"I think that in theoretical classes, the teachers need to address practical situations such as those normally happening in competitions or during training. This will help us to understand more quickly since we are often physically engaged and pay attention to our physical activities when injuries normally occur during practice sessions. We also need to know

[about] situations or how to calculate points during competitions." (PE Student # 16 – male)

SM Student # 3 – male added: "*I prefer listening to the teachers talking about how knowledge is applied in practice."*

Participants affirmed that listening to long lectures was boring. Therefore, they acknowledged that it was not essential for the teacher to deliver a significant amount of knowledge in a session. They expected to understand how theory worked in real situations through practical examples and illustrations. Students of the Pragmatist learning style learnt best if the teacher provided and explained situations that might occur in actual life.

The results of the interviews demonstrated that some participants favoured the Pragmatist learning style while being involved in games and competitions. They desired to apply what had just been learnt in these activities. This was a favourable environment for them to experiment efficiently with new knowledge and skills in real-life situations. Three students across the three different faculties displayed their preferred learning style in these activities:

"I like to participate in antagonistic activities, apply tactics into competitions or involve in relaxation exercises such as ghost soccer games." (SC Student # 1 – male)

"In addition to study activities, I would like to get involved in games related to the process of learning. It is a good opportunity for students to apply what they have just studied into such games." (SM Student # 15 – male)

"The activity I enjoy best is competitions among groups at the end of class time. This is a great time for us to put the lesson into practice the most quickly to see how it works in practice." (PE Student # 13 – male)

Games and competitions were identified as being the most popular among the participants. These activities provided them with opportunities to relax, interact with each other, and improve and develop sport skills and techniques. Furthermore, this was described as an enjoyable and effective environment which allowed for the application of learnt skills, techniques, and tactics into real-life situations.

It was acknowledged that theory and practice were two different entities but were not separated from each other. Being good at either theory or practice was not encouraged. To be a clever student, it was critical to understand all aspects of theory and know how to apply them in practice. Students with the Pragmatist learning style were concerned with these two areas of learning in their learning activities.

5.3.4.5: Multiple learning styles

According to the quantitative findings, while many students possessed a dominant single learning style, some demonstrated two or three learning styles. In alignment with the quantitative results, the qualitative data also demonstrated single learning styles which are discussed in the previous sections. This section reveals some of the combinations of the two learning styles in the participants' learning activities.

It is evident that the following student combined the Reflector and Pragmatist learning styles into his learning activities. He preferred watching others perform and desired to apply what they learnt into practical situations. He stated:

> *"First, I follow those who perform better than me. Second, I study myself to create my own ways. Then I can apply them into practice based on my skills." (PE Student # 10 – male)*

Whilst learning new skills and techniques, it was important to see the demonstrations of other people. In other words, observations were regarded as crucial to the formation and development of skills. This characteristic of the Reflector learning style was particularly fundamental in acquiring, mastering, and improving skills and techniques in sport, based on the experiences of others. Additionally, the students stated the importance of the application of learnt skills and techniques into practice.

The interview findings also demonstrated a combination of the Reflector and Pragmatist learning styles of a SM student. He focused on note taking and memorisation in theory learning and wished to apply theory to practice, as highlighted in the following quote:

> *"I take notes and memorise important points. Also, I normally put theory into practice to see how it works in practice." (SM Student # 15 – male)*

This student stated the need to further explore the theory and wanted to see how it worked in real-life situations. With this combination, the students had the opportunity to deepen their understanding of the knowledge content and gain an insight into its practical perspectives.

The interview findings revealed another combination of the Activist and Reflector learning styles, as pinpointed by a PE student:

> *"Firstly, I have the opportunity to experience kinesthetic learning. Secondly, I enjoy thinking, especially in sports which require thinking and teamwork." (PE Student # 13 – male)*

Kinesthetic learning was one of the most remarkable features of the Activist learning style. At the same time, the student demonstrated his preference for the Reflector learning style by

devoting himself to thinking and reflecting on what he was actioning. These two learning styles supported each other and overcame weaknesses of a single learning style. Therefore, with multiple learning styles, the students may optimise their learning opportunities and potentials rather than just relying on a single learning style.

5.4: Chapter summary

The quantitative results provided important statistics that were pertinent to responding to the first research question of the study. Of the four learning styles, Reflector, Activist, Theorist, and Pragmatist, the Reflector style was the most dominant among the students at DSU, followed by the Pragmatist, Activist, and Theorist learning styles. The findings revealed six combinations of two learning styles. The Reflector-Pragmatist was the highest multiple learning style preference, followed by an Activist-Pragmatist learning style, Reflector-Theorist, Activist-Reflector, Theorist-Pragmatist, and Activist-Theorist. In terms of the combinations of the three learning styles, the Reflector-Theorist-Pragmatist was the highest, followed by the Activist-Reflector-Pragmatist, Activist-Theorist-Pragmatist, and Activist-Reflector-Theorist learning styles.

The independent sample t-test was undertaken to assess the difference in means of learning styles and gender and student type. The results revealed significant differences in the means for Reflector and gender, and Theorist and student type. Also, ANOVA was conducted to examine the relationships between learning styles and age, major, and year of study. The findings demonstrated significant relationships between the Reflector learning style and age and year of study, but there was no statistically significant relationship between this learning styles and major. MANOVA is an extension of ANOVA, and this was employed to further investigate the relationships of learning styles with other demographic information variables. Similar results were produced with the use of this test (see Appendix 12).

The qualitative findings revealed the students' preference for theory learning due to the provision of additional knowledge, the synergy between theory and physical activities, the impact of the teachers' teaching styles and qualities, and the impact of subjects on students' engagement level. Some participants of the study found that theoretical classesand the teacher's teaching styles made them feel bored. With respect to practice sessions, all participants valued them for a number of reasons including sport engagement, mental and physical health, interaction, provision of theory, and skills learning and enhancement.

In addition, the qualitative data derived from the students' interview transcripts provided rich and detailed data to further support the quantitative data in relation to the four learning styles. The interview results indicated that most responses reflected the Reflector and Activist learning styles, with 12 comments for each whilst the number of responses in relation to each of the Pragmatist and Theorist learning styles was significantly fewer, with 6 quotes. There appeared a combination of the two learning styles of Reflector-Pragmatist and Activist-Reflector among the study participants. This closely aligned with the quantitative findings which showed that Reflector and Pragmatist were the most single dominant learning styles as compared to the Activist and Theorist learning styles. Also, Reflector-Pragmatist was the highest multiple learning style preference of all the combinations of double and triple learning styles. These qualitative findings further supported, clarified, and confirmed the quantitative data, which increases the reliability and validity of the data sets.

Chapter 6: Teachers' knowledge and understanding of learning styles

6.1: Introduction

This chapter presents the qualitative results which respond to Research Question 2 (RQ2) of the study: "What is the current level of knowledge of learning styles amongst sport education teachers"? To uncover more information about teachers, 19 sport education lecturers participated in individual structured interviews to explore their knowledge about learning styles, their perceptions of students' learning styles, and their use of teaching styles in their teaching practices. More specifically, this chapter first outlines some background information in relation to the sport education lecturers. Then, the lecturers' knowledge of learning styles will be explored by looking at their understanding of the term learning styles, and issues surrounding their identification of learning styles and their understanding of how to adapt to meet different student learning styles. Additionally, the chapter discusses the lecturers' perceptions of students' learning styles. Finally, some of the teaching styles that the lecturers used such as verbal cues, visual, demonstration, individualised instruction, and learner-centred activities are also highlighted in this chapter.

6.2: Demographics

Of the 19 lecturers from Danang Sport University (DSU) who participated in structured interviews, 10 held dual roles within the university as both lecturer and head of a department. The remaining nine lecturers who were interviewed were from the faculty of Physical Education (PE) and sports departments. One-on-one interviews were conducted to explore their knowledge and understanding of learning styles. In particular, the interviews sought to identify teachers' perceptions of students' learning styles and investigate the teaching styles generally used by the teachers. Detailed descriptions and explanations about the lecturers' background information and other demographic details are outlined in this section.

6.2.1: Gender

Of the 19 lecturers who were involved in the interviews, 68% (n = 13) of participants were males and 32% (n = 6) being female. This closely aligned with the overall teaching staff of the university (n = 109), with 71 males (65%) and 38 females (35%).

6.2.2: Age

The age range was 31–55 years for both male and female participants, with an average age of 39.8 years. This age range was closely aligned with the total population of staff at DSU, with an average age of 40.2 years. Figure 6.1 demonstrates the number of lecturer participants within different age groups (31–35, 36–40, 41–45, and over 45).

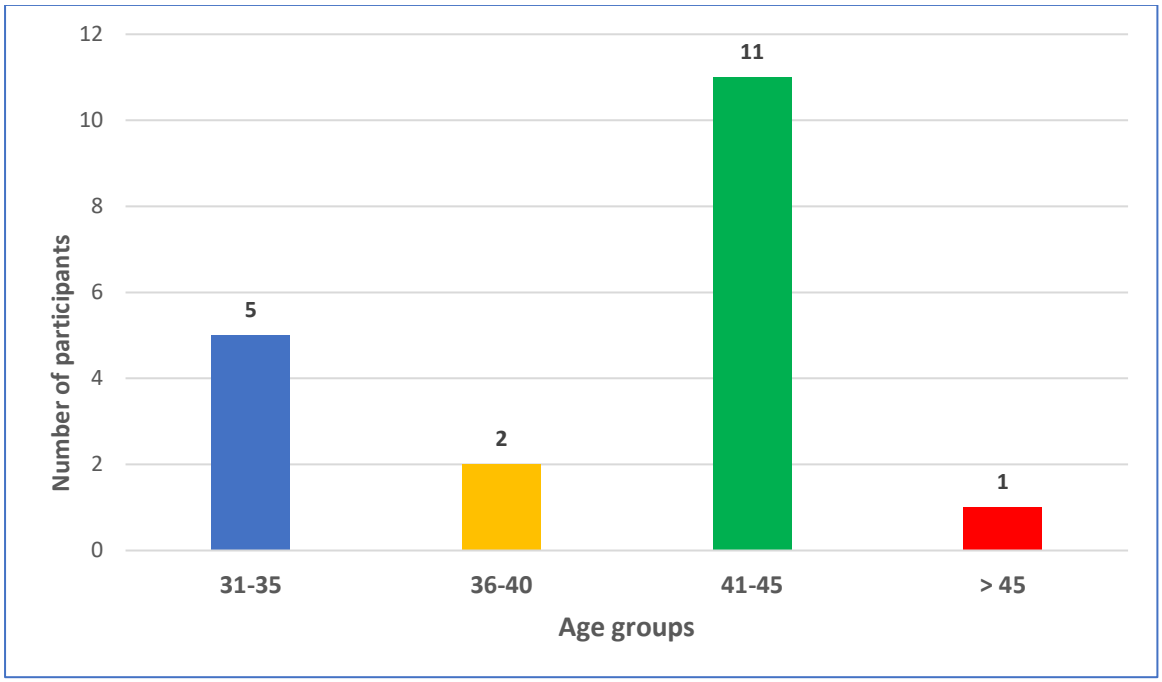

Figure 6.1 Age range of lecturer participants

As can be seen in Figure 6.1, the majority of lecturers (n = 11) were in the age group of 41–45 years of age, followed by 31–35 with five lecturers. The group 36–40 had two participants whilst only one lecturer was over 45 (aged 55).

6.2.3: Level of education

Of the 19 sport education teachers interviewed, seven lecturers held a doctoral degree and 12 others held a master's degree. There was a balance in gender among the lecturers who had attained a master's degree, while those who had a PhD were all males (see Table 6.1).

Table 6.1 Educational level

Educational level	Female	Male	Total
PhD	0	7	7
Masters	6	6	12
Total	**6**	**13**	**19**

6.2.4: Level of expertise

Of the 19 lecturers, six had previously been athletes. Two lecturers were athletes in track and field. One of these performed at the elite level for four years, while the other was a professional athlete for a longer period of time (11 years) and held a number of records. The other four lecturers who were previously athletes participated in sports such as Martial Arts, Table-tennis, Football, and Badminton. Of these lecturers, their athletic careers ranged from amateur to semi-professional status. A lecturer in Martial Arts was previously an amateur for five years, and his highest achievement was the third rank at the national level in Karate. The other three lecturers who were athletes in Table-tennis, Soccer, and Badminton were not considered elite athletes in their respective disciplines. The level of expertise of those who previously worked as athletes is illustrated in Table 6.2.

Table 6.2 Level of expertise of former athletes

Sports	Level	Period of time	Level achieved
Athletics	Elite	4 years	
	Professional	11 years	* National athlete in throwing events for 9 years * National record for 3 years * National Sports Festival record for 4 years
Martial Arts	Amateur	5 years	No.3 ranking at national level in Karate
Table-tennis	Amateur	7 years	
Football	Amateur	4 years	
Badminton	Semi-professional	5 years	

6.2.5: Teaching/coaching background

It is worthwhile noting that at DSU, several lecturers previously worked as coaches. Therefore, prior to highlighting some background information in relation to the teaching and coaching experiences of the lecturers involved in the interviews, it is important to distinguish the two terms of teaching and coaching. The meanings of the terms teaching and coaching are drawn from other authors, the researcher's knowledge, and from teachers' experiences in the sport environment. Teaching happens in schools, known as educational contexts, with a focus on helping students to learn sport-specific skills (Armour, 2013). This author further states that teachers are responsible for meeting the educational needs of students. In the context of this study, and also related to the teaching and coaching background of the lecturers, teaching refers to the delivery of instructions related to sport theory and to skills for students at a sport university. Meanwhile, coaching is defined as "a process of guided improvement and development in a single sport at identifiable stages of athlete development" (ICCI & ASOIF, 2012, p. 10). This definition places an emphasis on the continuing development and educational support by coaches of participants/athletes, and the significant signals of progress expected as a result of that experience (Lara-Bercial et al., 2017). Figure 6.2 displays years of teaching experience of the lecturers participating in the interviews.

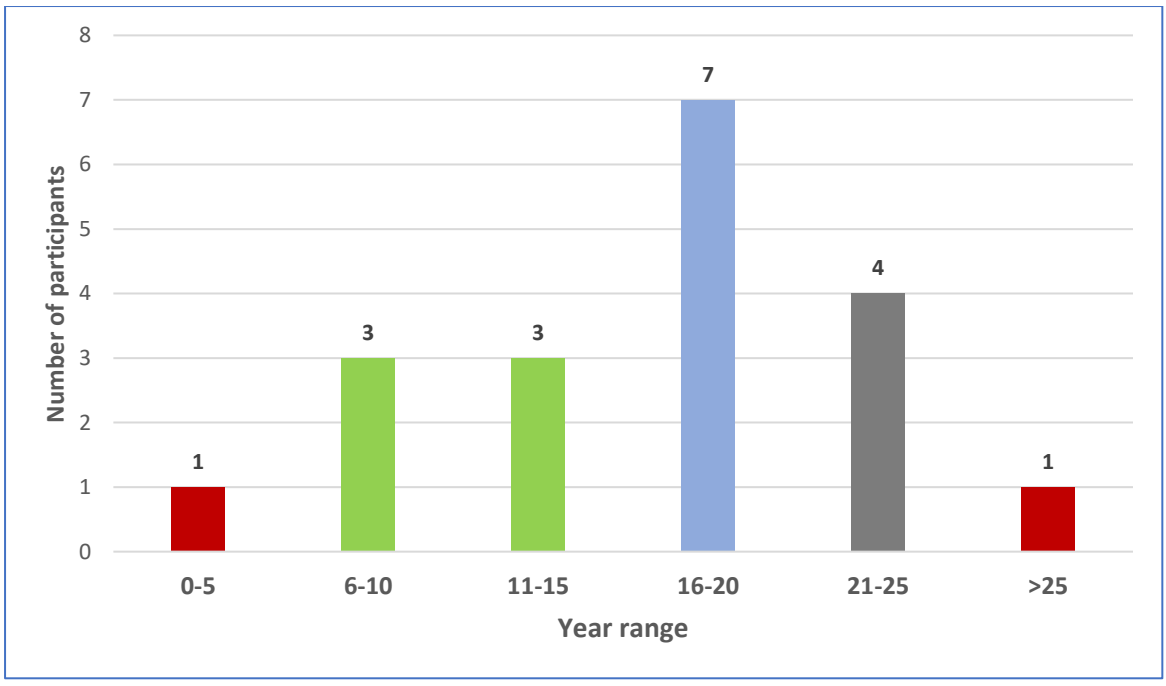

Figure 6.2 Years of teaching experience

Sixteen sport education teachers from their respective departments delivered instructions on a specific sport: Athletics, Martial Arts (Karate), Basketball, Volleyball, Football, Handball,

Swimming, Gymnastics, Badminton, Table-tennis, Tennis, and Chess. Three others from the faculty of PE were responsible for teaching sport theory, such as in the subjects PE Theory and Methods, Sport Education, and Sport History. Lecturers had many years of teaching experience in their discipline, ranging from 5 to 36 years. Most lecturers (n = 7) were in the group of 16–20 years, followed by 21–25 years for four lecturers. Experience groups 6–10 and 11–15 years had the same number of participants (n = 3) (see Figure 6.2).

In addition to teaching experiences, 3 out of 19 lecturers had experiences in coaching related to their major sport. One Badminton lecturer previously coached a young Badminton team for three years at National Sport Training Centre 3 and then returned to his teaching career. The other two lecturers who delivered instructions in Athletics trained students to participate in the city's student competition, sports festival, and national competitions.

Before or while taking service, Vietnamese teachers are required by the Ministry of Education and Training to secure a certificate in pedagogy and/or pedagogical psychology if they have not been trained in tertiary institutions of education, and in such training programs, learning styles are normally included as an obligatory matter.

6.3: Teachers' knowledge about learning styles

In the instructional landscape, an understanding of students' learning style preferences is important for teachers to be able to design and deliver effective programs of learning activities. Thus, this section explores the teachers' understanding of the term 'learning styles', and their perceptions about the identification of student learning styles and the adaptation to different learning styles. Before these are discussed in more detail in the following sections, it is of note to provide a general description of the students' learning styles at DSU as seen by the lecturer participants. According to them, DSU students' learning styles seemed to be different from those of other areas of study. As noted in the following excerpts, three lecturers revealed significant factors which contributed to a major difference in their learning styles as compared to students in other study fields.

> *"There are different learning styles but for sport students they have typical learning styles since they primarily get involved in practice sessions." (Lecturer # 1)*

> *"There are different learning styles but in the sport setting, students' learning styles are different from those of other disciplines since sport students mainly focus on practice sessions in which students interact with the teacher." (Lecturer # 2)*

"Learning styles of sport students are different from those of other majors. Sport students tend to participate in practice sessions which require [them] to get involved in physical activities, so they have typical learning styles." (Lecturer # 8)

The common element in the responses indicated that the lecturers believed that learning styles of students in the sport environment differed from those of students of other disciplines which primarily focused on theory or classroom-based learning. It appears that differences were due to the fact that students in the sport setting undertook a considerable number of training sessions throughout their course. These sessions were conducted on courts, playing fields, or in swimming-pools where students engaged in learning and mastering skills, as well as participated in sporting activities. In these sessions, the teacher placed a greater emphasis on practice, which enabled students to form, develop, and sustain their own typical learning styles. Put simply, the teachers talked about their awareness of the fact that the students in the sport environment tended to focus more on practical sessions rather than theoretical learning components. As such, according to the lecturers, the field of study and the training program played a major role in shaping the learning style preferences of students.

As stated previously, it is important for the teachers to gain some knowledge about students' learning styles. This knowledge significantly impacts upon a number of activities of the teachers, especially in developing curriculum, designing lesson plans, and delivering instruction. Additionally, this is foundational to using appropriate teaching methods, techniques, and strategies in an effort to address the diversity of learning style preferences. The following section will examine the issues surrounding teacher understanding of the term learning styles, difficulty in identifying students' learning styles, and knowledge about the adaptation of teaching styles to learning styles.

6.3.1: Teacher understandings of the term learning styles

The term learning styles may be familiar to some educators in Vietnam. In teaching practices, it is critically important for teachers to be aware of students' learning styles. Thus, they need to have a certain level of background knowledge about this term and about how to apply their understanding to their teaching landscape. When the sport education teachers were asked if they had previously heard about the term, most respondents (n = 15, 79%) indicated an awareness of the term, while 4 respondents (21%) had not heard the term.

There has been research exploring the learning styles of Vietnamese students learning English as a foreign language, but none has been conducted in the area of physical education

and sport. Therefore, for many educators, instructors, and students, learning styles was regarded as a relatively new term in the Vietnamese education context or it was understood in a variety of ways. In relation to the interview results with sport education teachers, of the four participants who were not aware of the term learning styles, Lecturer # 16 stated that "*the term learning styles is very new to me.*" In addition, when asked the first question "Have you heard about learning styles"?, the responses revealed that 19 lecturer participants differed in their knowledge, along a progression from not being aware and not understanding of the term to demonstrating their knowledge about the term, as shown in Table 6.3.

Table 6.3 Knowledge of the term learning styles

Level of knowledge of the term learning styles		**Lecturers (n=19)**
Not aware of the term		4 (21%)
Aware of the term	Show only limited understanding of the term	3 (16%)
	Have some understanding but provide limited explanations about the term	3 (16%)
	Demonstrate their knowledge and/or provide definitions about the term	9 (47%)

Table 6.3 demonstrates different levels of lecturers' understanding of the term learning styles. Four participants (21%) were unaware of the term learning styles. Among the 15 lecturers who had previously encountered the term, three participants (16%) showed only limited understanding of learning styles, three participants (16%) had some understanding but provided limited explanations associated with the term, and nine others (47%) demonstrated their knowledge and/or provided definitions about the term.

To learn more about the scope of their knowledge of learning styles, the researcher asked the second question, "What do you know about the term learning styles"? Learning styles are hard-to-define as a broad concept, as they involve five elements, environmental, emotional, sociological, physiological, and psychological that can influence a learner. However, drawing from their experiences, thoughts and perceptions, the sport education teachers provided a number of definitions of the term learning styles under three themes: students' preferred approaches to learning, multi-sensory learning, and attitudes towards learning. These reflected

some level of understanding by the teachers as well as forming part of their knowledge about learning styles. This understanding and knowledge will be presented in detail in the following sections.

6.3.1.1: Students' preferred approaches to learning

Whilst the literature indicated a wide range of definitions of learning styles, the intent of the research was to provide some knowledge of learning styles from the teachers' perspectives. This knowledge was demonstrated through responding to the interview question being asked "What do you know about learning styles"? According to some participants, learning styles were described as an individual's preferred ways of perceiving new knowledge and skills. These teachers seemed to understand that there are a variety of learning methods and that each learner has a unique approach to learning, which is known as a learning style. This is illustrated in the following quotations:

> *"I simply understand learning style is a learner's approaches to learning knowledge and skills." (Lecturer # 12)*
>
> *"Learning style is the ways that students acquire knowledge and skills in the processes of learning and research." (Lecturer # 14)*
>
> *"The term learning styles is a learner's preferred ways of learning and how they apply [it] in their learning activities." (Lecturer # 19)*

Although the above comments showed the teachers' knowledge about learning styles, Lecturer # 14 and Lecturer # 19 appeared to be more confident in their responses. They provided information like: each individual had her/his preferred ways or approaches to taking in, processing, remembering, and applying new information, knowledge, and skills. As a matter of fact, there are multiple learning styles, and the teachers identified learning styles as an individual's methods or approaches to learning. It is worthwhile noting that being mindful of, and identifying, one's learning style preferences are key to students developing their strengths and enhancing learning potential when being involved in learning activities.

6.3.1.2: Multi-sensory learning

As indicated by some of the lecturers, the term learning styles related to how students used different senses to learn new information and knowledge. Some students learnt best when the teacher provided them with visual materials; some preferred to listen. In this regard, the teachers commented as follows:

"To the best of my understanding, there are a variety of learning styles such as aural-visual, kinaesthetic, logical and social (work in groups)." (Lecturer # 3)

"The term learning style refers to the use of different senses to take in new information and knowledge." (Lecturer # 11)

From observations and experiences of the teachers, they could identify students' senses as important in acquiring and mastering skills, particularly in the sport setting. Some might prefer visual illustrations or listening, but also a preference for kinesthetic or tactile learning seemed to be popular among sport students as well.

6.3.1.3: Attitudes towards learning

Furthermore, the lecturer participants described learning styles as behaviour, reactions, and responsibility for learning activities. Particularly, they referred to learning styles as "*the attitudes towards learning"* (Lecturer # 7). It is further explained by the following comment:

"The term learning styles refers to an individual's attitude, perception and thought about learning activities." (Lecturer # 18)

As highlighted by the excerpts, the term learning styles was identified as being a learner's attitude towards, and awareness of, learning activities. Krathwohl (1964)'s taxonomy theory claims that there has been a progress in a person's learning attitude, and that past learning experiences have an impact on future learning experiences. In fact, student attitudes on learning may determine their ability and willingness to learn. If students have a positive attitude they will be more motivated to learn. Therefore, it was essential for teachers to place a greater emphasis on creating a good learning environment to promote students with positive attitudes. This would contribute to increasing levels of engagement and enhanced student learning.

Overall, sport education lecturers had a basic knowledge and understanding about the term learning styles. Firstly, it was defined as being closely related to students' preferred approaches to learning, multi-sensory learning, and attitudes towards learning. Secondly, unlike students whose study program was theory-based, the students in the sport environment had more typical kinesthetic learning styles as they preferred to get involved in physical activities. Some lecturers were also aware of the importance of identifying students' learning style preferences so that they could employ appropriate teaching styles to best suit students' preferred learning styles. This would assist in improving the teaching and learning practices.

6.3.2: Difficulty in identifying students' learning styles

From the teacher interviews it was evident that teachers were concerned about the identification of students' learning styles. Big classes with approximately 70–80 students in theory classes and 30–40 students in practice sessions, make the determination of students' learning styles a major issue for teachers. However, as demonstrated by Lecturer # 11, he might be able to be cognisant of prevalent learning styles and use appropriate teaching strategies to suit them:

> *"It may be difficult to identify all learning styles in a class. However, I can be aware of dominant learning styles of some students and use suitable teaching strategies with these students."*

Although the teacher attempted to gain a deep understanding of students' desires and needs in the hope of meeting their 'levels', there was little possibility for him to recognise different learning styles. However, he could identify dominant learning styles of students and strive to best suit these learning styles. Lecturer # 19 shared a similar viewpoint and commented as follows:

> *"With different learning styles in class, especially in a big class, I find it hard to identify their learning style preferences. … Normally, I just notice outstanding and naughty students or the most dynamic ones. These are the most remarkable students I may get to know. For the majority of students who are so quiet, it is not easy to know their learning styles."*

The teachers asserted it was challenging to identify all preferred learning styles of students, particularly in a large-sized class. The only thing that the teachers could do was to take notice of the students whilst being involved in physical activities and identify those who engaged in tasks most actively or those who preferred listening and observing others. These were regarded as the most dominant learning styles of the students. It is suggested that the teacher mix them up so that they could support each other. In practice, it would be impossible for the teachers to adjust to different learning styles of students. However, identifying multiple learning styles of students and knowing how to combine them in a session were fundamental to assisting students in maximising their strengths and taking advantage of learning opportunities.

6.3.3: Lack of understanding of adaptation

The findings revealed that some teachers were not aware of tailoring their teaching to different learning styles of students. This was due to a lack of understanding about learning styles or a failure to correctly identify the learning styles of students. Lecturer # 18 addressed this issue by stating:

"Actually, I do not know much about learning styles, so I don't often pay attention to different learning styles my students may have. Hence, I have no idea of how to adapt to their learning styles. What I normally do is to respond to situations in class based on my teaching experience from previous courses."

As outlined by the abovementioned response, the teacher possessed a suboptimal level of understanding surrounding the knowledge of learning styles. Consequently, the teacher was not concerned about accommodating different learning styles in the teaching sessions. In other words, no particular teaching strategies were used to adjust to students' preferred learning styles. The employment of teaching strategies in response to situations during training sessions was dependent on teaching experience. It is clear that this reflected a lack of understanding of adaptation of the teacher to different learning styles of students in teaching practice.

For comparison purposes, a study was conducted by Brown (2013) to identify learning styles of 123 college athletes across sport, level of sport performance, and gender and also to determine what college coaches know about learning styles. The setting of the study was the NCAA Division II institution in the southeastern part of the United States. The findings indicated that college coaches had a very general knowledge of learning styles while DSU teachers in the current study demonstrated only a limited understanding of student learning styles.

6.4: Teachers' perceptions of students' learning styles

In addition to gaining an insight into the teachers' knowledge about learning styles of the students, the researcher had a desire to further understand how the teachers perceived the concept. Analysis of the interview transcripts revealed a number of themes in relation to the teachers' perceptions of how students learnt, including rote/passive learning, proactive learning, visual learning, learning by imitation, kinesthetic learning, individual/peer/group learning, and integration of theory and practice. These emergent themes are consecutively presented and provide a rich understanding of the current learning practices of the students at DSU.

6.4.1: Passive learning/rote learning

One perception of teachers of how students learnt was described as passive and rote learning. These two forms of learning were inextricably linked to each other and regarded as popular among sport students, as explained by Lecturer # 19:

"Most sport students tend to follow rote learning and they are passive learners. In terms of rote learning, they often try to memorise information provided by the teacher based on repetition. They also use this technique to prepare quickly for a mid-term test or an exam. This reflects passive learning through direct instruction and lecturing of the teachers. Students just receive knowledge, memorise and receive no feedback."

As indicated by the teacher, the students in the sport environment placed a greater emphasis on repetition and memorisation of information and knowledge provided by teachers rather than attempting to gain an insightful understanding of it. This form of learning was not encouraged as it had a negative impact on students' long-term memory in relation to knowledge content they needed to learn. From the perspectives of sport education teachers delivering instructions on practical sessions, the students appeared to be "*still passive in their learning*" (Lecturer # 18), and most of them "*depend much on teachers; they mostly listen and imitate and they are not active in their studies*" (Lecturer # 6). The teachers reported that the teaching and learning processes were more productive if there was an interaction between the teacher and students and voiced the need for students to be more active and vocal in the classroom. If not, as stated by Lecturer # 13:

"the way of learning of current students and student-athletes is one way. They just listen, observe and perform the exercises provided by the teacher."

Additionally, two teachers made a comparison between current students and those in the previous cohorts in association with their attitudes towards learning and academic performance. Particularly, a lecturer who taught Chess commented on learning attitudes and awareness, as well as the capacity of students in the previous cohorts:

"…students learnt chess very well. They always listened to the teacher attentively, so the ability to solve chess exercises and analyse the stages of the game was very good." (Lecturer # 17)

Based on the teaching experiences, Lecturer # 16 highly valued *"the ability to acquire practical skills"* of previous students as *"they practiced really hard"* during class hours as well as during extracurricular activities. With respect to theory learning, the students did not invest a significant amount of time in understanding and exploring a substantial volume of theoretical knowledge. Their intent was to study for the exams, with the possibility of passing them successfully. In this regard, Lecturer # 16 stated:

"In terms of theory, students study only a few questions by random for the exams. Most have part-time jobs, so they spend less time in the library. They just start to learn their lessons when the exams approach."

6.4.2: Proactive learning

Three lecturers offered completely different viewpoints on the way students learn. The lecturers believed that unlike traditional learning methods, currently, *"students are more proactive and self-determined*." More specifically, Lecturer # 11 pinpointed that *"they are able to interpret, present their own personal views and no longer depend on others*." Furthermore, they *"know how to investigate, research and find smart learning methods to obtain knowledge they need"* (Lecturer # 14). In other words, students had a propensity for grasping knowledge more actively than they did previously and no longer followed a model or framework designed by the teachers. Central to the learning process was the discovery, exploration, and understanding of a very large amount of information and knowledge by students themselves, with the provision of guidance, support, and feedback from the teachers.

In order to adapt to the active learning of students, teachers provided students with optimal opportunities to gain a deeper understanding of the knowledge by requiring them to independently seek and read materials related to the scope of the knowledge content, as highlighted by Lecturer # 1:

> *"Currently, for students at DSU, apart from what is taught in class, students are required to read materials in relation to the lesson before going to school. Surfing materials from the internet is very easy for them, especially in the era of technology 4.0."*

As indicated by the teacher, the proactive learning of the students was demonstrated through further exploring the knowledge, along with what they acquired from the teachers, with the support of the internet. Nowadays, technology has a powerful impact on student learning. It could open many doors to knowledge and be a key to success in learning if students knew how to use it to explore new areas. However, there was a significant amount of knowledge students might have found, and they should have understood deeply which sources of knowledge are reliable and usable to serve their purposes.

Additionally, this teacher stressed the importance of exchange and interaction, which is needed for proactive learning in the teaching and learning processes:

> *"There is always an exchange and interaction between students and the teacher. Students normally ask teachers what they don't understand in relation to the knowledge and techniques. What they understand is encouraged to apply into practice to check how it works in practice." (Lecturer # 1)*

It is essential for students to discuss challenging issues with the teacher and their peers, issues that they might not be able to understand about knowledge and techniques in a specific sport.

Also, there is a need to apply what they are learning to real-life situations. In this way, students could establish a vital link between theory and practice, which would assist them to recall knowledge and remember how to put it into practice.

It was acknowledged that sport and physical education students differed from students of other disciplines. They devoted a significant amount of time to the mastery of skills and techniques related to a specific sport during practical sessions. Also, they tended to employ a wide range of learning styles to absorb knowledge transmitted from the teacher. These students could be considered to be proactive in their learning. In this regard, Lecturer # 15 responded from her understanding and knowledge about learning styles:

> *"Students use a variety of learning styles to gain knowledge from teachers. Because the physical education environment is unique and students focus mainly on practical skills, they have to use a combination of learning styles such as visual, auditory, kinesthetic, and group learning."*

In practice sessions students had the opportunity to observe and listen to the teachers demonstrate and analyse techniques. Also, they were physically engaged in activities with their peers as well as in competitions or extracurricular activities. Multiple learning styles used by the students in their learning reinforced the proactive learning they demonstrated.

6.4.3: Visual learning

Some lecturers also believed that visual learning was one of the most essential learning styles for sport students in gaining knowledge and skills. Particularly while being involved in practice sessions, students needed to observe their teacher's demonstration as well as their peers' performance. Lecturer # 12 addressed this issue:

> *"According to my personal experiences, sport students are not so good at memorising and analysing theory, so they often choose to learn visually directly and indirectly, which helps to better understand and remember longer."*

For this lecturer, visual learning helped to facilitate their understanding and to better memorise knowledge. It is clear that in addition to the demonstrations by the teachers, the students had an opportunity to watch video clips showing techniques and performances by professional athletes. With this visual form of learning which was regarded as one of the students' preferred learning styles, particularly in the sport setting, the students could gain a better understanding of the skills, helping them to maximise their learning potential.

6.4.4: Learning by imitation

Furthermore, learning by imitating was commonly used among the students as demonstrated by the teacher interviews. This learning style was based on the demonstration of the teacher and then the students imitated and practised skills and techniques that were shown by the teachers. They explained how their students used this form of learning in approaching knowledge and skills:

> *"While learning and practicing motor skills, many students often focus on observing and imitating the movements but are less willing to learn the basics of movement techniques and the effects of internal force inside the body. There is a lack of creativity in training,…" (Lecturer # 12)*

> *"… most students want to observe the teachers do the demonstration and then it is their turn to imitate and practise skills and techniques under the supervision of the teachers." (Lecturer # 9)*

> *"…. they [students] listen to the teacher analyse techniques, observe the teacher demonstrate, and then perform them in a way that is exactly similar to the instruction of the teacher." (Lecturer # 16)*

Students based much on imitation learning, meaning that they used existing information, which was already processed, absorbed it into their own knowledge, and applied it into practice. This way of learning was commonly adopted by students as they did not attempt to analyse and understand the techniques. Their learning was primarily based on memorisation, imitation, and repetition. Through this process, there was little chance for students to develop critical thinking and creativity in their learning.

6.4.5: Kinesthetic learning

Kinesthetic learning was perceived as being one of the preferred learning styles of the students whilst being involved in physical activities by the teachers. The interview findings indicated a high level of engagement of the majority of students in practical sessions to acquire skills and techniques. This involvement is known as kinesthetic learning, which denotes students' preference for actively participating in physical education and sporting activities. In fact, Lecturer # 9 pinpointed that:

> *"the majority of students prefer attending practice sessions on courts or playing fields to sitting in classroom and listening to lectures delivered by the teachers."*

Teachers indicated students had more fun and comfort whilst being in an environment which combined both study and play and promoted physical and mental health after hours of attending

theoretical sessions. In addition to training sessions as stipulated by the training program, students necessitated the need to:

> *"participate in extracurricular activities (playing any kind of sports on campus or in clubs off campus) as well as competitions to improve their professional levels" (Lecturer # 8).*

In alignment with this point, Lecturer # 7 added that students:

> *"focus on acquiring knowledge and skills by getting involved in practice sessions during class time as well as extracurricular activities."*

Accordingly, their skills might be developed by the repetition of movement techniques. Thus, it was fundamental for students to allocate significant time to practice, with the possibility of gaining the necessary skills in a variety of sports.

6.4.6: Individual/peer/group learning

Some teachers talked about whether the students should work in pairs or in groups, depending on the different kinds of sports and the activities required, while others had a preference for students working individually. Some sport education teachers addressed the issues of independent and cooperative learning, and how they impacted student learning. The choice of these forms of learning was inextricably linked to student learning styles. This is illustrated by teachers who responded that some students preferred working on their own while others liked working with their peers or in groups. The following excerpt highlighted this point:

> *"Many students want to practice skills and techniques by themselves. They also like to practice with a partner or with other friends in groups." (Lecturer # 9)*

In the sport environment, depending on the characteristics of a specific sport, whether it was an individual sport or a team sport, students might be able to undertake individual practice or collaborate with a partner or peers to practise skills and techniques. Taking individual sports such as Athletics, Swimming or Gymnastics as examples, students could manage their own training. However, it would be of great value to get a partner to observe and give feedback in the training process. With respect to team sports such as Soccer or Volleyball, a greater emphasis was placed by teachers on peer support and group learning while learning and practicing skills and techniques, as well as during competitions. For theory, students spent time studying on their own at home, reviewing, and further exploring knowledge in their own discipline. As such, the combination of theory and practice was of great importance to the learning of students as this helped them to gain a broader, more comprehensive, and more practical understanding of the issues.

6.4.7: Integration of theory and practice

Some teachers reported that students expressed their desire for the integration of theory into practice as their preferred way of learning. Such a combination resulted in better comprehension and recollection of the information and knowledge they had previously learnt. The following comments addressed this issue:

> *"Some students like the combination of theory and practice." (Lecturer # 9)*

> *"Combining theory with practical activities, which helps to better understand and remember longer." (Lecturer # 12)*

Theory and practice were closely correlated to each other and could not exist independently. The combination of these two components was critical in teaching and learning, which involved a wide range of theoretical knowledge of real-life situations. Being aware of the benefits of this integration, sport students were provided with a positive and encouraging learning environment to acquire and master sport skills as well as tactics and techniques, and to learn how to employ them in practice, training, games, and competitions.

6.5: Teachers' use of teaching styles

Being able to employ different instructional strategies in the sport setting was crucial to sport education lecturers. This reflected their knowledge and understanding about student learning style preferences and how they could be accommodated in their instructional practices. The interview results revealed that a combination of strategies and principles, individualised instruction, and learner-centred approaches were used by the teachers in their teaching practices. These will be presented in this section.

6.5.1: Physical education teaching strategies

When asked about the strategies generally employed in teaching sessions, several sport education teachers revealed using a combination of verbal cues, visual resources, demonstrations, exercises, and feedback. These strategies were characteristic of PE teaching, which emphasised the acquisition and mastery of sport skills and techniques. To highlight this point, sport education teachers stated:

> *"The most common teaching strategies are verbal cues, pictures, and demonstrations." (Lecturer # 13)*

> *"I usually use verbal cues to analyse movement techniques, demonstrate and provide feedback. These are commonly used instructional strategies in physical education." (Lecturer # 18)*

"Traditional methods in physical education are verbal cues, visual methods, exercise methods." (Lecturer # 7)

Verbal cues, demonstrations, feedback, visual methods, and exercises, frequently utilised in teaching PE and a variety of sports, were also described as traditional methods but were of great value for the instruction of fundamental sport skills and techniques. Lecturer # 15 added another strategy, 'assurance-support,' and further explained how these strategies were used in her teaching, as well as the purpose of each strategy:

"I use a combination of different teaching methods: verbal, visual and assurance-support. Assurance-support is a typical teaching method in physical education. That is to help students to feel secure psychologically. When performing a new movement, they may feel nervous, so the teacher must assure that they are more secure and safer during the process. Support means to create more force and impact to help them perform better and have a better feeling about that movement. With respect to visual method, teachers always have to demonstrate so that learners visualise images in their mind, think, understand and perform. This is combined with verbal methods. It is used to call names, analyse and give instructions."

In terms of practice or exercises, the teachers divided students into pairs or groups based on gender and capability. For example, one teacher noted a strategy for introducing a new technique:

"Depending on the teaching content, I employ a variety of teaching methods. Often, when teaching a new technique, I analyse and demonstrate it. Then, I get students to practise in pairs or groups." (Lecturer # 16)

Once the teacher ensured the students had gained an understanding of the techniques, students were required to move to the next step of the practice session. They could practise with a partner or in a group, depending on the knowledge and skill content, and under the guidance of the teacher. The division of students into groups was a key issue that might impact the training session and that the teachers needed to be aware of, as stated by Lecturer # 5:

"When teaching in a physical education class, I normally analyse and demonstrate the techniques at the same time. Also, I divide students into groups depending on gender and students' professional levels. Males and females practise separately. Students of the same level are in the same group. Then, I use exercises appropriate to each group of students or each individual to practice."

Differences in gender and performance levels of students were regarded as fundamental to forming groups for practice. Grouping students of the same gender or capability could allow the teacher to provide more suitable exercises for them to engage in.

To identify how much progress students made and what improvements were needed, teachers generally provided feedback, as well as support exercises and guidance for further self-practice outside class hours. Lecturer # 4 addressed this point:

> *"I correct students' common mistakes immediately. In addition, I provide them with support exercises to practise at home or during extracurricular activities as well as introduce video clips from YouTube regarding accurate and beautiful techniques for reference."*

The provision of specific and immediate feedback from the teacher is critical for students to make some adjustment related to technical movements in their practice. This teaching style would help the students to increase confidence and capacity to perform better. In addition to assistance from the teacher in providing support exercises and video clips, the students' diligence, resilience, and devotion to self-training were key factors in their success. For these university students, self-study had a positive impact on academic performance. If they knew how to balance study, work, and play or had good time management and appropriate priorities, they would be more likely to succeed in their studies. The appropriate use of teaching styles might have a significant impact on the students' attitudes towards learning as well as their learning performance.

Coupled with strategies commonly employed in teaching sport skills and techniques, some teachers applied an additional teaching principle in the sport setting; they increased the difficulty levels of exercises and the amount of movement throughout practice sessions. The followings were typical responses:

> *"These exercises go from simple to complex according to a planned route." (Lecturer # 5)*

> *"For sport activities or while teaching sports, teachers always have to put high demands on students, for instance, the amount of movement in the next training session must be higher than the previous ones; the following exercises must inherit and promote the results of the previous ones." (Lecturer # 7)*

> *"I follow the principles of teaching from easy to difficult, from simple to complex, the principle of increasing the amount of movement." (Lecturer # 13)*

These foundational principles were crucial to sport education teachers in teaching sport skills and techniques. Generally, for students who first entered university without much knowledge about sport and sport skills, it was essential for the teacher to deliver instruction by starting at low levels and then increasing the quantity of exercises as well as the levels of difficulty of exercises.

6.5.2: Individualised instruction

The interview findings indicated individualised instruction was also commonly used amongst sport education teachers while delivering practical sessions. In the individualised instruction strategy, teachers focused on specific learning needs of students (Lindner & Schwab, 2020). This was done by providing guidance and support that would help individual students understand better and maximise success.

While addressing the issue of individualised instruction, the teachers stressed the importance of identifying differences among students. These included in their background, characteristics and levels. Additionally, in the process of teaching, it was critical to know and understand the biological differences (Hansen, 2005) and physiological characteristics (Lagestad, 2017) of students. These were vital features of sport students the teachers needed to bear in mind before delivering practical sessions. Lecturer # 1 added:

> *"Being a teacher/coach, I must get to know the characteristics of each student/athlete. Teachers/coaches must be aware of her/his students/athletes' health conditions, interests and psychology at the beginning of each practice session."*

All the characteristics of sport students referred to by teachers impacted on student motivation, engagement level, and capacity to undertake exercises provided by the teacher. Therefore, the teachers needed to be aware of the students' preferred learning styles; this is fundamental to devising appropriate tasks and teaching strategies to suit a diversity of students. In turn, the students were more likely to take a greater interest in learning, gain a better understanding of the knowledge and skills required, and maximise their learning potential.

Individualised instruction was applied to students in the different categories—students and student-athletes. In practice, there were differences between these two types of students in the sport setting in terms of skills. Thus, the teachers needed to be mindful of this and use tasks and strategies which could meet the different learning needs and skill levels, as pointed out by Lecturer # 10:

> *"Normally, if students do not have good practice skills, teachers should reduce the quantity of practice and encourage them to conduct good skills. Student-athletes have good skills, so they need to carry out enough exercises. Therefore, teachers need to distinguish student types in order to apply appropriate exercises, teaching methods and approaches."*

Many of the students who did not demonstrate the skills needed to practise at a moderate level, needed a focus on improving skills rather than on the amount of movement. In other words, it was not important for them to undertake a heavy load of exercises; for them, the acquisition

and mastery of skills were more significant. Unlike students, the student-athletes cohort possessed higher execution skills, and therefore, it was more important for the teacher to give them sufficient exercise tasks.

Individualised instruction was also shown by the division of students into groups based on students' ability to master knowledge and skills. Students of the same professional level were grouped together and provided with tasks which were appropriate to them. Lecturer # 2 outlined this perspective:

> *"There must be teaching strategies to good and weak students. The teacher needs to divide students into groups; strong students do advanced exercises; the weak ones need to learn basic skills from the start, depending on each student."*

Students of low ability needed to be provided with additional exercises to practice, with a goal to improve their basic skills. With respect to highly skilled students, more focus was needed on the provision of more challenging exercises which promoted the development of advanced skills and techniques. In a class, there might be significant differences in students' background, aptitude, and capacity. Therefore, it was essential for teachers to be aware of these differences to adapt suitable instructional strategies in their teaching.

Additionally, the teacher employed individualised instruction for students who were physically injured during the training sessions. In sports, accidents generally occurred during practice as well as during competitions, and these caused physical injuries for students and athletes. In these circumstances:

> *"s/he should not be pushed to train like the others with the same quantity and intensity of movement. Instead, they should be allowed to take a break or undertake some light exercises for recovery." (Lecturer # 1)*

In terms of individualisation, Florian and Spratt (2013), Chan and Lo (2017) as well as Lindsay et al. (2014) revealed results in relation to teachers' individual motivation and feedback provided for students. The findings are consistent with the those in the current study. Also, there are a number of research which indicate individual support of students in the learning processes is used as a teaching strategy in classrooms (Otukile-Mongwaketse et al., 2016; Russak, 2016; Tarr et al., 2012). Such support can be provided to individual students and also to a group of students. The results are similar to those in the present study.

6.5.3: Learner-centred instruction

The interview findings indicated sport education teachers used learner-centred methods (Brinkmann, 2019; Flanders, 1970; Schweisfurth, 2011) as one of the fundamental instructional strategies. With this strategy, teachers tended to shift the focus of instruction from the teacher to the student, with a goal of developing learner autonomy and independence (Weimer, 2013). Learner-centred instruction placed an emphasis on providing skills and practices which allowed lifelong learning and independent problem-solving (Weimer, 2013). Some teachers provided students with optimal opportunities for exchange and discussion in which students played a central part in the process. For example, one teacher noted:

> *"The teacher poses questions and students give answers. The teacher provides instruction on hard questions which are not answered by students. The teacher works as a guide and students are considered as learner-centred in the processes of teaching and learning." (Lecturer # 17)*

This response demonstrated a process of teaching and learning as happening like a conversation or communication between the teacher and students. The teacher raised questions for the students to respond to in relation to the knowledge content, and this helped to activate the students' brainstorming and critical thinking skills (Weimer, 2013). The teacher played the role of a facilitator to offer greater explanation and clarification on the issues that might challenge the students. Another teacher commented:

> *"I normally apply [a] learner-centred method in which my students are encouraged to exchange regularly and not to be afraid of giving incorrect responses. Students actively address practical issues through practical exercises, pictures, and videos. In addition, I require students to prepare questions for discussion in the next session." (Lecturer # 12)*

The teacher placed an emphasis on frequent interactions between the teacher and the students. Additionally, the students were encouraged to proactively pose any questions about things that were hard for them to understand and about how to apply their knowledge in practical situations. Whilst being involved in discussions, the students had an opportunity to contribute to their understanding of issues. To highlight this, another teacher stated:

> *"……, but I also use a large amount of time for class and group discussion. This is really beneficial and helpful for students to engage in classroom activities and share what they know about the issues with the whole class. By this way, the teacher and students become closer and the class becomes more interesting when everyone has a chance to get involved in [it]." (Lecturer # 19)*

In learner-centred instruction, the students actively acquire knowledge through interactions and discussions with the teacher and their peers. The more students become engaged in learning activities, the more knowledge and skills they obtain. Hence, to maximise students' learning potential, it is fundamental for the teacher to use learner-centred instruction to increase students' motivation, confidence, and engagement levels, in all learning activities.

With regards to practical sessions, learner-centred instruction was shown in the correction of errors among students. Lecturer # 12 pinpointed this issue:

> *"Students are divided into two groups: implementation group and observation group. Those in the observation group are asked to identify common mistakes made by the implementation group."*

With this type of learner-centred instruction, the students were not simply those who performed tasks assigned by the teacher, but they also played the role of a teacher who provided personalised feedback on mistakes being made by their peers.

The findings of other research revealed that the teachers and students collaborated with each other on instructional tasks in the practical settings (Clarke, 2010; Paris & Combs, 2006). In the current study, the teachers also participated as learners to fufil a learning activity, particularly in practice sessions. Learner-centered teaching provides opportunities for students for independent learning (Doyle, 2018). Moreover, learner-centered instruction enhances students' learning and critical thinking and problem-solving skills (Avdal, 2013; Brydges et al., 2010; Diefenbeck et al., 2011; Hoke & Robbins, 2005; Zhang et al., 2012), communication skills (Clark et al., 2008), autonomy (Cooper & Carver, 2012), teamwork and higher student satisfaction (Zhang et al., 2012) and motivation (Kocaman et al., 2009).

6.6: Chapter summary

The DSU lecturers in this study demonstrated different levels of understanding of the term learning styles. A number of them saw this term as referring to students' preferred approaches to learning, to multi-sensory learning, and to attitudes towards learning. Teachers believed that identifying students' learning styles was challenging, and some demonstrated little understanding of how they could adapt their teaching styles to cater for students' learning styles. In terms of teacher perceptions of students' learning styles, most students were seen as passive in their learning activities, but some as proactive. The students were also seen as showing a strong preference for visual learning, imitation learning, kinesthetic learning, individual/peer/group learning, and integration of theory into practice in their learning

experiences. The interview findings revealed that the teaching styles, used by lecturers in physical education, included use of verbal cues, visual resources, demonstrations, exercises, and feedback, individualised instruction, and learner-centred instruction. Collectively, the interviews showed a limited understanding of learning styles by sport education teachers, and of how to apply this knowledge in their teaching practices. The findings of this research which pertain to the observations of practice sessions to address Research Question 3 (how to adapt the teaching styles to different learning styles in the current teaching and learning practices) will be presented in the following chapter.

Chapter 7: Teacher adaptation to different learning styles

7.1: Introduction

This chapter presents the research findings from the observations of practice sessions at Danang Sport University (DSU) in response to Research Question 3 (RQ3) of the study: "In what ways do sport education teachers adapt their teaching styles to individual learning styles"? These observations were carried out to better understand the teachers' use of teaching styles and their adaptation to students' learning styles. Eight practice sessions delivered by eight different sport education lecturers were used for these observations. This chapter first outlines some information about the observed faculty in relation to their major sport. Secondly, some of the teaching styles used by the teachers including combination of demonstration and verbal cues, use of feedback, and grouping are presented. Thirdly, the chapter addresses the issue of how the teachers accommodated the different learning styles of students.

7.2: Demographics

Observations of eight practice sessions were undertaken after the completion of all the interviews with lecturers to further investigate their use of teaching styles and the adaptation of teaching styles discussed in the teacher interviews. Of the eight lecturers who were involved in observations, four were the heads of sport departments. They delivered practice sessions in Swimming, Volleyball, Gymnastics, and Table-tennis. Other practice sessions in Athletics, Soccer, Karate, and Traditional Martial Arts were delivered by faculty staff from the Athletics Department, Martial Arts Department, and Institute of Sport Science and Technology (Two lecturers who instructed in Soccer and Traditional Martial Arts worked in this institute).

As far as the observation phase of the data collection is concerned, all lecturers observed (n = 8), were males. Their ages ranged from 30 to 55 years, with a mean of 42.5 years old. Of the eight lecturers observed, three had undertaken PhD studies in sport universities and institutes in China, two lecturers were undertaking their PhD in Vietnam when the current research was conducted, while the other three lecturers had all obtained their Master's degree in Vietnam. The teaching experience of the lecturers ranged from 11 to 36 years. In addition to teaching experience and skills in relation to their major sport, some lecturers also possessed experience in coaching.

7.3: Teachers' practices in employing teaching styles and adapting teaching styles to students' learning styles

7.3.1: Teachers' use of teaching styles

An in-depth analysis and interpretation of different teaching styles observed, in relation to the variety of sports, will be provided in the following sections. The teaching styles included: a combination of demonstration and verbal cues; use of feedback; and grouping.

7.3.1.1: Combination of demonstration and verbal cues

Verbal cues are short goal-directed, task-oriented phrases, spoken to a learner before or during a motor skill performance to focus their attention to a task to improve motor skill learning (Benz, 2014). One of the most common teaching styles used by sport education teachers throughout the sessions was a combination of demonstration and verbal cues, regardless of the different types of sports. In relation to verbal cues, the teachers used external focus cues that "direct conscious attention towards performing an action without specifically mentioning any body parts" and internal focus cues that "direct conscious attention towards performing an action with specifically mentioning body parts involved in the movement" (Benz, 2014, p. 12). These teaching styles were used, particularly in helping students to revise former sport techniques, for delivering instructions on new techniques, and during the practice stages. The following examples show how the teachers used these instructional practices for each respective sport.

The Soccer teacher provided demonstrations and verbal cues while teaching new techniques as well as during the practice stage. He asked his students to stand in two rows, and the ball was placed close to the teacher and the students so that they could observe and listen to the teacher. The main goal of the lesson was teaching the five stages of kicking the ball with the inside part of the foot. The teacher explained, demonstrated stage by stage, and raised questions for the students to answer at the same time. For example, "which stage is the most important?" was one of the questions posed by the teacher. All students offered the correct response to the question; then the teacher provided a detailed explanation and analysis of the technique, and the students watched and listened attentively. Through demonstrations, the students could visualise techniques in their brain, coupled with what they listened to from the teacher, to gain a broader and deeper understanding of the techniques. With the teaching styles the teacher used, he might be able to adapt to the students with the Reflector learning style who preferred listening and observing prior to acting. In addition, by posing questions while

instructing, the teacher promoted interaction, which suited the students with the Activist learning style. Furthermore, the students were provided with good opportunities to develop problem-solving and critical thinking skills.

In the Volleyball session, the teacher constantly combined demonstration and verbal cues in his instructions, to emphasise the core elements of techniques and to facilitate students' understanding and perception of skills. The teacher participated as a student to engage in activities, support students, and promote their motivation. During practice time, as a modification of his teaching styles to individual learning styles, the teacher provided individual assistance to students who needed to further develop skills, or to those who showed a lack of necessary skills while undertaking their performance. Whilst being involved in practicing with the students, he re-emphasised the correct technique, and students had an opportunity to enhance their understanding, develop skills, and achieve high performance levels.

The Athletics teacher provided demonstrations and verbal cues to the whole class during the session to assist the students in facilitating and enhancing their learning. In particular, after warm-ups, the teacher asked his students to do more support exercises using hurdles in preparations for acquiring new skills and techniques. Demonstrations and verbal cues were used in a bid to help the students gain a better understanding of these exercises. The use of these support exercises was essential for students in better preparing for the new lesson in terms of psychology, strength, flexibility, and other necessary qualities and skills. Also, he employed these teaching strategies when delivering a new technique on how to start to run by using starting blocks. The teacher adopted step-by-step instructions and analysis to enhance his students' insights into, and understandings of, the techniques.

The Traditional Martial Arts and Table-tennis teachers employed these instructional strategies with the main focus being the consolidation of techniques. While establishing techniques students had previously learned, the teachers offered demonstrations by student who had perfected the technique in addition to doing demonstrations by themselves. This was an effective outcome for students as they felt increased excitement and motivation. At the same time, the teachers analysed techniques verbally, which enabled students to better memorise and further understand what had been learned in the previous sessions. Most of the students observed and listened attentively while the teachers were demonstrating and analysing techniques. Students surveyed had a strong preference for the Reflector learning style (see Chapter 5) and a teacher focussing on demonstration and verbal analysis would help such

learners. However, the teachers should challenge students by providing different types of activities to help them develop other learning styles.

In Karate, demonstrations and verbal cues were frequently used throughout the session to revise the former techniques and to assist students to acquire new skills. In this practice session, the teacher demonstrated twice while revising former techniques as well as delivering instructions on new ones. Along with demonstrations, this teacher used slides to show new techniques as a means to motivate, facilitate, and engage students in the learning process. Of the eight teachers observed, this Karate teacher was the only one who made good use of audio-visual equipment and technology to support his demonstrations. In practice, it is hard for teachers to use these means while teaching in practice sessions as they occur in a large space, which is different from a classroom. Nevertheless, the Karate teacher made every effort to use support tools such as a projector showing movement techniques for the purpose of meeting his students' learning needs and learning styles. Obviously, the sound effects and highly technical movements performed by professional athletes helped to reach the students with a preference for watching and listening. He also used a 20-metre rope ladder used for fitness training at the end of the session.

There was a difference in the way the teachers in Traditional Martial Arts, Karate, and Table-tennis demonstrated. In addition to demonstrating themselves, these teachers demonstrated with another student. In the Table-tennis session, one student was asked to be involved in playing with the teacher, accurately implementing techniques of hitting the ball. At the same time, the teacher provided more analysis and explanation of these techniques. This method provided students with a greater understanding of the skills and techniques required to be mastered. Martial Arts involves a counterattack between two people, and thus the teacher needed another student to demonstrate with them, explaining techniques and tactics related to the knowledge content of the session. The Karate teacher had another student demonstrate with him, as the techniques being taught related to a counterattack involving two people. Demonstrating with another student may be particularly appropriate for these three sports because they involve a two-person contest. Teacher use of this type of student demonstration would increase the motivational levels and engagement of the rest of the class.

7.3.1.2: Use of feedback

In addition to demonstrations and verbal cues, all eight teachers used feedback as an instructional style during the observed sessions. Feedback was identified as being fundamental

to students in helping them to understand what areas needed to be improved in their skills and techniques. Feedback could be provided to individual students, a small group or the whole class, depending on the intent of the teachers as well as the level of the mistakes being made by the students. The following section offers a better understanding of how the observed faculty provided feedback in their teaching practices.

Whilst providing one-on-one feedback, the teachers tried to direct focus and observation of the whole class. Karate, Swimming, Soccer, and Volleyball teachers provided this type of feedback to their students in their practice sessions. For example, in Soccer, the teacher provided specific feedback to a male student on the postures of his legs and how to control the possession of the ball with the two feet. This drew other students' attention to this correction so that they could reflect on their mistakes and correct themselves. In Volleyball, the teacher placed a greater emphasis on common mistakes, providing feedback to the whole class in addition to individual feedback. Once the students made mistakes, the teacher corrected them immediately. Obviously, the teacher was aware that these students majored in Volleyball, and they would be coaches/instructors as their future career in this sport. Consequently, the students needed to perform accurate and exceptional techniques with confidence. Also, in this session, the teacher actively engaged in the practice by passing the ball to students to hit it to a target. At the same time, he provided feedback immediately to every student taking part in the process.

During the observation period, the Karate class was small with eight students specialising in Karate. This was a favourable environment for the teacher and students to get to know one another well, to collaborate, and to interact with each other more frequently. Furthermore, the teacher could keep a close eye on every student and provide corrections on skills and techniques they made. More importantly, whilst providing feedback to an individual, the teacher enabled other students to gain a better understanding of, and reflect on, their performance. In teaching sport skills, feedback was crucial to the acquisition and mastery of skills by students, particularly when it was specific and provided immediately. Sometimes feedback was simply provided to an individual learner for a minor mistake, but it was also the teacher's intent to have the whole class's attention to major and common errors.

Due to the characteristics of Swimming, most practice time was spent in the water with the teacher observing the students from the pool deck. This was a review lesson of breaststroke and a few mistakes in terms of skills and techniques were made by students. Those who made mistakes were called to the pool deck, asked to perform again, and then were corrected by the

teacher. The teacher walked across the ends of the lanes and carefully watched them to provide specific feedback.

In the Athletics session, the teacher corrected mistakes made by the students related to basic skills in running. One-on-one feedback was always given to students with the observation and focus of the whole class. Athletics was a compulsory program for any other sport, one that helped to build on shaping essential skills in multiple sports. Consequently, it was one in which every student needed to acquire and master skills. As such, the provision of feedback to individual students was critical to the understanding and acquisition of basic and advanced skills in running, particularly in starting to run.

Unlike the sports mentioned above, the teachers delivering Gymnastics, Table-tennis, and Traditional Martial Arts provided minimal or no individual feedback and without the whole class's attention. They mostly moved round and emphasised some core elements of techniques while students were practicing. For example, the Gymnastics teacher paid attention to the practice of students, but over the whole session, corrected common mistakes for only two students, checking their progress after repeated demonstration and correction. Another example was in the Table-tennis session. Although this class was quite small with only 15 students, the Table-tennis teacher did not appear to spend sufficient time carefully observing their practice sessions. This might be due to the fact that the focus of this session was on reviewing, or Table-tennis was his students' major sport, and they were in the final year of their course of study. However, some gifted and talented students performed very well as if they were professional players, but some students displayed a lack of foundational skills as well as an inability to grasp techniques and tactics in Table-tennis. Without careful observation the teacher could not identify mistakes being made by students. Mostly, he did not correct mistakes or provide feedback; he simply showed one student how to hold the racket. The Traditional Martial Arts teacher provided no individual feedback. While the students were practicing, he moved round, observed, and emphasised some fundamental elements of techniques.

The teachers in Soccer and Volleyball were actively involved in helping students execute skill drills and techniques while providing feedback. In Soccer, to practise the technique of kicking the ball with the inside of the foot, the teacher passed the ball to the students who took turns to speed up to hit the ball into the goal. At the same time, the feedback provided to individual students included eye contact on the ball/target, relaxation of the knee and ankle joints, as well as position of the standing foot and kicking foot. In Volleyball, to practise

offensive and defensive techniques, there were three students involved in the process with the help of the teacher who passed the ball to a student who hit it over the net. Of the two students on the other side of the net, one jumped up and blocked the ball and the other passed the ball to the teacher on the other side. While this was happening, the teacher corrected any errors made by individual students. There are two fundamental issues being addressed here. Firstly, the students were provided individual feedback on their practice, with the observation of the whole class. This helped to minimise the chance of other students making similar errors. In other words, students with the Reflector learning style had time to observe, listen and think cautiously before they acted. Secondly, the engagement of the teachers with students in the process created favourable conditions for students to be more actively involved in completing their task and promoted interaction and collaboration between the teacher and students. Students with an Activist learning style would feel more confident, comfortable, and motivated by this adaptation of teaching style. Students had a chance to take risks and enjoy new experiences with their peers in groups.

Feedback could include positive encouragement, but the disadvantage of this was that time might not allow the teacher to provide individual feedback to each student. In practice, while the teacher was offering feedback or demonstrating something to one individual, another student having problems might risk going unnoticed. Thus, in some circumstances, the teachers provided individual feedback, and in other cases they tried to keep the attention of the whole group/class—even when working one-on-one with a student. This helped to prevent all the students from presenting with the same problem.

In the context of physical education and sport, provision of feedback is one of the most common teaching styles used by teachers, especially during the practice stage. Providing different types of feedback is a modification of teaching style to address different learning styles of students. As a result, students can be more motivated to learn and have the opportunity to perform techniques more accurately and beautifully.

Whole class feedback was provided at the culmination of the class to consolidate these lessons in Athletics, Swimming, and Volleyball. Normally, the teachers summarised the main points the students had learned in the session. Particularly, in these sessions, the teachers stressed the most common mistakes the students made during the session and identified the need to improve. For example, in Athletics, before closing the session, the teacher called out one student to the front to slowly conduct the step-by-step techniques of starting to run as a

model, with the whole class's attention. The teacher observed, adjusted postures of legs, hand, eyesight to the front, and clarified all the steps. In Swimming, the teacher placed a greater emphasis on how to avoid the most common mistakes in breaststroke including head position and breathing, arm movement, leg movement, and body alignment. Also, the Volleyball teacher re-emphasised how to pass the ball to another player and how to block the opposing team's attacks and reminded students not to approach the ball too fast or early to optimise success. It is important to note that this consolidation stage was needed in the teaching procedures as this was an opportunity for the teacher to closely focus on key knowledge content of the lesson as well as skills and techniques students need to further explore themselves. Moreover, with an emphasis on common and major errors students made during the session, the teachers offered students ample opportunities to reflect on their performance, revise, and improve later. In this way, the teachers adapted their teaching styles to the students with the Reflector learning style.

7.3.1.3: Grouping

As observed across the eight practice sessions, the teachers enabled the students to work individually or allowed for collaboration with a partner or in groups. This flexibility in grouping depended on the nature of the sport, the knowledge content, and the skills that were to be acquired by the students. This section addresses the issue of how the teachers grouped students in delivering instructions in their sessions.

Individual work

Observation data across the eight practice sessions in relation to different sports demonstrated the students were provided opportunities to work individually. This was easily seen in Athletics, Gymnastics, Swimming, and Soccer sessions. For example, in Athletics, each student was asked to undertake the steps of starting to run from a starting block. It is acknowledged that Athletics is always an individual sport except for relay running, as is Swimming, in which the students practised breaststroke techniques in their own lane. Also, in Gymnastics, the students practised skipping rope techniques on their own ropes. In Soccer, the students took turns to move through five cones and kick the ball into the goal with the inside part of the foot, with the engagement of the teacher in guiding each student and passing the ball to them. In these sports, the teachers placed a greater emphasis on individual skills and techniques. Consequently, the students were given ample opportunities to work individually under the observation and supervision of the teachers. Assistance was also provided to individual students when needed during the practice. This type of grouping was used by the

teachers depending on the goal and context of the activity. Individual practice would suit the learning styles of the students who preferred to work on their own and at their own pace.

Pair work and groupwork

Along with individual work, students were provided with opportunities to practise in pairs as well as in groups under the supervision of the teachers in Soccer, Volleyball, Karate, Traditional Martial Arts, and Table-tennis. For example, in the Soccer session, the students were requested to practise in pairs with a ball. Two students stood close to each other and played with a ball using hands, feet, and head under the guidance and supervision of the teacher. Another example was in the Karate session where the teacher arranged a variety of groupings, ranging from pair work to groupwork, to involve students in different kinds of activities to better perceive skills and techniques as well as to maximise their potential and capacity to learn new knowledge. Due to a small class size, the teacher had a close connection and interaction with pairs and groups while they were practicing. He observed every student carefully and provided immediate support to individual students not only during warm-up exercises but also during the training session related to former and new techniques.

Additionally, pair work formed the foundation for the practice of skills and tactics in Table-tennis. After the demonstrations and analysis of techniques, the students were freely grouped into pairs for practice. It was of note that the teacher took no notice of how the students were divided into groups and on what foundation. Meanwhile, the Traditional Martial Arts instructor also divided the class into pairs and groups for practice and performance. Females could practise with males. The issue of preferred learning styles of the students was not taken into consideration in student groupings.

Different types of groupings can ensure effective results if the teachers know when and how to use them. Individual work enables students to use their own preferred learning styles and strategies. Pair work and groupwork foster student interaction and are preferred by students with the Activist learning style. To be effective, it is crucial for the teacher to constantly vary groupings in a session to address the variety of student learning styles in a class. More importantly, teachers should consider allocating students to pairs and groups to give a mixture of learning styles within them so that students can have the opportunity to demonstrate their dominant learning styles, support each other to complete the tasks successfully, and achieve a common goal. The issue of tailoring teaching styles to a variety of learning styles of students will be further explored in the next section.

7.3.2: Adaptability of teaching styles to different learning styles

An understanding of how to adapt teaching styles to students' learning styles is a critical issue that teachers need to address in their teaching practices. The following section provides observations of the adaptability of teachers' teaching styles to different learning styles of students across the eight practice sessions. One of the most important elements of aligning instruction to different learning styles is the teacher's awareness of individual learning style preferences.

7.3.2.1: The learning styles of the students

Whilst observing the teaching styles of the teachers, it was important to look at the learning styles of the students in the teaching and learning processes. Most of the students were actively involved in all activities organised by the teachers across different sports. In other words, they showed a preference for the Activist learning style. For example, the students in the Volleyball session were motivated and inspired to be involved in the training session as Volleyball was their major sport. They demonstrated positive attitudes towards learning and desired to be physically engaged in activities organised by the teacher, notably when the teacher actively interacted with them and provided support in the training process. The teacher appeared to be authoritarian and students made every attempt to complete all the tasks assigned by him. Correspondingly, they needed to obtain a certain level of performance to satisfy his teaching approach. In the Table-tennis session, all students were actively engaged in the learning process, reflecting a preference for the Activist learning style. They collaborated well and supported one another to achieve a common goal, that is, to master skills and techniques in a specific sport with high levels of awareness, motivation, interest, and engagement in practice. It was of note that the Activist learning style that the students showed in the abovementioned examples as well as in other practice sessions was the actual learning style observed by the researcher. It might not be their actual preferred learning style (free to learn in the way students would have liked to); it could be that the teachers put pressure on them to behave in that way.

Another example was the Karate session with only eight male students. All participants were actively involved in the training process with the assistance and guidance of the teacher, meaning that they showed a preference for the Activist learning style. This observed learning style might be different from their natural preference to learn as they acted in alignment with the teacher's instructions. There was a variation and continuation of exercises and activities during the session, which continued without a break. This could be explained by the fact that

all had a high level of motivation and interest in Karate, which was their major sport. They possessed and demonstrated excellent skills and techniques. It appeared that the teacher and this unique sport had a great impact on students' responsibility, behaviour, and attitudes towards learning. Swimming students appeared to be highly motivated as the training was closely associated with their area of study as well as their future career. Also, the students religiously followed the teacher's instructions and performed well in accordance with his commands. The researcher could see no evidence of the students' preferred learning styles was displayed as they took a passive role in the session. The teacher simply provided feedback to individual students as well as for the whole class. Likewise, in Traditional Martial Arts, the students were passionate about their major sport, and were enthusiastically engaged and diligently involved in the training session. It is possible that the students in the abovementioned practice sessions were exhibiting their preference for the Reflector and Activist learning styles. It is suggested that the teachers vary their teaching styles to help the students to develop these dominant learning styles as well as expand their less preferred learning styles (in this case, Theorist and Pragmatist).

Through the eight practice sessions, the students demonstrated their preference for the Reflector learning style. It was worthwhile mentioning that this observed learning style might be different from the students' actual learning style preference. This was apparent as they carefully observed the teachers demonstrating and listened attentively to the teachers analysing techniques, in all sports. It might be because they were trained by their schooling to do this in class. The Reflector learning style could be easily seen in different stages of the class across all practice sessions. This was particularly so in the early stage of the class, as students gathered and had their attendance checked under the control of the monitor and the teacher. While the teacher taught new techniques, students stood or sat in rows, watching the teacher demonstrate and listening to their instructions. At the end of the class, the students came together, and the teachers emphasised primary knowledge content and skills of the lesson, reminding students of common mistakes and how to improve, and requesting them to undertake further practice. Teachers constantly demonstrating and using verbal cues in their instructions would have been helpful to the majority of students who were naturally inclined to the Reflector learning style. Moreover, other teaching styles and activities would have helped students develop other learning styles.

However, some students expressed negative attitudes towards learning, or a lack of responsibility for their learning, in some sports. For example, at a certain point in the Soccer

session, some students had a short break after a vigorous activity. During this session, two female students were seen to sit outside the pitch for a break without asking for the teacher's permission. In the Gymnastics practice session, since the teacher did not set a time for practice, some students simply focused on training for a short period of time and then appeared to neglect it and gather in groups to relax and talk. In other words, they did not use their practice session to get as much out of it as possible. They would stop and talk to each other when the teacher did not keep an astute eye on them. There were a number of factors leading to this phenomenon. Firstly, they were in the first semester of the first year, and they had not adapted themselves to the new learning environment which required them to do a lot of physical activities. Consequently, they were not strong enough to undertake such exercises over an extended period of time. Secondly, they may have thought that these exercises were boring since they were based on individual practice rather than a group task and collaboration. Thirdly, during the first year, they were not fully aware of their own learning approach. Accordingly, they did not develop a sense of responsibility for their learning activities. The teacher did not closely monitor and adjust the approach of these students who were not accustomed to training at a high level at a sport university. Presumably, over time the teachers would assist their students to effectively adapt to the new learning setting.

It was difficult for the teacher to identify a variety of preferred learning styles of students due to the class size. For example, in the Swimming session, there were 23 students, and in the Gymnastics session, there were 30 students, which was a large number for the teachers to be aware of differences in learning styles. Addressing the issue related to differences in students' learning styles was challenging for the teachers. As a common practice, the students followed the teacher's instructions and practised diligently under the teacher's supervision. The teachers attempted to manage the students' levels of engagement but also to maintain and increase their participation in physical activities.

In fact, in all sessions, the students were requested to undertake tasks and activities following the instructions of the teacher. No student had a chance to raise their voice in the sessions. This implies that the teachers were unlikely to address different learning styles of the students. In order to promote the activeness and creativity of students in the process of learning, students should be required to raise questions rather than just respond to questions. The teacher should step back, and students should be encouraged to step up. Generally, in the sessions, teachers should not talk much or interfere with students; they just need to organise students into groups to collectively discuss a specific topic in relation to knowledge content about

techniques. Students need to think, collaborate, and complete the task designed by the teacher. The practice sessions would be more meaningful and beneficial if the teacher knew how to link issues discussed relating to skill learning and techniques to the implementation or performance stage. Such incorporation is vital in sport education as it would provide students with the knowledge needed for a better understanding of, and the development of sport skills and techniques.

7.3.2.2: Lack of adaptability of teaching styles to learning styles

It was important for DSU teachers to determine the students' learning styles and tailor instructional styles to learning styles. This issue was central to motivating, inspiring, and enhancing student learning in the teaching practice. Generally, there were various learning styles in a class; however, it was not easy to identify differences in learning style preferences of the students. During my observations of the eight practice sessions, the teachers did not address this issue, and every student was treated equally in their instructions. No individual differences were taken into account to promote motivational levels and engagement in any of the physical activities. It seemed that all the activities carried out during practice sessions were based on the teachers' prior teaching experiences.

The teachers adopted a standardised lesson plan for all students and used the same teaching strategies throughout the session. It was of note that all students were treated equally, irrespective of differences in learning needs. As such, there was little evidence of the teacher adapting his instructional styles to a variety of learning styles. In the Karate session, every student showed their obedience, responsibility, and engagement in learning activities under the teacher's instruction, observation, and guidance. The teacher was primarily concerned about how his students perceived knowledge and skills, how they conducted exercises, and about the necessity to provide feedback to individual students in the practice session.

Meanwhile, in the Traditional Martial Arts session, while females were physically weaker than their counterparts, they trained very hard. Despite this gender difference, the teacher applied the same lesson plan and teaching styles to the whole class. As noted during the observation of the Table-tennis session, the teacher did not address the issue of adaptability. This was shown through the division into groups for practice, irrespective of differences in students' capacity, skills, and professional levels, as well as differences in gender. Attention to such issues could help students reach their full potential and maximise their learning if they could receive valuable support from their peers. Also, the Gymnastics teacher was not

concerned about the students' preferred learning styles. He provided one-on-one support for several students who made mistakes and in this way, other students could learn from these mistakes. In practice, the teacher was unable to provide assistance and support for the majority of students due to the limited time in a session.

One of the most important observations in the Volleyball session was of a mini competition between two teams at the end of the session. This represented a marked difference in the adaptability of teaching style between this sport and the other seven practice sessions. The class was divided into two teams and the teacher played the role of a referee, watching the game to provide feedback later. With competition, students expressed greater interest in interacting and collaborating with each other. Also, this was a favourable environment where they could apply what had been learned into practical situations. Those who preferred the Pragmatist learning style would have been more interested in participating in this game; they would have been helped by this adaptation of teaching style.

7.3.2.3: Differentiated/Individualised instruction

While teachers did not clearly adapt their instructional styles to different student learning styles in any of the teaching sessions, they did employ differentiated instruction based on gender differences, in some sessions. Students enter the classroom with a range of differences in their readiness (Trinter et al., 2015) and this instructional approach aims to deal with student diversity (Suprayogi & Valcke, 2016). In relation to physiological trait, researchers have indicated that male students are in their better position to perform well in PE as generally they possess better physical conditions to develop key factors including strength, flexibility, and endurance (Evans, 1989; Lagestad, 2017). In Soccer, the teacher was cognisant of gender differences; thus, he did not allow females to perform advanced techniques which required strength, stamina, and skills with a high level of difficulty. Particularly, they were not requested to undertake the practice of five stages of kicking the ball with the inside part of the foot as it seemed to be challenging for them, and it was not needed for Sport Management (SM) students, notably female students. Instead, they were asked to conduct lighter exercises with lower level of difficulty. In other words, the teacher differentiated their instruction to accommodate differences of students..

Gender differences were also a key factor that the Volleyball teacher was aware of in his teaching practices. There was an observable difference in physical qualities between males and females in the session. Height, weight, endurance, strength, and flexibility are beneficial

features to possess in most physical activities, particularly ball games, which shapes a big part of the PE (Standal et al., 2020). In this sport, females were not as physically strong as males, and compared to their counterparts, did not possess the same level of motor skill expertise. Females appeared to be exhausted after a period of training. Thus, the teacher did not ask them to hit the ball over the net with force. For those who were exhausted, the teacher encouraged them to pass the ball over the net, which did not require force. This was identified as the individualised instruction the teacher was employing based on differences in gender.

The teachers might be fully aware of, and gain a better understanding of gender differences, and therefore did not put much pressure on females during the sessions. It is worthwhile noting that in the context of sport teaching, teachers needed to adapt differentiated and individualised instruction not only because of differences in gender but also because of differences in learning needs, background, interests, personality traits, and abilities. All these elements should be taken into consideration by teachers in their teaching practice.

Table A13 in Appendix 13 summarises key aspects of the observed teaching sessions, including teaching styles used and any evidence of adaptation to meet the needs of different students.

7.4: Chapter summary

This chapter provided the key findings from the observations of eight practice sessions through the three pedagogical lenses which included the teaching styles commonly used by the lecturers, differentiated and individualised instruction, and the adaptability of teaching styles to different preferred learning styles.

Firstly, demonstration, verbal cues, and feedback were some of the most common teaching styles used by sport education teachers. When demonstrating, some teachers used another student to show the skill with them, coupled with explanation and analysis of techniques required. This was particularly in Martial Arts (Karate and Traditional Martial Arts) and Table-tennis. Feedback was also provided to the students across the sports, especially, in Soccer and Volleyball, where the teachers provided feedback while being involved with students in undertaking movement techniques. In addition to providing individual feedback, the teachers in most sports focussed the whole class's attention on common mistakes. Pair work and group work were also employed by some sport education teachers during the practice stage. However,

the students themselves were free to form their pairs and groups, meaning that the teachers took no part in grouping students.

Secondly, differentiated/individualised instruction was one of the teaching styles employed by the teachers to adapt to physical differences between males and females, such as in Soccer and Volleyball. By nature, females were physically weaker than their counterparts; therefore, they were not required to undertake exercises which demanded strength and stamina. For example, the Soccer teacher did not ask females in SM to dribble and kick the ball to the target. Likewise, in Volleyball, females were not requested to hit the ball over the net with a great force.

Thirdly, observation data demonstrated that the teachers did not clearly and frequently adapt to different learning styles of students in most practice sessions. This may be due to the fact that the teachers lacked knowledge about the preferred learning styles of the students. They might not be able to identify the students' learning style preferences or provide students with an opportunity to be aware of their own learning styles. Therefore, the same teaching styles as well as the standardised lesson plans were used for the whole class, regardless of the different preferred learning styles that students might have. The students passively obeyed and followed the instructions of the teachers and undertook all the learning activities. This is commonplace in classes in the Vietnamese educational system, and it was difficult for the teachers to identify differences in students' learning style preferences. The issue of learning style preferences of students, teachers' knowledge of learning styles, and how it was applied in teaching practices will be discussed further in Chapter 8.

Chapter 8: Discussion of results

8.1: Introduction

The primary purpose of this research was to identify the factors that contribute to the learning styles of students at Danang Sport University (DSU). Once the preferred learning styles were determined, the relationships between the learning styles and gender, age, major, year of study, and student type were examined. Furthermore, the researcher explored sport education teachers' knowledge and understandings of learning styles and how these are applied to their teaching practices. Learning styles in sport education were explored by incorporating the overarching question which guided this research study:

What are the factors that contribute to sport student learning styles?

The following three sub Research Questions (RQs) were posed in order to focus the research further:

- **RQ1.** Is there a relationship between students' learning styles and age, gender, major, year of study and student type (i.e. student or student-athlete)?
- **RQ2.** What is the current level of knowledge of learning styles amongst sport education teachers?
- **RQ3.** In what ways do sport education teachers adapt their teaching styles to individual learning styles?

Based on the quantitative findings of the research, the participants at DSU collectively showed strong preferences for the Reflector and Pragmatist learning styles and displayed moderate preferences for the Activist and Theorist learning styles. Also, through this research it was found that Reflector was the most dominant learning style among the students, followed by the Pragmatist, Activist, and lastly Theorist learning styles. There was a statistically significant relationship between the Reflector style and gender, age, and year of study, and between the Theorist style and student type, but there was no statistically significant association between learning styles and major. Based on the qualitative component of this research, the lecturers in this study demonstrated only a limited understanding of student learning styles. They did not clearly and frequently adapt to the different learning styles of students.

This chapter addresses critical findings from the quantitative and qualitative analysis. More specifically, a summary of the preferred learning styles of DSU students in relation to the literature and the relationships between students' learning styles and gender, age, year of study, major, and student type are presented. The quantitative findings are compared and contrasted with the literature and with the qualitative findings of the research. Additionally, the chapter discusses sport education teachers' knowledge of learning styles and their adaptation of teaching styles to students' individual learning styles.

8.2: Danang Sport University students' learning style preferences

It is important to note that the preferred learning styles of DSU students are directed towards two main parts. Therefore, this section first discusses the five preference degrees of learning styles of DSU students. It then presents the order of preference of single learning styles among study participants. A comparison between quantitative and qualitative data in relation to learning styles is also highlighted.

8.2.1: Degrees of preference for learning styles

In alignment with the five levels of preference ('very strong preference', 'strong preference', 'moderate preference', 'low preference', and 'very low preference') proposed by Honey and Mumford (2006), as depicted in Table 5.8, the participants at DSU collectively showed strong preferences for the Reflector and Pragmatist learning styles. Pragmatist was the main individual learning style but when compared with the Reflector learning style was more prevalent; however, the level of difference between these two learning styles was not significant. Preference for the Reflector style was consistent with Mak et al. (2007) who found that both undergraduate and postgraduate students at the Hongkong Polytechnic University showed strong preference for the Reflector learning style. Although these two settings have a focus on practicalities, students still displayed a strong preference for the Reflector learning style. This learning style was important for students in approaching their studies at DSU. The findings of this research are not only significant to DSU but also to colleges and universities in Vietnam as well as other institutions outside of Vietnam. They are essentially crucial to the teaching and learning practices, especially in the context of physical education and sport. An understanding of students' learning styles helps teachers to use suitable teaching styles to fit in with the learning styles that students show strong and very strong preferences for and to develop the learning styles that students exhibit moderate, low, and very low preferences for.

In relation to the Pragmatist learning style which DSU students showed a strong preference for, this was significant to students, essentially in the sport setting. They emphasised the need to apply theory into practice and try things out immediately. This learning style was needed for sport students in which they focused on the two components of learning – theoretical sessions and practice sessions. Their knowledge and understanding from theory in relation to sport skills and techniques needed to be put into practice during practice sessions.

Additionally, the findings revealed that DSU students displayed moderate preferences for the Activist and Theorist learning styles. The research finding was consistent with Czepula et al. (2016) and Mak et al. (2007) who found Pharmacy students at the Federal University of Paraná, Brazil and polytechnic postgraduates at the Hongkong Polytechnic University, respectively exhibited moderate preferences for the Activist and Theorist learning styles. A possible explanation could be the fact that DSU students tended to be active while participating in sport activities at a moderate level of preference. In practice, they studied both theoretical subjects in classrooms and practice sessions in courts or playgrounds; therefore, they demonstrated a moderate preference for the Theorist learning style. However, the findings were inconsistent with Raju (2011) who conducted a study on the learning styles of 400 management students following a 2-year full-time MBA program in a campus of Pune city in the state of Maharashtra in India. The results revealed that the students demonstrated very strong preferences for Activist and Theorist learning styles, and moderate preferences for Reflector and Pragmatist learning styles. Significant differences in preference levels of learning styles between Raju (2011) and the current research could be explained by the fact that the participants in the previous study were at a higher level of study, and they might primarily focus on the component of theory learning.

8.2.2: Order of preference of the four learning styles

Through this research it was found that Reflector was the most dominant learning style (36.1%) among the students at DSU, which is important to student learning in the context of sport setting. The research showed that the students with the Reflector learning style preferred to be more introspective, more thinking than doing, ruminating ideas in their heads before raising their voice in discussions, enjoying observing other people in action and listening to others. They tended to think about things thoroughly before coming to any conclusion. Like any other professional courses, sport students are required to learn a significant number of facts and

theories. They are also expected to be skilful in observing demonstrations, planning training, investigating and analysing information related to the knowledge content within their field.

The research suggests that teachers should assess students' learning styles by administering a Learning Styles Inventory (LSI), Index of Learning Styles (ILS) or Learning Styles Questionnaire (LSQ). The findings suggest that students should be more balanced in their learning styles and try to be more active in their learning. Otherwise, their own professional development in their field may be limited if they can only use one learning style. Kolb (1999) states that no particular learning style is better than another. Based on the results emanating from this study, it would be best for students to promote a strong preference in one or more than one of the four learning styles and attempt to develop other learning styles to be able to flexibly respond to various teaching styles of teachers.

Comparing different studies which used the Honey and Mumford LSQ (2006), the results of this study were consistent with the study on an 'A' level programme in a college of further education in the UK by Woolhouse and Blaire (2003), both showing a dominance of the Reflector learning style. However, the findings of this research have contradicted some aspects of that of Brown (2013) who investigated the learning styles of college athletes in the US. This research indicated that the Theorist learning style was the most prevalent among participants across a variety of sports (22.6%), followed by the Pragmatist (18.1%), then Reflector (14.2%), and Activist (13.5%) learning styles. Across the studies (Brown, 2013; Woolhouse & Blaire, 2003), Pragmatist was the second strongest learning style among the study participants.

The results of this study also demonstrated that the Pragmatist was the second preferred learning style (15.9%) among DSU students. In alignment with this, students expressed their desire to integrate practice into theory, meaning they are practical learners who want to apply what has been learned into practice. In the theoretical classes, they need the teachers to provide, explain, and clarify issues in relation to real-life situations. In practice sessions, skills, techniques, and tactics they have learned are also needed to be applied in competitions at the end of the class time. In their teaching practice, teachers should offer opportunities for students to apply the theory into practice. This would help them with better recollection of knowledge and be more successful in their ongoing professional development.

An unanticipated finding was the small number of students who exhibited their preference for the Activist learning style (7.2%, n = 42). Activist was the least preferred learning style of the four learning styles among DSU students, despite the fact that kinesthetic learning was a

fundamental part of student learning for sports students. This result was in line with the above Brown (2013) study which found that only 13.5% of college athletes preferred the Activist learning style, less than each of the other three learning styles. This indicates that although these students are involved in the sport environment and primarily focus on practice sessions, they do not tend to take risks and engage in new experiences actively. They do not get totally involved in physical activities and do not work well with others, ask for help, and talk through problems with others. Instead, they plan appropriately and consider the benefits prior to being involved in any activities. However, while responding to the interviews, the students with this learning style were interested in participating in practice sessions as these provided them with levels of comfort and relaxation after theoretical sessions. Also, these offered them opportunities to interact with their peers whilst being involved in the training of sport skills and techniques.

Being students studying in the sport setting, they tend to prefer practical sessions to theoretical classes, which accounts for why so few participants preferred the Theorist learning style (2.9%, n = 17). This finding was inconsistent with the study of college athletes by Brown (2013) who found that Theorist was the most prominent learning style of the four learning styles, preferred by 22.6% of students. The DSU students were not overly enamoured with basic assumptions, principles, and theories. The research showed that students were less passionate about theoretical classes with some students finding it hard to memorise and understand subjects with a significant amount of knowledge and information. Additionally, they did not have a strong inclination toward gaining more in-depth knowledge by reading reference books recommended by the teachers.

Correspondingly, lecturers may help students to facilitate their learning by using appropriate teaching styles. For example, to respond to less dominant learning styles amongst students at DSU (Theorists and Activists), and make their learning more productive, lecturers could use problem solving, games, role-playing exercises, or activities backed up by ideas and concepts that form a model, system, or theory. Students can be provided with a variety of exercises and different groupings to develop their learning styles, enhance their learning, and accommodate to the teacher's teaching style. Developing skills in all learning styles is of great importance (Shuck & Phillips, 1999).

8.2.3: Comparison between quantitative and qualitative data in relation to learning styles

The qualitative findings further supported, clarified, and confirmed the quantitative data, which increases the reliability and validity of the data sets. The survey and interview data were closely aligned with each other in terms of the order of the most and least dominant learning styles among DSU students. These datasets demonstrated that Reflector was the most prevalent learning style among students and that the least preferred learning style was Theorist. These results are likely due to the personality of the Vietnamese students – they are not as active as they seem to be and do not want to take risks whilst being involved in physical activities. They need to watch, listen, and understand clearly prior to acting. This was consistent with the study conducted by Charlesworth (2008) and Wong (2004) who found that Asian students seem to be more passive and reflective learners rather than activist learners. The current study was conducted in Vietnam and all participants were Vietnamese. They had something in common with Asian students in relation to the reflector behaviour. This could be explained by culture having an impact on an individual's learning styles. In terms of the Theorist learning style that the students prefer the least, this result may be explained by the fact that DSU students tend to demonstrate their preference for practice sessions rather than classroom-based learning. The latter form of learning exacerbates student's boredom and causes feelings of tiredness, particularly with subjects encompassing a significant amount of information and knowledge to memorise.

Based on interviews, students with the Reflector learning style desired sufficient time to gather information and evidence from different sources in relation to theoretical learning. They also tended to think and observe carefully before raising their voices or coming to any conclusions. Likewise, in practice, they expressed their desire for careful observation and thorough thinking before acting or performing an action. Watching the teacher demonstrating, coupled with listening to their instructions helped to form images in their brain for a better recollection of things. In addition, to enhance skills and techniques, students watched performances of professional athletes through video clips on YouTube.

The qualitative findings also showed that students with the Activist learning style emphasised the need to work in groups and interact with their peers and the teacher in theoretical classes. During practice sessions, they desired to proactively participate in all learning activities in which they could learn and support each other. Contrary to the survey results, through interviews with students, students seemed to prefer this learning style. They

said that it was a favourable environment for them to engage in new experiences. In instruction for theory and practice sessions, teachers should design multiple activities for students to be involved in, in an effort to cater for students with a preferred Activist learning style.

Whilst learning in theoretical classes, students with the Pragmatist learning style preferred the teacher to present applicable instances in relation to practical situations. For example, situations that normally arose included how to prevent and deal with injuries during training or how to calculate points during competitions. These students expressed their interest in applying new knowledge and skills into practice (games and competitions). It is of note that Pragmatist is an important learning style, especially for students in the area of sport, when they must combine both theory and practice in their studies. If a student has an extensive knowledge of theory but they do not know how to put it into practice, they are not regarded as a successful student. Trying to test theory to see how it works in practice is not only an important quality for students while they are at university but also helps them in their future professional development. Thus, it is suggested that teachers identify and understand students with the Pragmatist learning style, and present more actual situations as well as provide students with opportunities to apply theory into practice.

Students with the Theorist learning style showed their interest in reading. Through reading, they were capable of analysing and synthesising facts and material well to further investigate the issues in relation to the knowledge content. In addition, students with this learning style were analytical, precise, and thorough. This information is important as it assists teachers in gaining insights into this learning style. It is recommended that teachers provide more reading to help students gain more in-depth understanding of the content of the lesson. In this way, the teachers attempt to accommodate students with the Theorist learning style and help others to develop this learning style which is less preferred.

It is worthwhile mentioning that there is no best learning style. Students should be encouraged to have a prominent learning style and develop other learning styles. In addition, it would be good for students to possess multiple learning styles to flexibly and effectively adapt to teaching styles of teachers as well as to successfully complete a variety of tasks and activities assigned by the teacher.

The results of the study have added to new knowledge in the instructional practices of teachers. On one hand, teachers should direct their teaching styles to the prevailing learning styles of students (Reflector and Pragmatist in the case of DSU students) and for students with

these preferences, giving them time to listen, observe, and think about what happened before coming to a considered opinion, and by showing techniques with clear practical advantages, with feedback from an expert. On the other hand, the teachers should help to develop other less dominant learning styles (in this case Activist and Theorist). It is important for teachers to understand that students learn in a variety of ways and to try to encompass all learning styles in their teaching (Zhou, 2011). According to Romanelli et al. (2009) teachers should reach the majority of students in a class, through instruction appropriate to their learning styles and use other activities to challenge all students in their learning.

In their teaching practices, it is important for teachers to identify the learning styles of students. Also, students need to be aware of their own learning styles with the help of teachers. Once both the teachers and students are cognisant of the importance of the issue of learning styles in teaching and learning practices, these variables should be taken into account in every lesson plan. Different kinds of activities are designed in accordance with characteristics of every learning style.

8.3: Relationships between learning styles and student variables

This study investigated relationships between DSU student learning styles and their gender, age, year of study, major, and student type.

8.3.1: Relationship with gender

The findings revealed a statistically significant association between the Reflector learning style and gender. Female students showed a greater preference for the Reflector learning style with a mean score of 9.05 and a standard deviation of 1.28 (9.05±1.28) than male students with a mean score of 8.55 and a standard deviation of 1.69 (8.55±1.69). This finding was consistent with studies by Andrea et al. (2015) and Wagner (2016) who found that there was a close connection between gender and VARK (Visual/Auditory/Read-Write/Kinesthetic) preference and that learning style preferences varied between men and women (Andrea et al., 2015). However, no significant difference was found between the learning style preferences of sport sciences students and their gender at Ondokuz Mayıs University, Turkey (Bostanci, 2020). Additionally, the Honey and Mumford LSQ found major gender differences in learning style preferences (Brown, 2013; Mazo, 2017). Particularly, females showed a strong preference for the Pragmatist and Theorist learning styles; whereas, males exhibited a lesser preference towards these learning styles (Mazo, 2017). However, these findings were contrary to Brown (2013) who indicated no significant association between learning styles and gender. Despite

being conducted in a similar sporting context with Brown (2013), the current research revealed different findings. This may be explained by the fact that there were two types of students at DSU: students and student-athletes, and they majored in the three different areas of Physical Education (PE), Sport Coaching (SC), and Sport Management (SM).

In addition to the statistically significant relationship between the Reflector learning style and gender, it was interesting to find that female students showed a stronger preference for the Theorist and Pragmatist learning styles based on the mean scores. The findings were consistent with how sport education teachers responded in interviews concerning their understanding and knowledge about learning styles. When asked about the difference in learning styles across genders, they stated that female students tended to stand back to listen and observe, as well as to think carefully before acting, meaning that they preferred the Reflector learning style, as stated:

> *"Females are patient to listen to the teachers in theoretical classes and observe carefully during practice sessions." (Lecturer # 5)*

The qualitative findings supported and strengthened the survey results with respect to the relationship between the Reflector learning style and gender. This finding contributes new knowledge to what is a gap in the literature. Also, females expressed their greater desire to learn theoretical subjects than males. In other words, they liked to analyse and synthesise knowledge content, and preferred to maximise certainty in their learning activities, representing the Theorist learning style. The qualitative findings also indicated females showed a preference for the Pragmatist learning style. Coupled with their preference in learning theory, they preferred to establish a linkage between theory and practice as well as how theory is applicable to real-life situations.

However, there was no significant difference in gender for the Activist learning style. This is consistent with what was observed across practice sessions. In the sport setting, both female and male students were open-minded and enthusiastic about anything new. They enjoyed the here and now and were happy to do sport when encountering the sport environment. This was not matched by how the teachers responded in interviews. Many of them mentioned some of the differences between males and females in the sport setting. Particularly, they talked about females not being as physically strong as males, and not having the capacity to possess good motor skills compared to their counterparts, coupled with biological, physiological, and psychological differences that affected their engagement in the training process.

Gender differences in approaches to teaching and learning were clearly observed across the three practice sessions in which the teachers applied individualised instruction in their teaching. This teaching style was commonly applied to the context of physical education and sport, especially in the teaching of sport skills. For lecturers, understanding the relationships between learning styles and gender was vital as they taught in classes with a mix of gender as gender differences impacted student learning styles as well as their engagement in learning activities. In the Volleyball session, female students were not asked to hit the ball over the net with force as they seemed to be tired and had to sit outside. As could be seen during the Soccer session, the teacher did not request females to perform difficult techniques which required strength, stamina and skills such as running, dribbling the ball through cones, and kicking the ball into the goal. In the Gymnastics session, a female student, experiencing menstruation, did not feel well enough to be involved in the session; she simply sat outside and observed what was happening. The teachers might be fully aware of, and understand physical weaknesses of female students, and therefore did not navigate a strict regulation that they had to follow during the sessions.

Together with individualised instruction that was used in the teaching practices, observation data showed that the teachers mixed both males and females in pairs or groups. Piotrowski (2013) claims that mixed gender grouping may strengthen performance of masculinity and femininity because young boys and girls know that opinions about their beauty may be based on these characteristics. This finding was significant as they could support each other in completing the tasks assigned due to the fact females seemed to be physically and technically weaker than their counterparts. Hill (2015) indicated that in PE setting, students are often connected with physical appearance and performance such as capacity, strength or muscularity. The close relatedness to sport and masculinity of the students in PE is also supported in a number of research (Davison, 2000; Drummond, 2003; Tischler & McCaughtry, 2014). Biological traits between genders are essential as weight and size are associated with stamina, strength, and flexibility, which plays an important part in physical capacity (Hansen, 2005). In terms of physiological charateristics, males perform better as they have better physical conditions to develop strength, flexibility, and endurance (Evans, 1989; Lagestad, 2017). Therefore, male students might help their counterparts within pairs and groups to fulfil any tasks or exercises which require higher level of strength, stamina and flexibility. More importantly, a mix of gender helps maintain a balance in learning styles within pairs/groups,

and students can have the opportunity to learn from each other and develop their less dominant learning styles.

8.3.2: Relationship with age

The survey results indicated a statistically significant correlation between the Reflector learning style and age. The 22–25 age group students (9.05±1.22) strongly preferred the Reflector learning style compared to the 18–21 age group students (8.56±1.72). The finding of the present research was closely aligned with that of Wagner (2016) who found a significant relationship between the variable of age and preferred learning style of mathematics students at a community college in Pennsylvania. By contrast, Bostanci (2020) found no significantly significant relationship between sport sciences students and their age groups. The finding of the current study showed that as students became more mature, they tended to prefer the Reflector learning style. This means that compared to younger students, older students are normally more thoughtful and patient, and listen and observe before acting. This pivotal finding provides teachers with vital information in designing activities which suit the preferred learning styles for each age group.

The research also showed that the mean scores for the Pragmatist learning style increased from 8.37 to 8.52, and then to 9.25 in alignment with the age groups of 18–21, 22–25 and 26–29. This might be due to the fact that as students become more mature, the more practical they become. These students want to know how to put what they are learning into practice in the real world. Also, as they are older, they have more experience to experiment with theories, ideas, and techniques, and the Pragmatist learning style is important and needed for them in integrating theoretical and practical knowledge. Therefore, it is suggested that teachers provide more opportunities for students, especially those who are about to graduate to better understand and experience practical situations in the real world.

The study results confirmed that the Reflector and Pragmatist learning styles became more preferred as age increased. Therefore, teachers should take the age factor into account in the instructional practices. They should also design a variety of activities for students to be involved in. In this way, the students can develop their less preferred learning styles of Activist and Theorist to ensure a balance in their learning styles.

8.3.3: Relationship with major

The findings revealed no significant impact of major area of study on the learning styles. This was consistent with the study by Colvey (2014) who demonstrated no correlation between the

preferred learning styles and the major fields of study of participants enrolling in professional programs in the Department of Health, Physical Education, and Sport Sciences at a university, located in the mid-south in the United States. As noted, DSU students specialised in one of the three major areas of PE, SC, and SM but their learning style preferences were not related to the major area. A possible explanation for this is that they entered the sport university with some similarity in their sport background as well as in their passion about sport. However, this finding was contrary to Peters et al. (2005) who revealed that the outdoor recreation students were more tactile and less auditory than students of sport studies and sport and exercise science. Likewise, the findings in the study conducted by Wagner et al. (2014) revealed a significant relationship between college majors in Dietetics, Exercise Science, and Athletic Training and student learning styles.

In line with the quantitative findings, some sport education teachers stated that there were no differences in students' learning styles for different majors. This may be due to the fact that students were forced to adopt one learning style because of the teacher's teaching methods. Students across the three faculties of PE, SC, and SM depended a lot on the teachers lecturing with the use of slides to illustrate points. They might not be able to note down sufficient key points using their own words that would help them memorise the material. Such learning styles would be described as inactive learning as there was no interaction between the teacher and students in the process of delivering, grasping, and comprehending knowledge. Therefore, students had little chance for gaining a deeper understanding of the knowledge content, and this had an impact on the memorisation of knowledge. Not only in the acquisition of theory but also in the mastery of skills in practical sessions, students relied entirely on the teacher with their focus on presentations and demonstrations. Students based their learning on memorisation as a key learning process whilst observing demonstrations was the most common way students used to acquire practical skills. They were primarily concerned with practical skills in a variety of sports rather than devoting a great deal of time to learning theory. To enhance sport skills, most students practised technical movements constantly and made an attempt to increase the amount of movement. This continual practice and an increasing amount of activity significantly contributed to developing fundamental motor skills and increasing physical strength, which was crucial to a variety of sports. On the other hand, students demonstrated a lack of creativity and limited learning in how to manage sport activities, umpire matches and organise competitions. In addition to acquiring sport skills students needed to also learn these sorts of skills.

Additionally, the research showed that most sport students tended to prefer visual, auditory, and kinesthetic learning. These important learning styles appeared to be characteristic of sport students, together with a preference for interaction and collaboration during the training sessions rather than working independently. Therefore, students need to be provided with a supportive learning environment in which audio-visual materials, coupled with demonstrations are used to enhance student understanding of techniques and foster their engagement levels in physical education and sporting activities.

However, according to some sport education teachers, there existed differences in student learning styles across the three majors of PE, SC, and SM. For example, SM students displayed a preference for theory learning and tended to further explore relevant knowledge through video clips, books, and newspapers. This was due to the fact that in accordance with the training program, SM students had to deal with a very large amount of theoretical knowledge pertaining to the area of sport management. By contrast, students from the faculties of PE and SC seemed to engage more in training sessions and competitions, with the goal of acquiring and mastering practical skills in the clinical setting, rather than engage in the learning of theory, as they primarily focused on improving specific sport skills and achieving high sport performance in their major sport. In other words, students of three different faculties have different approaches to their learning in association with what they needed to perceive in the training program. The following section further discusses differences in the learning styles of the students in the three different areas of study.

Sport Coaching

Sport education teachers indicated that most SC students possessed good fundamental motor skills and specific sport skills, but might not be able to perceive, comprehend, and memorise theoretical knowledge thoroughly. Since student-athletes had started their training at an early stage in their life, they were fully equipped with professional skills. Additionally, they had good motor skills. As a result, they could learn skills and techniques very quickly, not only in their major sport, but also in a variety of sports. With a great passion for, aptitude for, and devotion to sport, some achieved high performance in national, regional, and international competitions. However, as compared to students of other faculties, they seemed to perceive knowledge in the theoretical subjects more slowly, and most of them had difficulty studying theoretical subjects. This was due to the SC students being more focused on training sessions and some of student-athletes having to dedicate time to training in the sport centre. Consequently, this led to their exhaustion and had a profound effect on their learning of theory.

With the difficulty that SC students faced, it would be helpful if they could be exempted from several class hours in relation to their major sport. This would help to minimise their workload and offer them an opportunity to perceive theoretical knowledge content more effectively. In addition, the teachers should lecture in a succinct and appealing way that helps to increase student levels of motivation and engagement. As such, they could find it easier to acquire and memorise knowledge. In other words, it is important for teachers to help these SC students to develop their Theorist learning style.

Sport Management

As stated by sport education teachers, the propensity and capacity for the mastery of sport skills and the learning of theory of SM students differed from SC students. Unlike SC students, SM students focused primarily on theory or studied a lot of theory related to sport management as stipulated by the training program, rather than placing an emphasis on the practice of sport skills. With a greater emphasis on theory, SM students demonstrated fundamental skills while dealing with the component of theory learning, including good analysis, presentation, and memorisation skills. With regards to the acquisition of specific sport skills, they acquired techniques in a specific sport from the teachers very slowly, and this had a negative impact on their performance of new techniques. This applied to practical skills related to a wide range of sports. Thus, most of them attempted to practise skills simply to pass the exams. Additionally, as some students stated in interviews, the teachers did not expect them to acquire proficient sport skills in practice sessions.

Furthermore, the research showed that SM students were not as active in practice sessions as students in PE and SC; however, they were more reflective than those in PE and SC. This is important as the Reflector learning style is suitable for SM students who will work in the area of sport management after graduation. People with the Reflector learning style have the ability to listen and observe, thorough preparation, careful thinking before acting, research, and evaluation (Honey & Mumford, 2006). In addition, students in SM showed a stronger preference for the Theorist learning style as in accordance with the training programs, they are mostly provided with theoretical subjects which assist them in managing sport such as in clubs or gyms. In teaching practice, teachers should help maintain the preferred learning styles of SM students (Reflector and Theorist) as they closely relate to their major area of study. Also, it is suggested that teachers assist the students to extend the other learning styles of Activist and Pragmatist by providing diverse activities.

Physical Education

Between the two extremes represented by SC and SM students were PE students, with a balance between the learning of theory and practical skills. PE students did not obtain high-level practical skills compared to SC students, and they did not display such a strong preference for the Theorist learning style as did SM students. PE students tended to equally stress the importance of the two components: theory and sport skills. They appeared to be more diligent in learning and participating in extracurricular activities to gain a deeper understanding of techniques, improve skills, and make more progress in their performance. In relation to theory, they prepared well for the exams; more specifically, they knew how to review lessons for the exam according to the contents of the test, with a goal of obtaining good results in the exams. In line with the training objectives of the faculty of PE, students work as PE teachers at all levels of the education system, from elementary to university levels. In response to this, PE students emphasised the need to master teaching methods as well as fundamental skills in relation to a variety of sports. Therefore, to be effective sport education teachers, PE faculty staff should have appropriate strategies to help PE students acquire and develop a balance of all learning styles. This assists them in the acquisition of knowledge and skills not only in their current studies but also for their ongoing professional development, as they in turn educate their students, who will have a variety of preferred learning styles.

8.3.4: Relationship with year of study

The findings revealed a statistically significant relationship between the Reflector learning style and year of study. Seniors showed a stronger preference for the Reflector learning style than their counterparts. This was in alignment with the results revealing that the third-year students showed a significantly greater auditory preference in their learning styles than their first-year counterparts across a range of sport-related programmes at a UK University College (Peters et al., 2005). In relation to the current research finding, it is important to note that students in the final year seemed to be more reflective in their studies. This may be explained by the fact that as students are becoming more mature, they tend to be more careful, critical, and detailed in approaching their studies. However, this finding was inconsistent with that in a study undertaken by Brown (2013) who showed no significant association between learning styles and year of study.

Interviews with sport education teachers revealed some of the differences in the learning styles of students across years of study. Freshmen and sophomores were more activist than

juniors and seniors. The teachers said that students in the first two years expressed their desire to learn different kinds of sports because they did not know much about sport before entering university. Therefore, they devoted themselves to training to learn skills. Additionally, freshmen and sophomores seemed to be more reflective than juniors and seniors, but they were not as pragmatist as juniors and seniors. This was because students in Year 1 and 2 were not used to a new university environment, teachers' teaching styles, practice sessions, and the timetable. By contrast, juniors and seniors tended to prefer the Theorist learning style once they achieved some level of performance in relation to practice skills.

One important difference related to attitude, behaviour, and responsibility of students towards learning. Students in the first years were not fully aware of their own learning, but students in Year 3 and 4 had a clear learning strategy as well as their career development goal. This matched with what was observed through practice sessions—students in Year 3 and 4 expressed more positive attitudes than those in Year 1 and 2. The evidence was clearly showed through the observations of the seniors in Volleyball, Athletics, Table-tennis, Traditional Martial Arts sessions, and juniors in the Karate session. They showed positive attitudes towards learning through their proactive engagement in different tasks assigned by the teachers. By contrast, some of the first-year students in the Gymnastics session did not make an effort to practise at their full potential. They made time to stop and talk to each other when the teacher did not keep an eye on them. Some students even left the Gymnastics hall and gathered in groups to relax and talk. To find a solution for this, the teacher should use a variety of activities to increase students' level of engagement. In addition, students need to be informed of regulations they have to observe to maintain a self-disciplined learning environment. Depending on differences in students' learning styles in the four grade levels, it is important for teachers to design different lesson plans with appropriate teaching strategies to effectively adapt to different learning styles of students in each year of study.

8.3.5: Relationship with student type

The results of the present research demonstrated a statistically significant association between the Theorist learning style and student type. Student-athletes showed a greater preference for the Theorist learning style than students. The previous studies on relationships between learning styles and other variables have focused on one single subject—professional/amateur athletes (Andrea et al., 2015; Brown, 2013; González-Haro et al., 2010), student-athletes (Perkins, 2010; Wesley, 2003) or students majoring in physical therapy, health and sport

sciences (Croft, 2013; Holland & Mills, 2015; Lowdermilk, 2016). In the current study, the researcher had no opportunity to compare the research findings to the literature in terms of this correlation as this research focused on both students and student-athletes. By doing this, the research attempted to fill the gap in the literature and add new knowledge. In relation to a strong relationship between the Theorist learning style and student type, this finding was significant as it provided teachers with important information about what student-athletes needed in their studies. Student-athletes had retained good practice skills from the early stages of their athlete life; therefore, they primarily focused on theoretical subjects related to coaching methods, sport medicine, sport psychology, and sport nutrition. These subjects provide them with foundational knowledge which will support and assist them a lot in their coaching career after graduation. Thus, in their teaching practices, teachers should deliver theory in an interesting way and try to effectively respond to the preferred learning style of students.

However, based on interviews with sport education teachers, student-athletes had more difficulty in focusing on learning theory as they spent a significant amount of time training as athletes outside university hours. They said that student-athletes did not feel comfortable and were not willing to acquire knowledge in theoretical classes due to their fatigue through participating in training. Instead, they possessed much better practice skills than students. The learning style of these two student categories was clearly reflected in practice sessions. Students and student-athletes seemed to be reflective. They related back to what had happened and what they had previously learned as well as current evidence provided by the teacher. Also, they showed their preference for the Activist learning style by actively engaging in physical activities and expressing their need to work in groups and to learn more from each other.

8.4: Sport education teachers' knowledge of learning styles

The interviews with lecturers in this study demonstrated different levels of understanding of the term learning styles. Their knowledge about this term was reflected by the way it was defined, whether they saw it as being students' preferred approaches to learning, multi-sensory learning, or attitudes towards learning. The research findings indicated that the lecturers had some baseline knowledge of learning styles through their self-directed learning as well as their teaching experiences. This was consistent with the research done by Brown (2013) who found that college coaches had a very general knowledge of learning styles. Therefore, it is important that the lecturers have more specific knowledge of learning styles which can help them in their teaching practices to cater for different learning styles of students. In order to effectively

accommodate students' learning styles, it is crucial to learn about each of them (Brown, 2013; Williams & Anshel, 2000). As demonstrated in the findings of Egel (2009), it is important for teachers to tailor their teaching practice to students' learning styles. In line with this, teachers should vary instructional styles (Onwuegbuzie & Daley, 1997). The conclusions of Boyle and Dunn (1998) supported the findings of this study as they found that teachers should identify and modify their practices to support the learning styles of students. To gain a more insightful understanding of learning styles, it is recommended that the lecturers should attend short-term training on learning styles and teaching styles for the purpose of their professional development in the field. This would benefit not only the lecturers themselves, but it would also help to facilitate their students' learning processes when their learning styles are catered for by the lecturers.

The findings also revealed that in their teaching practices, the lecturers believed identifying students' learning styles was challenging, and some demonstrated little understanding of how to adapt their teaching styles to students' learning styles. The lecturers had some difficulty in determining the learning styles of their students, particularly in large size classes. However, some lecturers also found this hard even when they taught in smaller classes. The research showed that mostly the lecturers were not aware of student learning styles, nor did they regard learning styles as an important issue in teaching. These findings are very important as lecturers teach in classes with different single and multiple learning styles that students might have; lecturers need to be helped to raise their awareness of learning styles in their teaching practices. As soon as the issue of learning style is taken into account, and students' learning styles are identified, the next step would be adapting teachers' teaching styles to individual students' learning styles. As previously discussed, the lecturers did not previously attend any workshops on learning styles, and therefore, they did not know how to identify and profile the learning styles of students. It is crucial for teachers to have appropriate training when they start to use teaching styles to accommodate multiple learning styles because without training, the outcomes can be harmful to students' learning experience (Robles et al., 2012).

It is recommended that lecturers ask students to complete an LSQ or LSI at the beginning of each semester. The students should know their results in relation to their most dominant learning style as well as their less preferred ones. The lecturers could use these survey results, along with their observations through their teaching practices to keep a profile of each student's learning styles in their class. This would provide the lecturers with a clear picture of learning

styles of every single student, which would assist them to modify their teaching styles to cater for the different learning styles of students more effectively.

8.5: Teachers' adaptation of teaching styles to students' learning styles

Based on the study's observations, aspects such as demonstration, verbal cues, and feedback were some of the teaching styles incorporated by sport education teachers. They were regarded as the most common teaching styles in the context of sport teaching. Additionally, pair work and group work were employed by some sport education teachers during the practice stage. This was consistent with the findings from interviews with sport education teachers teaching a variety of sports. The employment of these instructional strategies is fundamental in providing students with images in the brain in relation to movement techniques, along with the verbal analysis of the teachers. This assists them with better recollection of knowledge content, and skills and techniques, which helps students to practise more efficiently and effectively. This is one of the most important stages in teaching and learning sport skills. To conduct the practice stage successfully, students need to receive valuable and constructive feedback from the teacher. It may include encouragement, support, and advice on areas that students need to improve on in the training process. A possible explanation for the consistency in the teaching styles used by the teachers as interviewed and observed may be that these are foundational and common in the context of teaching sport skills. Every sport education teacher has an in-depth understanding of these approaches and knows how to apply them in their instructional practice.

One of the differences in the teaching styles used by the teachers, as revealed through the teacher interviews and observations, was the individualised instruction. The interview findings demonstrated that the teachers employed this teaching style in their instruction with a focus on differences in students' background, characteristics, and levels. Also, student categories (student and student-athlete) were taken into consideration as student-athletes demonstrated higher levels of performance, execution and skills. The use of this teaching style was also reflected in the division of groups based on students' capacities. Finally, when students were injured or unwell in the practice sessions, they were allowed to take a break and sit outside as observers. However, observations showed that differentiated and individualised instruction that was used by sport education teachers focused only on differences in gender such as in Soccer and Volleyball, where female students are not required to perform at the same levels as males. As discussed above, male students possess better biological traits (Hansen, 2005) and physiological charateristics (Evans, 1989; Lagestad, 2017) than their counterparts, which are

closely connected with the development of foundational elements such as strength, flexibility, endurance, and performance (Evans, 1989; Lagestad, 2017). Therefore, the teachers in these practice sessions did not ask female students to conduct techniques which require a high level of difficulty as well as force. This shows a contradiction between the teacher interview responses and the instructional practices of the teachers. This might be explained by the fact that in their teaching practices teachers do not pay much attention to students' preferred learning styles.

Additionally, as indicated in the teacher interviews, learner-centred instruction was used by the teachers as one of their teaching styles but there was little sign of this happening during observations of practice sessions. This inconsistency may be due to differences in the setting of the classroom-based teaching and learning and the clinical setting where practice sessions were conducted. In the classroom setting, the teachers may provide students with opportunities to discuss in groups any topics or issues raised by the teacher, and then share and present their own opinions in the whole class. However, students in the clinical setting were requested to follow the teacher's instruction, guidance, and advice in relation to procedures—from warm-ups and delivery of new skills to the practice stage and the provision of feedback. This finding has important implications for teachers who need to develop strategies to initiate learner-centred instruction while teaching sport skills to students during practice sessions.

One of the pivotal findings from the interviews was that teachers were not fully aware of or concerned about the preferred learning styles of students. As a result, they demonstrated a lack of knowledge about the adaptability of their teaching styles to different learning styles of students. These interview results were consistent with the observation data in relation to how the teachers accommodated a variety of students' learning styles. As discussed previously, apart from some different approaches to males and females, the teachers employed the same teaching styles as well as the same standardised lesson plans to the whole class regardless of the variety of learning styles that students might have. Some of the issues emerging from this finding relate specifically to the close relationship between teaching styles and learning styles. Teaching style significantly impacts on the student's self perceived level of learning. In fact, there are a wide variety of learning styles and students may possess one or more than one learning style, depending on their educational background, personality, interests and many other factors. However, there is no best learning style that a learner may use on the pathway to learn, comprehend, and explore new knowledge and information. It is very important for teachers to identify the preferred learning styles of students in order to adjust, alter, and adapt

their teaching styles to different learning styles. This could contribute to enhancing students' levels of satisfaction, motivation and engagement, and help maximise their learning potential. Also, the teachers need to create a positive, relaxing, and open environment for students to develop their confidence, communication, and collaboration whilst being involved in teachers' instructional processes.

8.6: Chapter summary

This chapter has discussed the quantitative and qualitative findings in relation to previous research on learning styles and teaching styles. It has first clarified the learning styles of students at a sport university in Vietnam and examined the relationships between learning styles and demographic information pertaining to the educational contexts in Vietnam and in existing literature. The quantitative and qualitative findings have also been compared and contrasted with each other in relation to students' learning styles as well as their relationships with age, gender, year of study, major, and student type. Then, it has explored sport education teachers' knowledge of learning styles and their adaptation of teaching styles to students' individual learning styles. The last chapter will provide educational implications based on the findings, describe the potential contributions of the study, outline the limitations, and highlight recommendations for future research.

Chapter 9: Conclusion

9.1: Introduction

This chapter first highlights educational implications for practice in sport education contexts where learning styles need to be taken into account. Second, contributions of the research and limitations associated with the research are also outlined. Third, the chapter proposes recommendations for future research that build on and expand this work. Finally, a summary of the major findings and some final comments conclude the chapter and the thesis.

9.2: Educational implications for practice

Based on the findings of the research and the discussion in the previous chapters, this section provides implications for educators in the area of learning styles. Making teaching and learning practices more successful by addressing learning styles has implications for three parties: students, teachers, and administrators. It is important to: (1) enhance students' awareness of their own learning styles; (2) increase teachers' understanding and knowledge of learning styles; and (3) provide training sessions on learning styles for sport education teachers. These are each discussed in the following section.

9.2.1: Enhance students' awareness of their own learning styles

One of the most important implications of this study is the need to raise students' awareness of their own learning styles. With an understanding of their own learning styles, students can increase awareness of their most dominant learning styles and can also identify the need to accommodate less prevailing learning styles (Felder, 2010). As stated by Kolb (1999) no specific learning style is better than the others, but each learning style has its strong and weak points (Hardigan & Cohen, 2003). For example, those with the Reflector learning style are careful, thorough and methodical, thoughtful, good at listening to others and assimilating information, and rarely jump to conclusions. However, they show weaknesses including a tendency to hold back from direct participation; they are slow to make up their minds and reach a decision, and tend to be too cautious, not take enough risks, and not be assertive. Some of the strengths of the Activists are being flexible and open-minded, happy to have a go, happy to be exposed to new situations, and optimistic about anything new. Their weaknesses include a tendency to take the immediately obvious action without thinking, often taking unnecessary risks, and rushing into action without sufficient preparation. The Theorists are logical, rational and objective, but they show low tolerance for uncertainty, disorder, and ambiguity. The

strengths of the Pragmatists are that they are keen to test things out in practice, and they are practical, and realistic. However, they are not very interested in theory or basic principles. It is important that students understand more about their own strengths and weaknesses as learners and become more motivated to learn.

Students can use any Index of Learning Styles (ILS), Learning Styles Inventory (LSI) or Learning Styles Questionnaire (LSQ) to identify and profile their own learning styles, and determine their preferred ways of acquiring skills. This helps them to gain a better understanding of their learning styles, which can be used during their study courses and for their future professional development. For example, when students have difficulty learning in any subjects or do not achieve good results in a course, knowing their preferred learning styles is key to approaching the course material and planning their learning program. This knowledge would also assist students to amend their study habits to make study time more effective, and to develop effective study skills for both theoretical learning and practical sessions; students need skills in both types of learning if they want to be successful.

It is crucial for students to be aware of their own learning styles so that they can grasp learning opportunities knowingly, use appropriately learning strategies for self-study, and effectively acquire knowledge and skills from the teacher. This assists them in feeling satisfied about their learning, optimising their learning, and improving their study outcomes. In addition, there is a need for students to extend their learning styles in accordance with the environment (classroom-based learning or in the clinical setting), and for different teaching methods and disciplines. Learning styles are generally fixed traits and shaped in the early years of learning, but in some circumstances, they can be flexible, developmental, and changeable. Therefore, the development, extension, and adaptation of learning styles are fundamental for students in the process of acquiring, understanding, and processing knowledge and information. Students benefit from a comprehensive understanding of learning styles as it helps them apply and adapt their preferred learning styles to teachers' teaching styles in all learning activities.

9.2.2: Increase teachers' understanding and knowledge of learning styles

Increasing teachers' understanding and knowledge of learning styles is another crucial implication for educational practice. The interview findings from sport education teachers revealed a lack of knowledge about learning styles. Consequently, they found it hard to identify students' learning styles, respond to their learning needs, and tailor their teaching to a diversity of learning styles. Therefore, within the role of the teachers, at the beginning of each semester,

right in the first class, they might hand out a LSQ, a LSI or an ILS to students. By doing this survey, not only are students able to be cognisant of their own learning styles but the teachers also get a profile of students' learning styles. The learning style profiles help teachers to obtain a better understanding of how their students learn, and to acquire a comprehensive perspective on the types of students they are teaching in the class. Also, sport education teachers may always be aware of the range of learning styles of sport students in addition to the predominant learning styles.

Focussing on learning styles can help to extend and enlarge educational experiences for students. Teachers might consider helping students to continually develop their predominant learning styles and enhance their capacity to use less preferred learning styles. This can be done by using multiple teaching styles to respond to the learning styles of most students, but also to address less preferred learning styles. A focus on different learning styles is important for students as each learning style has its advantages and disadvantages. Therefore, when identifying the predominant learning styles as well as less prevailing ones, teachers may decide on the best teaching styles, particularly how to plan lessons, design materials and deliver instructions to effectively address all the learning styles. Increasing teachers' knowledge and understanding of learning styles helps in providing students with appropriate learning activities and opportunities that suit their learning styles. In turn, this would help students to develop a wider range of learning abilities and skills.

9.2.3: Provide training sessions on learning styles for sport education teachers

In order to help increase teachers' knowledge of learning styles and how to apply it in their teaching practices, it would be best to provide them with opportunities to engage in training sessions on learning styles. As demonstrated through the interviews with sport education teachers, they had different levels of understanding and knowledge about learning styles. Some had not even heard the term learning styles. This is due to the fact that they have had no opportunity to participate in any formal training sessions on learning styles. Therefore, within the role of administrators, training sessions on learning styles should be organised for sport education teachers for their professional development as well as for the benefits of their students.

9.3: Contributions of the research

The meaning of the term learning styles has been debated in the research fields of education. This research sheds new light on this topic by investigating learning styles, exploring sport education teachers' knowledge level and understanding of learning styles, and how they adapted their teaching styles to different learning styles at a sport university in Vietnam.

This study provides both quantitative and qualitative data on students' preferred learning styles. The quantitative component of the study aims at identifying learning style preferences of students and examining the relationships between learning styles and different demographic aspects of students. The qualitative research provides an opportunity to further explore students' learning styles. Most of the research on learning styles identifies learning styles and investigates the relationships between students' learning styles and their demographic information based on quantitative data. This study provides a more comprehensive analysis of learning styles in the area of physical education and sport based on both quantitative and qualitative research.

The study also offers qualitative insights into sport education teachers' knowledge and understanding of learning styles and how they applied this knowledge in their teaching practices. Furthermore, this research compares what they know about learning styles with how they employ different teaching styles to adapt to a variety of student learning styles. The findings show both similarity and difference between the knowledge of learning styles and the way it is adopted in practice. This research raises important issues about students' and teachers' awareness of learning styles. Such awareness assists students in discovering more appropriate learning strategies that suit their learning styles to enhance their learning outcomes. For teachers, this helps them to effectively plan lessons and deliver instructions with a focus on learning styles. More broadly, this study provides valuable information for curriculum planning and teacher training in learning styles. For example, knowledge of learning styles gained from the training may help teachers to identify different ways of learning that might be more enjoyable and effective for students. Activities to suit different learning styles can be included in curriculum design. Examples include:

- Activist learning style: brainstorming, practical experimentation, role plays, group discussion and problem-solving

- Pragmatist learning style: case studies and time to think about the practical applications of what you are learning
- Reflector learning style: spending time reading around a subject, and watching others try things out
- Theorist learning style: using models and theories, with plenty of background information.

Activities which support a particular learning style help students gain a better understanding of and recollection of information they are learning. Understanding more about each of the learning styles and a variety of strategies for accommodating them will enhance the effectiveness of a teacher. Also, by using multiple teaching strategies, the teacher is likely to be successful with most students in the class.

9.4: Limitations of the study

A substantial amount of focus and thought was given to the formation of the research questions, the methodology that offered a roadmap in responding to the research questions, data analysis, and the findings of the research. Despite this, the researcher explicitly acknowledges the occurrence of several limitations that are connected with this study.

This study was limited to a single university with a limited number of students participating in individual interviews. Additionally, there was a lack of teachers who were involved in interviews as well as observations. As a result, it is difficult to generalise the results to the whole university or other universities in Danang City or Vietnam.

Furthermore, the survey was administered to students once; this did not allow conclusion to be drawn about any changes in learning styles over time. From the knowledge of the researcher, this was not an issue that significantly impacted the overall research. Essentially, that this research in learning styles was first conducted in sport education in Vietnam is a good starting point for further such research

One of the important limitations was the lack of female teachers involved in this study; all the teachers observed in practice sessions were male. The reason for this was that the researcher focused on the sports as well as classes to be observed rather than on the gender of lecturers. Also, female lecturers are in the minority at Danang Sport University (DSU), especially in sport departments.

Other possible limitations include the number of students selected for interviews, the frequency and duration of observations, and the employment of the Honey and Mumford LSQ (2006).

The number of student participants for interviews

A small sample of students (16) was selected for interviews after they participated in the survey to further explore their learning styles. These students left their contact details at the bottom of the survey, indicating their willingness to be involved in the interviews. The decision to choose the number of 16 students for interviews was made before data collection, based on the number of students across the three faculties of Physical Education, Sport Management, and Sport Coaching. Such a small number of respondents were not representative of the whole university population. Therefore, this issue raises concerns over the ability to generalise the findings of this study.

The frequency and duration of the observations

Each practice session was observed only once and lasted for 50 minutes. The learning styles of students and teaching styles of teachers could not be thoroughly demonstrated over such a short period of time. Additionally, an individual's learning styles might develop and change from time to time. Therefore, it is not possible to determine if the results can be generalised to the entire university teacher and student population. However, observation was an additional method used to reinforce the results from the survey and interviews.

Employment of the Learning Styles Questionnaire

The Honey and Mumford LSQ (2006) is a forced-choice survey with only two options of 'Agree' and 'Disagree'. It should have had multiple options like a Likert scale to increase the accuracy and reliability of responses. The questionnaire did not include open-ended questions.

9.5: Recommendations for future research

Further research should be conducted to identify students' learning styles of undergraduate students at DSU, particularly with a larger sample of students for the purpose of confirming the findings of this study. A longitudinal study should be undertaken to observe changes in the learning style preferences of students throughout their training education program.

More studies on learning styles and/or teaching styles in the area of physical education and sport are needed. Some recommendations for future research include:

- Replicate the study with a larger sample size with more than one university and use the same questionnaire survey for comparative purposes.
- Replicate the study with the quantitative component for teachers. A questionnaire could be used to identify teaching styles of teachers.
- Conduct a quantitative study to identify learning styles and/or teaching styles of teachers, using a LSQ with multiple options like a Likert scale to increase the accuracy and reliability of responses. The questionnaire could be used more than once throughout the data collection period.
- Replicate the study by categorising participants by Grade point average to determine if a relationship exists between the student's learning outcomes and preferred learning styles.
- Replicate the study with the involvement of a larger sample of female students in the qualitative interviews as well as more female teachers in the qualitative observations.

According to Honey and Mumford (1992) the preference degree of learning styles should be compared against the general norms to determine whether an individual's level of preference is above or below average. Therefore, as part of a longer-term research project, the general learning style norms for sport education students in Vietnam should be determined for better comparison and understanding of research results. This would require around 1500 to 2000 questionnaires to be completed.

9.6: Summary of main findings

The research concludes with a summary of the four key points in relation to the learning styles of students, teachers' knowledge of learning styles, and how this knowledge is applied in instructional practices.

Firstly, through this research it was found that Reflector was the most dominant learning style among the students, followed by the Pragmatist, Activist, and lastly Theorist learning styles. The order of preference of these four learning styles is of great significance not only to the instructional practices at DSU but also to the broader teaching and learning community. Additionally, students showed a strong preference for the Reflector and Pragmatist learning styles and exhibited a moderate preference in both the Theorist and Activist learning styles. It is important for teachers to identify and profile the learning style preferences of students. Also, teachers need to help students to be aware of their own learning styles. Knowing about students'

learning styles, teachers can decide to design appropriate activities which adapt to every single learning style. It is also vital to assist students to maintain a range of preferred learning styles by helping them to develop their less preferred learning styles.

Secondly, there was a statistically significant relationship between the Reflector style and gender, age, and year of study, and between the Theorist style and student type, but there was no statistically significant association between learning styles and major. Therefore, it is crucial for teachers to pay attention to these factors in their teaching practices. In addition to gender, age, discipline, year of eligibility, and student type, there are many other factors outside the scope of this research such as achievement and culture, which may affect preferred learning styles. As noted, some traits of learning styles are fixed, but others can be developmental when people are growing up. An understanding of all these factors assists teachers in identifying differences in students' learning styles and using appropriate teaching styles to effectively adapt to the preferred learning styles of students. For example, the teaching styles that teachers use in PE classes should be different to those in SC and SM ones. Similarly, the lesson plan used in each grade level should not be the same. Teachers need to be smart, creative and have some knowledge and understanding of pedagogical skills and learning styles in designing activities, planning lessons, and delivering instructions.

Thirdly, the lecturers in this study demonstrated only a limited understanding of student learning styles. One of the best ways for teachers to learn more about this issue is to read materials in relation to learning styles and teaching styles in their field to gain an insightful understanding of this topic and how it can be applied in their teaching practices. Additionally, for longer-term professional development, teachers should attend courses on learning styles that would be useful to them in knowing how to identify students' learning styles, plan lessons, and deliver instructions with a focus on learning styles. If there is no improvement in the knowledge of learning styles of teachers, students will not be taught in a way that they feel accommodates their learning styles. Therefore, they will be demotivated, leading to lower levels of engagement in all learning activities.

Lastly, the lecturers did not clearly and frequently adapt to different learning styles of students, although some differentiated/individualised instruction was one of the teaching styles employed by teachers to adapt to physical differences between males and females. This finding is important as teachers teach classes with a mix of genders differing in terms of physical, biological, and psychological elements. Therefore, an understanding of these and taking them

into account are crucial for teachers in delivering instruction in practice sessions. More specifically, the use of differentiated/individualised instruction in the context of physical education and sport is essentially needed, acknowledging the differences between the two genders and responding appropriately in teaching approaches. In some circumstances, males and females should practise separately with different activities and tasks assigned. For example, exercises that require more physical strength may be more suitable for males. Effective teachers need to be flexible in catering for learning needs and responding to differences between males and females by using multiple activities suitable to them so that they can feel more pleased and comfortable engaging in them. This helps to make the teaching and learning processes more effective.

When students are aware of their own weaknesses in some learning styles, they can refer to the strengths and weaknesses of each learning style provided by Honey and Mumford to enhance their learning styles. An individual's learning styles can be developed with their determination and effort. For teachers, it is important to adapt their teaching styles to different learning styles of students more frequently.

Teaching styles

The different preferred learning styles of students should allow sport education lecturers to reflect on their role as educators in the context of physical education and sport teaching. Lecturers should always attempt to teach with multiple teaching styles that both meet the learning styles of most students in a class and challenge them to develop their less preferred learning styles. There are a wide range of skills related to each learning style, and information on all the learning styles provides students with opportunities to extend and develop these. Variations and adjustments in teaching styles in instructional practices can help to enhance students' learning potential and develop all learning styles, both in their current studies and their future professional development. For example, grouping students with a mix of different learning styles helps to enrich group work and discussion. This maintains a balanced learning climate in the class, providing encouragement to the Reflectors and challenging the strident Activists. As such, an inspiring learning environment is created for different types of students, which contributes to fostering the effectiveness and efficiency of their education. In sum, the lecturers play a crucial role in extending the knowledge of learning styles to their students through helping them to identify their own learning styles, expand the strengths, and minimise weaknesses in relation to their learning styles; they can do this through designing lesson plans; and delivering instructions with a focus on learning styles.

Curriculum design

Whilst learning styles can be taken into consideration in teaching and learning activities, higher education programs should be designed to suit a wide variety of student learning styles to ensure the effectiveness and efficiency of the teaching and learning processes. The design of the curriculum to accommodate multiple teaching styles is the best way to facilitate effective teaching (Romanelli et al., 2009). To do this well, curriculum designers and developers must also have an insightful understanding and knowledge of learning styles.

Concluding remarks

The thesis therefore makes original contributions to the knowledge of students' learning styles through its case study of a particular sport university in Vietnam. The contributions include: (i) identification of learning styles and the most dominant one among students in sport-related majors; (ii) recognition of various degrees of relationship among several factors not thoroughly studied before, namely learning styles and gender, age, year of study, majors, and student type; (iii) practical evidence-based suggestions for improvement of teachers/coaches' instruction so that teaching and learning styles can match and reach higher effectiveness.

This research evolved as a result of my continued interest in the research area of learning styles as a researcher, parent, and educator. At the outset this study was undertaken in order to better understand the preferred learning styles of DSU students, the teachers' knowledge of learning styles, and how it was applied in their instructional practices. The findings allow me to incorporate the learnings into my everyday practice for the betterment of my students. I intend to disseminate the key findings to my colleagues, so that DSU staff can be enlightened by these insights.

A variety of tasks and roles that I have undertaken for the past four years have helped to provide growth in my knowledge of learning styles. More importantly, I have had opportunities to develop research skills and learn from experts, including academic staff, as well as my student peers who come from different regions of the world. This learning has been very worthwhile and will be applicable to my teaching and research practices in my institution, not only for my own professional development but also for the benefits of my students and my colleagues within the broader teaching community.

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Appendix 1: Site permission letter

Doan Minh Huu

Western Sydney University

Locked Bag 1797

Penrith NSW 2751

Date……

Dear Mr. Huu,

Based on my review of the proposed research by Doan Minh Huu, a PhD student in the School of Education, Western Sydney University under the supervision of Assoc. Prof. Tonia Gray and Dr. Tim Hall, I give permission for him to conduct the study entitled ***"Profiling the Learning Style Preferences of Students at a Sport University in Vietnam"*** within Danang Sport University. As part of this study, I authorize the researcher to recruit, obtain consents and collect data. Individuals' participation will be voluntary and at their own discretion.

We understand that our organization's responsibilities include providing rooms for the survey, personnel and other resources if needed. We reserve the right to withdraw from the study at any time if our circumstances change.

This authorization covers the time period of September 2018 - January 2019.

I confirm that I am authorized to approve research in this setting.

I understand that the data collected will remain entirely confidential and may not be provided to anyone outside of the research team without permission from Danang Sport University.

Sincerely,

Le Duc Chuong

President of Danang Sport University

44 Dung Sy Thanh Khe Street

Danang City, Vietnam

M: 0912015410

Email address: leducchuong@yahoo.com

Appendix 2: Recruitment scripts for student meetings

RECRUITMENT SCRIPT (verbal, in person)

My name is Doan Minh Huu, a PhD student in the School of Education at Western Sydney University. I would like to invite you to participate in my research study to determine the learning styles of students. As a participant, you will be asked to fill in your demographic information and complete a survey to determine your learning style preferences. Then, you will be involved in a one-on-one interview to further explore about your learning styles and experiences in learning and to know what instructional styles the teachers are offering. You will also be observed during the practice session to see whether teaching style and learning styles are matched/mismatched.

All information you tell me associated with your participation in this study is going to be kept confidential and secure. You will not receive any compensation for participating in this study.

Now, I am going to hand out a Participant Information Sheet and a Consent Form which are stapled together and the Student Survey. If you agree to be involved in the study you have to return the signed Consent Form and the completed survey in a locked and fixed box which will be open for one week in the Department of Student Affairs. You have one week to consider your participation and complete the questionnaires. Those who provide contact details at the bottom of the survey will be contacted for interviews.

The results can benefit others to understand students' learning styles and how teachers adapt their teaching styles to students. These results may help teachers and students understand how teaching styles and learning styles are matched.

Do you have any questions now? If you have questions later, please contact me at Minhuu2005@yahoo.com or you may contact my Principal Supervisor at T.Gray@westernsydney.edu.au

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Appendix 3: Participant information sheet – Students

Project Title: *Profiling the Learning Style Preferences of Students at a Sport University in Vietnam*

Project Summary:

The project will identify and profile the learning style preferences of sport students at Danang Sport University. Relationships between students' learning styles and demographic information related to gender, age, major and student type (i.e. student or student-athlete) will also be examined. Based on the study results, recommendations on instructional strategies and curriculum design in academic settings including Faculties of Physical Education, Sport Management and Sport Coaching will be developed to enhance undergraduate students' learning.

You are invited to participate in a research study being conducted by Doan Minh Huu, a PhD student from School of Education under the supervision of Assoc. Prof. Tonia Gray, School of Education and Dr. Tim Hall, School of Business.

How is the study being paid for?

The study is sponsored by School of Education, Western Sydney University.

What will I be asked to do?

1. You will be asked to fill out your demographic questionnaire such as years of age, gender, major, grade level and student type (i.e. student or student-athlete) and to tick "Agree" or "Disagree" for each item in the Honey and Mumford Learning Styles Questionnaire. Forty statements correspond to the four learning styles of Reflexive, Theoretic, Pragmatic and Active. After completing the questionnaires, you will have to score your points for each learning style. If you agree to be involved in the study you have to return the signed Consent Form and the completed survey in a locked and fixed box which will be open for one week in the Department of Student Affairs. You have one week to consider your participation and complete the questionnaire.

2. You will participate in an one-on-one interview to further explore about your learning styles and experiences in learning and to know what instructional styles the teachers are offering.

3. You will be observed during the practice session to see how teaching style and learning styles are matched/mismatched. The researcher is a complete observer and you do what you normally do during class time. No extra time is required from you.

How much of my time will I need to give?

It will take you 15 minutes to complete the questionnaire but you have to return it within one week.

It will take about 30 minutes to conduct the interview.

The practice session will take about 50 minutes.

What benefits will I, and/or the broader community, receive for participating?

By participating in this study, you will be aware of your learning style preferences and recognize your strengths and weaknesses. The researcher is also hoping to bring some change in university such as teaching methods, curriculum design, etc.

Will the study involve any risk or discomfort for me? If so, what will be done to rectify it?

The study does not involve anything that will discomfort you. However, please alert the researcher if you are feeling any discomfort and the procedure will be stopped. You will also be allowed to withdraw from the study at any time without penalty.

How do you intend to publish or disseminate the results?

It is anticipated that the results of this research project will be published and/or presented in a variety of forums. In any publication and/or presentation, information will be provided in such a way that the participant cannot be identified, except with your permission. Be assured that raw data you provide will only be accessed by researchers. The findings from the research will be published in journal articles and thesis.

Will the data and information that I have provided be disposed of?

Please be assured that only the researchers will have access to the raw data you provide. However, your data may be used in other related projects for an extended period of time. Please note that minimum retention period for data collection is five years post publication. The data and information you have provided will be securely disposed of.

Can I withdraw from the study?

Participation is entirely voluntary and you are not obliged to be involved. If you do participate you can withdraw at any time without giving any reasons.

If you do choose to withdraw, please notify the researcher that you wish to withdraw. Any information that you have supplied will be deleted.

What if I require further information?

Please contact Doan Minh Huu, Tonia Gray or Tim Hall should you wish to discuss the research further before deciding whether or not to participate.

Student: Doan Minh Huu, PhD student, School of Education, Western Sydney University, 19057327@student.westernsydney.edu.au

Principal Supervisor: Assoc. Prof. Tonia Gray, School of Education, Western Sydney University, Mobile: 0427 331127, T.Gray@westernsydney.edu.au

Co-Supervisor: Dr. Tim Hall, School of Business, Western Sydney University, +61 2 9772 6019, t.j.hall@westernsydney.edu.au

What if I have a complaint?

If you have any complaints or reservations about the ethical conduct of this research, you may contact the Ethics Committee through Research Engagement, Development and Innovation (REDI) on Tel +61 2 4736 0229 or email humanethics@westernsydney.edu.au.

Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

If you agree to participate in this study, you may be asked to sign the Participant Consent Form. The information sheet is for you to keep and the consent form is retained by the researcher/s.

This study has been approved by the Western Sydney University Human Research Ethics Committee. The Approval number is H12810.

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Appendix 4: Consent form – Students

Project Title: *Profiling the Learning Style Preferences of Students at a Sport University in Vietnam*

I hereby consent to participate in the above named research project.

I acknowledge that:

- I have read the participant information sheet (or where appropriate, have had it read to me) and have been given the opportunity to discuss the information and my involvement in the project with the researcher/s
- The procedures required for the project and the time involved have been explained to me, and any questions I have about the project have been answered to my satisfaction.

I consent to:

☐ *Participating in a survey*

☐ *Participating in an interview*

☐ *Having the interview audio recorded*

☐ *Being observed during the practice session*

☐ *Having the practice session audio and video recorded*

I consent for my data and information provided to be used in this project and other related projects for an extended period of time.

I understand that my involvement is confidential and that the information gained during the study may be published and stored for other research use but no information about me will be used in any way that reveals my identity.

I understand that I can withdraw from the study at any time without affecting my relationship with the researcher/s, and any organisations involved, now or in the future.

Signed:

Name:

Date:

This study has been approved by the Human Research Ethics Committee at Western Sydney University. The ethics reference number is: H12810.

What if I have a complaint?

If you have any complaints or reservations about the ethical conduct of this research, you may contact the Ethics Committee through Research Engagement, Development and Innovation (REDI) on Tel +61 2 4736 0229 or email humanethics@westernsydney.edu.au.

Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

Appendix 5: Student survey

Section I:

DEMOGRAPHIC INFORMATION QUESTIONNAIRE

Date: _____

Participant Number (researcher use only): _____

Please respond to the following items by placing an "x" in the box after the best answer to each question.

1. I am a

Male ☐ Female ☐

Others:……

2. My age range is

18-21 ☐ 22-25 ☐ 26-29 ☐

Others:……..

3. My grade level is

Freshman ☐ Sophomore ☐ Junior ☐
Senior ☐

4. I am from the Faculty of

Physical Education ☐ Sport Coaching ☐ Sport Management ☐

5. I am a

Student ☐ Student-athlete ☐

Section II:

HONEY AND MUMFORD LEARNING STYLES QUESTIONNAIRE

This questionnaire will help you identify your learning style preferences and clarify your preferred ways of learning so that you can choose learning strategies which match your preferred learning styles in learning activities, which helps to enhance your learning outcomes.

If you agree with a statement, place an "x" in the box next to "Agree". If you disagree with a statement, place an "x" in the box next to "Disagree". Please tick all items.

1. I quite like taking risks.

☐ Agree

☐ Disagree

2. Before taking part in a discussion or meeting, I like to read the appropriate papers and prepare carefully.

☐ Agree

☐ Disagree

3. I like to be absolutely correct about things.

☐ Agree

☐ Disagree

4. I like practical, tried and tested techniques.

☐ Agree

☐ Disagree

5. I often do things just because I feel like it, rather than thinking about them first.

☐ Agree

☐ Disagree

6. I make decisions only after weighing up the pros and cons of different possibilities.

☐ Agree

☐ Disagree

7. I prefer to solve problems using a systematic approach that reduces guesswork and uncertainty.

- Agree
- Disagree

8. What matters most to me is whether something works in practice.

- Agree
- Disagree

9. I actively look for new things to do.

- Agree
- Disagree

10. I prefer to establish the facts and think things through before reaching a conclusion.

- Agree
- Disagree

11. I like to check things out for myself rather than take them for granted.

- Agree
- Disagree

12. When I hear about a new idea or technique, I immediately start working out how to apply it to my situation/problems.

- Agree
- Disagree

13. I like the challenge of trying out different ways of doing things.

- Agree
- Disagree

14. I prefer to have as many bits of information about a subject as possible. The more I have to sift through the better.

- Agree
- Disagree

15. I am quite keen on sticking to fixed routines, following procedures and keeping to timetables.

- Agree
- Disagree

16. In discussions, I like to get straight to the point.

- Agree
- Disagree

17. I prefer to jump in and do things as they come along rather than plan things out beforehand.

- Agree
- Disagree

18. I prefer to base decisions on hard evidence rather than on hunches or intuition.

- Agree
- Disagree

19. I like to fit things into some sort of pattern, framework or model.

- Agree
- Disagree

20. I tend to judge people's ideas on their practical merits.

- Agree
- Disagree

21. In discussions, I usually come up with lots of spontaneous ideas.

- Agree
- Disagree

22. I prefer to look at a problem from as many different angles as I can before starting to solve it.

- Agree
- Disagree

23. I prefer to evaluate the soundness of my ideas before sharing them.

- Agree
- Disagree

24. In meetings and discussions, I put forward ideas that I know are down-to-earth and realistic.

- Agree
- Disagree

25. Usually I talk more than I listen.

- Agree
- Disagree

26. If I have to write a report or a formal letter, I prefer to have several rough drafts before settling on the final version.

- Agree
- Disagree

27. I am rather fussy about how I do things – a bit of a perfectionist.

- Agree
- Disagree

28. I find that I can often work out more practical ways of doing things.

- Agree
- Disagree

29. I find rules and procedures take the fun out of things.

- Agree
- Disagree

30. I like to consider many options before I make up my mind.

- Agree
- Disagree

31. I believe that careful, logical thinking is the key to success.

- Agree
- Disagree

32. I prefer ideas with an obvious relevance to my life and work.

- Agree
- Disagree

33. I am usually the ‘life and soul’ of the party.

- Agree
- Disagree

34. I like to think through the consequences before taking action.

- Agree
- Disagree

35. I like to understand the assumptions, principles and rationale upon which things are based.

- Agree
- Disagree

36. In my opinion, it doesn’t matter how you do something, as long as it works.

- Agree

- Disagree

37. I enjoy the excitement of a crisis situation.

- Agree
- Disagree

38. I usually do more listening than talking.

- Agree
- Disagree

39. I like meetings and discussions to be structured and orderly.

- Agree
- Disagree

40. I do whatever I need to, to get the job done.

- Agree
- Disagree

SCORING

For each question you ticked "x" above, put a "1" beside the question number in the columns below. Add up the 1s in each column. For example, if you put a "1" next to three question numbers in the activist column, then your activist total is 3.

Activist	Reflector	Theorist	Pragmatist
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20
21	22	23	24
25	26	27	28
29	30	31	32
33	34	35	36
37	38	39	40
Total:	**Total:**	**Total:**	**Total:**

Thank you very much for completing my survey!

If you agree to be interviewed, please provide your contact details below. This section is not compulsory.

1. Full name:…….
2. Mobile number:……
3. Email address:……..

Appendix 6: Student interview protocol

Section 1: Student preferred learning styles

Q1: Do you like theoretical classes? Why?/Why not?

Q2: Do you like practice sessions? Why?/Why not?

Q3: How do you prefer to perceive knowledge in theoretical classes?

Q4: How do you prefer to learn skills in practice sessions?

Q5: What activities would you like to do in a practice session?

Q6: Can you describe your learning experiences?

Section 2: Student perceptions of teaching styles

Q1: In general, are you satisfied with your teachers' teaching styles? To what extent?

Q2: Do teachers normally accommodate your learning styles? How? In what ways?

Q3: What happens to you if teachers teach you in a way that does not suit your learning styles?

Q4: What is your expectation from the teachers' teaching styles so that the lesson is interesting and efficient to meet students' needs?

Appendix 7: Email for sport education teachers' recruitment

Dear ……. (name of a teacher),

I am writing to invite you to participate in the research project of my PhD study. My name is Doan Minh Huu, a PhD candidate in Education at Western Sydney University. The research project is entitled *"Profiling the Learning Style Preferences of Students at a Sport University in Vietnam"*.

As a participant of the study, you will be interviewed about your knowledge of learning styles and what instructional strategies you employ to interact with various learning styles. The interview will be conducted face-to-face in person for approximately 30 minutes. You will also be observed during the practice session which takes 50 minutes.

If you are interested in this project, should you contact
Doan Minh Huu, a PhD candidate, minhuu2005@yahoo.com or
Assoc. Prof. Tonia Gray, Principal Supervisor, T.Gray@westernsydney.edu.au or
Dr. Tim Hall, Co-Supervisor, t.j.hall@westernsydney.edu.au

Thank you very much for your participation.

I look forward to receiving your reply.

Kind regards,

Doan Minh Huu

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Appendix 8: Participant information sheet – Teachers

Project Title: *Profiling the Learning Style Preferences of Students at a Sport University in Vietnam*

Project Summary:

The project will identify and profile the learning style preferences of sport students at Danang Sport University. Relationships between students' learning styles and demographic information related to gender, age, major and student type (i.e. student or student-athlete) will also be examined. Based on the study results, recommendations on instructional strategies and curriculum design in academic settings including Faculties of Physical Education, Sport Management and Sport Coaching will be developed to enhance undergraduate students' learning.

You are invited to participate in a research study being conducted by Doan Minh Huu, a PhD student from School of Education under the supervision of Assoc. Prof. Tonia Gray, School of Education and Dr. Tim Hall, School of Business.

How is the study being paid for?

The study is sponsored by School of Education, Western Sydney University.

What will I be asked to do?

You will be asked questions about your knowledge of learning styles and what instructional strategies you employ to interact with various learning styles. The interviews will be conducted face-to-face in person.

You will be observed during the practice session to see what instructional strategies you employ to interact with various learning styles.

How much of my time will I need to give?

It will take about 30 minutes to conduct the interview.

The practice session will take about 50 minutes.

What benefits will I, and/or the broader community, receive for participating?

By participating in this study, you will be aware of your teaching style so that you can employ appropriate teaching strategies to accommodate individual students' learning styles.

Will the study involve any risk or discomfort for me? If so, what will be done to rectify it?

The study does not involve anything that will discomfort you. However, please alert the researcher if you are feeling any discomfort and the procedure will be stopped. You will also be allowed to withdraw from the study at any time without penalty.

How do you intend to publish or disseminate the results?

It is anticipated that the results of this research project will be published and/or presented in a variety of forums. In any publication and/or presentation, information will be provided in such a way that the participant cannot be identified, except with your permission. Be assured that raw data you provide will only be accessed by researchers. The findings from the research will be published in journal articles and thesis.

Will the data and information that I have provided be disposed of?

Please be assured that only the researchers will have access to the raw data you provide. However, your data may be used in other related projects for an extended period of time. Please note that minimum retention period for data collection is five years post publication. The data and information you have provided will be securely disposed of.

Can I withdraw from the study?

Participation is entirely voluntary and you are not obliged to be involved. If you do participate you can withdraw at any time without giving reason.

If you do choose to withdraw, please notify the researcher that you wish to withdraw. Any information that you have supplied will be deleted.

What if I require further information?

Please contact Doan Minh Huu, Tonia Gray or Tim Hall should you wish to discuss the research further before deciding whether or not to participate.

Student: Doan Minh Huu, PhD student, School of Education, Western Sydney University, 19057327@student.westernsydney.edu.au

Principal Supervisor: Assoc. Prof. Tonia Gray, School of Education, Western Sydney University, Mobile: 0427 331127, T.Gray@westernsydney.edu.au

Co-Supervisor: Dr. Tim Hall, School of Business, Western Sydney University, +61 2 9772 6019, t.j.hall@westernsydney.edu.au

What if I have a complaint?

If you have any complaints or reservations about the ethical conduct of this research, you may contact the Ethics Committee through Research Engagement, Development and Innovation (REDI) on Tel +61 2 4736 0229 or email humanethics@westernsydney.edu.au.

Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

If you agree to participate in this study, you may be asked to sign the Participant Consent Form. The information sheet is for you to keep and the consent form is retained by the researcher/s.

This study has been approved by the Western Sydney University Human Research Ethics Committee. The Approval number is H12810.

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Appendix 9: Consent form – Teachers

Project Title: *Profiling the Learning Style Preferences of Students at a Sport University in Vietnam*

I hereby consent to participate in the above named research project.

I acknowledge that:

- I have read the participant information sheet (or where appropriate, have had it read to me) and have been given the opportunity to discuss the information and my involvement in the project with the researcher/s
- The procedures required for the project and the time involved have been explained to me, and any questions I have about the project have been answered to my satisfaction.

I consent to:

☐ *Participating in an interview*

☐ *Having the interview audio recorded*

☐ *Being observed during the practice session*

☐ *Having the practice session audio and video recorded*

I consent for my data and information provided to be used in this project and other related projects for an extended period of time.

I understand that my involvement is confidential and that the information gained during the study may be published and stored for other research use but no information about me will be used in any way that reveals my identity.

I understand that I can withdraw from the study at any time without affecting my relationship with the researcher/s, and any organisations involved, now or in the future.

Signed:

Name:

Date:

This study has been approved by the Human Research Ethics Committee at Western Sydney University. The ethics reference number is: H12810.

What if I have a complaint?

If you have any complaints or reservations about the ethical conduct of this research, you may contact the Ethics Committee through Research Engagement, Development and Innovation (REDI) on Tel +61 2 4736 0229 or email humanethics@westernsydney.edu.au.

Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

Appendix 10: Teacher interview schedule

Section 1: Education background

Q1. What is your highest level of education? (degree, certificates, where, when, etc.)

Q2. In the past, were you an athlete? If so, describe your experience as an athlete. (what kind of sport, level of sport performance, for how long, etc.)

Q3. What is your background in teaching/coaching? (what kind of sport, level, for how long, etc.)

Section 2: Learning styles

Q4. Have you ever heard about or what do you know about the term learning styles?

Q5. From your experience as a student/student-athlete and teacher/coach, what can you tell me about how students/student-athletes learn?

Q6. What similarities and differences have you noticed in how your students learn skills or concepts?

Q7. Do you notice any differences in the ways students from different faculties learn and if so what are they?

Q8. How different is it between students and student-athletes in acquiring skills?

Q9. What possible factors may affect students' learning styles?

Section 3: Instructional styles

Q10. What type of environment do you try to create in practice, games, conditioning, etc.?

Q11. What instructional strategies do you use in a Physical Education class?

Q12. How do you accommodate the different learning styles of students in your classes?

Q13. How do you adapt your instruction if you have students with special needs in your class?

Q14. To what extent do you think the match/mismatch between students' learning styles and your teaching styles affects students learning in Physical Education contexts?

Q15. Is there any difference in learning styles between males and females?

Q16. Is there any difference in learning styles among years of study?

Q17. Do you have any suggestions for solutions with university or higher levels in regards to the promotion of learning styles and teaching styles?

Q18. Could you provide any further information which would be useful to the study?

Appendix 11: Field notes sheet

Instructor: _____ Class/Major: _____
Observer: _____ Date and Time: _____
Class size: _____ Duration of time: _____

Time	Teacher's activities	Students' activities	Analysis/Reflections

Lesson topic: _____

Focal points for observation:

- The outdoor/indoor facility (playing fields, court, playground equipment, …)
- Equipment (ready and sufficient for maximised learning)?
- Environment, sights, sounds, temperature, etc.
- Teaching materials and equipment used to teach in the lesson
- Demonstrations, verbal/non-verbal cues provided by the teacher
- Practice time, assistance
- Skill correction, feedback
- Number of students actually involved in the learning process
- Differences in students' learning styles
- Teaching strategies used during the lesson/activity
- Instructional styles adapted to different learning styles

Appendix 12: Multivariate analysis

Multivariate analysis of variance (MANOVA) is an extension of the univariate analysis of variance (ANOVA) (Frey, 2018). Gall et al. (2007) describe an ANOVA as "a procedure for determining whether the difference between the mean scores of two or more groups on a dependent variable is statistically significant" (p. 632). The MANOVA extends this analysis by considering multiple continuous dependent variables and bundles them together into a weighted linear combination or composite variable. In this study, the MANOVA essentially tested whether or not the independent grouping variables including gender, age group, major, year of study, and student-type simultaneously explained a statistically significant amount of variance in the dependent variables of learning styles.

The Box's test of equality as shown in Table A12.1 indicated significant differences between the covariance matrices ($p = 0.002 < 0.05$), meaning that the homogeneity assumption was violated and Wilks' lambda was an appropriate test to use.

Table A12.1 Box's test of equality of covariance matrices of gender

Box's test of equality of covariance matrices	
Box's M	28.410
F	2.807
df1	10
df2	252953.834
Sig.	0.002

The following is the MANOVA using the Wilks' lambda test. As can be seen in Table A12.2, this test was significant, Wilks' $\lambda = 0.98$, $F(4.581) = 2.516$, $p = 0.041 < 0.05$. This significant F revealed that there were significant relationships between learning styles and gender.

Table A12.2 Multivariate tests of gender

Effect		Value	F value	Hypothesis df	Error df	p value	Partial eta squared
Intercept	Pillai's Trace	.970	4713.598	4.000	581.000	.000	.970
	Wilks' Lambda	.030	4713.598	4.000	581.000	.000	.970
	Hotelling's Trace	32.452	4713.598	4.000	581.000	.000	.970
	Roy's Largest Root	32.452	4713.598	4.000	581.000	.000	.970
Gender	Pillai's Trace	.017	2.516	4.000	581.000	.041	.017
	Wilks' Lambda	.983	2.516	4.000	581.000	.041	.017
	Hotelling's Trace	.017	2.516	4.000	581.000	.041	.017
	Roy's Largest Root	.017	2.516	4.000	581.000	.041	.017

The Levene's test of equality of error variances was also used to test the assumption of MANOVA that the variances of each variable are equal across the groups (Table A12.3).

Table A12.3 Levene's test of equality of error variances of gender

	F	df1	df2	p value
Activist	.002	1	584	0.967
Reflector	10.530	1	584	0.001
Theorist	.034	1	584	0.853
Pragmatist	.022	1	584	0.882
Tests the null hypothesis that the error variance of the dependent variable is equal across groups.				
a. Design: Intercept + Gender				

However, when the test between subjects was conducted a relationship was shown (p = 0.967, 0.096, 0.096) between the Activist, Theorist, and Pragmatist learning styles and gender, but not to a level of significance. In contrast, the relationship between the Reflector learning style and gender was statistically significant with p-value = 0.002 (< 0.05) (see Table A12.4).

Table A12.4 Tests of between-subjects effects of gender

Source	Dependent variable	Type III sum of squares	df	Mean square	F value	p value	Partial eta squared
Corrected model	Activist	.005[a]	1	.005	.002	0.967	0.000
	Reflector	25.437[b]	1	25.437	9.788	0.002	0.016
	Theorist	10.771[c]	1	10.771	2.787	0.096	0.005
	Pragmatist	6.806[d]	1	6.806	2.774	0.096	0.005
Intercept	Activist	19390.654	1	19390.654	6211.352	0.000	0.914
	Reflector	31182.734	1	31182.734	11999.193	0.000	0.954
	Theorist	20373.932	1	20373.932	5272.013	0.000	0.900
	Pragmatist	28953.475	1	28953.475	11800.423	0.000	0.953
Gender	Activist	.005	1	.005	.002	0.967	0.000
	Reflector	25.437	1	25.437	9.788	0.002	0.016
	Theorist	10.771	1	10.771	2.787	0.096	0.005
	Pragmatist	6.806	1	6.806	2.774	0.096	0.005
Error	Activist	1823.136	584	3.122			
	Reflector	1517.662	584	2.599			
	Theorist	2256.894	584	3.865			
	Pragmatist	1432.900	584	2.454			
Total	Activist	30077.000	586				
	Reflector	45512.000	586				
	Theorist	31178.000	586				
	Pragmatist	42882.000	586				
Corrected total	Activist	1823.142	585				
	Reflector	1543.099	585				
	Theorist	2267.666	585				
	Pragmatist	1439.706	585				

a. R Squared = .000 (Adjusted R Squared = −.002)

b. R Squared = .016 (Adjusted R Squared = .015)

c. R Squared = .005 (Adjusted R Squared = .003)

d. R Squared = .005 (Adjusted R Squared = .003)

The Box's test of equality of covariance matrices was used to check the assumption of homogeneity of covariance of the four learning styles across the three age groups of 18–21, 22–25, and 26–29. As can be seen in Table A12.5, the Box's test of equality indicated significant differences between the covariance matrices ($p = 0.000 < 0.05$), meaning that the homogeneity assumption was violated and Wilks' lambda was an appropriate test to use.

Table A12.5 Box's test of equality of covariance matrices of age

Box's test of equality of covariance matrices	
Box's M	39.465
F	3.896
df1	10
df2	213538.566
Sig.	0.000

Table A12.6 shows the multivariate test of the age distribution. The Wilks' lambda test was conducted and the main effect of degree of preference for learning styles and age groups displayed an F ratio of $F (8, 1160) = 1.74$, $p = .086 > .05$ (Table A12.6), indicating that there were no significant relationships between learning styles and age group.

Table A12.6 Multivariate tests of age distribution

Effect		Value	F value	Hypothesis df	Error df	p value	Partial eta squared
Intercept	Pillai's Trace	0.737	405.532	4.000	580.000	0.000	0.737
	Wilks' Lambda	0.263	405.532	4.000	580.000	0.000	0.737
	Hotelling's Trace	2.797	405.532	4.000	580.000	0.000	0.737
	Roy's Largest Root	2.797	405.532	4.000	580.000	0.000	0.737
Age group	Pillai's Trace	0.024	1.734	8.000	1162.000	0.086	0.012
	Wilks' Lambda	0.976	1.735	8.000	1160.000	0.086	0.012
	Hotelling's Trace	0.024	1.736	8.000	1158.000	0.086	0.012
	Roy's Largest Root	0.019	2.803	4.000	581.000	0.025	0.019

The Levene's test of equality of error variances was also used to test the assumption of MANOVA that the variances of each variable are equal across the groups (Table A12.7).

Table A12.7 Levene's test of equality of error variances of age

	F value	df1	df2	p value
Reflector	9.259	2	583	.000
Activist	.446	2	583	.640
Theorist	1.059	2	583	.347
Pragmatist	2.571	2	583	.077
Tests the null hypothesis that the error variance of the dependent variable is equal across groups.				
a. Design: Intercept + Age group				

Table A12.8 depicts the tests of between-subjects effects of age. However, when the test between subjects was consulted a relationship was shown (p = 0.421, 0.096, 0.380) between the Activist, Theorist, and Pragmatist learning styles and age group, but not to a level of significance. The relationship between the Reflector learning style and age group was statistically significant with the p-value = 0.013 (< 0.05).

Table A12.8 Tests of between-subjects effects of age

Source	Dependent variable	Type III sum of squares	df	Mean square	F value	p value	Partial eta squared
Corrected model	Reflector	22.846[a]	2	11.423	4.381	0.013	0.015
	Activist	5.410[b]	2	2.705	.868	0.421	0.003
	Theorist	18.129[c]	2	9.064	2.349	0.096	0.008
	Pragmatist	4.771[d]	2	2.386	.969	0.380	0.003
Intercept	Reflector	2667.514	1	2667.514	1022.962	0.000	0.637
	Activist	1575.563	1	1575.563	505.329	0.000	0.464
	Theorist	1782.678	1	1782.678	462.007	0.000	0.442
	Pragmatist	2623.279	1	2623.279	1065.812	0.000	0.646
Age group	Reflector	22.846	2	11.423	4.381	0.013	0.015
	Activist	5.410	2	2.705	.868	0.421	0.003
	Theorist	18.129	2	9.064	2.349	0.096	0.008
	Pragmatist	4.771	2	2.386	.969	0.380	0.003
Error	Reflector	1520.253	583	2.608			
	Activist	1817.732	583	3.118			

Source	Dependent variable	Type III sum of squares	df	Mean square	F value	p value	Partial eta squared
	Theorist	2249.537	583	3.859			
	Pragmatist	1434.935	583	2.461			
Total	Reflector	45512.000	586				
	Activist	30077.000	586				
	Theorist	31178.000	586				
	Pragmatist	42882.000	586				
Corrected total	Reflector	1543.099	585				
	Activist	1823.142	585				
	Theorist	2267.666	585				
	Pragmatist	1439.706	585				
a. R Squared = .015 (Adjusted R Squared = .011)							
b. R Squared = .003 (Adjusted R Squared = .000)							
c. R Squared = .008 (Adjusted R Squared = .005)							
d. R Squared = .003 (Adjusted R Squared = .000)							

The Box's test of equality of covariance matrices was used to check the assumption of homogeneity of covariance among years of study for the four learning styles. Table A12.9 indicates significant differences between the covariance matrices ($p = 0.000 < 0.05$), meaning that the homogeneity assumption was violated and Wilks' lambda was an appropriate test to use.

Table A12.9 Box's test of equality of covariance matrices of years of study

Box's test of equality of covariance matrices	
Box's M	83.004
F	2.731
df1	30
df2	723814.634
Sig.	.000

Table A12.10 is the MANOVA using the Wilks' lambda test. Notably, this test was significant, Wilks' $\lambda = 0.95$, $F(12.153) = 2.32$, $p = 0.006 < 0.05$. This significant F indicated there were significant relationships between learning styles and years of study.

Table A12.10 Multivariate tests of years of study

Effect		Value	F value	Hypothesis df	Error df	p value	Partial eta squared
Intercept	Pillai's Trace	.978	6420.051	4.000	579.000	.000	.978
	Wilks' Lambda	.022	6420.051	4.000	579.000	.000	.978
	Hotelling's Trace	44.353	6420.051	4.000	579.000	.000	.978
	Roy's Largest Root	44.353	6420.051	4.000	579.000	.000	.978
Years of study	Pillai's Trace	.047	2.312	12.000	1743.000	.006	.016
	Wilks' Lambda	.953	2.319	12.000	1532.182	.006	.016
	Hotelling's Trace	.048	2.323	12.000	1733.000	.006	.016
	Roy's Largest Root	.034	4.967[c]	4.000	581.000	.001	.033

The Levene's test of equality of error variances was also used to test the assumption of MANOVA that the variances of each variable are equal across the groups (Table A12.11).

Table A12.11 Levene's test of equality of error variances of years of study

	F value	df1	df2	p value
Reflector	11.929	3	582	.000
Activist	.227	3	582	.878
Theorist	.601	3	582	.615
Pragmatist	2.863	3	582	.036

Table A12.12 reveals the tests of between-subjects effects of years of study. However, when the test between subjects was carried out a relationship was shown ($p = 0.428, 0.759, 0.349$) between the Activist, Theorist, and Pragmatist learning styles and years of study, but not to a level of significance. Meanwhile, the relationship between the Reflector learning style and years of study was statistically significant with the p-value = 0.014 (< 0.05).

Table A12.12 Tests of between-subjects effects of years of study

Source	Dependent variable	Type III sum of squares	df	Mean square	F value	p value	Partial eta squared
Corrected model	Reflector	28.063[a]	3	9.354	3.593	0.014	.018
	Activist	8.655[b]	3	2.885	.925	0.428	.005
	Theorist	4.572[c]	3	1.524	.392	0.759	.002
	Pragmatist	8.108[d]	3	2.703	1.099	0.349	.006
Intercept	Reflector	42291.538	1	42291.538	16246.263	0.000	.965
	Activist	27025.078	1	27025.078	8668.345	0.000	.937
	Theorist	27931.422	1	27931.422	7183.125	0.000	.925
	Pragmatist	39711.997	1	39711.997	16144.462	0.000	.965
Years of study	Reflector	28.063	3	9.354	3.593	0.014	.018
	Activist	8.655	3	2.885	.925	0.428	.005
	Theorist	4.572	3	1.524	.392	0.759	.002
	Pragmatist	8.108	3	2.703	1.099	0.349	.006
Error	Reflector	1515.036	582	2.603			
	Activist	1814.487	582	3.118			
	Theorist	2263.094	582	3.888			
	Pragmatist	1431.598	582	2.460			
Total	Reflector	45512.000	586				
	Activist	30077.000	586				
	Theorist	31178.000	586				
	Pragmatist	42882.000	586				
Corrected total	Reflector	1543.099	585				
	Activist	1823.142	585				
	Theorist	2267.666	585				
	Pragmatist	1439.706	585				

a. R Squared = .018 (Adjusted R Squared = .013)

b. R Squared = .005 (Adjusted R Squared = .000)

c. R Squared = .002 (Adjusted R Squared = −.003)

d. R Squared = .006 (Adjusted R Squared = .001)

The Box's test of equality of covariance matrices was used to check the assumption of homogeneity of covariance of the four learning styles across the three majors of PE, SC, and SM. Table A12.13 reveals the significant differences between the covariance matrices ($p = 0.028 < 0.05$), meaning that the homogeneity assumption was violated and Wilks' lambda was an appropriate test to use.

Table A12.13 Box's test of equality of covariance matrices of major

Box's test of equality of covariance matrices	
Box's M	34.793
F	1.685
df1	20
df2	25733.128
Sig.	.028

The Wilks' lambda test was used and the main effect of degree of preference for learning styles and majors displayed an F ratio of $F(8.1160) = 1.058$, $p = 0.390$ indicating no significant relationship between learning styles and majors (Table A12.14).

Table A12.14 Multivariate tests of major

Effect		Value	F value	Hypothesis df	Error df	p value	Partial eta squared
Intercept	Pillai's Trace	.942	2376.261	4.000	580.000	.000	.942
	Wilks' Lambda	.058	2376.261	4.000	580.000	.000	.942
	Hotelling's Trace	16.388	2376.261	4.000	580.000	.000	.942
	Roy's Largest Root	16.388	2376.261	4.000	580.000	.000	.942
Major	Pillai's Trace	.014	1.06	8.000	1162.000	.389	.007
	Wilks' Lambda	.986	1.058	8.000	1160.000	.390	.007
	Hotelling's Trace	.015	1.057	8.000	1158.000	.391	.007
	Roy's Largest Root	.008	1.125	4.000	581.000	.344	.008

The Levene's test of equality of error variances was also used to test the assumption of MANOVA that the variances of each variable are equal across the groups. Table A12.15

indicates the Levene's test was non-significant, this means that the assumption was met for the learning styles and majors ($p > 0.05$).

Table A12.15 Levene's test of equality of error variances

	F value	df1	df2	p value
Reflector	.975	2	583	0.378
Activist	.604	2	583	0.547
Theorist	1.944	2	583	0.144
Pragmatist	.762	2	583	0.467

Table A12.16 reveals the tests of between-subjects effects. From the above results, it is evident that, when the test between subjects was consulted a relationship was shown ($p = 0.354, 0.504, 0.810, 0.408$) between the Activist, Reflector, Theorist, and Pragmatist learning styles and majors, but not to a level of significance.

Table A12.16 Tests of between-subjects effects

Source	Dependent variable	Type III sum of squares	df	Mean square	F value	p value	Partial eta squared
Corrected model	Reflector	3.618[a]	2	1.809	.685	0.504	0.002
	Activist	6.487[b]	2	3.243	1.041	0.354	0.004
	Theorist	1.636[c]	2	.818	.210	0.810	0.001
	Pragmatist	4.420[d]	2	2.210	.898	0.408	0.003
Intercept	Reflector	16105.192	1	16105.192	6099.021	0.000	0.913
	Activist	9776.979	1	9776.979	3137.623	0.000	0.843
	Theorist	10217.235	1	10217.235	2628.671	0.000	0.818
	Pragmatist	14616.827	1	14616.827	5937.219	0.000	0.911
Major	Reflector	3.618	2	1.809	.685	0.504	0.002
	Activist	6.487	2	3.243	1.041	0.354	0.004
	Theorist	1.636	2	.818	.210	0.810	0.001
	Pragmatist	4.420	2	2.210	.898	0.408	0.003
Error	Reflector	1539.481	583	2.641			
	Activist	1816.655	583	3.116			
	Theorist	2266.030	583	3.887			

Source	Dependent variable	Type III sum of squares	df	Mean square	F value	p value	Partial eta squared
	Pragmatist	1435.286	583	2.462			
Total	Reflector	45512.000	586				
	Activist	30077.000	586				
	Theorist	31178.000	586				
	Pragmatist	42882.000	586				
Corrected total	Reflector	1543.099	585				
	Activist	1823.142	585				
	Theorist	2267.666	585				
	Pragmatist	1439.706	585				
a. R Squared = .002 (Adjusted R Squared = −.001)							
b. R Squared = .004 (Adjusted R Squared = .000)							
c. R Squared = .001 (Adjusted R Squared = −.003)							
d. R Squared = .003 (Adjusted R Squared = .000)							

The Box's test of equality of covariance matrices was used to check the assumption of homogeneity of covariance of the four learning styles among students and student-athletes. As can be seen in Table A12.17, Box's M (4,07) was not significant, $p = .952 > .05$, indicating that there were no significant differences between the covariance matrices. Therefore, the assumption was not violated and Pillai's trace was an appropriate test to use.

Table A12.17 Box's test of equality of covariance matrices of student type

Box's test of equality of covariance matrices	
Box's M	4.060
F	.390
df1	10
df2	18657.626
Sig.	.952

The Wilks' lambda test was carried out and the main effect of degree of preference for learning styles and student type displayed an F ratio of $F (4.581) = 1.77$, $p = 0.134$, indicating no significant relationship between learning styles and student type (Table A12.18).

Table A12.18 Multivariate tests

Effect		Value	F value	Hypothesis df	Error df	p value	Partial eta squared
Intercept	Pillai's Trace	.921	1693.647	4.000	581.000	.000	.921
	Wilks' Lambda	.079	1693.647	4.000	581.000	.000	.921
	Hotelling's Trace	11.660	1693.647	4.000	581.000	.000	.921
	Roy's Largest Root	11.660	1693.647	4.000	581.000	.000	.921
Student type	Pillai's Trace	.012	1.768	4.000	581.000	.134	.012
	Wilks' Lambda	.988	1.768	4.000	581.000	.134	.012
	Hotelling's Trace	.012	1.768	4.000	581.000	.134	.012
	Roy's Largest Root	.012	1.768	4.000	581.000	.134	.012

The Levene's test of equality of error variances was also used to test the assumption of MANOVA that the variances of each variable are equal across the groups. As displayed in Table A12.19, the Levene's test was non-significant. This means that the assumption was met for the learning styles and student type ($p > 0.05$).

Table A12.19 Levene's test of equality of error variances

Levene's test of equality of error variances				
	F value	df1	df2	p value
Reflector	.729	1	584	.393
Activist	.003	1	584	.957
Theorist	.060	1	584	.807
Pragmatist	2.245	1	584	.135

Table A12.20 reveals the tests of between-subjects effects. From the above results, it is evident that, when the test between subjects was used a relationship was shown ($p = 0.793$, 0.349, 0.138) between the Activist, Reflector, and Pragmatist learning styles and student type, but not to a level of significance. However, the relationship between the Theorist learning style and student type was statistically significant with the p-value = 0.023 (< 0.05).

Table A12.20 Tests of between-subjects effects

Source	Dependent variable	Type III sum of squares	df	Mean square	F value	p value	Partial eta squared
Corrected model	Reflector	2.314[a]	1	2.314	.877	0.349	0.001
	Activist	.216[b]	1	.216	.069	0.793	0.000
	Theorist	20.126[c]	1	20.126	5.230	0.023	0.009
	Pragmatist	5.405[d]	1	5.405	2.201	0.138	0.004
Intercept	Reflector	11203.426	1	11203.426	4246.406	0.000	0.879
	Activist	6953.581	1	6953.581	2227.678	0.000	0.792
	Theorist	7858.454	1	7858.454	2041.939	0.000	0.778
	Pragmatist	10711.289	1	10711.289	4361.282	0.000	0.882
Student type	Reflector	2.314	1	2.314	.877	0.349	0.001
	Activist	.216	1	.216	.069	0.793	0.000
	Theorist	20.126	1	20.126	5.230	0.023	0.009
	Pragmatist	5.405	1	5.405	2.201	0.138	0.004
Error	Reflector	1540.785	584	2.638			
	Activist	1822.926	584	3.121			
	Theorist	2247.539	584	3.849			
	Pragmatist	1434.302	584	2.456			
Total	Reflector	45512.000	586				
	Activist	30077.000	586				
	Theorist	31178.000	586				
	Pragmatist	42882.000	586				
Corrected total	Reflector	1543.099	585				
	Activist	1823.142	585				
	Theorist	2267.666	585				
	Pragmatist	1439.706	585				

a. R Squared = .001 (Adjusted R Squared = 0.000)

b. R Squared = .000 (Adjusted R Squared = −0.002)

c. R Squared = .009 (Adjusted R Squared = 0.007)

d. R Squared = .004 (Adjusted R Squared = 0.002)

Appendix 13: Field notes for different sports

Table A13.1 Summary of field notes across eight sports

Sport and student teaching group numbers	Facility	Equipment	Environment	Practice time and assistance given	Skill correction and feedback to individual students provided	Engagement of students	Differences in learning styles	Teaching styles	Teaching styles adapted to different learning styles (Yes/No)
Soccer 12 (10 male + 2 female)	38 m x 20 m outdoor synthetic court	Ball for each student Goals and nets Cones Whistle	It was a cool day with a temperature of around 26^0 C. There was little noise from surrounding areas.	40 min. Guiding each student in passing the ball for another student to kick into the goal	Correct postures of legs and how to control the possession of the ball with the feet Immediate and specific feedback provided	Initially, all 12 students were actively involved. 2 female students had a break after a vigorous activity.	No differences in learning styles Females were not allowed to practice the 5 stages of kicking the ball with the inside of the foot.	Demonstration Verbal cues Feedback	No Individualised instruction was employed: females were not allowed to perform advanced techniques

Sport and student teaching group numbers	Facility	Equipment	Environment	Practice time and assistance given	Skill correction and feedback to individual students provided	Engagement of students	Differences in learning styles	Teaching styles	Teaching styles adapted to different learning styles (Yes/No)
Volleyball 14 (3 female + 11 male)	60 m x 35 m indoor volleyball hall	Net Balls Whistle	It was a cool day with a temperature of 24^0 C. No noise could be heard from outside, but there was noise from inside coming from the bouncing of the balls and the sound of the students' shoes on the court floor.	40 min. Assistance provided in passing the ball to each student	Immediate and specific feedback provided	Initially, all 14 students were actively involved. 3 female students were exhausted, not able to hit the ball over the net with force.	No differences in learning styles	Demonstration Verbal cues Groupwork Feedback	No Individualised instruction was employed: females were not allowed to perform techniques requiring strength.
Athletics 18 (5 female + 13 male)	Track-and-field	10 hurdles 5 starting blocks	It was a cool and sunny day with a temperature of 27^0 C There was a light wind and no sound could be heard.	40 min. Assistance provided when needed	Basic skills in running, notably for students in the early stage of athletics	All students were actively engaged except for a female who was ill.	No differences in learning styles, following teacher's instruction Males were stronger and more flexible.	Demonstration Verbal cues Feedback	No

Sport and student teaching group numbers	Facility	Equipment	Environment	Practice time and assistance given	Skill correction and feedback to individual students provided	Engagement of students	Differences in learning styles	Teaching styles	Teaching styles adapted to different learning styles (Yes/No)
Traditional Martial Arts 10 (2 female + 8 male)	17 m x 50 m in-door hall	A pair of gloves per student	It was a cool day with a temperature of around 27^0 C. The hall provided sufficient light. There were no fans; thus, it seemed to be hot in summer.	40 min. Assistance provided when needed	Immediate feedback on skills and techniques provided	All students were actively engaged.	No differences in learning styles, following teacher's instruction Females were weaker but they trained hard.	Demonstration Verbal cues Groupwork in pairs Feedback	No
Table-tennis 15 (8 female + 7 male)	40 m x 20 m indoor table-tennis hall	Tables Rackets Balls	It was a cool day with a temperature of 25^0 C. There were adequate ceiling lights. A lot of noise could be heard from outside.	40 min. No assistance provided as they were in the final year	The teacher did not observe carefully. Only limited correction and feedback were provided as this was a reviewing session	All students were actively engaged.	No differences in learning styles identified, following teacher's instruction	Demonstration (with another student) Verbal cues Groupwork in pairs Feedback	No

Sport and student teaching group numbers	Facility	Equipment	Environment	Practice time and assistance given	Skill correction and feedback to individual students provided	Engagement of students	Differences in learning styles	Teaching styles	Teaching styles adapted to different learning styles (Yes/No)
Martial Arts (Karate) 8 male students	17 m x 17 m indoor hall	A 20 m rope ladder An overhead projector	It was a rainy and wet day with outside temperatures of 26–29^0 C. It was quiet.	40 min. Assistance provided	Corrections on skills and techniques provided Specific and immediate feedback provided	Initially, all students were actively engaged. Then, one student was injured and sat outside as an observer.	No differences in learning styles identified, following teacher's instruction	Demonstration (with another student) Verbal cues Visual means Groupwork in pairs Feedback	No
Swimming 23 (6 female + 17 male)	25 m x 50 m outdoor swimming-pool	No equipment provided by the university but students could wear their own swim caps, swim goggles, earplugs and nose clips.	It was on a sunny day with a temperature of 30^{0}C. Some noise and sights due to another session happening.	40 min. Assistance provided	Corrections on skills and techniques provided Specific and immediate feedback provided	All students were actively engaged.	No differences in learning styles identified, following teacher's instruction	Demonstration Verbal cues Feedback	No

Sport and student teaching group numbers	Facility	Equipment	Environment	Practice time and assistance given	Skill correction and feedback to individual students provided	Engagement of students	Differences in learning styles	Teaching styles	Teaching styles adapted to different learning styles (Yes/No)
Gymnastics 30 (6 female + 24 male)	25 m x 50 m indoor gymnastics court	Skipping ropes	It was hot because there were no fans, no air-conditioners and no ventilated windows. The court seemed to be dark since there were not enough lights. Students could not hear any sounds and see anything from outside.	40 min. Assistance provided	Common mistakes corrected Specific and immediate feedback provided	All students were actively engaged except for one female who became ill and sat outside as an observer.	No differences in learning styles identified, following teacher's instruction	Demonstration Verbal cues Feedback	No