METACOGNITIVE LEARNING EXPERIENCES IN WUSHU AMONG PHYSICAL EDUCATION UNIVERSITY STUDENTS IN CHINA

By

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Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Doctor of Philosophy

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Chairman : Professor Soh Kim Geok, PhD
Faculty : Educational Studies

Despite its three-thousand-year legacy, Chinese Wushu remain absent from the Olympic Games. This exclusion is largely attributable to two key factors: limited global recognition and participation in the sport, coupled with the substantial challenges inherent in mastering Wushu techniques. Hence, more research is needed to explore the Wushu learning experiences. This study integrates metacognitive theory and self-regulated learning theory to propose the concept of metacognitive learning and incorporate it into Wushu learning. Utilising a case study approach within qualitative research, it explores the metacognitive learning experiences among physical education university students in China.

The sample selection was based on purposive sampling and voluntary participation, involving physical education students enrolled in Wushu courses at Yuncheng University in Shanxi, China. Data were collected through focus groups, in-depth semi-structured individual interviews, direct

observation, field notes, and document analysis. Following the principle of data saturation, the final sample comprised 10 students in the focus group, and 15 in-depth interviews were obtained. A detailed three-level data coding analysis was conducted using NVivo software and manual coding. The study's credibility and rigour were enhanced through case study quality assessment guidelines, COREQ qualitative research checklist, triangulation, member checks, peer review, researcher reflexivity, detailed in-depth descriptions, and audit trails. Ethical considerations were strictly followed throughout the qualitative research process, ensuring the study's integrity. This study has culminated in synthesising and integrating 10 emerging main themes and 19 sub-themes. The results have illuminated that students perceive metacognitive learning as an advanced cognitive approach, a metacognitive skill, and an ownership of learning. The metacognitive learning model's component dimensions include metacognitive knowledge, metacognitive behaviour, and metacognitive emotion three-stage, metacognitive learning awareness, understanding Wushu, setting goals and planning, selecting and applying learning strategies, problem-solving and self-monitoring, self-evaluation and reflection. The study also identified influencing factors and challenges, such as educational philosophies, teaching methods and approaches from teachers, the learning environment and feedback mechanisms in teaching, students' learning styles and experiences, metacognitive skills, and motor skills.

This study has revealed that Wushu encompasses many aspects of learning elements that are more reflected in metacognitive learning. This suggests

that Wushu possesses enough learning elements to be considered an Olympic sport. Furthermore, highlighting the learning aspect of Wushu could make it more practical and recognisable by other countries outside China. By making the learning content available in different languages, Wushu could become more accessible. With these advancements, the dream of including Wushu in the Olympics could be realised sooner. Future studies could use different research designs to deeply explore and examine the metacognitive learning dimension between different Wushu disciplines, and delve into comparative studies on metacognitive learning across populations at various educational stages, genders, and other sports disciplines.

Keywords: metacognitive learning experiences, self-regulated learning, Wushu learning, physical education students

SDG: GOAL 3: Good Health and Wellbeing, GOAL 4: Quality Education

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

PENGALAMAN PEMBELAJARAN METAKOGNITIF DALAM PEMBELAJARAN WUSHU KALANGAN PELAJAR UNIVERSITI PENDIDIKAN JASMANI DI CHINA

Oleh

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Januari 2025

Pengerusi : Profesor Soh Kim Geok, PhD
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Walaupun mempunyai warisan selama tiga ribu tahun, Wushu Cina masih tidak termasuk dalam Sukan Olimpik. Pengecualian ini sebahagian besarnya disebabkan oleh dua faktor utama: pengiktirafan dan penyertaan global yang terhad dalam sukan ini, serta cabaran besar yang wujud dalam menguasai teknik Wushu. Oleh itu, lebih banyak penyelidikan diperlukan untuk meneroka pengalaman pembelajaran Wushu. Kajian ini menggabungkan teori metakognitif dan teori pembelajaran kendiri untuk mencadangkan konsep pembelajaran metakognitif dan memasukkannya ke dalam pembelajaran Wushu. Dengan menggunakan pendekatan kajian kes dalam penyelidikan kualitatif, kajian ini meneroka pengalaman pembelajaran metakognitif di kalangan pelajar universiti pendidikan jasmani di China.

Pemilihan sampel berdasarkan pensampelan bertujuan dan penyertaan secara sukarela, melibatkan pelajar pendidikan jasmani yang mendaftar

dalam kursus Wushu di Universiti Yuncheng di Shanxi, China. Data dikumpulkan melalui kumpulan fokus, temu bual mendalam separa berstruktur individu, pemerhatian langsung, nota lapangan, dan analisis dokumen. Mengikut prinsip ketepuan data, sampel akhir terdiri daripada 10 pelajar dalam kumpulan fokus dan 15 temu bual mendalam diperoleh. Analisis pengekodan data tiga peringkat yang terperinci dijalankan menggunakan perisian NVivo dan pengekodan manual. Kredibiliti dan keteguhan kajian ditingkatkan melalui garis panduan penilaian kualiti kajian kes, senarai semak penyelidikan kualitatif COREQ, triangulasi, semakan ahli, semakan rakan sebaya, refleksitiviti penyelidik, penerangan terperinci yang mendalam, dan jejak audit. Pertimbangan etika diikuti dengan ketat sepanjang proses penyelidikan kualitatif, memastikan integriti kajian. Kajian ini telah menghasilkan sintesis dan integrasi 10 tema utama yang muncul dan 19 subtema. Hasilnya telah menunjukkan bahawa pelajar melihat pembelajaran metakognitif sebagai pendekatan kognitif lanjutan, kemahiran metakognitif, dan pemilikan pembelajaran. Komponen dimensi model pembelajaran metakognitif termasuk pengetahuan metakognitif, tingkah laku metakognitif, dan emosi metakognitif tiga peringkat, kesedaran pembelajaran metakognitif, pemahaman tentang Wushu, menetapkan matlamat dan perancangan, memilih dan menerapkan strategi pembelajaran, penyelesaian masalah dan pemantauan kendiri, penilaian kendiri dan refleksi. Kajian ini juga mengenal pasti faktor-faktor yang mempengaruhi dan cabaran seperti falsafah pendidikan, kaedah pengajaran dan strategi dari guru, persekitaran pembelajaran dan mekanisme maklum balas dalam pengajaran, serta gaya

pembelajaran dan pengalaman pelajar, kemahiran metakognitif, dan kemahiran motor.

Kajian ini telah mendedahkan bahawa Wushu merangkumi banyak aspek elemen pembelajaran yang lebih tercermin dalam pembelajaran metakognitif. Ini menunjukkan bahawa Wushu mempunyai elemen pembelajaran yang mencukupi untuk dianggap sebagai sukan Olimpik. Selain itu, menonjolkan aspek pembelajaran Wushu boleh menjadikannya lebih praktikal dan diiktiraf oleh negara-negara lain di luar China. Dengan menyediakan kandungan pembelajaran dalam pelbagai bahasa, Wushu boleh menjadi lebih mudah diakses. Dengan kemajuan ini, impian untuk memasukkan Wushu dalam Sukan Olimpik mungkin dapat direalisasikan lebih cepat. Kajian masa depan boleh menggunakan reka bentuk penyelidikan yang berbeza untuk meneroka dan mengkaji dimensi pembelajaran metakognitif antara disiplin Wushu yang berbeza, dan menyelami kajian perbandingan mengenai pembelajaran metakognitif dalam kalangan populasi pada peringkat pendidikan, dan jantina yang berbeza dalam disiplin sukan lain.

Kata Kunci: pengalaman pembelajaran metakognitif, pembelajaran terkawal kendiri, Pembelajaran Wushu, pelajar pendidikan jasmani

SDG: MATLAMAT 3: Kesihatan Yang Baik dan Kesejahteraan, MATLAMAT 4: Pendidikan Berkualiti

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Finally, I want to express my gratitude to myself. It was in my middle age that I made this challenging yet meaningful decision. I'm thankful for my perseverance and hard work, which once again proved myself.

This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy The members of the Supervisory Committee were as follows:

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MCL	Metacognitive Learning
MCLU	Metacognitive Learning Understanding
MCLR	Metacognitive Learning Regulation
MCLE	Metacognitive Learning Experiences
MCLB	Metacognitive Learning Behaviour
MCLE	Metacognitive Learning Emotions
SRL	Self-Regulated Learning
PE	Physical Education
PT	Practice Time
RCWS	Reasons for Choosing Wushu Specialisation;
OPWS	Objectives of Pursuing Wushu Specialisation

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter summarises the fundamentals of Chinese Wushu and delves into the question ‘Why hasn't Wushu been included in the Olympic Games?’ The following sections discuss the research background, problem statement, research objectives, significance, scope, limitations of the study, and the definitions of key terms.

1.2 Background

Chinese Wushu, also known as martial arts or Kung Fu, is a profound cultural heritage with a history spanning three millennia. Originating from ancient combat techniques and philosophical traditions, it encompasses hundreds of styles. Currently, there is no consistency in the use of Wushu terminology, nor is there a unified standard for its classification. In China, Wushu is generally categorized into two types: traditional Wushu and modern Wushu (Yang, 2018). Modern Wushu has been standardized for competitive and performance purposes, including disciplines such as Sanda, Taekwondo, and Judo, while traditional Wushu primarily emphasizes self-defence, health, and moral cultivation, as seen in Wushu routines (Yang, 2010). In this study, the term Wushu primarily refers to Wushu routines within traditional Chinese Wushu.

With a history spanning over three millennia, Chinese Wushu stands as a quintessential representation of the country's traditional sports culture. With the continuous implementation of China's open-door policy and people's increasing concern for health, conventional Chinese Wushu is gaining popularity and acceptance as a cultural heritage. Nevertheless, it faces a significant predicament as it has yet to be included in the Olympic Games (Dai, 2016; Liu et al., 2023). So, why has the Olympic Games yet to embrace Wushu? One of the key reasons is that Wushu's global recognition and participation levels do not meet the requirements outlined in the Olympic Charter (Olympic Charter, 2023).

During the International Olympic Committee Executive Board meeting on 8 January, 2020, Wushu was officially included as a competitive sport in the fourth Youth Olympic Games scheduled for Dakar in 2026 (Maison, 2020). This marked Wushu's first recognition as an official competitive sport in the Olympic series. In February 2024, during an interview with Xinhua News Agency, IOC President Thomas Bach stated, 'We will witness Wushu's debut at the 2026 Dakar Youth Olympics, and afterwards, we will evaluate this debut and assess whether Wushu has garnered sufficient international recognition and participation, and after these steps, we will be able to determine whether Wushu can enter the Olympics' (Khalatyan, 2024). While this news presents a significant opportunity for Chinese Wushu, it comes with numerous challenges.

International recognition and participation in Wushu determine its future as an official Olympic sport. Low international recognition and participation can be attributed to objective external and subjective internal factors (Peng & Yang, 2021; Dai, 2016). External factors mainly include recognition and acceptance from society and cultural discrimination, whereas internal factors include the various challenges encountered in Wushu teaching and learning. These factors are detailed as follows:

1. *Social recognition and acceptance.* Wushu's specialised nature has led to the notion that it lacks the elements of learning, coupled with language barriers, and is somewhat challenging to learn (Liu, 2021). Most people are inclined to choose more effortless and convenient exercise activities as they are better suited to the fast-paced lives of modern people than Wushu, which entails long-term dedication and practice (Liu et al., 2023).

2. *Cultural discrimination factors.* Due to historical reasons, Chinese Wushu was long a closed-door development and not entirely open to the outside world (Peng & Yang, 2021). This has led to some news media and commercial cultures portraying the practice of Wushu as 'non-mainstream' and aggressive or violent (Sofia & Cruz, 2017; David et al., 2017). Such portrayals have influenced public opinion, leading some to perceive Wushu as a dangerous activity that may result in injuries. These perceptions contribute to people's reluctance to try Wushu.

3. *Wushu's learning encounters various challenges.* Currently, Wushu's teaching is influenced by traditional educational concepts emphasising a teacher-centred approach. Teachers excessively focus on imparting technical skills, neglecting the students' central role and social-psychological development (Dai et al., 2022; Du et al., 2018). This has resulted in practitioners lacking independent learning abilities and having suboptimal learning experiences.

Enhancing students' independent learning abilities and experiences in Wushu teaching is critical. This improvement is essential for increasing international recognition and participation in Wushu (Terry et al., 2022; Masdeu et al., 2022).

1.2.1 Metacognition and Self-Regulated Learning

Psychology, a scientific field that studies human behaviour, seeks to optimise human learning and education (Arroyo González et al., 2020). Metacognition and its research challenge the artificial separation of human psychological processes and emphasise the interconnectedness among various psychological processes. By examining metacognition, researchers aim to reintegrate an individual's components, thus bridging the gap between different psychological processes to a certain extent (Cheng et al., 2023).

Metacognition refers to the perception of cognition. In pedagogical education, it is the cognition of self-awareness and self-regulation of one's learning process (Flavell, 1979). Metacognitive skills are crucial for assessing students' learning abilities (Hameed & Cheruvalath, 2021; Aytunga & Ataseven, 2016). Self-regulated learning (SRL) is an critical concept belonging to metacognitive skills. It involves the process of learners controlling and regulating their learning activities, which is an advanced learning ability (Zimmerman, 2000).

Numerous studies have consistently demonstrated that using metacognitive skills leads to effective learning methods and positive outcomes. These skills are closely associated with an individual's level of cognitive processing

(Pintrich, 2004; Pintrich et al., 1993). High levels of metacognitive skills contribute to increase happiness, hope, self-confidence, and overall well-being (Mehrangiz Shoaakazemi et al., 2013; Adaryani, 2013). Furthermore, high levels of metacognitive skills enhance an individual's likelihood of success (Neriman Ataseven et al., 2016) and are correlated with self-efficacy (Šafranj, 2019) and self-concept (Durodolu, 2018). These skills also foster the development of critical thinking (Elhamifar et al., 2019; Worley et al., 2019), problem-solving (Breed & Bailey, 2018; Tachie, 2019; Kumar et al., 2022; Atman Uslu, 2022), learning strategies (Berger & Karabenick, 2016; Al-Rawahi, 2015), academic performance (Langdon et al., 2019), and self-regulation skills (Kermarrec et al., 2004; Shimon & Petlichkoff, 2009; Šteh & Šarić, 2020; Trabelsi et al., 2022). Additionally, metacognitive skills aid in controlling and regulating negative emotions, thoughts, and distressing memories (Davis et al., 2010; Hameed & Cheruvalath, 2021). Hence, Ataseven and Oguz (2016) stated that the development of metacognitive learning (MCL) skills should be integrated throughout the education process, starting from preschool and continuing to university-level education.

1.2.2 Metacognition and Self-Regulated Learning in Physical Education

In sports, more scholars are shifting their focus from general to specialised cognitive skills in sports and from external motor skills to internal control research (Mucha et al., 2020; Sudirtha et al., 2022; Wang, 2003). Many scholars have also introduced metacognition into sports; several studies

have examined the effects of metacognitive interventions on motor skills, and few studies have focused on the impact of sports on metacognitive skills.

Physical education (PE) students are future teachers of PE, and their performance and behaviour will influence students' performance. Therefore, in the context of students' sports performance, it is essential to improve the metacognitive skills of PE students (Hameed & Cheruvalath, 2021). However, Gündoğdu and Celebi conducted a study using the Meta-cognitive Awareness Inventory (MAI) to survey 854 students from the Faculty of Sports Science at Flat University. The study's findings revealed that the MAI scores of students from the Faculty of PE were significantly lower than those of other departments and professional fields. This indicates that PE student's metacognitive skills are relatively weak, which can impact their academic performance in the future (Gündoğdu & Celebi, 2017). However, most prior studies have used quantitative approaches to measure motor skills and motor techniques in learning outcomes. Only a few studies have used qualitative studies to focus on the learning process and abilities.

In addition, there needs to be more clarity and overlap in academia regarding using of metacognition and SRL concepts. So far, in terms of learning ability, although SRL is considered a concept, there are still some subtle differences between it and metacognition. Therefore, there is a pressing need to clarify the two concepts and improve the metacognitive learning model.

1.2.3 Metacognition and Self-Regulated Learning in Wushu

Traditionally, wushu has placed great emphasis on self-regulation, making use of self-control, body control, and discipline (Lakes & Hoyt, 2004). The core of traditional wushu implants in people the idea of "growing up with wushu". This concept spurs people to boost self-awareness, actively strive for character building, and reach self-actualization through constantly assessing and modifying their thoughts and actions. Some scholars have accurately depicted wushu as a systematized way to develop human potential, providing practical models and mechanisms for psychological intervention (Winkle & Ozmun, 2003).

The self-control, self-regulation, and self-discipline inherent in traditional wushu are exactly what metacognition demands, yet they are often overlooked in wushu learning. Thus, integrating metacognition into wushu learning can enrich the learning components of wushu and enable more people to embrace, acknowledge, and engage in wushu (Lakes & Hoyt, 2004; Terry et al., 2022). Although some scholars have carried out related research (Massey et al., 2013; Milligan et al., 2015; Sandford et al., 2021), the quantity of such studies is relatively limited. Furthermore, these studies mainly focus on modern Wushu programs, such as taekwondo, and mixed martial arts, with very little explanation of traditional Wushu programs.

In addition, owing to the influence of the teacher-centred teaching philosophy, most studies on metacognition and SRL and Wushu also measured the learning effects of Wushu techniques on the learning

outcomes taught by teachers. In contrast, fewer studies were conducted on students' learning experiences and abilities during Wushu learning.

1.3 Problem Statement

With a history spanning over 3,000 years, Wushu is still an ancient and popular sport in China. However, because of factors such as history and culture, China's open-door policy, and language barriers, Wushu's popularity is primarily confined to China compared with other sports such as taekwondo, karate, and boxing, which enjoy broader international appeal. This limited international visibility is why Wushu has yet to be included in the Olympic program (Dai, 2016; Bai, 2017; Peng & Yang, 2021).

In today's context, compared with other disciplines, Wushu learning in China excessively emphasises a teacher-centred approach to educational philosophy (Dai, 2016; Liu, 2021). It relies on traditional teaching methods that overemphasise teachers' teaching skills and neglect the development of students' learning skills (Guo et al., 2022). Consequently, Wushu teaching only emphasises improving Wushu motor skills and mastering of technical movements in the learning outcome. It neglects the cultivation of students' independent learning ability in the learning process, so students' learning is overly dependent on the teacher's explanation and demonstration (Chai & Sun, 2020). This approach results in limited learning ability and poor student learning experience and delays the development of other psychosocial skills (Zhu et al, 2023).

Many educators regard metacognition as a higher-order cognitive process. It entails awareness and regulation of one's learning processes and is the foundation for SRL (Schunk, 2008). Scholars have introduced various concepts related to metacognition, such as metacognitive awareness (Davis et al., 2010; Gündoğdu & Celebi, 2017), emotions (Dong, 1989), feelings (Goudas et al., 2017), strategies (Adaryani, 2013; Berger & Karabenick, 2016; Liu et al., 2019), judgements (Palmer et al., 2019), behaviour (Chatzipanteli et al., 2015b), and knowledge (Elhamifar et al., 2019; Stephanou & Karamountzos, 2020; Worley & Worley, 2019). However, there is a lack of practical research on the overarching concept of 'metacognitive learning' (MCL). The academic community still lacks a unified definition and model of MCL, and the distinction between critical concepts in the field of metacognition remains unclear, particularly regarding the main structures associated with MCL.

SRL includes metacognitive elements and is itself a high-level metacognitive skill (Dignath & Veenman, 2021; Zimmerman, 2000). Many scholars use MCL and SRL interchangeably as their core concepts are identical. Both focus on student-centred learning approaches that help develop students' independent learning abilities (Lenzen et al., 2022; Athanasios, 2020). Therefore, exploring MCL in Wushu learning can provide insights into students' specific cognition, behaviours, performance, and emotions during the Wushu learning process. This understanding can enrich students' learning abilities and help more people understand and appreciate the elements and experiences of Wushu learning.

Numerous studies have investigated the impact of metacognition in various sports domains, including different physical education (PE) courses, such as football courses (Kent et al., 2022; Price et al., 2018; Yasuo, 2021), volleyball teaching (Chatzipanteli et al., 2016), basketball teaching (Stephanou & Karamountzos, 2020), and yoga teaching (Jiang, 2019). However, a notable research gap exists in metacognition in Wushu learning. Furthermore, most studies adopted quantitative approaches to assess motor skills and academic performance outcomes, with insufficient focus on learning abilities and experiences during the learning process (Dai, 2016). Therefore, qualitative research approaches to explore students' MCL experiences in Wushu learning can fill this research gap.

Finally, research in sports and psychology has demonstrated the positive effects of Wushu training on cognitive, metacognition, social, and behavioural aspects. Studies have explored the impact of Wushu on self-esteem (Lu, 2011), self-regulation (Lakes & Hoyt, 2004; Milligan et al., 2015), executive functions (Diamond, 2012), self-control, physical control, discipline (Lakes & Hoyt, 2004), attention and awareness of mental abilities (Massey et al., 2013), respect for others (Milligan et al., 2019), and other affective factors. However, most of these studies have focused on elementary and secondary school students, and only a few have focused on college students. Physical education students are future teachers whose Wushu learning experience will eventually influence other Wushu learners. Therefore, exploring the MCL experiences of PE students in Wushu learning can lead more people to understand Wushu, become familiar with Wushu,

and participate in Wushu, increasing the recognition and participation of Wushu in other countries and regions (Terry, 2022).

1.4 Research Objectives

This study builds on metacognition and SRL theories to construct a new conceptual framework for MCL. It employed qualitative research methods to develop an operational and systematic conceptual framework that comprehensively captures the complex and evolving process of MCL among PE students in Wushu learning. The specific objectives of this study are as follows:

1. To explore a framework for understanding and enhancing the Wushu learning process by constructing the MCL model.
2. To explore the component dimensions of the MCL model in Wushu learning.
3. To explore factors and challenges affecting MCL in Wushu learning.

1.5 Research Questions

Based on the research objectives outlined above, this study aimed to address the gap in the extant literature by exploring MCL among PE students in Wushu learning in China. The following research questions were formulated:

1. What do the students understand of MCL in Wushu learning?
2. What are the component dimensions of MCL in Wushu learning?
3. What are the influencing factors and challenges of MCL in Wushu learning?

1.6 Research Significance

This study makes theoretical and practical implications for the following gaps in previous research regarding the research framework, study populations, sports teaching setting, and study design.

1.6.1 Theoretical Significance

Theoretically, this study not only contributes to but also extends metacognition theory. This study elucidated the conceptual distinction between metacognition and SRL in PE observed in prior research by addressing the confusion and overlap between metacognition theory and SRL learning theory (Schunk, 2008; Sperling, 2014). Then, building upon the theories of metacognition and models of SRL, this study introduced the concept of 'metacognitive learning'. It constructed a foundational theoretical model and applied it for the first time in Wushu's learning. Ultimately, a three-stage eight-dimensional model of MCL was developed. This conceptual and theoretical framework was proposed to innovate and expand metacognition theory and SRL. The model offers a new perspective for future research on Wushu learning and a theoretical foundation for the applicability of Wushu learning in different cultures and countries.

The findings from this study provide valuable insights into understanding students' perceptions regarding MCL theory. Findings about the factors influencing MCL offer a theoretical basis for Wushu teachers, educational administrators, and learners to apply the MCL model in depth. The study

used case study findings from qualitative research to provide a new research design perspective for exploring MCL processes.

1.6.2 Practical Significance

The results of this study help from the macro level of top-level design to the micro level of individual learning. The study provides theoretical guidance for university education administrators. It supports them in further developing and formulating policy guidelines and policies for reforming university Wushu teaching. This offers a practical basis for developing relevant policies and systems.

This study provides valuable leads and insights for Wushu teachers, coaches, trainers, and learners. The study found the learning factors in Wushu learning, especially the high-level learning factors of SRL, providing valuable clues for Wushu teachers coaches, and trainers. They can use the study's findings to acquire insights into the current Wushu learning. The learning elements further enhance Wushu learning and can help Wushu enthusiasts and new Wushu learners acquire specific learning methods and strategies.

In addition, this study identified the physical and psychosocial benefits of Wushu learning, corrected misconceptions, and prejudices about Wushu, and provided insights into the Wushu learning experience. This provides evidence to increase Wushu's international social acceptance, participation, and recognition, laying the groundwork for its possible inclusion in the

Olympic Games. Finally, the MCL interview, which outlines the design and related papers published in this study, can provide evidence to inform research in other disciplines.

1.7 Scope of the Study

Considering the in-depth nature of the study and the convenience of data collection, the sample of this study was chosen to be conducted at Yuncheng College in Shanxi Province, which provides a specific spatial field for data collection and analysis. The subjects of the study were the students majoring in physical education. The choice to make them the subject of the study is primarily based on the consideration that PE students are the future PE teachers, and their educational concepts will influence more Wushu practitioners. Furthermore, they represent the general university student practitioners rather than high-level athletes, and conducting in-depth interviews with them will provide an in-depth understanding of Wushu learners' experiences. Thus, it will lead more people to join the wushu practice. In addition, the study focuses on constructing dimensions of MCL, factors, and challenges by exploring MCL in Wushu among PE students.

1.8 Research Limitation

First, the diversity of Wushu forms, including traditional and modern Wushu, each with distinct movement characteristics and internal mechanisms, poses a challenge. This study focuses specifically on the routines in traditional Wushu, and different programs may yield different research results.

Therefore, future research should consider evaluating the learning process across multiple variations.

It is important to note that while this study is primarily based on exploring metacognition and SRL theories, the concept of MCL has yet to be clearly defined in current literature. Most studies in this area have utilised quantitative research designs. However, qualitative research is more valuable for this study. By adopting a qualitative research approach and employing a case study method, this study offers a new academic exploration and teaching practice in applying MCL concepts in Wushu learning for PE students.

As with all qualitative research, it is inevitable in this study that the researcher's biases and preconceptions may limit the methodology and analysed results to some extent (Creswell & Poth, 2016). Several methods of reducing bias are detailed in Chapter 3 to minimise bias.

1.9 Definition of Terms

1.9.1 Wushu Learning

In China, Wushu learning is a fundamental course offered to undergraduate students majoring in PE (Dai, 2016). It consists of both general Wushu courses and specialised courses. The general course focuses on practical sports training, with an emphasis on physical practice and the application of technical skills. It covers the fundamental theories, basic techniques, and teaching and training methods of Wushu. This course typically spans one

semester. The specialised course builds upon the foundation established in the general course and delves deeper into the teaching of Wushu equipment and routines. Its objective is to enable students to understand Wushu's theoretical knowledge and professional skills comprehensively. Through this specialised course, students develop strong teaching abilities and gain the competence to instruct middle school students independently. Moreover, the course enhances practical Wushu teaching, training, learning and guidance skills. They develop the necessary teaching competencies and sensible abilities to instruct others in Wushu effectively (Jin et al, 2017).

1.9.2 Physical Education's University Students

Terminological Definition

The PE major in China aims to provide students with a comprehensive understanding of the essential knowledge and skills required in PE. It equips students with the necessary expertise to excel in various aspects of PE, including understanding the rules and regulations of PE in schools, developing practical solid abilities, and fostering overall development. PE majors are trained to become high-level professionals who can actively engage in PE physical activities, sports training, and competitions in secondary schools. They are also trained to contribute to school sports science research and management and provide guidance in social sports activities (Zhang et al., 2016).

Many students majoring in PE aspire to become future PE teachers. As future educators, their metacognitive skills play a crucial role in determining

their learning abilities and, in turn, those of their future students (Liu et al., 2019). Furthermore, PE majors are also responsible for preserving and promoting traditional Chinese sports culture. They carry the mission of passing down this rich heritage to future generations.

Operational Definition

For this case study, the interviewees were selected from sophomore, junior, and senior students majoring in PE. Sophomores are enrolled in general Wushu courses, while juniors and seniors are enrolled in specialised Wushu courses, allowing for a diverse range of perspectives and experiences to be captured in the study.

1.9.3 Metacognitive Learning

Terminological Definition

In the context of PE learning, 'metacognitive learning' (MCL) refers to the strategies and skills of students in understanding the learning process of physical education. It encompasses students' cognitive strategies and abilities to comprehend and navigate the PE learning process (Dong, 2005; Pintrich et al., 1993). The essence of MCL lies in self-awareness and self-regulation. MCL aims to enable learners to acquire and apply knowledge effectively, solve problems efficiently, process information adeptly, and adapt to new learning environments efficiently (Pintrich, 2004; Zimmerman, 2000).

Operational Definition

This study combines metacognition theory and the SRL model and proposes a concept of MCL based on these two perspectives. It also defines 'metacognitive learning' as the cognition and ability to reflect on and regulate one's learning process, strategies, and emotions. It includes understanding one's thought processes, planning, monitoring progress, assessing effectiveness, and making necessary adjustments.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter focuses on the problems and gaps in the extant literature. It is divided into three main parts. The first part discusses the problems and challenges of Wushu's status and the research gaps in the extant literature. The second part summarises the application and practice of metacognitive learning (MCL) and self-regulated learning (SRL) theories in physical education (PE) and research gaps based on a systematic literature review. The third part elaborates on the theoretical and conceptual framework of this study. The discussion in this chapter sets the stage for the detailed research design in Chapter 3.

2.2 The Problem and Challenges of Wushu

2.2.1 The International Problem and Challenges of Wushu Learning

Although Wushu is a famous and ancient sport with a history spanning over three millennia in China, its popularity is still limited to China compared with other sports such as taekwondo and boxing in other countries. This is one of the main factors that has led to Wushu not being included in the Olympics and Wushu's most humiliating issue. At present, misunderstanding the culture of Wushu, difficulties associated with the complexity of learning the movements, and language barriers to understanding the cultural connotations of Wushu terminology are the key challenges encountered in

Wushu learning internationally, which collectively contribute to the inability of Wushu to gain widespread international recognition (Dai, 2016; Liu, 2021; Peng & Yang, 2021; Liu et al., 2023).

Chinese Wushu is judged differently than modern sports in the Olympics. It needs to be quantifiable and measurable, like modern sports. It leads many learners to believe it entails more learning elements and is too difficult to learn compared with taekwondo, boxing, and combat (Zhang et al., 2022). Furthermore, there are many kinds of traditional Chinese Wushu cultures, each focusing on gangs and need to be more open to other cultures. The learning of each Wushu mainly depends on the master's hand-to-hand instruction, resulting in a lack of independent learning ability on the part of the learners (Liu et al., 2023).

The rapid development of modern competitive sports has profoundly impacted traditional Chinese Wushu. There has been a deviation in cultural identity. Following World War II, the international community embraced ‘competitive sports’ to promote unity and eliminate the remnants of hostility from the war (Liu et al., 2023). In line with this global trend, the new China embraced competitive sports as a national endeavour, causing Chinese Wushu to become associated with sports and ‘development’ through competitions (Du et al., 2018). Nevertheless, the competitive sports promoted by the Olympic spirit and their rules significantly differ from the core philosophy of traditional Chinese Wushu, which emphasises the cultivation of physical and mental harmony (Liu et al., 2023). Consequently,

many people's understanding of Chinese Wushu is confined to its definition as a decorative, competitive, and aggressive activity, neglecting its practical and holistic impact (Hortiguela et al., 2017). This limited understanding hinders the authentic practice and dissemination of traditional Chinese Wushu.

Internationally, several countries, including Europe, Japan, France, and Slovakia, have implemented educational programs and incorporated Wushu courses, such as judo, karate, and self-defence, into their middle school physical education curricula (Nakonechnyi & Galan, 2017). According to a 2009 Australian Bureau Statistics survey, Wushu is among the top ten sports activities for children and adolescents in France, Canada, Australia, the Netherlands, and Belgium (Vertonghen & Theeboom, 2010). Numerous authors strongly advocate for including Wushu in physical education programs (Chen, 2021; Winkle & Ozmun, 2003). However, Wushu courses are primarily offered in commercial schools in the United States and Spain. A prior study that examined the status of physical education and sports sciences revealed that out of 368 students, only five (1.36%) had experienced Wushu as part of their physical education curriculum. In Brazil, Wushu classes are scarce in most schools (David et al., 2017). Wushu is less accepted and more often emphasised than in China.

In summary, Wushu's international recognition and participation are limited because of misinterpretation of its essence and culture, difficulties associated with the complexity of learning the movements, language barriers

to understanding the cultural connotations of Wushu, limitations of judging criteria, and the influence of mass media swayed by commercial and entertainment factors.

2.2.2 The Problem and Challenges of Wushu Learning in China

In China, Wushu learning is influenced by traditional Wushu culture, emphasising teacher-centred student learning and a lack of independent space and time. Because of this practice, classroom teaching is always dominated by the teacher's explaining and training, where students are overly dependent on the teacher; therefore, the students cannot independently practice themselves (Shi et al., 2020). In the long run, this limits the participation of Wushu learners, making it challenging to meet the standards required by the International Olympics (Liu et al., 2023). In addition, due to the influence of teacher-centredness, Wushu learning's measurement focuses solely on improving motor skills in the learning outcomes. It pays insufficient attention to the learning experience during the learning process (Peng & Yang, 2021).

Furthermore, the teaching methods of Chinese Wushu courses need to be revamped (Meng, 2016). Wushu classes' teaching process and assessment methods tend to prioritise rote memorisation and completion of specific actions rather than fostering an in-depth understanding and mastery of core technical methods, basic techniques, and the underlying principles of Wushu movement learning (Bai, 2017; Chai & Sun, 2020). Secondly, Wushu teaching remains rooted in the traditional teacher-centered approach, which

leads to low student engagement, poor learning experiences, and diminished interest in learning Wushu. This teaching method does not align with the current need for physical education curriculum reform in primary and secondary schools. It fails to fulfil the broader cultural aspects and needs of students in Wushu learning (Shi et al., 2020).

To address these challenges, it is crucial to revamp the teaching methods and content of Wushu courses in unity with the reforms in PE curricula. This includes shifting the focus from mere technical instruction to developing a deeper understanding of core principles and techniques and incorporating traditional Wushu culture to enhance student engagement. Additionally, finding practical ways to implement the 'Healthy Physical Education Curriculum Model' theoretical framework will help create a more effective and comprehensive Wushu learning approach (Liu et al., 2023).

2.3 Research on Wushu Teaching and Learning

2.3.1 International Wushu Research

From an international perspective, there is significant scholarly interest in Wushu research. Chinese Wushu, traditionally dominated by men, promotes the health and well-being of all individuals, including those with disabilities (Sun et al., 2022; Hollins, 2018). Participation in Wushu can enhance various positive social and psychological variables while reducing negative factors (Bell, 2016). Studies have demonstrated that disciplines such as taekwondo can markedly reduce tension, depression, and anger levels among young individuals (Tony, 2020; Ng-Knight et al., 2022; Lakes et al., 2013). Winkle

and Ozmun (2003) emphasised that Wushu training can enhance students' health and fitness, self-concepts, respect, moral development, and cognitive abilities. Some parents highlight that the most notable benefit of Wushu is its remarkable ability to boost children's self-confidence (Vertonghen & Theeboom, 2010; Winkle & Ozmun, 2003). Academic research has provided substantial evidence of the benefits of learning Wushu. However, with the high interest in academic circles regarding Wushu research, the outlook for research on Wushu teaching and learning could be more optimistic.

Research on Wushu teaching and learning primarily focuses on two main aspects. First, there is theoretical research on the reform of Wushu teaching. This line of research explores various aspects of Wushu teaching, including goals, curriculum design (Broadbent & Poon, 2015; Langdon et al., 2019; Mehrangiz et al., 2013), teaching strategies (Brich et al., 2022; Bailey, 2003), such as self-check (Papaioannou et al., 2012; Chatzipanteli et al., 2016), thinking aloud (Whitehead & Jackman, 2021), and instructional modes (Chai et al., 2020) and teaching styles (Berger & Karabenick, 2016) to promote effective learning, enhance exercise self-efficacy (Al-Harthy et al., 2010; Mulyana, 2017), and foster students' persistence and ability to learn sports independently (Kok et al., 2020; Lu, 2011; Mucha et al., 2020). Some scholars are increasingly interested in investigating the impact of Wushu learning on students' social interactions, mental health, and overall well-being (Sandford et al., 2021a; Rotunda & Ryan, 2019; Akehurst et al., 2020a). Most studies used quantitative research focused on learning outcomes.

The second aspect involved a shift in international research on school physical education and Wushu away from focusing solely on teachers' teaching and external indicators such as students' academic achievement and sports performance. Instead, the focus is now on understanding students' learning processes and exploring internal indicators related to their learning. Some studies employed qualitative research methods to explore students' experiences and benefits in Wushu learning. These studies aim to better understand students' perspectives and engagement with Wushu practice (Spencer, 2012; Massey et al., 2013b; Massey & Meyer, 2015; Milligan et al., 2019). The research subjects encompass Wushu students in primary and secondary schools. This shift reflects a broader recognition of the holistic benefits of Wushu, which go beyond physical development and consider the social and psychological aspects of the student experience. However, most studies have been conducted with elementary and middle school students, and more research is needed with college students at high cognitive levels.

2.3.2 Wushu Research in China

Wushu has been an integral part of sports, culture, education, and health services since the founding of the People's Republic of China over 70 years ago (Dai, 2016). The scientific, in-depth, and various studies on Wushu have steadily improved, undergoing four distinct periods. First, the founding of the People's Republic of China to the early stage of reform and opening: During this period, research on Wushu focused on 'study, practice, and competition', leading to a general awareness of scientific research (Liu, 2021; Peng &

Yang, 2021). Second, reform and opening to the mid-1990s: Research on Wushu teaching and training continued to deepen, and a rise in historical, cultural, and educational investigations was witnessed. From the end of the 1990s to the Beijing Olympics: This period witnessed fruitful research on the basic theory of Wushu, with emphasis on dissemination and development becoming prominent themes (Shi et al., 2020; Bai, 2017). Lastly, after the Beijing Olympics in the new era, Wushu research has become more integrated into the national strategy, and there has been a gradual improvement in the academic system structure (Liu, 2021; Dai, 2016). However, most studies are only theoretical discussions with relatively few empirical studies.

The second aspect is empirical or experimental research on Wushu teaching. This type of research involves investigating the current state of Wushu teaching (Du et al., 2018) and exploring the application of new teaching modes, strategies, and experimental methods for teaching reform (Li et al., 2017; Zhang et al., 2016). The research samples typically include all grade-level students, focusing predominantly on primary and secondary school students. It also involves international comparisons, examining the current situation, challenges, and potential solutions for Wushu teaching reform (Liu et al., 2023; Liu, 2021). Chinese scholars have provided ample evidence for Wushu's research. Subject referencing and theoretical integration have been broader and deeper throughout the process. However, the integration of characteristic discipline theories still requires further development. While main research directions and fields have been established, more in-depth

research is needed on systematic academic theory. Research paradigms and methods continue to innovate, but more evident discipline characteristics and identification are needed. While theoretical propositions and achievements align with the demands of the times, there is room for improvement regarding timely transformation and practical application (Dai, 2016; Liu et al., 2023).

In conclusion, the above studies provided information on Wushu's teaching and learning. However, the popularity of Wushu is increasing, and in-depth knowledge and prejudice among participants and the public about Wushu learning need to be improved. Few scientific studies have focused on the Wushu learning process. Many metacognitive factors in Wushu learning, especially high-level SRL learning factors remain unexplored. Therefore, further research exploring and elucidating the effects of the Wushu learning process on psychological and social development is needed, leading to a more comprehensive understanding of Wushu learning's benefits (David et al., 2017).

2.4 Metacognition and Self-Regulated Learning in Physical Education

2.4.1 Metacognition in Physical Education

Research on metacognition in PE has focused on two main areas: the relationship between metacognition and human development and research on improving metacognitive skills in PE (İdawati et al., 2020; Aygün et al., 2020). The findings have revealed a significant positive correlation between

metacognition and various variables, including learning abilities (Ataseven & Oguz, 2016), spiritual health and life satisfaction (Aygün et al., 2020), motivation (Adaryani, 2013; Aytunga & Ataseven, 2016), self-efficacy (Šafranj, 2019; Al-Harthy et al., 2010), locus of control, self-concept (Smith et al., 2020), problem-solving awareness (Kumar et al., 2022), critical thinking (Elhamifar et al., 2019; Bakır & Eğmir, 2022), decision-making (Kent et al., 2022a), skill execution (Kent et al., 2022b; García et al., 2024), and protecting against mental and physical illnesses such as depression, anxiety, and stress (Mehrangiz et al., 2013; Li, 2022; Simonton et al., 2023; Trigueros et al., 2019). A primary objective of modern education is to equip students to effectively self-regulate their knowledge and learning processes (Keller-Schneider, 2014; Elhamifar et al., 2019; Stephanou & Karamountzos, 2020; Lenzen et al., 2022). Furthermore, research has been conducted on various teaching and training methods to enhance students' metacognitive abilities. Examples include Bloom's revised taxonomy (Sudirtha et al., 2022), explicit attention (Thompson, 2012), teaching strategies (Salters & Scharoun, 2022; Langdon et al., 2019; Huff & Nietfeld, 2009), and the Structure of the Observed Learning Outcomes (SOLO) model (Atman, 2022). The above studies provided ample evidence for metacognitive research in PE. However, these studies were less uniform in defining MCL factors in PE.

A notable shift in research focus within PE has been observed, specifically regarding metacognitive intervention. At the same time, the effects of exercise on neurobiology, social factors, and cognition have been extensively studied (Shi, 2002; Gündoğdu & Celebi, 2017). Many studies

have demonstrated the effectiveness of metacognitive interventions in PE among children and adolescents (Papaioannou et al., 2012; Karagiannidis et al., 2015). These interventions included MCL strategies (Rawahi, 2015), action memory metacognitive training (Wang, 2003), TGfU (Teaching Games for Understanding), SOLO taxonomy with reflective practice (Atman, 2022), advancing task involvement, intrinsic motivation and metacognitive regulation (Papaioannou et al., 2012), acute physical exercise (Palmer et al., 2019), a pressure training program (Kent et al., 2022b), a tactical-game approach (Chatzipanteli et al., 2016), 'Think Aloud' training (Birch et al., 2019; 2022; Stephenson & Whitehead, 2020; Whitehead & Jackman, 2021), target learning training method, self-questioning method, knowledge transfer method (İdawati et al., 2020; Li et al., 2007), self-recording, self-talk, and teaching styles (Chatzipanteli et al., 2015; 2016) on colleges or pre-teachers to improve the different level of MCL skills. These studies showed that metacognitive interventions helped enhance students' motor learning. However, most studies have used quantitative research designs to measure motor skills in learning outcomes. More research focusing on student learning experiences is needed.

These metacognitive skills include the degree of cognitive processing (Pintrich, 2004; Pintrich et al., 1993), metacognitive knowledge (Elhamifar et al., 2019; Worley & Worley, 2019), metacognitive strategies (Atman, 2022; Liu et al., 2019), problem-solving, cognitive flexibility (Breed & Bailey, 2018; İdawati et al., 2020; Kumar et al., 2022; Tachie, 2019), metacognitive behaviour (Chatzipanteli et al., 2015), metacognitive feelings (Rawahi, 2015),

decision-making and skill execution (Kent et al., 2022b), metacognitive awareness (Gündoğdu & Celebi, 2017; Sudirtha et al., 2022), metacognitive judgements (Palmer et al., 2019), metacognitive feelings (Goudas et al., 2017b), and self-regulating skills (Kolovelonis et al., 2011, 2022; Kolovelonis et al., 2013; Goudas et al., 2017; Lakes & Hoyt, 2004; Šteh & Šarić, 2020). Notwithstanding these wide-ranging aspects covered so far, MCL skills in PE and Wushu have yet to be defined.

To summarise, research on metacognition in PE has provided many valuable clues. However, the research needs to better define metacognitive elements, interventions, and skills in PE. The existing research has primarily concentrated on mastering and enhancing external sports techniques, paying limited attention to students' internal cognition and learning abilities. Most studies have focused on student learning outcomes by adopting quantitative research design, with minimal emphasis on the learning process for qualitative research design aspects. The selected sport types have predominantly focused on team ball games, with few intervention experiments conducted on individual sports such as Wushu. In addition, most of the studies are from outside China.

2.4.2 Self-Regulated Learning in Physical Education

Numerous studies in sports research have consistently demonstrated that SRL is a higher-order learning ability that significantly correlates with students' learning performance, adaptability, and motivation (Kolovelonis et al., 2012; Jørgensen & Mehus, 2022; Ommundsen, 2003), goal attainment,

and attributions (Kolovelonis et al., 2022; 2011, 2012). Consequently, fostering the development of students' SRL skills holds great potential for enhancing their performance across various domains, including learning and motor skills within PE (Kitsantas et al., 2000; Zimmerman, 2000, 2008). Recently, increased emphasis has been on improving students' SRL abilities (Schunk, 2008; Vrieling et al., 2012; Smith et al., 2020; Sperling et al., 2004; Carvalho & Araújo, 2022). Since the onset of the 2020 pandemic, adopting hybrid teaching models combining online and offline instruction has brought the study of SRL to the forefront, both nationally and internationally (Broadbent & Poon, 2015). Most research has proved that SRL is a high-level learning ability closely related to human learning (Schunk, 2008; Serling et al., 2004; Brandmo et al., 2020; Carvalho & Araújo, 2022).

According to the literature, PE provides a special place to practice students' SRL strategies. Most studies have examined the effects of various approaches and interventions on enhancing students' SRL abilities using mixed-methods approaches (Kolovelonis et al., 2011, 2012), achievement goals (Kolovelonis et al., 2012), teaching styles (Chatzipanteli et al., 2015), education programs (Lakes & Hoyt, 2004), mixed practices methods (Goudas et al., 2017; Kolovelonis et al., 2012), and different SRL interventions, such as goal-setting, self-talk, self-monitoring, and self-recording (Kolovelonis et al., 2022; Cleary et al., 2006a), which can guide students in achieving higher physical skill performance (Kolovelonis et al., 2011；2012). The findings suggest that implementing targeted interventions

and creating supportive learning environments can enhance students' SRL abilities, contributing to their overall learning and development.

SRL strategies in PE have been shown to enhance effective learning outcomes (Cleary et al., 2006a; Zimmerman,1998；2000；2008). Moreover, integrating SRL approaches in teacher preparation programs for college students majoring in PE can facilitate the development of content and pedagogical knowledge. By incorporating SRL principles into teacher training, future physical education teachers can better understand and apply effective strategies to promote SRL among their students (Liu et al., 2019; Brandmo et al.,2020). These PE courses involve football (Price et al., 2018; Chen, 2018), aerobics (Tang, 2006), public physical education (Sun, 2020; Arroyo González et al., 2020), swimming (Li et al, 2002), basketball (Cleary et al., 2006), volleyball (Jørgensen & Mehus, 2022; Yang, 2008), speed skating (Wang, 2006), yoga (Jiang, 2019), and Wushu (Lakes & Hoyt, 2004). These studies have demonstrated that SRL is a high-level learning ability that involves a wide range of PE programs; however, there is little research on Wushu teaching.

In conclusion, existing research on SRL in PE has primarily targeted college students across various subjects, without specific emphasis on PE students. Most research has concentrated on high-level athletes and sports elites within the field of PE, often paying attention to the needs and experiences of general PE students. In terms of research design, quantitative research

methods are more commonly used in studying SRL in PE than qualitative research methods.

2.5 Metacognition and Self-Regulated Learning in Wushu Learning

In recent years, there has been a growing interest in linking empirical research and theoretical reviews of Wushu with the theories of metacognition and SRL. Scholars have conducted theoretical and empirical studies to explore enhancing metacognition and self-regulation through Wushu training. Indeed, qualitative research has focused on metacognition, SRL, and the influence of different Wushu strategies on various techniques. The importance of metacognition and SRL is generally recognised in these studies. (Zhang et al., 2016). SRL in Wushu teaching (Sandford et al., 2021; Milligan et al., 2015a; Polak et al., 2019) influences different Wushu strategies on multiple techniques (Massey et al., 2013a; Massey & Meyer, 2015), such as Taijiquan (Zhang, 2022)，taekwondo (Akehurst et al., 2020b; Sandford et al., 2021b) and Wushu routines. Executive functions and social behavioural functioning (Bell et al., 2016; Diamond, 2012) were conducted. However, most of these studies have focused on Wushu skills due to learning outcomes, and only a few have focused on learning skills and experiences during the Wushu learning process.

Some quantitative studies have focused on assessing the self-regulation mental state of Wushu athletes (Massey et al., 2013; Milligan et al., 2015, 2019). Due to the diverse range of Wushu styles and activities, scholars have chosen specific forms of Wushu as case studies to deepen their

understanding. For instance, Ng-Knight et al. (2022) focused on taekwondo, while Milligan et al. explored mixed Wushu (Milligan et al., 2015; 2019). Kong and Lin (2011) conducted a case study on Wushu routines. However, further comprehensive research on SRL in PE is still required. While theoretical research is available, there is a relative scarcity of empirical research in this area. In terms of research design, quantitative research methods are more commonly employed than qualitative research methods to study SRL in physical education.

In conclusion, although the literature on Wushu, metacognition, and SRL is available, it needs to be more extensive. Quantitative studies have been conducted more often than qualitative studies, with more focus placed on Wushu skills in the learning outcomes and less on learning experiences during the learning process. This scarcity can be attributed to several factors. First, the international dissemination of Wushu has been limited, resulting in a smaller pool of participants and fewer studies conducted on this topic. Additionally, the diverse nature of Wushu, with its variegated styles and techniques, contributes to the complexity of studying its effects on cognitive processes. Different forms of Wushu may yield varied outcomes regarding metacognition and SRL. Consequently, future research needs to focus on the above research gaps.

2.6 Research Gap Based on the Systematic Literature Review

Systematic reviews involve collecting, evaluating, and synthesising existing research findings through systematic and transparent research methods that

minimise bias to answer a specific research question (Álvarez-Bueno et al., 2017; Deng et al., 2023). For this study, the researcher has published two systematic literature reviews focusing on quantitative and qualitative research designs.

The first quantitative systematic literature review was titled 'Effect of Teaching Interventions on Metacognitive Skills in Physical Education: A systematic review'. It has been published in the International Journal of Sport Psychology. Based on five prominent databases, namely, PubMed, Web of Science, SPORTDiscus, Scopus, and China National Knowledge Infrastructure, 15 articles were included in this review. Based on this review, the researcher identified the following research gaps: (1) intervention and (2) population gaps.

1. Intervention Gaps

Out of the 15 reviewed studies, different interventions were employed, namely, the TGfU model (Stephanou & Karamountzos, 2020; Chatzipanteli et al., 2015b), the tactical-game model (Chatzipanteli et al., 2016), the cyclical model of SRL (Yasuo Susaki, 2021); different teaching styles, which include student-activated teaching style (Chatzipanteli et al., 2015a) and a 'self-check' teaching style (Kolovelonis et al., 2012); various training methods, including metacognitive training methods (Jiang, 2019), cognitively challenging physical activity games (Kolovelonis et al., 2022; Kolovelonis & Goudas, 2023), and self-regulated instruction (Cleary et al., 2006); practice methods, opting for pressure training and cognitive-behavioural and

reflective practices, and cognitively challenging physical activity games (Kent et al., 2022); a combination of social feedback, simple practice, and process goals (Goudas et al., 2017a); and leadership teaching program and circling curriculums (Chen et al., 2022; Lakes & Hoyt, 2004). Among these studies, intervention strategies related to metacognition and SRL were used to improve motor skills; however, limited studies have applied sport as an intervention to enhance metacognitive skills.

2. Population Gaps

The review revealed that only three of the 15 articles focused on college students (Yasuo, 2021; Jiang, 2019; Cleary et al., 2006), with the majority concentrating on primary and secondary school students. None specifically targeted those majoring in PE. Therefore, research on metacognition among college students majoring in PE needs to be improved.

The second qualitative systematic literature review and meta-analysis was titled 'Unveiling the Impact of Metacognition on Academic Achievement in Physical Education and Activity Settings: A Comprehensive Systematic Review and Meta-Analysis of Qualitative Insights'. The review has been published in Psychology Research and Behaviour Management. Based on five databases, namely, Web of Science Core Collection, SPORTDiscus, ProQuest, PubMed, and Scopus, 20 articles were included in this review. Based on this review, the researcher noticed the following research gaps: (1) content and (2) sports discipline gaps.

1. Content Gaps

Among the 20 articles, most studies indicated that metacognition enhanced motor skills acquisition and knowledge (Price et al., 2023; Trabelsi et al., 2022; Lakes et al., 2013; Lloyd et al., 2006; Sangster, Whitebread, 2014, 2016) about motor learning outcomes. Few studies focused on controlling cognition, managing feelings of difficulty (Jackman et al., 2021), facilitating attentional control (Oliver et al., 2020), fostering social-emotional skills, and providing behavioural and cognitive benefits (Wolff & Stapp, 2019), as well as learning disabilities (Milligan et al., 2015), during the motor learning process. Hence, the learning experience and performance during the learning process must be explored more.

2. Sport Disciplines Gaps

This review revealed that the sports disciplines include soccer (Kent et al., 2022a; Price et al., 2023; Toering et al., 2011), gymnastics (Trabelsi et al., 2022), endurance running (Brick et al., 2015; Brick et al., 2020; Jackman et al., 2021), golf (Oliver et al., 2020), taekwondo (Akehurst et al., 2020; Lakes et al., 2013), mixed martial arts (Massey et al., 2013; Massey & Meyer, 2015; Milligan et al., 2015), yoga (Wolff & Stapp, 2019), table tennis (Lindsay, 2015), hockey (Lloyd et al., 2006), and metacognition-related physical education programmes (Kermarrec et al., 2004; Sangster et al., 2016, 2014; Monem, 2015). Among the 20 articles, only five are related to the Wushu type, with three focusing on mixed Wushu and two on Taekwondo. As a result, most studies predominantly centre around team ball sports such as basketball and football and individual activities like yoga and darts; at the

same time, there is a notable scarcity of research on Wushu. Taekwondo and mixed martial arts have received the most attention within Wushu teaching, whereas other aspects, such as Wushu routines and basic Wushu techniques, have been scarcely explored.

2.7 Research Theoretical Framework

2.7.1 Metacognition Concept

In his seminal paper in 1976, Flavell (1979, 1985) introduced the concept of metacognition as 'the cognition of cognition'. He broadly defined metacognition as encompassing all knowledge about cognitive processes and all cognitive activities involved in regulating these processes. Flavell proposed a three-part model of metacognition, consisting of metacognitive knowledge, monitoring, and experiences (Flavell, 1985). Essentially, metacognition involves understanding how one's mind operates and having the ability to control and monitor one's learning processes. Schraw and Moshman (1995) noted that metacognition encompasses metacognitive knowledge, regulation, and experiences.

2.7.2 The Metacognition Theory

Since Flavell's seminal work, metacognition has garnered massive attention and has been extensively cited across various fields. Flavell revised the concept of metacognition in 1976, 1981, and 1985, further refining its understanding. Other scholars and researchers have provided diverse definitions of metacognition from different perspectives (Brown, 1987;

Hussen, 1985; Weinert, 1987; Dong, 2005). These variegated perspectives contribute to the broader understanding and conceptualisation of metacognition.

Scholars also offer different perspectives on the structure and classification of metacognition (Pintrich & Groot, 1990; Schraw & Moshman, 1995; Double & Birney, 2019; Drigas & Mitsea, 2020). Different models and frameworks have been developed to understand metacognition, such as the SRL model proposed by Zimmerman (2000) and the cognitive apprenticeship model presented by Collins (Collins et al., 2007). Among these scholars, Chinese researcher Dong Qi (1989) included metacognitive knowledge, experience, and monitoring in the structure of metacognition (Dong, 1989). These variations in the conceptualisation of metacognition contribute to a more comprehensive understanding of its nature and components.

2.7.3 Self-Regulated Learning Concept

'Self-regulated learning' is a key concept in educational psychology that pertains to learners' control and regulates their learning activities (Zimmerman, 2000). It entails a high level of MCL skills. Currently, there is no universally accepted definition of 'self-regulated learning' in academic settings. Scholars have approached SRL from different perspectives. Pintrich defines this concept as '*an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behaviour, guided and constrained by their*

goals and the contextual features in the environment and situation' (Liu, 2016; Pintrich, 2000).

2.7.4 The Self-Regulated Learning Theory

The foundational theory for SRL is self-regulation, as proposed by Bandura (Ghanizadeh, 2011; Schunk, 2008b). SRL emerged in the 1980s and gained traction in education, particularly with the growing prominence of multimedia tools in the 1990s (Dickinson, 1992). Building upon Bandura's work, Zimmerman systematically reviewed various definitions of 'self-regulated learning' and identified three common characteristics. First, it emphasises self-regulation strategies in metacognition, motivation, and behaviour. Second, it highlights the feedback loop process involved in self-regulation. Lastly, it underscores using of learning strategies (Zimmerman, 1998; 2000; Winne & Hadwin, 1998; Shimon & Petlichkoff, 2009; Panadero et al., 2017, 2018). Pintrich and colleagues put forth the perspective that SRL involves an active and constructive process where learners establish goals for their learning and then strive to monitor, regulate, and control their cognition, motivation, and behaviour (Pintrich, 1993, 2000, 2004). Chinese scholar Pang Weiguo views SRL as the conscious determination of learning goals, formulation of learning plans, selection of learning methods, monitoring of the learning process, and evaluation of learning outcomes (Pang, 2002).

2.7.5 Connections between Metacognition and Self-Regulated Learning

Metacognition and SRL are two essential aspects of learning that have been extensively studied in educational psychology (Winne, 1996; Lee et al., 2016). Some intersections and overlaps between the two concepts make it challenging to articulate their relationship adequately (Dinsmore et al., 2008; Schunk, 2008). MCL refers to the capacity to monitor and control one's cognitive processes during learning (Schraw & Moshman, 1995; Berger & Karabenick, 2016; Kermarrec et al., 2004; Pintrich, 2004). This includes the ability to plan, monitor, and assess one's learning strategies. SRL is a broader concept encompassing MCL, and motivational and affective processes (Zimmerman, 2000). For instance, a self-regulation strategy for one researcher may be considered a metacognitive strategy by another researcher (Zeidner, 2019). Metacognitive strategies typically involve awareness and monitoring of learning, planning, and regulation. SRL also encompasses MCL strategies known as metacognition or metacognitive self-regulation, which involve planning, monitoring, and regulating cognitive strategies during learning (Efklides, 2019).

Based on an analysis of the existing literature, most scholars consider MCL as a subcategory of SRL. In other words, SRL represents a higher-level approach to MCL (Adaryani, 2013; Berger & Karabenick, 2016; Kermarrec et al., 2022; MacIntyre et al., 2014; Sternberg, 2001; Breed & Bailey, 2018; Smith et al., 2020a). Furthermore, MCL and SRL are mutually supportive processes. For instance, a study revealed that students instructed in

metacognitive strategies exhibited enhanced SRL behaviours, including goal-setting and self-monitoring (Dignath & Büttner, 2008). Similarly, another study found that students with solid metacognitive skills exhibited high SRL behaviours (Efklides, 2011). Thus, these two constructs complement each other and mutually reinforce one another.

2.8 Theoretical Framework

The theoretical framework in qualitative research is a crucial tool that helps the researcher clarify the focus and scope of the research question (Anfara, 2015; Merriam & Tisdell, 2016). Through this framework, researchers have consolidated the concepts related to metacognition and SRL that appear during the learning process, leading to a more accurate understanding of the metacognitive elements. This has resulted in introducing of the concept of metacognitive learning, a significant development in our understanding of learning processes.

Flavell first introduced the concept of metacognition in 1979. Later, in 1985, he proposed a three-part model of metacognition, consisting of metacognitive knowledge, monitoring, and experiences. Building on Bandura's research, Zimmerman systematically reviewed various definitions of self-regulated learning, identified three standard features, and provided a concept of self-regulated learning (Zimmerman, 2000). Building upon this, Pintrich proposed a four-phase model of self-regulated learning (Pintrich, 2004).

Guided by the metacognitive theory by Flavell (1985) and the SRL theory by Pintrich (2004), metacognition begins to influence when individuals possess a certain level of metacognitive knowledge, monitoring skills, and experiences during the learning process (refer to Figure 2.1). When individuals exhibit the four elements - forethought, monitoring, controlling, and reflecting - this process indicates that the students have developed a certain degree of self-regulated learning ability, which can further enhance their metacognitive learning experience. The theoretical framework of the MCL is depicted in Figure 2.1.

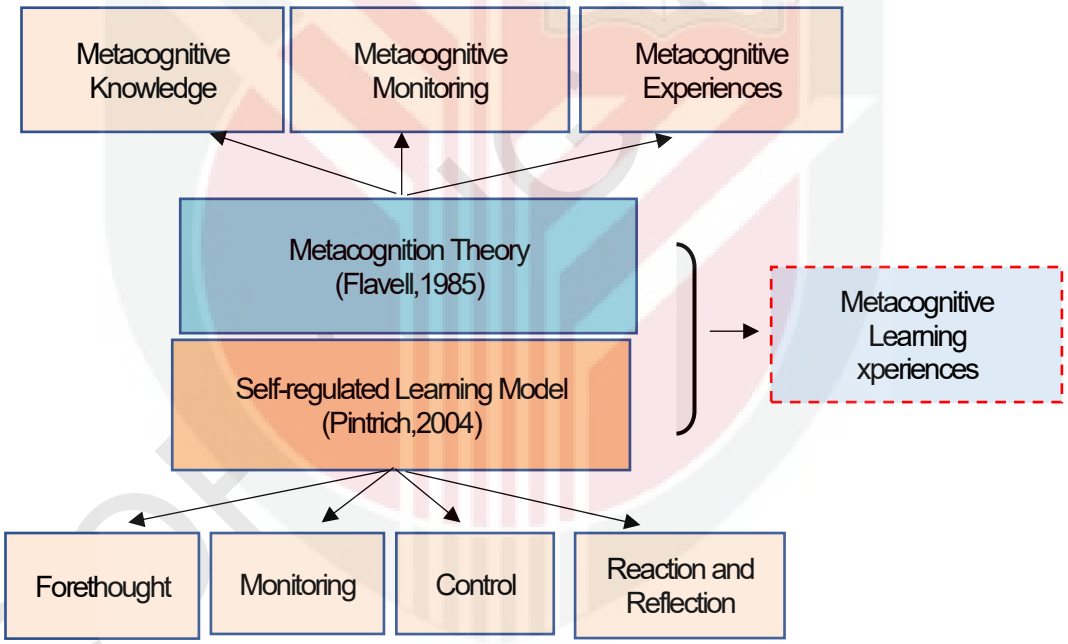


Figure 2.1 : The Theoretical Framework of MCL
(Flavell, 1985; Pintrich, 2004)

2.9 Conceptual Framework

This study aims to integrate the metacognition theory with Pintrich's four-phase SRL model to further expand the above theoretical framework. The

concept of MCL consists of three primary components: understanding of MCL, MCL experiences, and regulation. To define these components, the study adopts the following approach: (1) Cognitive psychology is used to categorise cognition into knowledge, emotions, and experiences; (2) Relevant elements of metacognitive experience and metacognitive knowledge are extracted from Flavell's metacognitive theory; (3) The four phases of Pintrich's SRL model, namely monitoring, control, reaction, and reflection, are extracted to form MCL regulation. Additionally, the concept of forethought is extracted to establish an understanding of MCL. So, this study proposes the structure for the concept of MCL. It includes three components: MCL understanding (MCLU), MCL experiences (MCLE), and MCL regulation (MCLR).

MCLU encompasses information and understanding individuals possess about their cognitive processes during learning, including attention, memory, motivation, and strengths and weaknesses in learning and problem-solving (Stephanou & Karamountzos, 2020). MCLR refers to the strategies and skills individuals employ to plan, monitor, problem-solve, assess, imagine, and perform physically based on their knowledge of their cognitive abilities (Stephanou & Karamountzos, 2020). MCLE encompasses the subjective aspects of learning, such as confidence, frustration, enjoyment, and emotions. It involves reflecting on one’s learning experiences and regulating one's emotional abilities and strategies (Goudas et al., 2017; Davis et al., 2010).

Subsequently, the study applied the constructed framework of MCL to Wushu learning. It explored students' MCL experiences through three research questions: students' understanding of MCL, the components of MCL, and the factors influencing and challenges faced in MCL. The independent variables (IVs) are students' learning experiences in Wushu learning, including an understanding of MCL in Wushu learning, the component dimensions of MCL in Wushu learning, and MCL's influencing factors and challenges. The detailed conceptual framework is depicted in Figure 2.2.

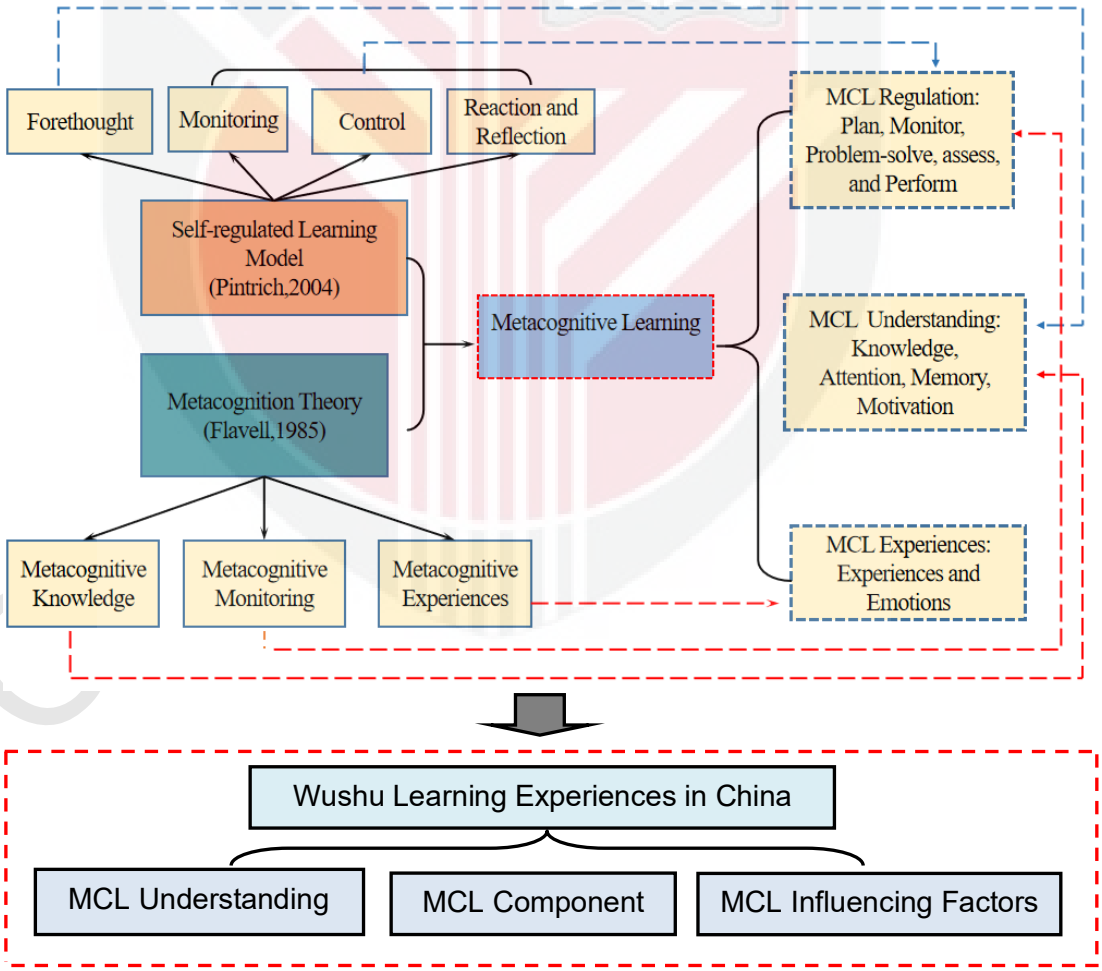


Figure 2.2 : The Conceptual Framework of MCL in Wushu Learning

CHAPTER 3

MATERIALS AND METHODS

3.1 Introduction

The purpose of this study was to explore MCL perspectives in Wushu learning among PE students in China. Applying case studies in the foundational research design aims to enhance our understanding of students' MCL perspectives in Wushu learning. This chapter provides a detailed overview of the research design, research methods, the researcher's role and reflexivity, data collection procedures, coding and analysis methods, validity and reliability, and ethical considerations involved in the study.

3.2 Research Design

3.2.1 Rationale for Adopting Qualitative Research Design

Existing sports science primarily adopts a 'biological view' rooted in natural science, focusing on studying the human body (Chen, 2022). This approach is influenced by the dominant perspective in sports based on Pavlov's theory and is commonly referred to as scientific reductionism or biophysical sciences. Biophysical science analyses the human body using factor analysis; however, it does not adequately address the study of human movement behaviour (Cheng & Jiao, 2023). This is because the key characteristic of human behaviour, regardless of its nature, is subjectivity, which pertains to the essence of life and its inherent 'differentness'. Factor

analysis methods rely on scales, surveys, experiments, and similar approaches to analyse the pursuit of similarities. However, these data and factors do not fully capture the essence of life; they merely hold statistical significance and provide quantitative objective data that are used to draw subjective, abstract, and hypothetical conclusions. The structured approach based on naturalism in physical education research emphasises normativity and scientific rigour. However, it encounters challenges in representing and capturing human sport behaviour's complexity, fluidity, and self-consistency of human sports behaviour due to methodological constraints (Cheng et al, 2022). Therefore, qualitative research serves as a valuable complement to quantitative research methods.

Qualitative research design has evolved and matured in social science since the early 1990s. Various scholars have proposed different qualitative research methods, such as the 28 methods identified by Tesch (1990), the 22 types presented in Wolcott's tree (2009), and the Five methods of qualitative investigation proposed by Creswell and Poth (2018). Marshall and Rossman (2016) have also discussed five types commonly recognised by different authors. Five methods are generally acknowledged and widely used across the social and health sciences: narrative, phenomenology, ethnography, case study, and grounded theory (Creswell, 2018).

In the context of this research, MCL represents an inherently advanced learning method that is challenging to measure using objective data alone. Therefore, the adopting of qualitative research methods is more appropriate

for this study. Based on the study objectives and research questions, a qualitative research design was adopted for the case study.

3.2.2 Rationale for Adopting a Case Study

Case study research is a qualitative approach exploring a real-life bounded system or multiple systems (cases) over time. It relies on detailed, in-depth data collection from various sources to gather insights into the phenomenon under investigation (Adekalu, 2018; Yin, 2018). Case research can be defined as an intensive study of an individual, a group, or a unit, aiming to summarise multiple units and understand their behaviour (Gustafsson, 2017).

Baxter and Jack (2008) asserted that case research does not require control over research events in the natural environment. The focus of a case study is to describe the internal characteristics of the subject and gain an understanding of their behaviour. According to Yin, the selection of a case should be unique, extreme, critical, enlightening, or offer a unique perspective on a standard case. Bartunek, Rynes, and Ireland (2006) suggest that theory built through case study research is often fascinating and valuable (Yin, 2018).

The case study design encompasses four types of designs, and this study primarily adopts the single-case (holistic) design. According to Yin utilising a single case offers several benefits. First, a single-case study is the most suitable choice when the researcher studies a specific individual or a distinct

group (Yin, 2003). Second, a single-case study allows researchers to establish a meaningful dialogue between existing and new theories, exploring the relationship between the two and gaining a deeper understanding of the topic (Dyer & Wilkins, 1991). Lastly, when researchers aim to develop a high-quality theory or contribute to advancing existing theory, a single-case study enriches the understanding of the subject of investigation (Gustafsson, 2017; Yin, 2018). Therefore, in the context of the current study design, case study is suitable.

Considering the identified research gaps in the subject matter, research design, and research content from the literature review, this study primarily employs the case study method as a qualitative research approach to investigate and gain insights into the MCL among PE students. The case study method will facilitate understanding, exploring, describing, and interpreting PE students' MCL in Wushu.

In addition, it will enhance the quality and credibility of this study. The research process and report strictly adhered to two qualitative research assessment tools, Yin's Case Study Protocol (Yin, 2018) and the COREQ checklist (Tong et al., 2007). The case study methodology and guidelines presented by Robert K. Yin have precise requirements regarding research questions and objectives, case selection, data collection, data analysis, and research reporting. The COREQ Checklist contains 32 items for clear and comprehensive reporting of qualitative research (Tong et al., 2007).

3.2.3 Description of the Case Setting

The case study method offers five rationales for selecting a single case, including critical, unusual, common, revelatory, or longitudinal cases (Yin, 2018). In this research, the rationale is based on a common case study approach, which aims to capture the circumstances and conditions of an everyday situation.

First, the selected case is the Physical Education Department of Yuncheng University, where the researcher serves as a teacher. This position provided ample time and energy to the researcher to observe and analyse the daily situation in depth, especially the students' behaviours and experiences in the process of Wushu learning, which strongly supported the research objectives. According to Baidu statistics, 368 universities in China offer sports education majors. Yuncheng University is one of the Physical Education Department. The sample meets the subjective requirements of the research design.

3.2.4 Subjects and Location

Figure 3.1 : Topographic Map of Yuncheng, Shanxi Province (https://image.baidu.com/)

As of the end of December 2023, there are 2,542 universities in China, with 2,246 being regular (including 444 private universities). Shanxi Province has 71 universities, with Yuncheng University ranking 11th among universities in Shanxi Province and 199th in the comprehensive university rankings in China. Yuncheng University is situated in Yuncheng City, Shanxi Province, a significant birthplace of Chinese civilisation. The Ministry of Education officially approved it in February 2002. The university comprises 17 teaching and research units and offers 53 undergraduate majors across 10 major disciplines, including economics, law, education, literature, history, science, engineering, agriculture, management, and art.

The university currently has over 20,486 full-time undergraduate students and 1,304 full-time teachers. Among them, 200 teachers hold doctoral

degrees, 695 teachers have master's degrees, 322 teachers have senior professional titles, and 94 are supervisors for doctoral and master's students (http://www.ycu.edu.cn/.html). The university has been actively engaged in international collaborations, having signed cooperation agreements with 24 universities in the United States, Germany, the United Kingdom, Russia, Australia, Malaysia, and South Korea. It has also established exchange programs with six universities in Poland, South Korea, Malaysia, and Russia. Additionally, the university has set up a Chinese practice base in Thailand and conducts joint master's programs with high-level universities in South Korea.

The Physical Education Department of Yuncheng University, formerly known as the Physical Education Department of Yuncheng Teachers College, was established in 1986. The department has 56 faculty members, 49 full-time teachers, and seven administrative assistants. Among the full-time teachers, were one professor, 15 associate professors, 31 lecturers, two teaching assistants, and 45 postgraduates, including 14 doctors. The department has a total of 904 full-time students and 22 teaching classes. The undergraduate major offered is physical education, and the department provides compulsory courses such as exercise physiology, sports health care, introduction to sports, school sports, sports psychology, ball games, gymnastics, Wushu, track and field, computer basics, and college English. It also offers courses in sports biomechanics, sports management, sports marketing, sports sociology, and project-specific electives.

Yuncheng University offers a 4-year undergraduate program with a specialisation in physical education. The Wushu course is divided into two types: general and specialised Wushu courses. General Wushu courses begin in the third semester and last for one semester, while specialised Wushu courses span from the fourth to the eighth semester. Participants in this case study were selected from second-, third-, and fourth-year students majoring in physical education. Second-year students participate in general Wushu courses, whereas third- and fourth-year students engage in specialised Wushu courses, which allowed the researcher to capture diverse viewpoints and experiences.

3.2.5 The Reasons for Selecting Study Location

This researcher chose Yuncheng University as the research location based on the following considerations:

1) **Representativeness of the Research Sample.** According to Creswell, case study sample should be representative (Creswell, 2018). Yuncheng College ranks 11th among 71 colleges and universities in Shanxi Province, and its physical education department was established in 1986. Yuncheng University's choice as the study site represents 80% of physical education students and provides sufficient data for the study.

2) **Feasibility of Access**. Creswell has noted that the case study method is an exploration of how a real, contemporary bounded system (case), or multiple bounded systems (cases) have changed over time through detailed case studies (Creswell, 2013). This study aimed to introduce MCL into Wushu learning and to explore the physical and psychological experiences of physical education students before and after their Wushu studies through in-depth

observation and students' self-reports. Considering that the researcher is currently serving Yuncheng University, the location for the study was chosen given the depth and ease of access to the data. Moreover, the research has already obtained approval from the Yuncheng College Academic Committee for ethics application, ensuring a smooth process for data collection and interviews.

3) **Alignment with Research Objectives**. The study aimed to explore PE students' understanding, behavioural manifestations, and experiences of MCL. Given the above considerations, Yuncheng University's research location aligns well with the research objectives and provides a suitable study environment. By considering these factors, Yuncheng University serves as an appropriate and practical research location that fulfils the needs of the research project.

3.2.6 Sample Selection Criteria

Based on different Wushu learning experiences, the research participants were divided into focus groups and individual in-depth interviews. During the initial and later stages of the research, participants were selected as follows:

Table 3.1 : Sample Selection Criteria of Students

Interviews	Inclusion Criteria	Exclusion Criteria	Sample Size
Focus group	1. Sophomore-level students. 2. Students enrolled in the general Wushu course. 3. No gender limitation 4. No prior Wushu learning experience.	1. Other grade-level students, 2. Students not enrolled in the general Wushu course 3. with previous Wushu learning experience	10
In-depth interview	1. Junior and senior-level students. 2. Students enrolled in a specialised Wushu course. 3. No gender limitation. 4. A minimum of 1 year of Wushu learning experience.	1. Other grade-level students 2. Students not enrolled in specialised Wushu courses, 3. Less than 1 year of Wushu learning experience	15

3.2.7 Sample Size

There is no specific answer regarding the sample size for qualitative research as it depends on the qualitative design employed. However, rough estimates can be derived from a review of numerous qualitative studies (Creswell, 2018). For instance, the case study approach typically involves approximately four to five cases. Another approach is the concept of saturation from grounded theory. Charmaz (2006) suggests that saturation is reached when collecting new data no longer yields new insights or reveals new properties, indicating the researcher conducted in-depth interviews not only with students at different stages but also separately with two substitute Wushu teachers, one male, and one female to gather more detailed data.

The Sampling Technique: Yin recommends using purposive sampling in case studies (Yin, 2018). Considering this study sample is targeted at a unit group of Wushu specialisation and general education students, purposive sampling was performed with full respect to the participants' wishes while considering the principle of voluntariness. Three weeks prior to the official start of data collection, the researcher first introduced the purpose of the study to the students through their substitute teachers. After that, in accordance with the principle of voluntariness, the sample was selected based on classroom observation and the recommendations of the substitute teachers for the different censoring criteria for the focus groups and in-depth interview groups. The focus group first selected 14 students from four classes in the third semester of the sophomore year for basic Wushu training, and the in-depth interviewers initially selected 17 students from different

grades in the fourth to eighth semesters as potential interviewees for this study.

Sample Size: After the first round of preliminary selection, based on the selection criteria for the focus group and in-depth interviews, four students with Wushu learning experience were removed, leaving four female and six male students, for 10 students to form the focus group. After the first interview, according to the effect of the interview and considering that sophomores tend to be more formal and may not be good at expressing themselves, some of the Wushu specialisation students from the individual in-depth interviews were invited to participate in the focus group discussion in the subsequent interview based on the principle of voluntariness. Thus, the fixed list of focus interview groups remained at 10 students.

Initially, 17 students were identified as potential interviewees for the in-depth interviews. In the later data analysis, the researcher found that all questions were largely saturated and satisfied the study requirements (Yang & Zhang, 2022). Therefore, 13 students, including six female and seven male students, were ultimately retained as in-depth interviewees. In addition, two substitute teachers were selected for in-depth interviews, bringing the total number to 15. The sample size for each phase is shown in Table 3.2.

Table 3.2 : The Samples in Each Stage and Interview Schedule

Phase	N	Semester	Interview Methods
Pre-phase	10	3	Focus Group
	13	4,5,6,7	In-depth interviews
Mid-phase	10	3	Focus Group
	13	4,5,6,7	In-depth interviews
Post-phase	10	3	Focus group
	13	4,5,6,7	In-depth interviews

3.2.8 Participants' Demographics and Background

Based on data saturation considerations, the study ultimately retained data from 13 in-depth interviews. Table 3.3 presents participants' demographics and background-specific information.

Table 3.3 : Participants' Demographics and Background

NO	NC	G	A	S	PT/Y	RCWS	OPWS
1	LCY	FM	20	3	5	Personal hobbies and preferences	Showcasing oneself, accepting challenges, and promoting the Wushu culture
2	GCY	FM	22	7	4	Passionate, preventing oneself from being bullied.	Deepening understanding and research in Wushu to enhance personal development.
3	XWB	FM	22	7	4	A lifelong Wushu dream since childhood.	Enhancing Wushu skills.
4	ZYZ	FM	21	5	3	Personal hobbies and preferences	Building physical fitness, cultivating virtues, enriching leisure time, and developing self-defense awareness.
5	ZXM	FM	21	5	3	Gradually developing a love for Wushu	Improving Wushu skills and participating in provincial-level competitions
6	MWY	FM	22	7	3	Enjoy practicing Wushu static exercises	To make more people aware of the benefits of Wushu.
7	SPJ	M	22	5	3	Quite interested	Gaining knowledge cultivating an interest and hobby in Wushu and maintaining disciplined lifestyle habits.
8	LDH	M	23	7	10	Exercise the body, strengthen the will, and practice self-defense.	Learning the virtues and spirit in Wushu, refining one's willpower
9	SLP	M	22	5	3	Fulfilling childhood dreams	Enhancing physical fitness and Wushu skills, cultivating both physical and mental well-being.
10	GWW	M	20	3	11	Passionate about Wushu since childhood.	Admission to master's program
11	MWT	M	23	7	4	Personal hobbies and preferences	Mastering the theoretical knowledge, understanding the offensive and defensive meanings of Wushu
12	LZL	M	20	3	2	Enhancing control over the body, achieving unity of knowledge and action	Improving Wushu's professional skills, cultivating good character, enhancing overall personal abilities, improving physical fitness, and possessing self-defense capabilities.
13	JL	M	23	7	7	Since childhood, he has had a fondness for Wushu and Sanda,	Returning to the military and continuing his service, driven by a desire to protect himself from potential bullying.

(Note: NC: name code; G: gender; S:Semester；M: male; Y: year; FM: female; A: age; PT: Practice time; RCWS: Reasons for Choosing Wushu Specialization; OPWS: Objectives of Pursuing Wushu Specialization)

3.3 Research Methods

3.3.1 Documentation Methods

Documentation is one of the essential sources of data for qualitative research, and it includes written, visual, digital, and physical materials related to the research with which it is associated (Merriam & Tisdell, 2015). In this study, in addition to the large number of speech texts collected in the semi-structured interviews, a large amount of documentary material was included such as videos, photographs, observation notes, field notes, and voice-conversion files. The researcher established focus group interviews and individual in-depth interview databases during the data collection process. The focus group interviews were divided into three sub-databases based on interview time. In the later stages of data analysis, four tertiary databases were established. The individual in-depth interview database was organised by each person's name, with three sub-databases created based on interview time. Subsequently, four additional sub-databases were established for data analysis based on research themes. Each sub-database contained primary audio recordings, transcribed audio-to-text materials, organised textual materials, and textual materials specific to different research themes, resulting in four quaternary sub-databases. The final transcribed audio totalled approximately 130,000 words, while the organised textual materials comprised around 50,000 words. Additionally, the researcher compiled 10 observation diaries and eight field notes throughout the data collection process. The specific details of the document database management are outlined in the following Figure 3.2. The data collection

methods are consistent with case study conventions (Yin, 2018). It provided a rich source of clues for subsequent data analysis.

3.3.2 Observation Methods

Observation is another essential method of qualitative research (Creswell, 2018). Before the research, the observation outline or observation card was designed, which included the observation time, content, start and end time, observation location, and observation subjects. This served as a guide for conducting systematic observations. The observations were conducted on-site during the research process, ensuring minimal disruption to the teaching practice. During the specific observation process, an assistant was invited to assist in using tools such as cameras and voice recorders for in-class documentation. The researcher recorded and observed all details as they occurred, completing observation diaries on the same day. Each week constituted one observation cycle, during which observation notes were collected and organised. In the end, there were 13 field diaries totalling around 15,000 words.

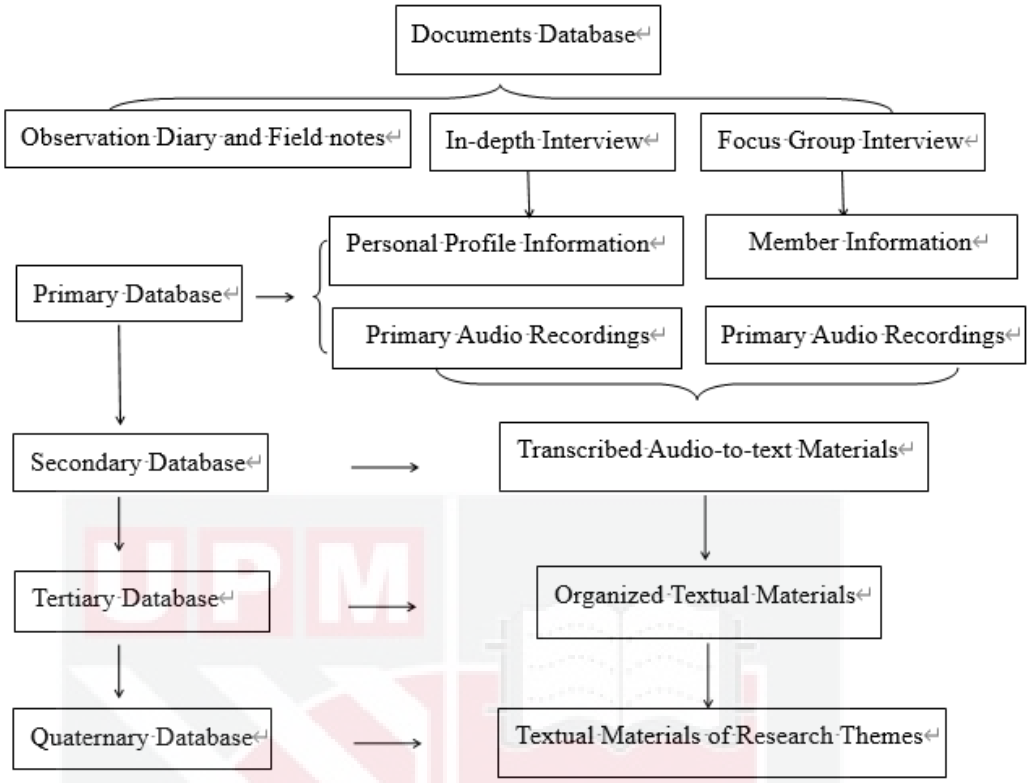


Figure 3.2 : Specific Document Database Information

3.3.3 Interview Methods

The interview method is a standard qualitative research method used to gather detailed, in-depth opinions, experiences, and attitudes of individuals or groups (Magaldi & Berler, 2020). A semi-structured interview is a standard protocol used in case studies (Yin，2018). This study mainly conducted focus groups and in-depth interviews as semi-structured interviews according to the research objectives. After completing the interview protocol in July 2023, four experts were invited to revise the interview protocol (Refer to Appendix G), followed by a September 2023 pilot study. In response to questions, the interview protocol was again amended on a smaller scale, followed by a semester-long follow-up interview from early October to late

December 2023. Although the researcher utilised an interview protocol during the data collection process, as stated by Yin, a case study expert, the interview protocol only provided the researcher with a framework or template rather than a strict set of instructions (Yin, 2018). Therefore, the researcher utilised the interview guide flexibly during the interview process. During each phase of data collection, the researcher reflected on and improved the interview guide after each interview. Such improvements reflected the researcher's ongoing insights and refinements to guiding the interviews (Ismail et al., 2018).

In the early phase of the research, the researcher focused on the understanding of MCL in Wushu' question to assess the level of metacognitive awareness among the interviewees. In the mid-term phase, the focus shifted to 'metacognitive behaviour' and 'metacognitive emotion' to understand how different interviewees choose MCL strategies and their MCL monitoring behaviours. Additionally, the learning experiences of other students in Wushu teaching were explored. Towards the end of the phase, the theme centred around 'metacognitive emotions' to further understand the learning experiences of different students in Wushu classes. The researcher attempted to utilise return to the Wushu sports context to provide additional evidence for collecting interview data (Zhong & Ding, 2022; Su et al., 2020).

3.4 The Researcher's Role and Reflexivity

In qualitative research, reflexivity requires constant attention throughout the research process (Olmos-Vega et al., 2022). The researcher's role as the

primary data collection tool necessitates the recognising and acknowledging of personal values, assumptions, and biases at the outset of the study (Yin, 2018). Therefore, researchers should endeavour to remain objective and neutral, avoid personal bias influencing the research process and results, and be careful in their roles.

3.4.1 Personal Background

The researcher of this study is a female PhD student in physical education and an associate professor currently working in the Physical Education Department of Yuncheng University in China and has been engaged in physical education for 18 years. The researcher's academic journey includes pursuing a bachelor's degree in physical education at Shanxi Normal University from 1998 to 2002, followed by sports humanities and sociology studies at the School of Physical Education of Soochow University from 2003 to 2006. Since 2006, the researcher has been working in the Physical Education Department of Yuncheng University, lecturing for courses such as 'Introduction to Physical Education', 'School Physical Education', and 'Physical Education Theory'. This tenure has provided the researcher with substantial teaching experience and a solid professional background.

In her spare time, the researcher has dedicated herself to studying traditional Chinese national sports culture, conducting multiple rounds of fieldwork in this field. The researcher collected relevant materials such as local chronicles, ethnographic data, and life histories, resulting in the publication of several academic papers on the subject. Additionally, the researcher has

overseen various research projects, including one from the Ministry of Education, two provincial projects, and over ten university-level projects. The researcher has also published more than 40 papers, contributing to a wealth of research findings and experience that serves as a solid foundation for the in-depth exploration conducted in this study.

3.4.2 Qualifications of the Researcher

During the PhD studies, this researcher systematically enrolled in qualitative research courses, participated in some qualitative workshops in Malaysia, and was equipped with the skills to conduct this study.

Furthermore, despite being a physical education teacher, the researcher is not a Wushu teacher but focuses on studying national traditional sports. This allows for an objective and unbiased analysis and evaluation of Wushu's teaching. To further mitigate the influence of personal values and biases on the research, the study involves guidance from the supervisory committee at UPM and the involvement of an associate professor specialising in physical education psychology, as well as a Wushu professor from Yuncheng University, who was responsible for supervising the data collection, compilation, and analysis processes of the study. Therefore, the researcher invited several researchers such as academic assistants and member checking to code the data independently, in addition to considerations based on their own work experience and previous academic research, to overcome their own biases through the measures mentioned above to improve the reliability and validity of the study correspondingly.

3.5 Data Analysis

In qualitative research, it is crucial to ensure that data collection and data analysis coincide (Creswell, 2018). To enhance the accuracy and authenticity of the collected data, this study divided the research stage into three phases: pre-research, mid-research, and post-research, aligning with the research objectives. The researcher followed simultaneous procedures and employed data winnowing techniques (Guest & Namey, 2012), assisted by NVivo software programs.

3.5.1 The Pilot Study

Pilot research is an invaluable technique in research, offering early insights into the feasibility of the study and equipping researchers with preventive measures to gather comprehensive information and data (Yin, 2018). It also allows for timely corrections and adjustments to the research approach and facilitates a revised interview protocol proposal. The study applied for ethics applications from both Universiti Putra Malaysia and Yuncheng University in May 2023 and was approved in July 2023 for Yuncheng University. Subsequently, the interview protocol was further modified in response to the issues raised by Proposal Defense. After that, the researcher conducted a two-week pilot study from August 7th to August 18th, 2023, using online interviews. Five Wushu students from the Sports Department of Yuncheng University volunteered as participants, including two females and three males. The pilot study refined and improved the interview content, ensuring thorough preparation for subsequent actual interviews.

3.5.2 Data Collection Strategies

Not all teachers and students are familiar given the complexity associated with metacognition. To enhance the efficiency of data collection, in the first week of this semester, the researcher conducted four hours of theoretical classes separately for the general Wushu class and the specialised class, delivering the relevant knowledge in two sessions. The first session primarily covered the fundamental knowledge, structure, development, significance, and current research status of metacognition in sports. In the second session, the researcher explained the questions outlined in the interview protocol one by one and addressed students' inquiries. The aim was to familiarise students with the relevant issues as quickly as possible in preparation for subsequent formal interviews.

A comprehensive interview outline, timetable, and activity table were developed for each phase. These tools provide a structured framework for conducting interviews, ensuring that relevant information is collected in an organised manner. The interview outline included details of the observation time, number of interviews, notes to be taken, and recordings. In addition to the interview process, a field journal was employed on-site to record specific details about observations. This journal recorded the researcher's thoughts, feelings, experiences, and insights throughout the research journey. It allowed for the documentation of valuable reflections and facilitated the compilation of summary notes based on the research cycle.

The focus groups and individual in-depth interview data were conducted in three phases, each targeting different questions, held in the first, ninth, and sixteenth weeks. Each focus group interview lasted approximately 60 to 90 minutes. To avoid disrupting students' regular class schedules, interviews were typically scheduled during the afternoon extracurricular activities period. To ensure an authentic experience for the students, the interviews were conducted in the Wushu training rooms where they usually have their classes.

Individual in-depth interviews varied in duration and lasted 40 to 60 minutes. After prior communication with the students, the interview locations were arranged based on their preferences. The researchers often conducted interviews while walking with the students to reduce psychological burdens and create a relaxed atmosphere. Consequently, interviews occurred in various locations, including the Wushu training rooms, the playground, and the researcher's office.

Ultimately, nearly 150,000 words of interview data were collected, comprising transcripts from focus group interviews with 10 individuals, in-depth interviews with 13 students, and interviews with two teachers. For specific interview details, please refer to Table 3.4.

Table 3.4 : The Specific Interview Details

Phase	Interview Methods	Time	Places
Pre-phase	Focus Groups	60m	Wushu training room
	In-depth Interviews	60-90m	Wushu training room playground
Mid-phase	Focus Groups	60m	Wushu training room
	In-depth Interviews	60-90m	office
Post-phase	Focus Groups	60m	Wushu training room
	In-depth Interviews	60-90m	Wushu training room office

3.5.3 Data Recording Procedure

According to Schatzman and Strauss (1973), qualitative data analysis involves classifying things, people, events, and their respective attributes. In line with this, for data collection, the researcher developed an observation protocol and an interview protocol to guide the process (Yin, 2018). All methods were conducted according to strict three-level coding procedures.

Level 1 Coding: Categorising and establishing datasets for data collected from focus groups and in-depth interviews. Focus group data were classified, sorted, and coded based on periods such as day, week, and phase. These data were recorded chronologically and periodically summarised in observation and interview protocol lists, accompanied by narratives to understand the survey results comprehensively. For data collected from individual in-depth interviews, individual databases were established. These were categorised, sorted, and coded based on date and phase.

Level 2 Coding: To ensure accuracy and detail, interviews with different interviewees were transcribed verbatim using a rapid speech-to-text web application. Assistants were invited to conduct meticulous reviews to check

for conversion errors. Once finalised and confirmed by the researchers, the original transcription records were saved for subsequent analysis. Field notes and diary entries were regularly kept throughout the research process.

Level 3 Coding: This level focuses on reviewing focus groups and individual in-depth interview data for different themes, as well as categorisation and sorting. All data were input into NVivo software according to themes and underwent subgroup three-level coding. Two assistants were invited to meticulously review and discuss the accuracy and rationality of each level of coding, ultimately determining the three-level coding descriptions of the subgroups.

3.5.4 Data Analysis Procedures

Theme analysis is a commonly used method in qualitative research to identify, analyse, and interpret patterns of meaning, also known as themes that emerge from qualitative data (Thomas & Harden, 2008). It is a powerful tool for qualitative researchers, providing a structured and systematic approach to understanding the meaning of qualitative data. In this study, data analysis was performed in five steps (Creswell et al., 2018).

Data Familiarisation: After an initial review of all the data transformations and facilitators, the researcher examined the data thoroughly, starting with the first case study and reading through the textual material twice to familiarise herself with its content (Creswell et al., 2018). The research highlighted in red certain elements, concepts, and ideas highly relevant to

the topic and took notes in the form of annotations to record initial impressions and insights.

Data primary coding: Building upon the prior familiarisation with content and highlighting key points, the researcher utilised an inductive reasoning approach to categorise, archive, and assign codes or labels to all data according to different research questions. Subsequently, the data were inputted into NVivo software based on these classifications, and with the assistance of the software, the initial level data extraction for each subgroup was completed. This involved the initial stage of coding, where the data were broken down into primary codes or categories based on the content (Creswell et al., 2018). Concurrently, another associate professor was invited to manually code independently. Once the secondary coding was complete, the two were together to check and discuss any disputed areas, knowing they had reached a consensus.

Theme Development: Based on the initial data extraction results from NVivo software and manually coding for different questions, codes extracted more than five times within each question were organised and grouped to form the primary-level coding. Subsequently, to further refine the coding by grouping similar primary codes into broader themes or categories through detailed reading and review, similarities and differences among different case codes were identified, and they were clustered into meaningful themes reflecting potential patterns in the data (Smith & Nizza, 2022; Thomas & Harden, 2008). The overall significance of the data was analysed to determine the

secondary-level thematic coding for each group. Then, through further detailed reading of the underlying patterns within each theme, summaries were made, and condensed into tertiary-level coding.

Theme Revision: The theme revision process involved the researcher conducting a thorough review of each tertiary-level coding procedure within each dataset. The researcher refined, clarified, and established preliminary themes for the entire dataset, adjusting and modifying them to ensure they accurately represent the data's meaning (Smith & Nizza, 2022). Additionally, two peer reviewers were invited to review the entire iterative process. Attachment F details the specific thematic coding process for the three questions.

Description and interpretation: Finally, based on the emergence of new themes under each question, the researcher integrated existing literature and previous research findings to engage in dialogue with prior studies and current literature. The research provided detailed descriptions of the identified themes, drawing upon the evidence collected from the data collection process, including images and visual materials, and offering insightful interpretations of the theme's significance. This process helped form an interwoven chain of evidence, establishing potential analytical themes (Creswell et al., 2018).

Following the five steps outlined above, the researcher systematically analysed the collected qualitative data, identifying meaningful themes and

generating rich descriptions and explanations. This process contributed to a deeper understanding of the relevant themes regarding students' MCL perspectives in Wushu teaching.

3.5.5 Instruments

The specific instruments and equipment involved in the research process are listed in Table 3.5.

Table 3.5 : Data Analysis and Instrument

No	Research Design	Data Analysis	Instruments
1	Research Method	Single-case study design	
2	Research Samples	Wushu Learning's students, Yuncheng University	
3	Data Collection	Observation protocol, Interview protocol Database, field notes	
4	Data Recording	Speech Notes, Voice Recognition	Camera, Voice Recorder Software NVivo 14.0
5	Data Analysis	Thematic analysis	

3.6 Validity and Reliability

In qualitative research, trustworthiness and rigour are essential considerations for ensuring the validity and reliability of the study. These concepts align with the philosophical perspectives inherent in the social world and help establish the credibility and dependability of qualitative findings (Creswell et al., 2018). As stated earlier, the research process and report strictly adhered to two qualitative research assessment tools, Yin's Case Study Protocol (Yin, 2018) and the COREQ checklist (Tong et al., 2007).

3.6.1 Validity

The validity of qualitative research includes internal and external validity. Internal validity refers to the extent to which the results of a study match reality or accurately reflect the actual situation. External validity refers to applying the research findings when generalised to other situations (Creswell et al., 2018; Merriam & Tisdell, 2015). To improve the validity of the research, the researcher mainly adopted the following strategies:

3.6.1.1 Triangulation: Different Data Sources

Triangulation is a method used in qualitative research to improve internal validity that involves comparing and cross-checking data from multiple sources (Creswell et al., 2018). This study collected data from different techniques including focus groups and individual in-depth semi-structured interviews, documentaries, field observation records, and field notes to satisfy the triangulation of data sources. During the data analysis process, two assistants independently analysed the interview data from different cases and compared, discussed, and deliberated on their findings (Patton, 2015).

3.6.1.2 Member Checking and Peer Review

Member checking is a method of validating research data to check its accuracy. Creswell stated that member checking helped build trust with participants and led to new insights and a comprehensive understanding of the data. In this study, the researcher invited a professor, an associate

professor, and a research assistant to participate in the research process. Janesick (2015) noted that researchers and peer reviewers can track research from start to finish, looking for points of agreement, confirmation, and changes in the study. At the various stages of research, experts participated in research design, data collection, and data analyses. The specific list of expert information is provided in Attachment G.

3.6.1.3 Thick Description

Thick description is an essential approach to qualitative research, which involves detailed, in-depth descriptions of the research setting, participants, and findings (Yin, 2018). The researcher has previously engaged in anthropological methods and accumulated extensive fieldwork experience. In this study, the researcher described the interviewer's case locations and background information in detail. The data collection process involved using direct participation and observation, long-term tracking, data collection, filming many film and television materials and photographs, and writing detailed observation notes and field notes. During the interview process, the researcher deliberately chose the locations of the interviews to make the interviewers immersive and retrospective of their real feelings during the practice. In the data analysis process, the researcher made detailed observations against the video, audio recordings, and text, to analyse the thoughts and feelings behind the interviewers through their expressions, movements, and voices.

3.6.1.4 Diversity of Sample

Increasing the diversity of the research sample is also a way to improve the study's external validity (Creswell et al., 2018). Although the subjects in this study were university students majoring in physical education, they came from various cities in China, and they had different genders, cultural backgrounds, family backgrounds, and Wushu practice experiences, which provided different information for this study. In addition, focus groups and in-depth interview groups were selected for this study to interview students with different Wushu practice experiences, and to provide rich and authentic information.

3.6.2 Reliability

To improve the reliability of the research, according to the suggestion of Yin (2018), for each phase, a detailed interview outline, timetable, and activity table were developed. Observation time, frequency, notes, and recordings were meticulously recorded. On-site, the researcher maintained a field journal to document specific details related to observations. Additionally, the field journal served as a platform to record the researcher's thoughts, feelings, experiences, and insights throughout the research. Concurrently, the researcher summarised the findings periodically and compiled summary notes based on the research cycle.

The researcher created an observation and interview protocol during the data collection process. The interview protocol underwent three revisions, apart from approval by the supervisory committee. These revisions were

conducted with the input of four experts: Dr. Seyedali Ahrari from Universiti Putra Malaysia, Professor Shi Yan from Shanxi University in China, Professor Duan Limei from Yuncheng University, and Associate Professor Wang Jianzhou from the Department of Sports Psychology at Yuncheng University (Refer to Appendix G). During the data collection process, one assistant was invited to assist, while Professor Duan Limei and Associate Professor Wang Jianzhou were invited to tasked data analysis process. Following the conclusion of the data analysis process, Dr. Seyedali Ahrari was asked to conduct a final review.

The gathered data were classified, sorted, and coded chronologically, based on different periods such as the day, week, and month. The researcher regularly summarised and recorded this information in a list format while preparing a comprehensive narrative package. To ensure accuracy, the researcher transcribed the audio recordings of interviews with various respondents verbatim using a web application. Periodic reviews were conducted on the field notes and journal entries. Additionally, the research enlisted the assistance of a research assistant to support activities such as data collection, coding, and transcription.

Additionally, an audit trail can provide a transparent report of the research process, documenting what was accomplished during the investigation (Cohen & Crabtree, 2006). In this study, the researcher kept the above activities as an audit trail to document the survey process through audit trails,

logs, and memos (Creswell & Miller, 2000). See the Appendix (C) for more details.

3.7 Ethical Considerations

Ethical considerations are crucial in qualitative research because of the researcher's direct involvement with human participants and their experiences (Creswell, et al., 2018). The data collected in such research can often be sensitive and personal. By addressing ethical considerations, researchers can ensure that their qualitative research is conducted responsibly and ethically, safeguarding the rights and welfare of the participants. Therefore, the following measures were implemented in this study to ensure the reasonableness and legitimacy of ethical issues.

3.7.1 Informed Consent

Before commencing this study, approval was obtained from the Academic Committee (which also serves as the Ethics Committee) and the Teaching Committee of the Department of Sports at Yuncheng University. Direct participant observation was conducted without disrupting the standard teaching order. Researchers first obtained informed consent from all participants, providing detailed information about the purpose of the study, potential risks and benefits, and the right to withdraw from the study at any time. The approval letters were attached to the Appendix (D).

3.7.2 Privacy

The researchers prioritised respecting participants' privacy and implemented appropriate measures to protect the collected data, ensure data security, and prevent unauthorised access. Focus groups and in-depth interviews were scheduled at times and locations chosen by the participants, following the principle of voluntariness. Consent from the interviewed students was obtained before any relevant data collection.

3.7.3 Data Ownership

Researchers discussed the ownership of the collected data with all participants. This involved reaching agreements on the use of the data, who had access to it, and the retention period. The aim was to ensure transparency and make participants fully aware of how their data would be handled throughout the research process.

3.8 Research Framework

This study followed the research line of 'literature analysis – case study – countermeasure study'. The initial step involved conducting a literature review to gather and summarise relevant literature on self-regulated learning theory, metacognition theory, physical education, and Wushu learning. This process helped identify research gaps and establish a theoretical framework.

Subsequently, the research integrated principles of MCL theory and self-regulated learning theory to formulate the concept of MCL. It employed a

case study approach to explore the application of this concept, particularly examining how MCL principles influence students' learning in Wushu learning and potential emerging themes. Through this exploration, existing issues in Wushu learning were identified and based on the current state of research, and improvement measures and recommendations were proposed. The specific process of case study design is illustrated in Figure 3.3.

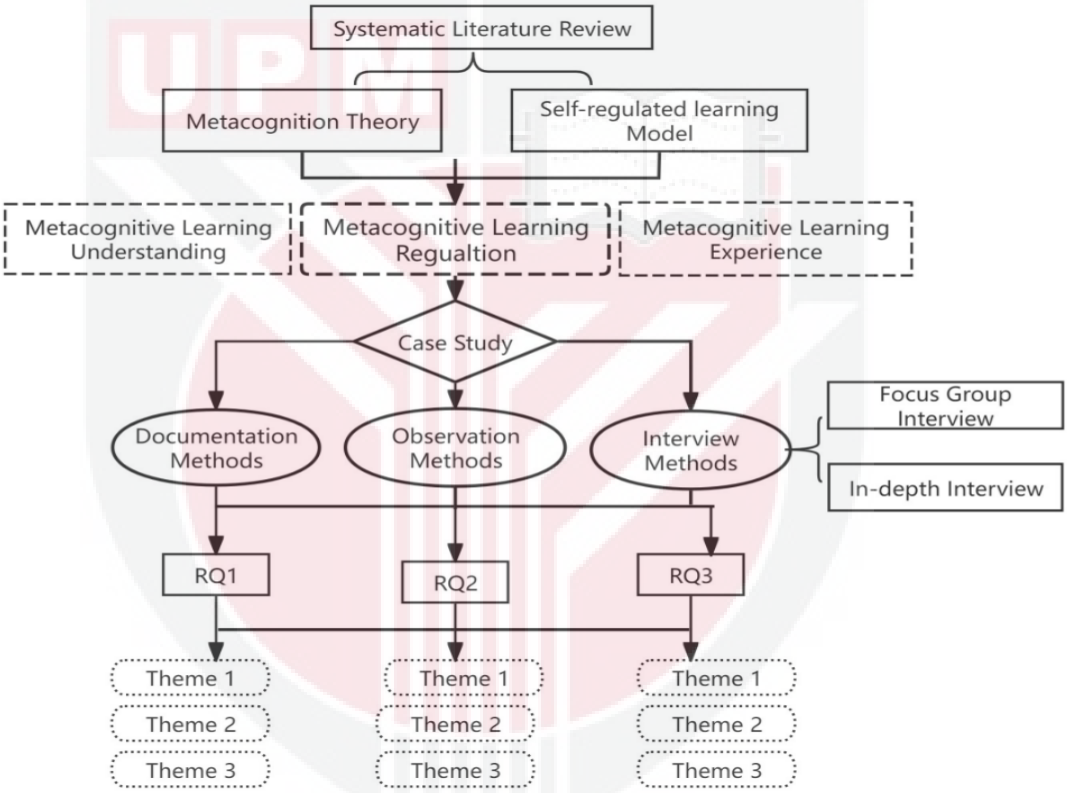


Figure 3.3 : The Flowchart of the Case Study Research Design

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the research findings based on the research questions outlined in Chapter 1. It introduces the results of the case study through interviews with participants, observation notes, and document analysis. The data analysis in this study aimed to identify and capture emerging themes from students' metacognitive learning experiences and provide an in-depth understanding of the application of metacognitive learning in Wushu learning among physical educational students at Yuncheng University, China.

4.2 Profile of Study Participants

4.2.1 Participants' Demographics and Background

To obtain detailed and authentic firsthand information for the interviews, individuals selected for personal in-depth interviews underwent a three-stage screening process to determine the final interviewees. Initially, a questionnaire was distributed online through Questionnaire Star, which collected personal basic information from 45 students. Following this, 26 students were selected based on personal voluntariness during in-depth classroom observations among the initial 45 students. Finally, based on specific selection criteria and the principle of data saturation, this study ultimately identified participants including a focus group of 10 fixed members, 13 students, and two teachers. These students were from the general and

specialised Wushu teaching from the third to the seventh semester. These interviewees came from different cities and had diverse backgrounds in Wushu learning. The selection maintained a balanced representation in terms of gender and grade levels. Although their Wushu skills might have varied, they shared a common passion for Wushu, and traits such as discipline, diligence, and hard work in their studies. These qualities align with the criteria set for the sample selection in this study. Therefore, the researcher included them as the personal in-depth interview subjects for this research.

The selection of participants for focus group interviews was less stringent than individual in-depth interviews because they shared similarities in various aspects such as age, grade, and martial arts learning experience. The use of focus group interviews was primarily aimed at assisting introverted or less expressive students to actively participate in group activities and discussions, supplementing individual perspectives on the research questions. Additionally, the researcher invited students with higher grades and longer learning experiences from individual in-depth interviews to join the focus group discussions, enhancing and broadening the scope of group activities. Three rounds of interviews were conducted successively, and the collected interview data largely met the research requirements for this study.

4.2.2 Interviewer's Profile

Participant 1: LCY

LCY comes from Shandong Province and is currently a sophomore majoring in Wushu. She first started practising Wushu in her freshman year of high school and now boasts five years of experience. While her initial Wushu fundamentals were not strong, she diligently practised and has become the student with the most vital skills among all the female Wushu majors. She is cheerful, sets high standards, and enjoys practising fundamental Wushu and swordsmanship. In the future, she aspires to pursue a master's degree and become a PE teacher.

Participant 2: GCY

GCY hails from a prefecture-level city in the northern part of Shanxi Province and is currently a senior majoring in Wushu. She joined the Wushu Association in her freshman year and later became its president. She now has four years of Wushu practice experience. Her proficiency in Wushu fundamentals is moderate, and she possesses a particularly cheerful personality, excelling in communication. While practising, she does not shy away from putting in hard work. Her goal is to enhance herself through the study of Wushu.

Participant 3: XFB

XFB comes from Fushan County in Linfen City, Shanxi Province, and is currently a senior majoring in Wushu. Inspired by a practising teacher during elementary school, she planted a small Wushu dream in her heart. In her

freshman year, she joined the Wushu training team and now has 4 years of Wushu learning experience. While her individual Wushu skills may be insignificant, she is exceptionally hardworking and has outstanding academic performance. Her personality falls in the middle range, characterised by diligence and a propensity for asking questions. She puts in extra effort during Wushu practice, although her aptitude may not be exceptionally high. Her current goal is to pursue a master's degree and become a physical education teacher.

Participant 4: ZYZ

ZYZ hails from a county in Shanxi Province and is currently a junior student. Having had a strong interest in Wushu since childhood, she began practising Wushu in college and now has three years of experience. Despite the relatively short duration of her Wushu practice, she possesses a high level of insight, leading to rapid improvement in her skills. Currently, she is among the top-performing female students. Her personality is lively and cheerful, with a proactive and self-disciplined approach. Her current goal in Wushu studies is to deepen her understanding further and enhance her skills.

Participant 5: ZXM

ZXM is from a prefecture-level city in Shanxi Province and is currently a junior student. Having had a fondness for sports since childhood, she began practising Wushu in college and now has three years of experience. She demonstrates exceptional early enthusiasm for personal learning and solid Wushu skills. She has an ambivert personality and maintains strict standards.

She achieved notable success, securing second place in the 2022 Shanxi Province Wushu Championship in Cha Quan and fourth place in San Lu Chang Quan. Her current goals in Wushu studies include deepening her understanding, honing her skills, and pursuing a master's degree.

Participant 6: MWY

MWY is a senior student from a prefecture-level city in Shanxi Province. Since childhood, she has possessed good endurance and enjoys long-distance running. Upon entering college, she began exploring Wushu, particularly for static exercises such as Tai Chi and Ba Duan Jin. Quietness, gentleness, a reserved nature, and a penchant for contemplation characterise her personality. Through her Wushu studies, she aims to foster a greater understanding of Wushu among more people.

Participant 7: SPJ

SPJ hails from Jincheng City, Shanxi Province, and is a Level-2 athlete in the 400-meter category in China. He is a third-year college student who has possessed excellent physical fitness since childhood and started practising sports in junior high school. In college, he chose to specialise in Wushu after excelling in gymnastics, wanting to explore whether he was suited for this discipline. Gradually, he developed a fondness for it. With a learning experience of one and a half years, he has demonstrated exceptional Wushu skills, earning the third position in the 2022 Shanxi Provincial Wushu Championship for Three-Road Long Fist. He is outgoing and disciplined. Besides attending classes, he dedicates time every day to practising Wushu.

Participant 8: LDH

LDH hails from Taiyuan, the capital city of Shanxi Province, and is a fourth-year college student. He began practising Wushu in junior high school and holds the record for the longest duration of Wushu practice among all students, accumulating 10 years of experience. Proficient in both free combat (Sanshou) and Wushu routines, he has extensive competition experience, having participated in numerous city-level and provincial-level Wushu routines and Sanshou competitions. He has achieved notable accolades, including first place in the Double-Section Staff category at the 11th Taiyuan Wushu Bid Competition, second place in the Long Fist Routine at the 2019 Taiyuan Martial Virtue Cup, and first place in the Knife Sparring category. In the 2018 Taiyuan City Sanshou Bid Competition, he secured first place in the 56-kg category. He exhibits a composed and steady demeanour, demonstrating resilience, diligence, and self-discipline. Recently, he completed the 2024 Master's entrance examination and aspires to pursue a career as a Wushu instructor.

Participant 9: SLP

SLP hails from Changzhi City, Shanxi Province, and is currently a fourth-year college student. Starting from junior high school, he attended the Changzhi Sports School. Proficient in middle-distance and long-distance running in track and field, he achieved notable successes, securing second place in the 3000 meters in the Men's Division B at the 2018 Shanxi Province Athletics Finals, and first place in the 3000 meters and 5000 meters in the Men's Division B at the 26th National Leaps Cup in the same year. With a decade-

long sports education, he initiated his Wushu training upon entering college, accumulating three years of experience. He excels in both free combat (Sanshou) and Wushu routines. He is lively and outgoing, demonstrating resilience, diligence, and self-discipline. Having recently completed the 2024 Master's entrance examination, he aspires to pursue a career as a Wushu teacher or trainer.

Participant 10: MWT

MWT is from Jinzhong City, Shanxi Province, and is currently a fourth-year college student. He started practising Wushu in his freshman year and now has four years of experience in Wushu. During his university years, he won the Long Fist championship and the runner-up in Swordsmanship at the 2022 Shanxi Province Wushu Championship. He is calm, composed, earnest, curious, and he profoundly appreciates Wushu culture with personal insights and perspectives. Having recently completed the 2024 Master's entrance examination, he possesses some experience in Wushu teaching and training. He envisions furthering his expertise in the field of Wushu in the future.

Participant 11: LZL

LZL hails from Jincheng City, Shanxi Province, and is a sophomore in college. Since his freshman year, he has joined the Wushu training team and has one year of experience in Wushu. He exhibits a high level of insight into Wushu, possessing personal reflections and understanding. His Wushu instructor has given him high praise, acknowledging his innate talent. With

excellent Wushu skills, he plans to pursue a master's degree, aiming to further specialise in Wushu teaching and research.

Participant 12: GWW

GWW is from Fangshan County, Lvliang City, Shanxi Province, and is currently a sophomore in college. Having started learning Wushu from a young age, he boasts 11 years of experience in the discipline. Despite his young age, he displays quick thinking and remarkable Wushu skills, having secured championship and runner-up titles multiple times in both Shanxi Province and Taiyuan City Wushu Championships. He has also been honoured as one of the top 100 Wushu athletes in Taiyuan City. He exhibits exuberance and is passionate about Wushu. He possessing a strong sense of individuality, and he aspires to pursue a master's degree in Wushu.

Participant 13: JL

JL hails from Sichuan Province and embarked on a two-year military service starting his sophomore year. In September 2022, he returned to university and is currently a third-year student. Since childhood, he has harboured a love for Wushu, having previously practised Sanda and Chinese-style wrestling. He once earned the second position in the 70-kg China University Wrestling Championship Group B category. He adheres to a rigorous daily exercise routine and is upbeat and determined. Looking ahead, he plans to rejoin the military and continue serving in the armed forces, building upon his experiences and skills acquired during his previous service.

Participant 14 (Teacher 1): XZL

XZL: Male, 37 years old, a master's graduate, hailing from Henan Province, has been immersed in professional Wushu training since childhood. He completed his master's degree at Chengdu Sports University and holds the titles of a second-level Wushu athlete, a national-level Wushu referee, and a nationally certified Wushu instructor. He joined Yuncheng College's Department of Physical Education Faculty in 2012. He currently serves as a Wushu teacher and the head coach of the college's martial arts team, boasting 12 years of experience in university-level Wushu education. He has led his students to participate in the Shanxi Province Wushu Championship numerous times, achieving outstanding results and earning the esteemed title of Excellent Wushu Coach in Shanxi Province.

Participant 15 (Teacher 2): ZYQ

ZYQ: Female, born in 1997, a native of Yuncheng, Shanxi Province. She completed her master's degree in June 2022 at Shenyang Sports College. Proficient in Taekwondo, she has achieved praiseworthy accolades, including the second prize in the Youth Division of the Eight Section Brocade at the 2020 National Fitness Qigong Network Video Series Competition, second place in the 46-kg category at the 2020 Shenyang Sports College Sports Meeting Taekwondo Competition, and first place in the Youth Female Taibai Team at the 2021 'Fighter's Cup' Liaoning Province Public Taekwondo Championship. In December 2022, she joined the Department of Physical Education at Yuncheng University, serving as a Wushu teacher. Since starting her career, she has been awarded the 'New Teacher Award' in

the 2023 Teacher Teaching Ability Competition of the Department of Physical Education and second prize in the school-level Course Ideological and Political Teaching Design Competition (using Wushu courses as an example)

4.3 Findings of the Study

Based on the case study method, the researcher identified 10 emerging themes. These themes are (1) advanced cognition, (2) metacognitive skills, (3) ownership of learning, (4) MCL knowledge, (5) MCL behaviours, (6) MCL emotions, (7) teacher factors, (8) student factors, (9) teaching factors, and (10) social factors. The detailed structure of these emerging themes is depicted in Figure 4.1.

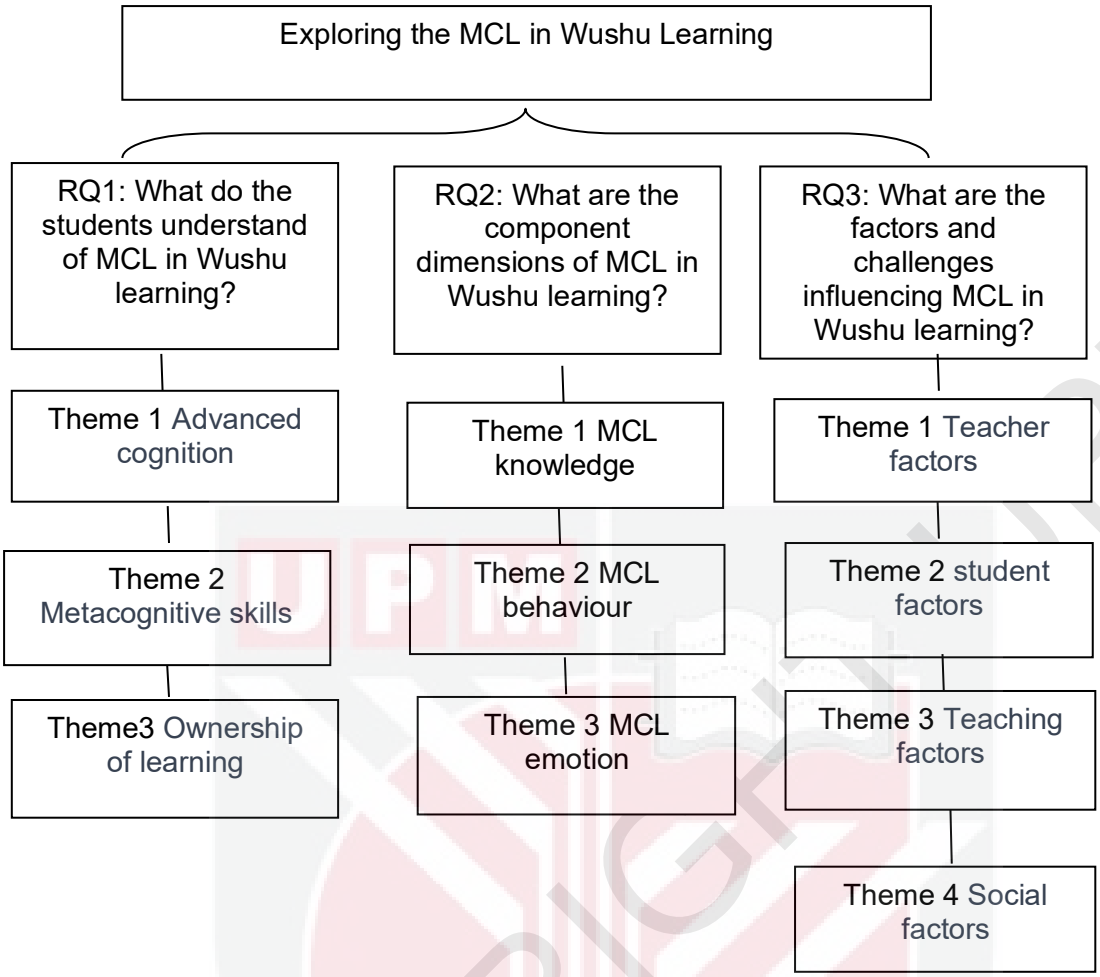
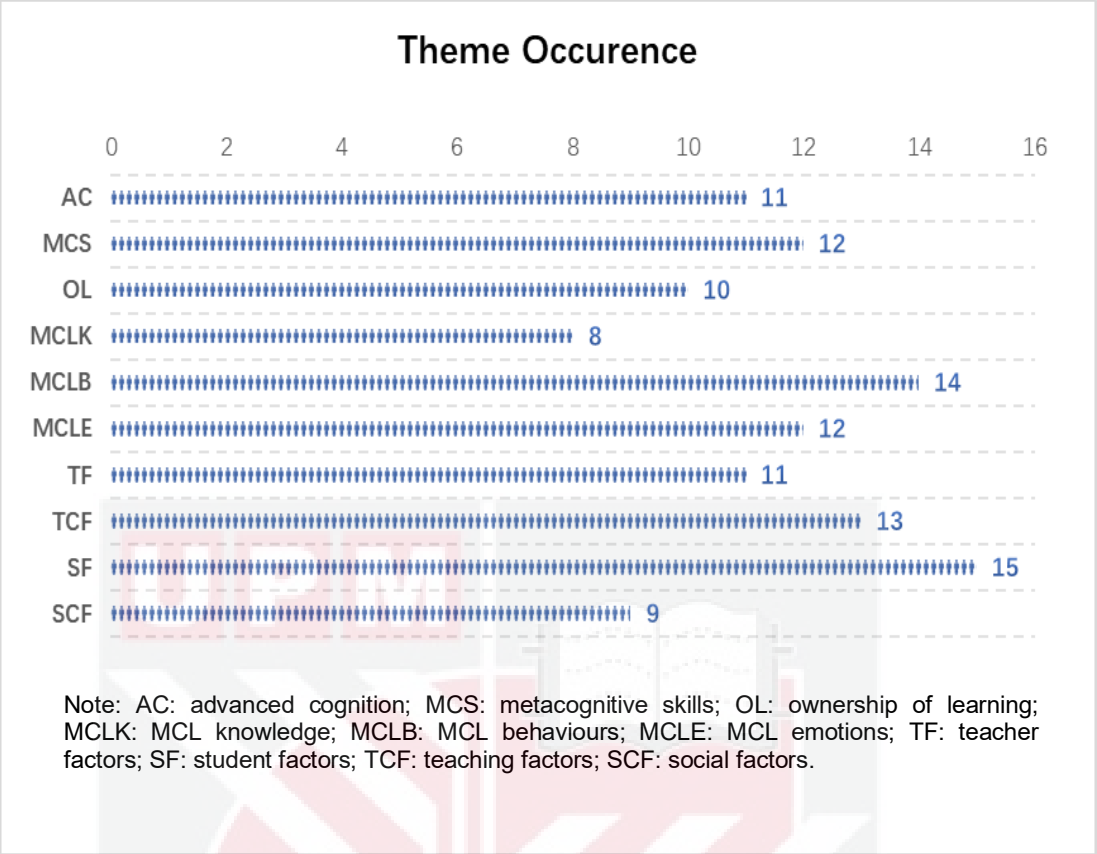


Figure 4.1 : Details of the Emerging Main Themes

Themes with five or more occurrences were retained in the data analysis. Figure 4.2 shows specific information on each of the main themes' occurrences.



Note: AC: advanced cognition; MCS: metacognitive skills; OL: ownership of learning; MCLK: MCL knowledge; MCLB: MCL behaviours; MCLE: MCL emotions; TF: teacher factors; SF: student factors; TCF: teaching factors; SCF: social factors.

Figure 4.2 : Main Themes Occurrences

4.4 What do Students Understand of MCL In Wushu Learning

The formulation of this question aims to gain a profound and precise understanding of MCL among students specialising in Wushu. This question is further divided into three interview guide questions and four sub-questions. Students provided varied answers to these questions. A three-tier coding process was sequentially applied to the interview data to identify the primary themes. Ultimately, three emerging themes were identified: advanced cognition, metacognitive skills, and ownership of learning. The first two themes can be supported by evidence from metacognitive and self-regulation theories. The third emerging theme is a novel perspective discovered in this research.

4.4.1 Advanced Cognition

Students participating in the discussion provided varying opinions on this issue. The majority considered MCL to be a more advanced cognitive process, especially crucial in learning Wushu, requiring a certain level of spirituality and insight. They attributed it to innate talent. For example, XWB stated that

> *'I believe that I lack innate talent in learning Wushu techniques, unlike LCY, which has better inherent conditions. However, I dedicate myself to theoretical studies. I have clear goals, aiming to participate in the master's entrance examination and aspiring to pursue further research in Wushu'.*

In additon, MWT, noted that

> *'The learning of Wushu techniques indeed requires a certain level of spirituality. That's why, even when teachers deliver the same content, some students grasp it after one practice, while others may still struggle after ten attempts. It's a matter of differing levels of insight. In this aspect, I am not as proficient as LZL. We often communicate, and I've observed that his insight surpasses mine'.*

However, some students expressed different viewpoints; for instance, ZXM asserted that

> *'I believe that while certain aspects of Wushu may demand higher physical fitness from individuals, the basic content of Wushu learning is achievable with dedicated effort. If someone hasn't mastered it, it's likely due to insufficient effort and commitment'.*

Furthermore, researchers have found that highly motivated students tend to have clear learning objectives and set strict study schedules. For example, student LDH stated he has two backup plans. First, to pursue a master's

degree, and if unsuccessful, to join the military. Therefore, from the observations of researchers and feedback from other students, it is evident that LDH's daily routine is highly organised and purposeful. In addition, some participants expressed that MCL involves self-reflection and the depth of self-awareness, enabling a clear understanding of one's strengths and weaknesses.

> *'I feel like the character "yuan" conveys the essence, just like the current trends of "metaverse" and "meta-analysis". Metacognition is also about understanding oneself. Simply put, it knows what you excel at and what you're not good at. In Wushu, it's about recognising your strengths and weaknesses'. (SLP)*

Teaching instructor XZL expressed that

> *'In China, there is an ancient saying, "Know yourself, know your enemy, and you will never be defeated in a hundred battles". In my teaching approach, I allocate ample time in each class for students to practice independently, allowing them to identify their challenges. I encourage them to contemplate addressing these issues, aiming to enhance their self-reflective abilities'.*

Finally, researchers also found a significant correlation between metacognition in Wushu learning and students' critical thinking, problem-solving abilities, and execution. For example, student XWB stated that if she encountered a problem, she had to find a solution immediately; otherwise, she could not sleep well or eat properly. Student SLP also expressed if there is a movement he has not mastered, he will keep practising it, failing which, he would feel uncomfortable.

4.4.2 Metacognitive Skills

Most students indicated that MCL is a skill or a competency. This ability is mainly expressed in the following areas: self-regulation, self-monitoring, and executive abilities. Student ZXM expressed that

> *'I believe that in Wushu learning, metacognition is a form of control over self-sentinel and consciousness, as Chinese Wushu emphasises the integration of internal and external aspects, as well as the unity of body and mind. Metacognition is, therefore, an emphasis on this aspect'.*
>
> *'Goals and motivation alone are not enough in Wushu learning, and execution is also critical. For example, if I set a plan that I can't complete that day, I'll take extra time to complete it, and if I can't, I'm never sure what I'm going to do' (LDH).*

Furthermore, interviews with focus groups further reveal a widespread student consensus: metacognition in Wushu learning underscores the internal insight into martial skills and culture, coupled with external practice. This is regarded as a crucial component of Wushu cultivation. However, not all students in Wushu learning can effectively regulate their behaviour and thoughts. This is closely associated with individual motivation, where some students may possess strong motivation but lack the execution capability.

4.4.3 Ownership of Learning

Students may demonstrate that MCL is a sense of ownership of their learning process, understanding that they play an active role in their skill development and mastery of Wushu. Student LDH asserted that

> *'We are university students now, not minors. The initiative for learning relies on our exploration. In Wushu learning, metacognition serves as the intrinsic drive for learning. It*

doesn't require external coercion; with strong metacognitive abilities, one will naturally engage in practice and learning, gradually cultivating it into a habit'.

Student XWB also expressed a similar perspective:

'I'm not proficient in Wushu techniques, but I am passionate about theoretical knowledge and culture. Therefore, I searched for numerous books and articles online to deepen my understanding of Wushu. In addition to attending classes, I dedicate one hour daily for practising. I believe in the adage: diligence can compensate for shortcoming'.

Furthermore, based on the researcher's in-class observations, surveys, and pre-conducted questionnaires, it was found that students with strong metacognitive abilities also exhibit enhanced learning capabilities and outstanding proactive learning tendencies. This observation is particularly evident in Wushu teaching, where students such as SLP, WDH, XWB, ZXM, and MWT scored significantly higher on metacognitive questionnaires than their peers, and their academic performance in the class stands out notably.

4.5 What are the Component Dimensions of MCI In Wushu Learning

Because this research question is the focal point of the study, the researchers designed three guiding questions and 17 sub-questions to delve deeper into the details. Students have provided a myriad of diverse perspectives on this matter. Still, the majority have centred their discussions around three main themes: metacognitive knowledge, metacognitive behaviours, metacognitive emotions, and eight sub-themes. The specific information is detailed in Table 4.1.

Table 4.1 : The Details Information of Question 2

Question	Main themes	Sub-themes
Component Dimensions of MCL	MCL Knowledge	MCL Awareness, Understanding of Wushu
	MCL Behaviour	Setting Goals and Planning, Selecting and Applying of Learning Strategies, Problem-Solving and Self-monitoring, Self-Evaluation and Reflection
	MCL Emotions	MCL Emotional Experiences, MCL Emotional Regulation

4.5.1 Metacognitive Learning Knowledge

Two sub-themes primarily emerged under this main theme: metacognitive awareness and understanding of Wushu. While metacognitive awareness has been identified in previous research, the knowledge of Wushu is a newly discovered theme in this study.

4.5.1.1 MCL Awareness

Students' responses on this issue also corroborate the findings mentioned above. For instance, student MWT stated that

> *'I integrated metacognition into my learning practice and observed several key insights. Initially, I held a simplistic perception of Wushu viewing it through the lens of sensationalised portrayals in Wushu films. However, as I gradually immersed myself in the practice, my understanding of Wushu deepened. The second point involves an increasing demand for skill proficiency in Wushu. I noticed a rising requirement for honing specific techniques and refining my abilities. The third aspect pertains to a heightened comprehension of Wushu culture, encompassing its intrinsic and extrinsic demands. This includes a deeper understanding of the intricate requirements and the exploration of more advanced and challenging techniques within Wushu'.*

Student LZL also expressed a similar viewpoint:

> *'Initially, I thought Wushu was just for show, but after a year of practice, I realised it's not true. It demands high control over the body, coordination, and flexibility. For example, when the teacher mentioned that kicking in Wushu is not about using leg strength but involves power from the Dantian (the body's centre of gravity), I couldn't grasp it initially and kept focusing on leg strength. However, now I understand that by generating power from the internal Dantian, kicking becomes effortless and requires minimal effort'.*

In summary, each student exhibits different metacognitive knowledge in learning Wushu, which may be influenced by individual cognitive perspectives, learning backgrounds, and experiences. This aligns with the viewpoint of scholar Flavell. Although Flavell did not explicitly provide a detailed list of factors influencing metacognitive knowledge, some general cognitive factors can be inferred from his research. For instance, as individuals age, their understanding and regulatory abilities regarding their cognitive processes tend to improve. Accumulation of metacognitive knowledge occurs through an individual's learning experiences across various subjects and tasks.

Furthermore, during the research process, the researcher obtained consistent viewpoints from interviews with teachers and students regarding the integration of body and mind in the practice of Wushu. It is unanimously agreed that in practising Wushu, one must pay attention to the unification of internal and external, the coordination of body and mind, and the integration of movement and stillness. This characteristic is particularly emphasised in traditional Chinese Wushu culture, and students also attach particular

importance to cultivating this awareness during their practice. This stands as the most significant distinction from other sports disciplines.

4.5.1.2 Understanding of Wushu

The researcher believes that to understand the implementation of metacognitive knowledge in Wushu teaching, it is essential to first focus on students' awareness of Wushu culture and Wushu teaching. This includes a comprehensive evaluation of their understanding of its techniques, culture, philosophy, and moral values, serving as a fundamental logical starting point. Therefore, the researchers have categorised this as a new sub-theme under metacognitive knowledge, which has not been observed in other studies.

The results indicated that as students deepen their understanding of Wushu, the learning skills become faster. This aligns with Schraw's perspective: as students acquire more metacognitive knowledge, they can better transition to new learning domains (Schraw, 2002).

In addition, based on the researcher's observations, it has been noted that there are significant individual differences in students' manifestation of metacognitive knowledge in the context of Wushu. These differences become particularly pronounced concerning grade level, gender, and learning experiences. As students advance in grade levels, their metacognitive knowledge becomes more profound. Furthermore, there is a notable divergence in the understanding and cognition of Wushu culture between male and female students. Males are more interested in and focus

on exercises involving strength, speed, combat, and fighting. At the same time, females tend to prefer flexibility-related exercises, such as Tai Chi and sword techniques. Lastly, the longer the duration of Wushu practice, the deeper the understanding of Wushu's internal and external requirements. Practitioners with more experience tend to focus more on self-awareness and align themselves closely with ontological principles.

4.5.2 Metacognitive Learning Behaviour

Participating students provided a wealth of rich and varied responses on this theme. Wushu teaching, in summary, contains the following four main themes: setting goals and planning, selecting, and applying learning strategies, problem-solving, self-monitoring, and self-evaluation and reflection.

4.5.2.1 Setting Goals and Planning

When choosing to specialise in Wushu, most students typically set specific learning goals for themselves, whether short-term or long-term. These goals often encompass physical fitness, martial skills, and psychological aspects. Among the 13 students interviewed, seven expressed their intention to take the master's entrance examination, three aspire to become physical education teachers, and one intends to enlist in the military. For example, student LDH stated that

> *'My primary choice is to pursue a master's degree. If not admitted, I will enlist directly and continue military service. Alternatively, I might take the civil service examination for the military. If I get into the military through this route, I can also pursue further studies within the military. Being in the*

military doesn't necessarily mean I must take exams externally'.

Student JL had served as a conscripted soldier for two years. He mentioned that after graduation, he still plans to return to the military because he enjoys the disciplined and masculine lifestyle it offers. Student LCY, hailing from Shandong Province, expressed her approach:

> *'I am preparing on two fronts, aiming to pursue a master's degree and secure a teaching position because these two paths are not mutually exclusive. Since I am currently only a sophomore, my initial focus is on mastering my major courses, strengthening my foundation in English as it is not my strongest suit, and honing my Wushu skills. Once I enter my junior year, I plan to dedicate more time to preparing for my major courses and the teacher qualification exams'.*

While the remaining students may yet have to set long-term goals, they have established short-term objectives. For instance, SPJ wanted to participate in a national Wushu competition. MWY remarked that

> *'I have a particular fondness for the graceful nature of Tai Chi and swordsmanship. Therefore, my goal is to excel in these two disciplines and improve my technical proficiency'.*

Additionally, based on the observations from the study, students majoring in physical education must clear the national English proficiency exam if they choose to take the master's entrance exam. Furthermore, aspiring teachers must first obtain a teaching qualification certificate. Consequently, these students develop personalised plans aligned with their goals. Beyond their daily coursework, they dedicate specific time to practising English and refining their Wushu skills. They diligently adhere to their schedules,

ensuring that all tasks and objectives are met, even making up for any lost time in case of unexpected events.

4.5.2.2 Selecting and Applying Learning Strategies

The researcher found during the survey that 'Wushu specialisation' is a specialised course designed for students with a particular foundation and interest in Wushu. It spans from the fourth semester of the sophomore year to graduation in the fourth year, totalling four semesters. The curriculum during this period primarily includes Wushu routine learning, weapon training (knife, gun, sword, staff), and Sanda (Chinese kickboxing). Different teaching contents impose varying demands on students' physical fitness and learning requirements. For instance, Wushu routine learning has relatively high requirements for students' basic skills, especially hand techniques, leg techniques, and boxing techniques, which demand a higher level of body control, flexibility, and balance. Weapon training emphasises on students' motor memory and flexibility, while Sanda primarily focuses on students' speed of movement and strength. In the process of Wushu specialisation teaching, in addition to learning the essential content, teachers require each student to choose 1–2 specialisations based on their actual situation. Therefore, students choose different specialisations and subsequently apply different learning strategies based on their interests and physical conditions.

For example, GWW has the longest Wushu practice duration among all the surveyed students. He started participating in Wushu competitions in the fourth grade of elementary school, received professional training, and

participated in competitions at a sports school before entering university. Therefore, he has always been engaged in competitive Wushu. However, after entering the university, Wushu's teaching and training differed from his previous competitive training. He said that in his personal experience,

> *'The university teaching is different from the competitive training I did before. The teaching emphasises repetition, allowing students to familiarise themselves with the action process, perform the actions correctly, and prioritise fundamental skills. However, Wushu competitions focus on achieving good results and do not emphasise the repeated practice of movements. Therefore, I am now calming myself down and shifting my mindset because I plan to pursue a career in the teaching industry. Every day, I dedicate one hour specifically to practice the fundamental skills of Wushu, aiming to make my movements more standardised'.*

Student LDH has been practising Sanda (Chinese kickboxing) since childhood. He enjoys the speed and power associated with Sanda. He mentioned enhancing his physical fitness, once a week, covering a minimum distance of 5 kilometres.

Additionally, the researcher observed that a dedicated WeChat group was created in the Wushu specialisation class to facilitate communication among the students. A smaller team of 6–8 individuals formed their subgroup within this large group. They established a collective practice time from 4:00 PM to 6:00 PM daily. Unless there are urgent matters, each member proactively engages in practice at the agreed-upon time.

SPL serves as the captain of this subgroup. When everyone gathers, he verbally presents the day's training plan. The team collectively completes the

training, encouraging and cheering each other. After accomplishing the tasks, each member raises any difficulties they encounter, and together, they discuss and solve these issues. During the research period, the researcher participated in their training three times and was deeply moved by their perseverance, unity, and spirit of hard work. Among the interviewees, ZXM, SPJ, LDH, SLP, and JL are all members of this small team.

Figure 4.3 : Wushu Team's Daily Training Silhouette

4.5.2.3 Problem-Solving and Self-Monitoring

Through interviews and observations, researchers found that self-monitoring and problem-solving abilities in Wushu learning are crucial components of metacognitive behaviour. Self-monitoring refers to the learner's ability to effectively observe and adjust their movements, postures, and skills during the practice of Wushu. Problem-solving skills entail an in-depth understanding of movements, tactics, or response strategies, the creative thinking to address difficulties, and the ability to adapt and make decisions

by flexibly applying learned skills to changing situations. Students demonstrate diverse characteristics and aptitudes in this regard. These differences become more pronounced in terms of gender and grade level.

Student LZL has only been practising Wushu for a little over a year. Still, both the teaching instructor and his conversations reflect that he is a student with a natural talent for Wushu, embodying the 'perception' emphasised in Chinese Wushu. He expressed,

> *'Through this year of learning, I feel that my control over my body has improved. When a movement is not executed correctly, I feel awkward and a sense that an issue with my body. I stop to think and practice again, and the more I practice, the more comfortable I become, realising that I've got the movement right. Additionally, practising regularly, I distinctly feel that my body's coordination and flexibility have also improved'.*

However, another female student, LCY, has a different perspective. She said,

> *'When I encounter a movement I can't master, I keep practising independently If I still can't learn it, I will ask the teacher. But currently, I don't feel the bodily sensations that LZL mentioned, and I haven't experienced how to control my body and movements'.*

Other female students XWB and ZXM, also mentioned practising independently and seeking guidance from teachers or classmates when encountering difficulties. On the other hand, male students SLP, MWT, and GWW expressed viewpoints similar to those of LZL. They mentioned that they would first practise independently. If they could not find the 'right feel', they would ask classmates for help or repeatedly watch short videos on platforms like TikTok, Baidu, or Bilibili, and then practise again.

The above observations reveal differences in problem-solving strategies between male and female students. Females typically tend to proactively seek assistance from others, while males often rely more on themselves to address challenges. This distinction may be associated with the traditional Chinese cultural emphasis on concepts such as ‘machismo’ and a desire to ‘save face’ among males. Furthermore, students who are older and possess stronger self-confidence demonstrate a greater ability to solve problems independently.

In terms of self-monitoring, the researcher observed that when instructors arrange practice tasks in class, female students generally exhibit stronger exercise monitoring abilities than male students. They often seize the opportunity to engage in extensive practice during class time. In contrast, there may be instances of male students ‘slacking off’, engaging in banter during breaks or conserving energy during exercises.

Regarding self-monitoring in Wushu practice outside of class, there exist glaring differences between male and female students. Females tend to utilise spare time to study theoretical knowledge, while most males choose to practise Wushu techniques.

With the advent of digital technology and the era of new media, both male and female students, when seeking extracurricular guidance, opt for various online resources to aid their learning. Additionally, they leverage sports or learning apps to ‘check-in’ and supervise their practice. For example, SPJ

shares practice updates on TikTok almost daily, documenting his training progress. He describes it as ‘motivating myself in this high-profile manner’. SLP also has a similar habit of checking in and documenting their practice. While female students also record short videos for documentation, they typically do not publish them online.

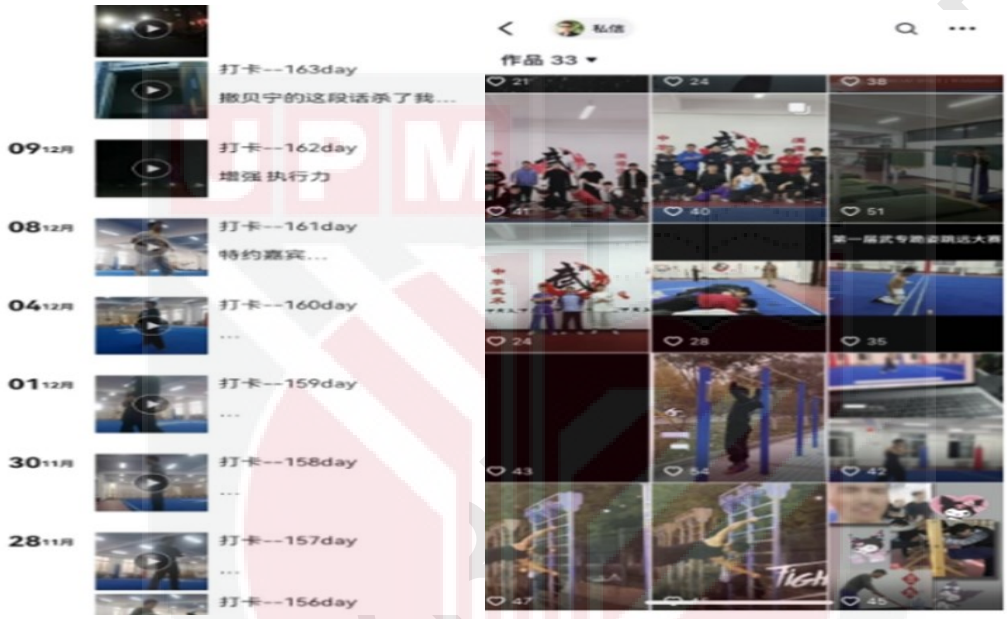


Figure 4.4 : Students’ TikTok and WeChat Record of Their Training Progress through Check-in Posts

4.5.2.4 Self-Evaluation and Reflection

In the research findings, it was discovered that self-evaluation is highly correlated with students’ learning experiences. The longer the duration of Wushu practice, the more accurate students tend to be in their self-assessments. For instance, during interviews with sophomore focus groups, participants were asked, ‘Do you know what your strengths and weaknesses are in practising Wushu?’ Most students appeared perplexed, unable to articulate their strengths and weaknesses clearly. However, in interviews

with juniors and seniors, most could quickly and clearly express their strengths and weaknesses. They identified areas where they had made significant strides in their Wushu journey and areas where there was still room for improvement.

For example, LKD, a senior male student, is rather shy and introverted, not inclined to speak much. However, when asked about the strengths and weaknesses of his Wushu practice, he responded candidly,

> *'The biggest advantage of my Wushu practice is having good physical fitness, while the not-so-good aspect is the sense of movement. For instance, what I learned today, I might forget tomorrow, and then I can't find that feeling again. The most significant gain from practicing Wushu for me is the confidence I feel while executing movements in this field. This subtle influence has gradually impacted my daily life, making me more self-assured'.*

Another student, GCY, noted that

> *'The greatest advantage of my Wushu practice is having a quick response in terms of genetic movements. When the teacher demonstrates a set of movements, after 1–2 repetitions, I can pretty much grasp it. However, I lack patience and don't enjoy repeating the same movement multiple times; I find it dull. As a result, my foundation in Wushu is not very solid'.*

On the other hand, researchers have found a correlation between self-evaluation and motor skills, with higher-level motor skills associated with more accurate self-evaluation. For example, GWW and LZL are two students with relatively strong Wushu skills, and their self-assessments align closely with the evaluations given by their teachers. Contrarily, students with less

proficient Wushu skills often struggle to accurately articulate their strengths and weaknesses.

In addition, to further assess each participant's self-evaluative abilities, researchers asked every interviewed student to rate their own Wushu learning on a scale of 1 to 10, with 10 being the highest score. The students' responses provided the research with diverse and insightful perspectives. The results are encapsulated in Table 4.2.

Table 4.2 : The Scores of Students Grading Themselves

Name	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13
Score	7	4	6	5	6	6	8	6	5	6	7	7	6
N	13		Mean		6.0769					SD		1.03775	

From the above table, it can be observed that students rated themselves with scores ranging from 4 to 8, with an average score of 6.08. This indicates that most students generally acknowledge their learning process. The scores primarily reflect their perceived effort and dedication. Notably, only one student, ZCY, rated themselves a four, believing they were not putting in the requisite effort. The areas where points were deducted show apparent variations, some attributing it to lack of talent, others to insufficient awareness, and some to perceived inadequacy in effort. For instance, student ZYZ mentioned

> *'I would rate myself a 5. The main deduction of 5 points is due to insufficient practice. I feel like I'm putting in the effort, but lack the spirit and vitality when others observe. This might be related to my physical fitness or that I haven't quite grasped the essence of practising Wushu yet." Student MWT stated, "I rated myself a 4, and the*

deductions are as follows: firstly, my understanding of Wushu is too superficial; secondly, my teaching skills are lacking; thirdly, my emotional regulation ability in the face of difficulties is not sufficient; finally, my self-communication skills are not good'.

4.5.3 Metacognitive Emotion

This study primarily focuses on two themes related to metacognitive emotion: metacognitive emotional experiences and metacognitive emotional regulation.

4.5.3.1 Metacognitive Learning Emotional Experiences

In Wushu's teaching, the theme of metacognitive emotional experiences primarily includes positive emotions, such as confidence, excitement, and calmness, and negative emotions, such as fear, frustration, anxiety, tension, nervousness, anger, and worry. Because of variations in students' learning motivations and experiences, metacognitive emotions in Wushu teaching also differ. Student LXL expressed that

'When I learn Wushu movements, I repeatedly ask myself if I'm doing it right. So, I believe that when learning movements, the first thing is to engage your brain. You can't just perform the actions without thinking; otherwise, the movement becomes lifeless. Therefore, it's crucial to contemplate. Once the body has reached a certain level of training, the movements become second nature, and you can empty your mind. There might be a moment when you suddenly comprehend that feeling. This excites me, and then I find it hard to fall asleep'.

Another student, MWT, noted that

'During the learning process, if a small goal is achieved, it's important to provide feedback to oneself. Learning to

self-evaluate, gradually, achievements will increase, and one will feel increasingly happy. For example, I would be very happy if I learned a movement today. I can feel this personally; I progressed today, and that's a very happy feeling'.

In addition, student XWB feels that

'The most profound experience I gained from learning Wushu is the exchange of values between teachers and students, such as cultivating personal qualities and learning etiquette in dealing with others." MWY expressed, "I love the graceful nature of Tai Chi; it allows me to calm down, think quietly, and contemplate how to harmoniously interact with the people, events, and things around me'.

Students SLP and JL enjoy kickboxing. They mentioned they love the power and speed of kickboxing, and the whipping leg movements make them appear cool and masculine.

4.5.3.2 Metacognitive Learning Emotional Regulation

Researchers have found that Wushu practice can alleviate and release negative emotions in students. For instance, the student SLP mentioned,

'When I'm feeling upset, I'll punch, give it all in the punches, break into a sweat, release all the negative emotions, then go take a shower, get a good night's sleep, and everything is fine'.

Additionally, because the fundamental exercises of Wushu can be monotonous when asked about what they would do if they did not want to practise these basics, student LDH said, he would go for a 10-kilometre run. LCY added that

'I write down all the things that make me unhappy because the writing process calms me down. While writing, you're

reflecting and releasing, and when things are over, looking back at what you wrote, you find it amusing'.

Metacognitive emotions play a critical role in emotional regulation. Students can learn to manage stress, anxiety, or other emotions that may arise during Wushu practice, promoting a positive learning environment. In learning Wushu, metacognitive emotions encompass feelings of effort, difficulty, correctness, confidence, frustration, satisfaction, and other emotional responses associated with learning tasks and processes. This conclusion aligns with theories emphasising the interconnectedness of cognitive and emotional aspects in human thinking and self-awareness.

In summary, students practising Wushu can integrate metacognitive knowledge, behaviours, and emotions to enhance their learning experiences, improve performance, and cultivate an in-depth understanding of both the physical and mental aspects of Wushu teaching.

4.5.4 Analyse Theme: The Metacognitive Learning Model

Based on metacognitive theory and self-regulation theory, the researcher analysed the emerging themes under this question and, based on revising previously proposed models of MCL hypotheses, improved a three-stage, eight-dimension theoretical model of MCL experiences in Wushu learning. Following Flavell's perspective, MCL perspectives are divided into three stages: MCL knowledge, MCL behaviour, and MCL emotions. MCL knowledge comprises metacognitive awareness and understanding of Wushu. Metacognitive behaviour includes four dimensions: goal setting and

planning, learning strategies selecting and applying, problem-solving and self-monitoring, self-evaluation, and reflection. Metacognitive emotions have two dimensions: metacognitive emotional experiences and metacognitive emotional regulation. See Figure 4.5 for details.

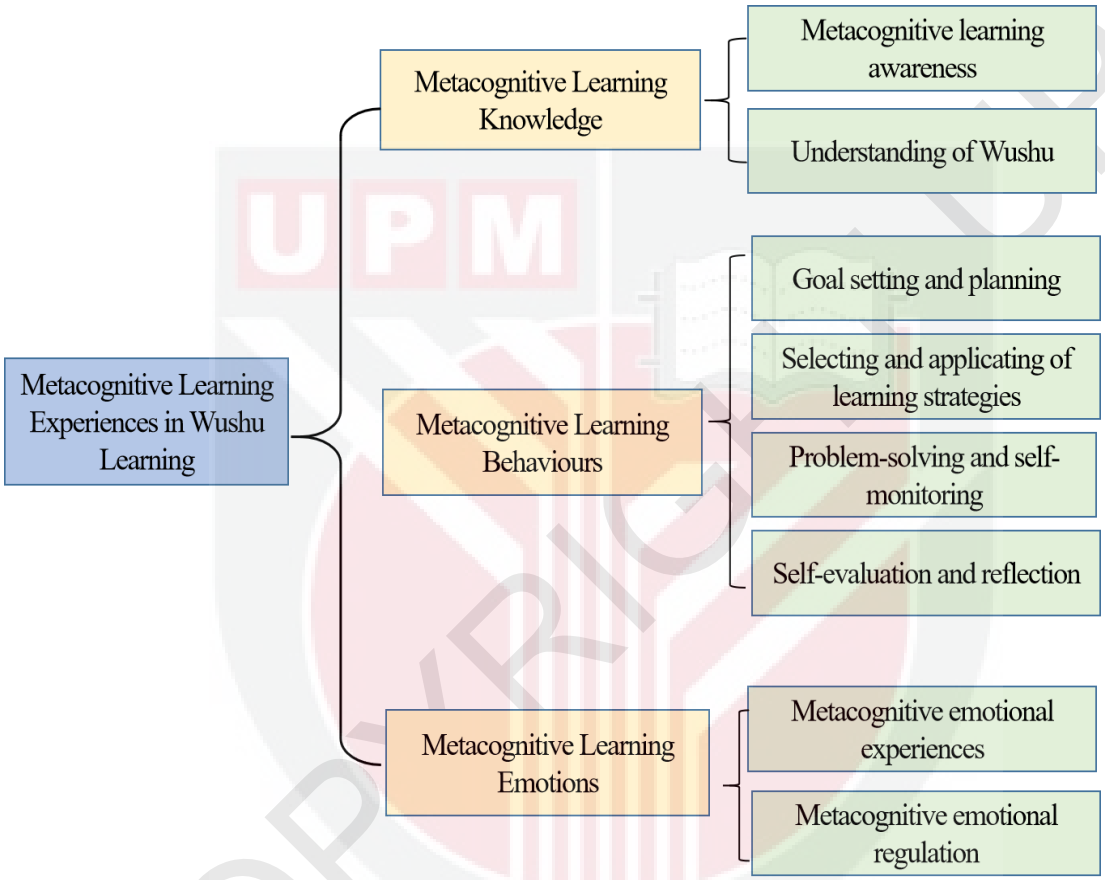


Figure 4.5 : Three-Stage, Eight-Dimension MCL Model

4.6 What Are the Influencing Factors and Challenges of MCL in Wushu Learning

The researchers designed three guiding questions and three sub-questions in response to this question. The research findings indicated that, within the context of Wushu teaching, the factors influencing MCL primarily centre around the following aspects.

Table 4.3 : The Details Information of Question 3

Question	Main-themes	Sub-themes
Influencing Factors and Challenges of MCL	Teacher Factors	Educational Philosophy, Teaching Methods and Strategies
	Students Factors	Learning Styles, Learning Experiences, Gender and Age, Metacognitive Skills, Technical Skills
	Teaching Factors	Learning Environment, Feedback Mechanisms,
	Social Factors	Cultural Considerations Ethical Considerations

4.6.1 Teacher Factors

From the interview question, 'What factors influence MCL in Wushu learning?' Most students indicated that the teacher's educational philosophy, teaching methods, and strategies are key to their MCL.

4.6.1.1 Educational Philosophy

Students expressed a wide range of views on this issue. XWB stated

> *'While some reforms have been made in higher education, the deep-rootedness of the traditional model of teaching and learning makes it challenging to move quickly away from a teacher-centred approach. This teaching model limits students' participation and initiative and adversely affects their interest and motivation in learning. Particularly in the teaching of Wushu, teachers tend to overemphasise the mastery of sports techniques to the detriment of other psychosocial and practical skills'.*

In the researcher's survey, students often complained about the excessive course content, the difficulty of technical movements, and the tight schedule. Encouraging students to engage in the metacognitive process can be challenging, as it requires them to reflect on their learning experiences and

emotions within the context of Wushu. This demands careful instructional design. However, the traditional educational philosophy of teachers significantly constrains the implementation of MCL.

Additionally, from the interviews with the two teachers, the researcher also identified a common issue: older teachers are less willing to adopt new teaching methods. They believe that traditional teaching methods must adhere to traditional Chinese Wushu. On the other hand, although passionate and eager to accept new challenges, younger teachers often lack teaching experience, making it difficult to understand and apply new teaching strategies accurately. Feedback from students, along with interviews with teachers XZL and ZYQ, as well as observations, further confirmed the observations above.

4.6.1.2 Teaching Methods and Strategies

This includes aspects such as classroom organisation, the utilisation of teaching tools, and the implementation of teaching feedback mechanisms. Student LZL mentioned

> *'I often hear some classmates complain that teacher XX asks us to repeatedly practice a movement until we are completely exhausted, leaving no time for reflection. I believe that in Wushu teaching, teachers should provide students with some independent practice and reflection time. Many movements in Wushu require careful consideration rather than blind repetition. If students merely engage in mechanical practice, the results may not be optimal'.*

Student MWT also expressed a similar viewpoint and said

> *'Learning Wushu indeed requires a certain level of talent. For example, some students catch on quickly, and the teacher's instructions make immediate sense to them. However, for someone like me, understanding may come a bit slower. I might not grasp what the teacher said, so it's crucial to have time to think, and then practice, and only later might I truly comprehend. Oh, that's how it works'.*

Teacher XZL remarked that

> *'In my teaching, I often employ various instructional formats, such as collective practice, group exercises, and individual demonstrations. Collective practice fosters a spirited atmosphere when introducing new movements. Group exercises involve dividing students based on skill levels, assigning distinct tasks, and providing differentiated instruction. Individual demonstrations aim to leverage the expertise of skilled students in guiding and assisting others. Different instructional formats yield different teaching outcomes. Regarding MCL, I believe that individual demonstrations have the most effective impact. When students observe others demonstrating, it prompts self-reflection'.*

4.6.2 Students Factors

4.6.2.1 Learning Styles

MCL involves one's awareness and regulation of the learning process. Therefore, students are the masters of the entire learning process. Individual differences in cognitive abilities, learning styles, learning experiences, goal setting, and MCL skills among students can all influence MCL. Recognising and adapting to these individual differences is imperative for effective teaching.

Learning style refers to the concept that individuals may vary regarding their most effective teaching or learning modes. The specific classification of learning styles may differ among different scholars or researchers. According to Zapalska and Pashler, learning styles can be categorised into four types: auditory learners, visual learners, kinaesthetic learners, and read/write learners (Pashler et al., 2008; Zapalska & Brozik, 2006).

According to the researcher's survey of Wushu teaching, respondents lacked a clear conceptual understanding of their learning styles. However, they were all aware of their most sensitive aspects. For example, student ZWB mentioned,

> *'I enjoy Wushu, but I've noticed that I'm not particularly skilled in learning Wushu techniques. However, I am strongly interested in Wushu theory and the culture'.*

This suggests that she may fall under the read/write learning style. The researcher also learned from teacher XZL that while XWB may not excel in Wushu techniques, she is exceptionally conscientious and consistently achieves top academic performance.

SPJ has remarkable Wushu skills, earning unanimous praise from teachers and classmates. However, when asked if he would consider pursuing a master's degree for further studies, he expressed hesitation because of his perceived inadequacy in English and a lack of enthusiasm for theoretical learning. The SLP echoed similar sentiments. Therefore, the responses from these students once again confirm that different learning styles and metacognitive approaches exist among students.

Furthermore, based on the researcher's observations, some students prefer playing music while practising Wushu, which enhances the overall experience. Others enjoy watching Wushu actions performed by celebrities or videos of skilled Wushu competitions. This also implies the existence of different learning styles among students. Additionally, students with a read/write learning style demonstrated higher metacognitive knowledge abilities than those with visual or kinaesthetic learning styles. On the other hand, students sensitive to visual and kinaesthetic stimuli exhibited higher Wushu skills than those with a read/write learning style.

In conclusion, different learning styles exert varying effects on Wushu's learning. However, it is challenging to determine which learning style is advantageous in Wushu education. The determination should be based on individual student differences and the specific content of the learning materials.

4.6.2.2 Learning Experiences

Learning experiences and metacognition are intricately intertwined. By accumulating a wealth of academic knowledge and practical experiences, individuals can better understand and reflect on their learning processes, enhancing learning outcomes and developing more efficient learning strategies (Ben-Eliyahu, 2019; Berger & Karabenick, 2016). This effect becomes even more pronounced in the context of Wushu's teaching.

According to the researcher's findings, the more extended the duration of Wushu practice and the more extensive the learning experiences, the deeper and more comprehensive the understanding of Wushu teaching. Additionally, individuals with more extended Wushu practice tend to exhibit more robust metacognitive knowledge, behaviours, and affective abilities in the domain of Wushu.

For instance, GWW, whicn has the most extended Wushu practice among the students, began specialised Wushu training in the fourth grade. He participated in various Wushu competitions and was primarily exposed to competitive Wushu until entering university. Pursuing a major in physical education in college, he started formal Wushu teaching. Despite perceiving a significant difference between competitive Wushu and Wushu teaching, he comprehends both aspects. GWW recognises that his current strength lies in Wushu techniques; however, his teaching abilities in Wushu are relatively weak. Consequently, he acknowledges the need to focus on cultivating his Wushu teaching skills in the future.

Similarly, SLP received professional track and field training at a sports school from a young age. Although not in Wushu, SLP believes that various sports techniques share similarities, enabling him to understand the purposes behind teaching methods employed by teachers. He is adept at smoothly transferring skills across different sports contexts.

Contrastingly, through a comparative analysis of interviews conducted with focus groups in the sophomore-level general Wushu course and in-depth interviews with Wushu specialised course students, researchers observed noticeably significant differences in metacognitive knowledge related to Wushu teaching methods, instructional content, and Wushu culture. Differences were also identified in metacognitive behaviours, including motivation, goals, learning strategies, self-monitoring abilities, self-evaluation, and self-reflection among students in the general Wushu teaching. The emotional experiences related to learning also exhibited pronounced disparities between the two groups.

In terms of metacognitive knowledge, in the general Wushu course, most students indeed more passion for it. Their focus tends to be on exam results and grades, leading to a one-sided and subjective approach to assessing Wushu's teaching and culture. Regarding metacognitive behaviours, a majority lack clear learning motivations and goals; their participation is driven by the need to earn credits. When asked about considering further specialisation in Wushu, many students nodded, indicating that they had not contemplated this issue. Regarding learning strategies, most only pay attention during class time and show little initiative in seeking solutions when facing difficulties. They seldom proactively approach teachers for assistance.

Regarding metacognitive monitoring, overall monitoring capabilities could be more substantial; attention during class is unfocused, and students lack diligence in practising movements, often using idle time to be lax. Regarding

self-evaluation and reflection, there is a tendency to overestimate their abilities. When encountering challenges, the first response is to complain about the teacher's methods and the monotony of instructional content. Students often fail to introspect and lack reflective abilities. Regarding metacognitive emotions, most complain about Wushu's practice being too strenuous, tiresome, and dreary, leading to a poor emotional experience. Their emotional regulation skills are lacking, resulting in occasional minor conflicts with teachers during class, demonstrating a lack of emphasis on etiquette in Wushu teaching.

4.6.2.3 Gender and Age

Prior quantitative research has discussed the relationships between factors such as gender, age, and grade, as MCL strategies and metacognitive abilities (Liverakos et al., 2018; Nasser, 2015). However, in qualitative research, there is no unequivocal answer regarding the specific relationships between other metacognitive factors and gender.

According to the researcher's observations, there were no evident differences between genders regarding metacognitive knowledge and behaviour. However, distinctions were identified in the domain of metacognitive emotions. The study revealed that male students tended to exhibit external physical performance in Wushu learning, while female students emphasised internal psychological experiences within metacognitive emotional encounters. Nevertheless, no significant differences were observed between genders in metacognitive emotional regulation.

Additionally, the research indicated substantial variations in MCL across different grades. With the progression of grades, there was a gradual enrichment of metacognitive knowledge, more rational metacognitive behaviour, and a fuller and more enriched emotional experience.

Additionally, the survey results indicate that the researcher's age is generally positively correlated with metacognitive knowledge and behaviour while showing no significant relationship with metacognitive emotions. These findings align well with the quantitative research results obtained from Rawahi and Martins's study, providing mutual corroboration (Martins et al., 2022; Nasser, 2015). They also align with Massey's conclusions. (Massey & Meyer, 2015).

4.6.2.4 Metacognitive Skills

Due to metacognition being a specialised field within psychology, there are numerous influencing factors. In Wushu teaching, the focus of teachers and students is primarily on the content of Wushu teaching and the learning of technical movements. Teachers and students may be limited in their understanding of the principles of MCL in this context. Consequently, integrating these concepts into the teaching process poses a challenge. Teacher XZL stated

> *'I admit that I don't have a deep understanding of metacognition. I've specifically looked into some materials and grasped the concept, but when it comes to implementing relevant teaching strategies in practical instruction, I haven't found precise methods. I'm unsure about how to proceed. Can you guide me?". Teacher ZYQ also expressed a similar viewpoint, stating, "I understand*

that metacognition is beneficial to students' learning, but I'm afraid that I might misunderstand it, which could have a counterproductive effect in practice"'.

To facilitate a smoother and more effective research process, the researchers provided interviewed students and teachers with materials and interview outlines related to metacognition before the formal interviews. The purpose was to familiarise teachers and students with the relevant content. However, the results indicated that most participants only had a conceptual understanding due to the specialised nature of metacognition and variations in individuals' comprehension abilities. They were aware of metacognition in a general sense but did not fully grasp its essence. Furthermore, they lacked a clear understanding of enhancing their metacognitive abilities in the specific context of teaching and learning.

In addition, extant research provides us with valuable insights into metacognitive teaching and learning strategies. However, because of the unique nature of sports science and physical education, there is limited research on metacognitive sports and physical education teaching. Even fewer studies specifically focus on Wushu teaching. Consequently, up to this point, applying and implementing metacognitive teaching strategies in Wushu teaching remains an important topic warranting further in-depth research.

Additionally, research has shown that metacognitive skills among students in sports-related disciplines are relatively low (Bailey, 2020; Gündoğdu & Celebi, 2017). Consequently, on an individual level, the lack of specific

metacognitive skills, such as clear and appropriate goal setting, adequate selection of learning strategies, self-monitoring of behaviour, and accuracy in self-assessment, can all impact the implementation of MCL. This finding aligns with the perspectives of previous scholars.

4.6.2.5 Technical Skills

Certain research findings regarding the relationship between motor skill proficiency and metacognitive abilities have been made. Studies suggest a positive correlation between motor skill proficiency and metacognitive skills, indicating that higher levels of motor skills are associated with more developed metacognitive abilities (Brick et al., 2015; Elferink-Gemser et al., 2018; Jonker et al., 2010). This is particularly evident in self-monitoring, self-regulation, goal setting and planning, and self-reflection.

Highly skilled athletes demonstrate a more pronounced ability monitor and evaluate their motor performance effectively. They exhibit greater flexibility in adapting to different sports contexts, possess the capacity to adjust strategies for improved execution, and excel in setting clear goals and planning. Moreover, they tend to engage in reflective practices, delving deeply into their training and competitive experiences.

The relationship between motor skill proficiency and metacognitive abilities is intricate and closely intertwined. Elevated motor skill proficiency may provide favourable conditions for honing and applying metacognitive skills. Conversely, improvements in metacognitive skills may positively influence

the further development of motor skills. This mutual influence contributes to enhancing overall performance levels in sports.

4.6.3 Teaching Factors

4.6.3.1 Learning Environment

The quality of the classroom ambience, equipment, resources, and relationships with peers and teachers can influence MCL (Li et al., 2023; Rocchi et al., 2022). To create a positive learning environment for students, the researcher observed that teacher XZL deliberately adorned the surroundings of the Wushu classroom. Different slogans were strategically placed on the walls, such as '*Practice in the heat of summer, practice in the cold of winter', 'Cultivate virtue before martial skills', 'The master leads you through the door, but personal growth is your responsibility',* and '*If your steps are not fast, your punches will be slow'.* A dedicated goal wall was also set up, allowing each student to display their academic goals for the semester. He installed mirrors around the classroom, allowing students to observe each of their movements. Teacher XZL explained, *'I aim to constantly remind them through these visual cues'.*

Figure 4.6 : Wushu Classroom Inspiration Wall

Furthermore, different students and various stages of learning have different requirements for the learning environment. For example, LZL mentioned,

> *'When I practice Wushu, I prefer practising alone. I don't like having someone next to me. It feels awkward even if they don't speak." On the other hand, student LCY expressed, "I enjoy practicing together with everyone. It creates a sense of momentum, and we can also keep an eye on each other, ensuring nobody slacks off".*

The Wushu teacher recommends that training together as a group is beneficial in the initial stages of practice, facilitating mutual learning. However, individual practice should take precedence once all the movements are memorised. Everyone has different skill levels, varying requirements for mastering the movements, and unique experiences.

Individuals need to comprehend and internalise the techniques on their own. Therefore, the choice of a learning environment depends on the individual student's learning habits and the stage of their learning journey.

4.6.3.2 Feedback Mechanisms

Quality feedback, both from instructors and peers, plays a crucial role. Constructive feedback helps students understand their strengths and weaknesses, fostering metacognitive awareness (Brick et al., 2020). In Wushu teaching, diverse feedback is vital in helping students promptly correct errors, preventing the fixation of incorrect movements, and enhancing learning efficiency. According to the author's research, most students strongly desire recognition and feedback from teachers and peers during their practice. They often start by practising in front of a mirror to evaluate the correctness of their movements. Subsequently, they may seek input from their peers before turning to the teacher for guidance (Potdevin et al., 2018). Student LZL stated,

> *'When I struggle with a movement, I initially try to figure it out independently. If I can't, I turn to my senior, MWT, and then we discuss it together." When asked why he chose MWT first, he explained, "Because my senior is approachable and easy to communicate with'.*
>
> *'When I feel my movements are incorrect, I prefer asking the teacher because I believe their guidance is more accurate than what others might say'. GWW added, 'Usually, teachers have limited time during class, and it's challenging to address every student's questions. Finding the teacher is difficult outside of class, so we first seek help from classmates and work together to find solutions. If that doesn't work, we turn to the internet, watch tutorials, and practice independently'. (XWB).*

In addition, teachers should promptly identify students' issues in the classroom, correct joint problems collectively, and address individual issues by providing constructive feedback and considering the students' self-esteem. The author observed that feedback-seeking depends on students' personalities, grade characteristics, and the teacher's style. Generally, extroverted students tend to actively seek various feedback mechanisms, while introverted ones may not initiate feedback-seeking, requiring teachers' increased attention.

Higher-grade students typically seek feedback from teachers more frequently than lower-grade students, and which is closely associated with their relationship with the teacher. Furthermore, the teacher's teaching style can also influence how students seek feedback. For instance, stringent teachers may hinder students from actively asking questions.

Finally, with the advent of the new media era, teachers must also need to change traditional teaching methods and actively incorporate advanced technological tools to help students receive more objective and accurate feedback. For example, using technologies such as micro-teaching and video analysis tools can assist students in reviewing and analysing their performance, gaining insights into their techniques and areas that require improvement. This is more objective than verbal feedback from teachers and tends to be more readily accepted by students.

4.6.4 Social Factors

4.6.4.1 Cultural Considerations

Despite Wushu's promotion in schools worldwide, the international dissemination of Wushu culture still faces certain constraints compared with Western competitive sports. The global recognition of Chinese Wushu continues to encounter challenges. Teacher XZL stated that

> *'Implementing MCL in physical education can promote global recognition of Wushu. However, several cultural challenges must be addressed. First, excessive media coverage has exaggerated the practicality of Chinese Wushu, leading to misunderstandings about its true nature. Second, there are cultural biases against Wushu, with some views considering it to have violent tendencies, which could mislead young people and negatively affect their physical and mental health. Third, there are concerns within China about the international promotion of Wushu, as it is considered a cultural heritage that should not be excessively spread globally. People worry that Wushu might lose its true cultural essence and be easily influenced by external cultures. These internal and external cultural factors pose significant challenges to implementing MCL in Wushu teaching'.*

Therefore, Wushu teachers should utilise the cultural influences of Wushu history and philosophy to enrich teaching and create worthwhile learning experiences. They should provide positive, empowering, and diverse Wushu cultural values while being mindful of cultural differences, avoiding assumptions or judgements based on stereotypes, and creating an inclusive and supportive environment for Wushu learning.

4.6.4.2 Ethical Considerations

Ethical considerations are also crucial in implementing MCL in Wushu teaching. Because implementing metacognitive teaching strategies primarily targets a living group – the students, its content involves aspects of students' psychological and emotional well-being. Therefore, in teaching, teachers should fully respect students' individual preferences and account for the ethical factors related to students' psychological and emotional aspects. Teacher ZYQ said that

> *'Wushu and MCL require certain prerequisites, and since each student has a different educational background, cognitive level, and individual differences, Wushu teachers should strive to create an ethical learning environment that provides equal, fair, and equitable opportunities for all students to learn and give feedback, and to set a positive example for the learner so that they can ensure that the metacognitive activity promotes a positive sense of well-being and personal growth while minimising the occurrence of negative consequences'.*

According to the researcher's observations, when teachers teach the same content and technical movements in Wushu learning, each student learns at a different pace and performs differently. Additionally, the more complex and challenging the coefficient of technical movements, the more they require certain natural conditions. Suppose teachers do not teach students according to the latter's aptitude. In that case, they may hurt the self-esteem and self-confidence of some students with poor learning foundations, thus making them lose the courage and motivation to continue learning. This is also an ethical consideration that deserves attention.

In conclusion, the challenges faced in implementing MCL in Wushu teaching arise from multitudinous factors, including students, teachers, teaching resources, and social aspects. To address these challenges, it is crucial to shift traditional teaching paradigms, empowering students as active participants in their learning. A meticulous approach to metacognitive strategies should be adopted, fostering a supportive learning environment and diverse feedback mechanisms to enrich and expand students' metacognitive knowledge, behaviours, and emotions. This approach aims to help overcome the obstacles encountered in implementing MCL in Wushu teaching.

4.6.5 Summary of Research Findings

The research findings presented in this chapter are based on data collected from focus group interviews conducted in the Physical Education Department at Yuncheng University, Shanxi, China, and individual in-depth interviews conducted during specialised courses. Qualitative content and themes analysis was employed to analyse the data for this study. The researcher has elaborated on the implications of emerging themes under three research questions in this chapter. The researcher has provided thorough evidence, incorporating images and audio-visual materials from the data collection process, and engaged in dialogue with prior studies to form an evidential chain. This will aid readers in better understanding MCL perspectives among students in Wushu teaching. The emerging theme under the second research question serves as the focal point of this study. Building upon the analysis and interpretation of themes under this question, a theoretical model

of three stages and eight dimensions of MCL perspectives was summarised, thereby expanding the boundaries of metacognitive theory.

4.7 Discussion

4.7.1 What Do Students Understand of Metacognitive Learning in Wushu Learning

Regarding the theme of advanced cognition, the findings revealed that these themes collectively provide a detailed exploration of participants' understanding of MCL in Wushu learning. Most students perceive metacognition as an advanced cognitive skill in Wushu learning, believing it requires continuous training. However, some students, especially those in lower grades, do not understand metacognition. According to the interviews conducted with sophomore focus groups by researchers, 50% of the student's expressed uncertainty about metacognition and were less aware of MCL in Wushu instruction. Although they applied it in practice, they may not fully understand it.

This finding supports the Sugiyama's results which found that metacognition can monitor and control the motor learning process, influencing the speed and effectiveness of motor skill acquisition (Sugiyama et al., 2023; Demirdogen et al., 2022). American psychologist John Flavell (1976) proposed that metacognition refers to the awareness of one's cognitive processes, or in other words, the ability to monitor and regulate cognitive activities. In general, the development of metacognition is a complex process involving various factors, a point substantiated by numerous scholars (Ben-

Eliyahu, 2019; Dinsmore et al., 2008). While genetic factors may play a role in metacognition during the learning process of Wushu, environmental factors, family background, educational context, and other external elements may also influence the cultivation of metacognition (Li et al., 2023; Liang, 2011; Wang, 2006; Yang, 2008). The findings showed that MCL, motivation, and self-reflection are highly correlated. Previous research findings can also corroborate this point. Many scholars have expressed that metacognition highly correlates with learning motivation (Benítez & Martínez, 2020; self-regulated learning (Arroyo González et al., 2020; Borkowski et al., 2000; Chatzipanteli et al., 2015), and self-reflection (Elhamifar et al., 2019; Güner & Erbay, 2021; Kent et al., 2022; Lakes et al., 2013; Potdevin et al., 2018; Tachie, 2019).

Regarding the theme of metacognitive skills, Scholars such as Flavell (1976), Brown (1987), Schraw and Moshman (1995), Pintrich and De Groot (1990), and Zimmerman (2000), who have made significant contributions in the field of metacognition, consistently emphasise that self-regulation and self-monitoring are two crucial factors in the MCL process. Milligan stated that self-regulation refers to managing and controlling one's thoughts, emotions, behaviours, and responses to different situations. Monitoring refers to the ongoing observation and assessment of one's performance or progress towards a goal. It includes keeping track of behaviours, evaluating outcomes, and being aware of changes in circumstances that may require adjustments in Wushu learning (Milligan et al., 2015; Pintrich, 2000). Scholarly perspectives of González and Karagiannidis also confirm the validity of the

observation above (Arroyo et al., 2020; Karagiannidis et al., 2015). This further substantiates the viewpoint of scholar Borkowski, emphasising that executive functions are also a crucial aspect of metacognitive abilities (Borkowski et al., 2000).

In the existing literature, emerging metacognitive skills in Wushu teaching studies include executive functions (Coppola et al., 2024; Lakes et al., 2013; Zhang et al., 2022), attentional self-regulation (Ng-Knight et al., 2022), attentional control (Milligan et al., 2019), behavioural self-regulation (Naknechnyi, 2017), metacognitive strategies (Rawahi, 2015; Bailey, 2003; Kong & Lin, 2011), self-esteem inventory (Lakes & Hoyt, 2004), self-regulation (Akehurst et al., 2020; Sandford et al., 2021; Panadero & Alonso, 2014; 2019), metacognitive monitoring (Chen, 2018), cognitive self-regulation (Allal, 2020; Lakes & Hoyt, 2004), self-regulation challenges highlighting the positive effects of various forms of Wushu (Milligan et al., 2015), and self-regulation strategies (Massey & Meyer, 2015). These studies training on metacognitive abilities, self-regulation, executive function, attentional control, and emotional well-being include different populations.

All the metacognitive skills mentioned in the literature are primarily concentrated within this study's secondary dimensions of metacognitive behaviour. However, this study did not observe specific metacognitive skills, such as metacognitive attention. Additionally, some emerging themes identified in this study, such as understanding Wushu, had not been documented in other literature. These discrepancies raise intriguing research

questions worthy of attention. Similar evidence can be found in other literature on emerging secondary dimensions such as metacognitive awareness (Gündoğdu & Celebi, 2017; Tuononen et al., 2023), metacognitive experiences (Adekalu, 2018; Jackman et al., 2021; Sandford et al., 2021), and emotions (Davis et al., 2010). These discrepancies could be ascribable to the specific nature of the Wushu activities examined in this study, which may elicit unique cognitive and emotional responses compared with other types of Wushu or interventions. It suggests further investigation into how different Wushu practices influence metacognition and its related aspects.

Regarding the ownership of learning, prior research has identified three sub-themes: learning attitude (Li Xinyang, 2021; Schraw, 2002), learning motivation (Chatzipanteli et al., 2015), and learning strategy (Duivenvoorden et al., 2021). However, the concept of 'ownership of learning' was not explicitly mentioned by any author in those studies, representing a new perspective in this research. The researcher believes that all previously identified sub-themes are manifestations of students' learning autonomy in the MCL process. Therefore, integrating all sub-themes into one offers a more comprehensive understanding. In addition, the study's result demonstrated that the more active students were in learning, the more outstanding their academic performance was. This aligns with the viewpoints of many scholars, confirming a significant correlation between metacognition and academic performance (Álvarez-Bueno et al., 2016; Olsen et al., 2022).

Overall, some of the themes that have emerged in this study in response to this question have been confirmed in other literature. In contrast, others have emerged novelly, which may be attributed to the universality of MCL and the specificity of Wushu learning.

4.7.2 What Are the Component Dimensions of Metacognitive Learning in Wushu Learning

The study's emerging themes related to this question include three main themes and eight sub-themes. This conclusion corroborates scholars' viewpoints in the literature and presents new findings in categorising specific themes. Although the theme names in this study differ slightly from those used by the scholars above, the core concepts remain fundamentally consistent, with only the perspectives of expression varying.

Scholars also offer different perspectives on the structure and classification of metacognition. Flavell suggests metacognition consists of metacognitive knowledge and experience (Flavell, 1979). Afterwards, he clarified that metacognition comprises three primary components: metacognitive knowledge, regulation, and experiences (Flavell, 1987). This is broadly consistent with the findings of this study. Researchers Annemic Desoete (1995) proposed a framework with three components: metacognition, meta-judgment, and self-regulation. Chinese researcher Dong Qi included metacognitive knowledge, experience, and monitoring in the structure of metacognition (Dong, 1989).

First, under the theme of metacognitive knowledge, this study identified two new sub-themes: metacognitive awareness and understanding of Wushu. Schraw argued that metacognitive knowledge encompasses declarative, procedural, and conditional knowledge (Schraw, 2002). Stephanou and Karamountzos (2020) asserted that metacognitive knowledge encompasses information and understanding individuals possess about their cognitive processes during learning. This includes awareness of their strengths and weaknesses in learning and problem-solving, and the ability to reflect on their own learning experiences and make judge their cognitive abilities skills and strategies (Stephanou & Karamountzos, 2020). Metacognitive awareness refers to understanding and awareness of one's cognitive processes, including monitoring, controlling, and regulating one's thinking and learning (Li, 2021; Schraw, 2002). These results have been confirmed in this study.

The viewpoints under this theme 'understanding of Wushu', differ notably from some of those presented in the literature. Currently, there are varying opinions internationally regarding Wushu. Most scholars believe that Wushu affects adolescents' the physical and socio-psychological development, especially in terms of social and behavioural aspects (Bell et al., 2016; Gerard Masdeu et al., 2022; Zhang et al., 2022). Some scholars argue that Wushu may provoke anger and aggressive behaviour in practising youths (David, et al., 2017; LI Yuan et al., 2018; Sofia & Cruz, 2017). A conducive educational environment may encourage students to develop a more comprehensive understanding and regulation of their cognitive processes.

Other scholars have also articulated similar viewpoints (Hartman, 2001; Sugiyama et al., 2023). In this study, the ‘understanding of Wushu’ theme suggests that researchers believe students' comprehension of Wushu encompasses technical skills and movements and understanding the cultural, philosophical, and ethical aspects behind it. This understanding directly influences students’ subsequent learning motivation, choice, and application of learning strategies, as well as their emotional experiences and regulation during the learning process. Therefore, it is necessary to integrate this dimension into the MCL model.

Second, metacognitive behaviours generally encompass the following four aspects: goal setting and planning, the selection and application of learning strategies, problem-solving, and self-monitoring, self-evaluation, and reflection (Potdevin et al., 2018). Flavell did not initially mention metacognitive behaviours in his proposed theory of metacognition. Chatzipanteli was the first to apply metacognitive behaviour in sports. He posited that metacognitive behaviour comprises five processes: engagement, formulation, implementation, evaluation, and internalisation (Chatzipanteli, 2015).

According to Zimmerman (2000), SRL consists of three key components: cognitive, metacognitive, and motivational. Pintrich presented a theoretical model of SRL, which includes four phases (forethought, monitoring, reaction, and reflection) and four domains (cognition, motivation, behaviour, and context). It should be noted, however, that these phases are not necessarily

sequential and can co-occur (Liu et al., 2019; Pintrich, 2004; Zimmerman, 1998). In addition, Sangster believes that self-evaluation is a crucial component of metacognitive strategies. Students can use metacognitive strategies to assess their progress and skill development in physical activity. This involves comparing current abilities with previous performances and identifying areas of growth (Sangster et al., 2014). Scholars Lloyd, Sangster, and Toering have also expressed similar viewpoints (Lloyd et al., 2006; Sangster et al., 2016; Toering et al., 2011). This study found that goal setting and planning, the selection and application of learning strategies, problem-solving, self-monitoring, and self-evaluation are metacognitive behaviours exhibited by students in the Wushu learning process. Despite their diverse nature and background, these behaviours generally align with the relevant principles of metacognitive theory and SRL.

Finally, this study identified themes related to metacognitive emotions, including two sub-themes: metacognitive emotional experiences and emotional regulation. Metacognitive emotions refer to an individual's subjective awareness, experiences, and feelings related to their cognitive processes during learning. It encompasses various aspects of the individual's internal states and perceptions, such as their awareness of their cognitive abilities, their experiences of effort, difficulty, correctness in completing a task, and their confidence level in their learning or performance (Goudas et al., 2017; Davis et al., 2010; Brick et al., 2020; Jackman et al., 2021). Metacognitive emotional regulation involves intentionally changing

thoughts or goals to alleviate the impact of negative emotions in response to challenges (Davis et al., 2010).

This study's predominant experiences while practising Wushu include confidence, excitement, calmness, passion, coolness, and masculine energy. This aligns well with the views of scholar Milligan, who believes that learning Wushu can improve students' emotional well-being and peer relations. It also enhances a child's persistence and willingness to persevere through challenges (Milligan et al., 2013). Additionally, the experiences vary depending on the specific Wushu discipline, and the experiences of male and female students differ. This perspective is entirely different from the concerns of some scholars who worry that Wushu may be a violent activity that could influence students towards violent, angry, and aggressive emotions and behaviours (Sofia & Cruz, 2017). In addition, according to the findings of this study, Wushu practice can alleviate negative emotions in practitioners, promoting positive social psychology among students. This aligns with the findings of scholars Bell (2016), in their research, as demonstrated earlier (Bell et al., 2016; Blomqvist Mickelsson, 2020; Davis, 2010).

4.7.3 What Are the Influencing Factors and Challenges of Metacognitive

4.7.3.1 Learning In Wushu Learning

Teachers, students, and teaching resources constitute the core elements of Wushu learning. However, implementing of metacognitive teaching approaches in Chinese has not been fully realised, and several challenges are encountered due to various factors (Arroyo González et al., 2020; Milligan et al., 2015). In response to this question, four main themes and eleven sub-themes emerged relevant to the research question.

Although the literature does not explicitly address the impact of teachers' teaching philosophies on MCL, educational theory suggests that applying teaching methods, strategies, and models directly reflects teachers' philosophies (Sugiyama et al., 2023; Reina et al., 2022; Zhu, 2000). In this study, many students reported that their teachers' teaching philosophies significantly influenced their learning processes. According to the literature, various factors influence metacognition, including individual cognitive levels, educational backgrounds, environmental factors, and sociocultural influences (Álvarez-Bueno, 2016; Malambo et al., 2022).

First, using different teaching methods, teaching models, and strategies by teachers can significantly impact students' MCL skills (Girard et al., 2023; Davoodi et al., 2022; Dong & Yu, 2022; Gao, 2019). The study findings validate Jonker and Laura's research conclusion: teaching strategies that incorporate reflection discernibly impact MCL outcomes. He asserted that

reflective teaching strategies can help enhance students' metacognitive skills (Jonker et al., 2010; 2011). Physical education research indicated that reflective teaching methods such as self-reporting and self-talk (Chatzipanteli, 2016; Kolovelonis et al., 2012), critical thinking approaches (Bakır & Eğmir, 2022; Elhamifar et al., 2019), think-aloud training (Birch, 2019, 2022), and the Teaching Games for Understanding (TGFU) instructional model can help enhance students' MCL skills (Stephanou, 2020). Some metacognitive skills were confirmed in this study.

Furthermore, this study found that factors such as the teaching environment (Chen et al., 2022; Kolovelonis et al., 2022), feedback mechanisms (Potdevin et al., 2018), social support (MacIntyre et al., 2014; Sakalidis et al., 2022), and cultural influences (Dai, 2016; Jin, et al., 2017) also markedly affect metacognition. Similar evidence can be found in other studies. This study and existing literature demonstrate that student-centred teaching environments and learning methods are more conducive to students' MCL.

In addition, this study revealed that in Wushu learning, students' MCL is also related to their learning styles, learning experiences, technical skill levels, metacognitive abilities, gender, and age. Similar evidence can be found in some other studies. Pashler suggested that people have different ways of learning that are influenced by various factors, including cognitive abilities, personality traits, and cultural backgrounds (Pashler et al., 2008; Zapalska & Brozik, 2006). In this study, the learning styles of Wushu learners are classified based on the VARK model, which categorises learners into four

main types: visual, auditory, reading/writing, and kinaesthetic learners. The findings indicated that different learning styles lead to varying metacognitive behaviours. The more extensive the Wushu learning experience, the better Wushu skills are and the stronger the metacognitive knowledge and skills are. Older age correlates with stronger MCL abilities. Gender does not significantly affect MCL knowledge or behaviours, but differences exist in metacognitive emotions. Similar evidence for these findings can also be found in other literature (Güner & Erbay, 2021; Malambo et al., 2022; Marques et al., 2017).

CHAPTER 5

SUMMARY, CONCLUSION, IMPLICATION, AND RECOMMENDATIONS FOR FUTURE STUDY

5.1 Introduction

This chapter is built on the foundations laid in the previous sections, further summarising the study's process and theoretical and practical implications. It offered feasible recommendations and actionable procedures from theoretical and practical perspectives. These suggestions aim to provide new directions for future research endeavours.

5.2 Summary

This study aimed to explore metacognitive learning (MCL) experiences in Wushu learning among physical education university students in China. The research is guided by three main questions: (1) What do the students understand of MCL in Wushu learning? (2) What are the component dimensions of MCL in Wushu learning? (3) What are MCL's influencing factors and challenges in Wushu learning?

This study employed a case study method within qualitative research to address the three research questions and achieve theoretical depth. Data were collected through focus groups, in-depth semi-structured individual interviews, direct observation, field notes, and document analysis. The interviews aimed to explore, discover, and understand the MCL experiences in learning from the perspectives, viewpoints, and performances of PE

students majoring in Wushu. The sample selection was based on purposive sampling and voluntary participation, involving PE students enrolled in Wushu courses at Yuncheng University in Shanxi, China. Following the principle of data saturation, the final sample comprised 10 students in the focus group, and 15 in-depth interviews. This sampling technique aligns with the requirements of case study research, allowing researchers to select specific samples to gain insights into the relevant research questions (Creswell, 2018; Yin, 2018).

Considering that different Wushu learning experiences might influence the research outcomes, semi-structured interviews were divided into focus group and in-depth individual interviews for different study subjects. The interviews were conducted in three phases: initial, middle, and final stages, tailored to various research questions. Each interview session lasted between 30 and 90 minutes. All interviews were audio-recorded, with research assistants transcribing them verbatim and verifying the transcripts. Detailed three-level data coding analysis was conducted using NVivo software and manual coding, followed by member checking. Several strategies were employed to enhance this study's credibility and rigour, including the case study quality assessment guidelines, COREQ qualitative research checklist, triangulation, member checks, peer review, researcher reflexivity, in-depth descriptions, and audit trails (Yin, 2018). Ethical considerations were strictly followed throughout the qualitative research process, ensuring informed consent from participants, anonymity requirements, data storage privacy, and other ethical standards (Creswell, 2018).

The emerging themes in the research findings have addressed all the research questions, and the first question aimed to understand students' perceptions and experiences of MCL in Wushu learning. The results showed that students' responses to this question offered new insights. These include MCL as an advanced cognitive approach, a metacognitive skill, and an ownership of learning. These emerging themes reflect students' genuine views and understanding of metacognition. They acknowledge that metacognitive elements are essential in Wushu's learning and can enhance and improve Wushu's learning abilities. This approach centres on student-driven learning. However, some students believed MCL required certain innate abilities and were concerned that their lack of metacognitive skills may hinder their Wushu learning. These findings offer researchers valuable information to understand MCL from the student's perspective.

The second question aimed to identify students' manifestations of MCL in Wushu learning, and to improve the MCL model. The responses to this question revealed three main themes: metacognitive knowledge, behaviour, and emotion. These themes align closely with the existing metacognitive model (Pintrich, 2000; Pintrich et al., 1993; Pang, 2002). Under each main theme, several sub-themes emerged, some of which had appeared in previous literature, while others were identified for the first time. The researchers integrated these into eight new sub-themes. These sub-themes provided rich insights into students' MCL knowledge, behaviours, and emotions in Wushu learning. This study enhanced and expanded the metacognition model by analysing these sub-themes, and developing a

three-stage, eight-dimension MCL model. The findings further confirmed that incorporating MCL elements in Wushu enhanced its learning elements, allowing more people to truly understand and experience Wushu learning, thereby increasing their desire to learn. This also offered practical references for applying MCL to other sports.

The third question explored the influencing factors and challenges influencing MCL in Wushu learning. Factors from four aspects, students, teaching, and society emerged as the main themes, under which 11 sub-themes were identified. These findings provide valuable references for researchers to implement MCL in practice. Participants also suggested several measures and recommendations to enhance MCL in Wushu. These include reforming teachers' educational philosophies, strategies, and methods, improving students' metacognitive skills, enhancing the learning environment, and emphasising Wushu's cultural and ethical values.

5.3 Conclusion

This study explored the MCL experiences in Wushu learning among PE university students in China. This section mainly presents the conclusions drawn based on the research questions.

The first conclusion of the study is that for Wushu, with its 3,000-year history, to join the century-old Olympics, it must enhance its international recognition and participation. This requires more effort in Wushu learning to address the current challenges. Currently, Wushu's learning emphasises a teacher-

centred approach, neglecting students' initiative. Consequently, students heavily rely on teachers' guidance, and need more independent learning abilities (Zhang et al., 2022). This study demonstrated many MCL elements of self-goal setting, self-monitoring, self-regulation, self-evaluation, and self-reflection in Wushu learning. So, introducing of MCL can help cultivate students' initiative and independence in Wushu learning, thereby addressing the first research objective and allowing students to develop a theoretical framework for understanding MCL.

The second conclusion of the study clarifies the boundaries and relationship between metacognition theory and self-regulated learning theory (Brick et al., 2020; MacIntyre et al., 2014). Despite some overlap, intersection, and confusion in using metacognition and SRL concepts, the understanding of their core concepts remains largely consistent. Extensive literature concludes that metacognition forms the foundation of SRL, and the latter is a high-level MCL skill. Based on these theories, the study introduced the concept of MCL and applied it to Wushu learning to explore students' MCL experiences in Wushu learning.

Then, the study explained how students majoring in PE understand MCL in their Wushu learning. Based on the research findings, most students indicated that MCL is crucial in Wushu learning. It can stimulate their intrinsic motivation and engage their active participation in learning. For instance, MCL can enhance their ability to reflect on their learning, allowing them to understand themselves and deepen their comprehension of Wushu

objectively and realistically. Second, certain metacognitive elements, such as metacognitive awareness, self-control, self-regulation, and executive functions are inherently present in Wushu learning. These metacognitive elements act as catalysts in Wushu learning. Lastly, some students needed help understanding MCL and its relationship with Wushu. They suggested that future teaching should incorporate and emphasise metacognition theory to deepen their understanding and help learners acquire more relevant knowledge.

Next, the study explored the MCL experiences of PE students in Wushu learning. Building on the metacognition theory model, the study further refined and improved the MCL model by analysing emerging themes. It updated a new three-stage, eight-dimensional model. The model represents a comprehensive framework for understanding MCL in Wushu learning, integrating previous research gaps with new insights from this study's results. It offers a structured approach to conceptualise and implement MCL strategies in Wushu learning, aiming to enhance students' MCL skills and optimise their overall learning experience.

Finally, the study identified the factors influencing MCL in Wushu learning and the challenges faced. Factors such as teachers' teaching philosophies and strategies, students' learning styles, learning experiences, metacognitive skills, the teaching environment, feedback mechanisms, and understanding of Wushu culture and ethics provide researchers with clear clues and ideas (Milligan et al., 2019). Most students recognised that certain metacognitive

elements were inherently present in Wushu learning. They suggested that greater emphasis should be placed on educating and promoting the importance of MCL. In Wushu learning, methods such as self-goal setting, self-reporting, self-assessment, and self-reflection should be more frequently employed to provide students with opportunities for independent learning and to enhance their metacognitive skills. Additionally, teachers should consider reform their teaching philosophies and traditional strategies, optimise the teaching environment, and guide students towards a correct understanding of Wushu culture.

In conclusion, this study explored the MCL experiences in Wushu learning among PE university students. It provided insights into students' understanding of MCL, the MCL knowledge, behaviours, and affective manifestations exhibited during Wushu learning, and the factors that influence MCL. Wushu involves many learning elements which are more reflected in SRL, which is a high level of learning in MCL. This suggests that Wushu has enough learning elements to be considered an Olympic sport like other martial arts. Furthermore, showing the learning aspect of Wushu will also make it more practical and recognisable by other countries outside China. Make Wushu easier to learn by making the learning content in different languages. With all the help, the dream of including Wushu in the Olympics will be achieved soon.

5.4 Implications

This study adopted a qualitative case study approach to explore MCL in the Wushu learning process. It provided rich information for extending metacognitive theory and reforming Wushu's teaching, laying a solid foundation for future research. This section presented the study's theoretical and practical implications in detail.

5.4.1 Implications for Theory

The academic community has well-established discussions on MCL and SRL concepts, structures, and models (Schraw & Moshman, 1995; Zimmerman, 2000; Brick et al., 2020; Schunk, 2008). However, misuse, mixed usage, and ambiguity exist regarding their application (Schunk, 2008; Sperling et al., 2004). This needs to be of a specific conceptualisation of MCL.

Theoretically, this study not only contributes but also extends metacognitive theory. The study clarifies that MCL serves as the foundation for self-regulated learning, which represents an advanced level of MCL, combines metacognitive theory with self-regulation theory, and proposes a conceptual and theoretical framework for MCL. This study defines the concept of MCL as the learning ability involving cognition, regulation, control, and reflection during the learning process. This conceptual and theoretical framework was proposed to innovate and expand Flavell's metacognitive theory and Pintrich's four-phase SRL model (Pintrich, 2004). It was then applied to the Wushu teaching, exploring physical education students' experiences of MCL

applying the theory to practice, and providing references for subsequent research.

The study builds upon Flavell's proposed first-level structure of metacognition by integrating it with the self-regulated learning model (Flavell, 1979; Pintrich, 2004). This fusion combines the four dimensions of the self-regulated learning model with the three structural frameworks of metacognitive theory, resulting in the development of an MCL model consisting of three stages: MCL knowledge, behaviour, and emotions and eight dimensions: metacognitive awareness, understanding of Wushu, the setting goals and planning, selecting and applicating of learning strategies, problem-solving and self-monitoring, self-evaluation, and reflection. This MCL model is proposed to offer a theoretical basis for application in other disciplines. The eight dimensions of the metacognitive model gave us an in-depth understanding of physical education students' MCL performance and experience in learning Wushu and inspired more people to learn it.

The findings from the first question of this study provide a great deal of insight into understanding students' perceptions of MCL theory. Metacognition is a technical term in psychology that needs to be more abstract and better understood (Schraw et al., 1995; Schunk, 2008; MacIntyre, 2014). Some scholars even believe that metacognition is an innate factor that cannot be acquired through training in the short term (Liu, 2016). This study provides valuable clues to understanding metacognition from the students' perspective, allowing students and educators to recognise

the importance of metacognition in learning and the theoretical mechanisms of how it can facilitate learning. Furthermore, this study extends the boundaries of applying metacognitive theory in Wushu learning and provides a new theoretical perspective for the reform and innovation of Wushu teaching. This study also expands our understanding of the contributions of MCL in Wushu learning.

MCL skills are a complex cognitive process. There are currently two contrasting views within the academic community regarding metacognitive intervention in learning. One perspective asserts that metacognition is highly beneficial for teachers in enhancing teaching effectiveness and for students in improving learning efficiency (Brick et al., 2020; Sugiyama et al., 2023). Metacognitive strategies can be implemented and introduced early in the educational process through specific intervention measures. On the other hand, an opposing viewpoint argues that due to the inherent complexity of metacognition, the multitude of influencing factors, and the difficulty in implementation, it may not yield significant results in short-term teaching practices (Idawati et al., 2020; Lyon et al., 2013).

Findings from this study concerning the factors influencing MCL provide a theoretical basis for teachers, educational administrators, and students to apply the MCL model in depth. Teachers' teaching concepts, strategies and methods, and feedback mechanisms provide concrete methods for teachers to operate. Influential factors such as students' learning styles, learning

experiences, and gender can help students better understand the problems in Wushu learning and how to improve their metacognitive skills.

Quantitative research methods, such as data analysis, factor analysis, and experimental research, tend to pursue homogeneity. However, these methods and the resulting data and factors must fully capture the complexity of the ontology of life. While they can provide statistical significance, they may need to reflect the true essence of human movement (Chen, 2022; Smith, 2016; 2018). Consequently, there is a divergence between research outcomes and the actual nature of human sports behaviour. From an academic standpoint, contemporary sports and physical education research struggle to break free from the biological stereotype that views the human body as the sole object of sports investigation (Zhong, 2022). This misalignment of the research focus consistently directs attention towards 'the human body' rather than 'human movement behaviour'.

Consequently, this academic barrier leads to research outcomes that deviate from the corresponding relationship with human movement behaviour (Su, 2020; Tracy, 2010). The structured approach and textual representation of naturalism-based sports research increasingly showcase its normative and scientific aspects. However, these methods encounter difficulties in capturing and comprehending the complexity, fluidity, and self-consistency inherent in human sports behaviour within the constraints of methodological frameworks (Wang, 2022).

Therefore, to overcome the limitations of a narrow focus on biological aspects in sports research, it is crucial to return to human beings' essence, acknowledge individuals' ontology, and prioritise real-life experiences in sports. Existing literature integrating metacognition or SRL into Wushu teaching using qualitative research design provided valuable resources for this study (Akehurst et al., 2020; Sandford et al., 2021; Massey et al., 2013; Massey & Meyer, 2015; Milligan Massey et al., 2013; Yaroslav Galan, 2017). However, these studies primarily focus on helping students master Wushu techniques and enhance their skills. Although some research also considers other physical performances, more attention should be paid to cultivating students' internal cognition and learning abilities.

The study used case study findings from qualitative research to provide a new research design perspective for exploring MCL processes. Most previous studies have used quantitative research designs to measure MCL outcomes such as motor skill performance, motor technique, and academic effectiveness in PE. This study examined learning competencies in the learning process. This new research perspective provides detailed clues for an in-depth analysis of the MCL process and fills the gaps in research design and research populations in the literature.

Future research should incorporate a more comprehensive methodological approach, including qualitative, quantitative, and mixed-methods studies, to further validate and expand upon the current findings. Such diversified research approaches would contribute to establishing a more robust

evidence base for metacognitive learning strategies, potentially leading to more informed pedagogical practices and policy decisions in Wushu teaching.

5.4.2 Implications for Practice

The results of this study help from the macro level of top-level design to the micro level of individual learning. This section will discuss the practical implications of the research questions for policymakers, academics, university administrators, teachers, coaches, and general Wushu learners.

Physical education and Wushu teachers should emphasise cultivating of students' MCL ability in learning (Li & Xu, 2007), such as critical thinking skills (Uzuntiryaki-Kondakci, 2013; Elhamifar et al., 2019; Worley & Worley, 2019), problem-solving skills (Breed and Bailey, 2018; Tachie, 2019; Idawati et al.,2020; Kumar et al., 2022), learning strategies (Nasser, 2015), decision-making (Godbout & Gréhaigne, 2020, 2022), skill execution (Kent et al., 2022), metacognitive awareness (Gündoğdu and Celebi, 2017; Sudirtha, et al., 2022), metacognitive monitoring (Huff & Nietfeld, 2009), meta-attention (Oliver et al., 2020), metacognitive feelings (Goudas et al., 2017), and self-regulating skills (Lakes and Hoyt, 2004; Kolovelonis et al., 2012; Goudas et al., 2017), metacognitive judgements (Palmer et al., 2019), metacognitive behaviour (Li et al., 2023; Chatzipanteli et al., 2015b; Lidor, 2004), emotional regulation (Rogowska & Tataruch, 2024; Trigueros et al., 2019), and metacognitive knowledge (Elhamifar et al., 2019; Worley, 2019; Stephanou & Karamountzos, 2020).

Existing literature suggests that specific intervention measures can enhance metacognitive skills. Reflective and productive teaching methods significantly enhance metacognitive skills, while the effectiveness of specific cognition-related game-based training courses or programmes is particularly evident (Akpur, 2020; Zhao et al., 2022; Fedorets et al., 2022; Zhu & Li, 2022). Many studies demonstrate that in the field of physical education and physical activity, direct or indirect interventions related to metacognition, such as physical education teaching models (Chatzipanteli et al., 2016b; Stephanou & Karamountzos, 2020b; Dignath & Veenman, 2021), teaching methods and teaching styles (Chatzipanteli et al., 2015b; Papaioannou et al., 2012) exerted discernible effects on students' metacognitive skills. Other methods include pressure training, cognitive-behavioural training, reflective practice (Kent et al., 2022; Kolovelonis et al., 2022; Kolovelonis & Goudas, 2023), self-talk and mental imagery practices (Trabelsi et al., 2022), think aloud training (Brith, 2019; 2021; Stephenson et al., 2020; Whitehead & Jackman, 2021), social feedback and process goals (Kolovelonis et al., 2012; Goudas et al., 2017), as well as other single or comprehensive training methods that incorporate metacognitive features (Cleary et al., 2006; Jiang, 2019; Yasuo, 2021). Especially in the case of certain cognition-related games, and training courses, the effectiveness of methods is more pronounced.

Pertinent literature has demonstrated that during the learning process, factors that influence metacognition include external and internal factors. External factors encompass social interaction, such as environmental regulation, social support, and structured amnesty (Sangster et al., 2016;

Jackman et al., 2021; Butler & Winne, 1995; Carter et al., 2016; Massey et al., 2013), and educational resources (Toering et al., 2011). These factors provide the framework and conditions for learning, impacting individuals' learning experiences and opportunities. Internal factors consist of psychological factors such as metacognitive awareness (Monem, 2015; Davis et al., 2010; Gündoğdu & Celebi, 2017; Tuononen et al., 2023), metacognitive knowledge (Kermarrec et al., 2004; Lloyd et al., 2006), goal setting and planning, learning strategies, self-monitoring (Lindsay, 2015; Sangster et al., 2016; Jackman et al., 2021), self-efficacy (Massey et al., 2013), and emotion regulation (Massey & Meyer, 2015; Wolff & Stapp, 2019;). These factors involve individuals' cognitive and emotional states and play a crucial role in applying and developing metacognitive skills.

The elements of MCL skills demonstrated in the study findings include self-setting goals, self-monitoring, self-reporting, self-regulation, self-talk, self-assessment, and the need for diverse learning resources such as teachers, peers, and online videos. These strategies provide a new learning approach for general and new Wushu learners. These elements may help Wushu enthusiasts and new learners acquire specific learning methods and techniques that may change their cognitive biases towards Wushu learning. In addition, the positive emotional experiences of bravery, excitement, strength, positivity, and masculinity of men, and the softness, gentleness, quietness, and serenity of women are embodied in the process of Wushu learning. These multidimensional affective experiences may serve as a significant motivational catalyst, potentially enhancing public engagement

with Wushu through increased comprehension, active participation, dedicated practice, and sustained interest. Importantly, this process contributes to the normalization of Wushu within the global Wushu paradigm, positioning it as an accessible discipline comparable to established practices such as taekwondo and karate.

This study provides valuable information, theoretical insights, and evidence for Wushu teachers, coaches, and trainers. However, given the inherent complexity of metacognitive learning, it is imperative to establish comprehensive policy support for its promotion and dissemination within educational frameworks. This necessitates the development of targeted professional development programs to enhance teachers' metacognitive knowledge and pedagogical competencies, thereby facilitating more effective implementation in educational practice. Such systemic support should encompass curriculum development, resource allocation, and ongoing teacher training initiatives to ensure the successful integration of metacognitive strategies across diverse learning environments.

Teachers in Wushu should implement the MCL process by first reforming the traditional teaching philosophy, overcoming the ‘teacher-centred’ concept, and then focusing on cultivating students' MCL abilities, such as critical thinking, problem-solving, decision-making and skill execution, metacognitive attention, metacognitive awareness, self-regulation, and metacognitive judgment by applying various direct and indirect reflective and productive instructional models, teaching strategies, pedagogical methods, and

cognitive-behavioural training approaches to improve students' metacognitive skills.

This study results for the influencing factors mainly derived from internal and external factors. External factors include educational philosophy, teaching methods and strategies, learning environment, teaching feedback mechanisms, gender and age, metacognitive skills, and technical skills. Internal factors mainly stem from students' learning styles and experiences. The study provides theoretical guidance for university education administrators. It supports them in further developing and formulating policy guidelines and policies for reforming university Wushu teaching, improving and enhancing the university Wushu learning environment and students' learning abilities. It also references to the reform of Wushu teaching in other countries' schools.

5.4.3 Implications for International Recognition and Participation of Wushu

Through the academic practice of this study, expressed in the form of text, overcoming the language barrier of Wushu learning, and restoring the personal experience and feelings of Wushu learners, it can let more people understand the essence and benefits of Wushu learning, overcome the psychological fear, eliminate the prejudice of people's cognition of Wushu, which can have a contributing effect on Wushu to go out of the China door to the world and to expand the international influence and cognition of Wushu.

In the long run, it can also contribute to the early inclusion of Wushu in the Olympic Games by increasing its global recognition and participation.

5.4.4 Implications for People's Learning Ability

Learning ability refers to acquiring, understanding, processing, and applying knowledge and skills. This includes a range of cognitive and non-cognitive skills that help individuals learn and adapt effectively in various contexts (Efklides, 2019; Jassim et al., 2022). Metacognition is a vital learning ability, and through the academic findings of this study, unfamiliar and abstract metacognitive concepts can be transformed into familiar and tangible behaviours, and performances so that people can understand the importance and actionability of metacognition. They can be reminded to pay attention to the development of their MCL ability in the future in their study, life, and work. In addition, this study also provides MCL factors such as self-awareness, self-control, self-regulation, and self-evaluation through Wushu learning, which also offers new learning strategies to enhance and improve metacognitive abilities through sports.

5.5 Recommendation for Future Study

Although this study explored MCL experiences in Wushu learning, the following issues still need to be explored. Subsequent research requires scholars to investigate these issues and explore them in depth.

1. Based on metacognition theory and SRL theory, this study proposed the concept of MCL and constructed an MCL model with three stages and eight dimensions. However, the depth of exploration may

be limited due to the many dimensions of MCL. Subsequent studies may focus on exploring a particular dimension to deepen understanding, such as different types of metacognitive knowledge, behaviours, and emotions in sports.

2. In this study, the Wushu types mainly involve Wushu routines. Due to the diversity of Wushu styles, different kinds may produce different research results. Therefore, future research could investigate different PE disciplines and various Wushu practices or conduct comparative studies between different Wushu disciplines, and other sports disciplines.

3. This study explored the MCL experiences among PE students in Wushu learning. Previous research has primarily focused on elementary and secondary school students. Since MCL is a crucial skill, scholars recommend early intervention. Therefore, future research should investigate comparative studies on MCL across populations at different educational stages, ages, and genders in other sports disciplines.

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Appendix C

Audit Trail

No	Phase /Item	Activities	Rationale/ Remarks
1	Getting started	1.1 The researcher has been engaged in physical education teaching at universities for nearly 16 years, while simultaneously dedicating efforts to the scientific research of Chinese traditional sports culture. Through long-term teaching and scientific research in Wushu, the researcher has identified the following issues in Wushu teaching: Firstly, there is excessive emphasis on mastering physical techniques, while neglecting the development of students' social and psychological aspects, leading to certain biases in students' perceptions of Wushu. Secondly, Wushu teaching consistently revolves around the teacher, failing to fully empower the students' subjective position. Therefore, how to change the current situation has become a focal point of interest for the researcher.	Research Origin
		1.2 Drawing from discussions with Chinese sports educationists and sports psychologists, the study sought to address these issues by awakening students' subjectivity through a metacognitive lens.	Theoretical Starting Point
		1.3 The chosen method for this study was derived from both educational research and cognitive psychology. Recognizing that previous research primarily focused on learning outcomes with less attention to the learning process itself, the study aimed to gain a deeper understanding of students' experiential learning processes. To achieve this, a qualitative research design was adopted to comprehensively explore instructional practices and psychological dynamics within Wushu classrooms. This approach allowed for an in-depth investigation into the lived experiences of students, shedding light on the intricacies of learning journey within the Wushu context.	Method Selection
		1.4 In order to delve deeply into the theoretical framework of metacognitive learning, after discussions with the supervisory committee regarding the methodology of this research project, it was ultimately decided to employ a case study approach within the qualitative research design. This decision was made to facilitate a thorough examination of metacognitive processes within the context of Wushu teaching. By focusing on	Research Design

		specific cases, this methodology allows for a detailed exploration of the interplay between learning strategies, learning experiences, and instructional practices, offering rich insights into the complexities of metacognitive learning in Wushu settings.	
		1.5 In consideration of feasibility, convenience, and representativeness, the process of sample selection was meticulously deliberated and diversified. Participants comprised students and instructors from various Wushu disciplines at Yuncheng University in Shanxi Province, China. Rigorous selection criteria were established to facilitate a nuanced understanding of the current issues at hand. This ensured that the chosen sample effectively represented the diverse perspectives and experiences within the Wushu teaching context, thereby enriching the depth of analysis and insights gleaned from the study.	Sample Selection
2	Literature Structure	Through systematic literature review and meta-analysis of relevant studies employing qualitative and quantitative research designs in metacognition and physical education, this study once again identified research gaps in terms of participant demographics, research methodologies, types of sports, and research themes. This reaffirmed the theoretical foundation for the in-depth exploration of this study and aided in determining its focus and methodology. By addressing these gaps, this research endeavors to contribute to the advancement of the field by filling existing research voids and fostering further development.	The systematic literature review and meta-analysis were conducted to identify research gaps.
3	Pilot Study	Researchers conducted a two-week pilot study from August 7th to August 18th, 2023, using online interviews. Five Wushu students from the Sports Department of Yuncheng College volunteered as participants, including two females and three males. Through a pilot study, further revisions were made to the interview protocol, including the addition and modification of secondary sub-questions under each primary interview question ensuring thorough preparation for subsequent actual interviews.	Refined and improved the interview guide
4	Primary Interview Guide (Actual Study)	Building upon the pilot study, a three-month actual study was conducted employing a semi-structured interview approach for each research question. Sufficient interview data was collected, laying the groundwork for thorough subsequent data analysis.	Discussed interview times, locations, and durations with the supervisory committee
		4.1 Collection Preparation. Received ethical approval from UPM and approval from the Academic Committee of Yuncheng University and approval of the Department of Physical Education. In addition, considering the specialized and somewhat complex	Appendix A Appendix B

		nature of metacognition, the researcher conducted specialized theoretical training for students during the first week of classes to ensure comprehension	
		4.2. Based on voluntary participation, the researcher has selected a proactive master's student from my cohort to assist with data collection.	Gaining and selecting the assistant
		4.3 Entering the Field-Data Generation. Conducting in-class observations three times a week and maintaining detailed field notes. During the observation process, the researcher sought potential interview subjects. After one month, the researcher had essentially identified all potential candidates for in-depth interviews. At the end of each month, hosting 30-60 minutes focus group interviews after class, with meticulous recording of audio and field notes. Coordinating specific times and locations for in-depth interviews with participants. Immediately summarizing field notes on the same day, transcribing interview recordings, and conducting initial checks to ensure data accuracy and timeliness.	In-class observations field notes Appendix (H) audio recording; transcribing recordings; initial checks Appendix (F)
		4.4 Refining Interview Guide Questions were modified and interview guide was refined. As the interviews progress, promptly correct and supplement any existing interview questions as needed after interview 5 students.	Crafted Refined Interview Guide Questions
		4.5 Main Data Collection. Respecting the interviewees' preferences, the researcher arranged interview times and locations in advance with the candidates for in-depth interviews. To create a comfortable environment for the students, the researcher typically chose locations such as the Wushu gym where they usually practice or during casual walks together. To ensure the accuracy and authenticity of the data, the interview recordings of each in-depth interviewee were transcribed on the same day. An assistant was invited to transcribed on the same day, followed by a second check by the researcher.	Arranged interview times and locations; Data was collected and generated; Transcribed on the same day; Two rounds of review of the transcribed text.
		4.6 After three rounds of data collection, when no new hints or clues emerged for each question at each stage, it indicated data saturation. The focus group retained its size, while three in-depth interviewees were excluded. Ultimately, there were 13 students and 2 teachers, totaling 15 participants for the in-depth interviews.	Data saturation
5	Data Analysis	The data analysis strictly adhered to the five-step process of qualitative research: data	

		familiarization, primary coding, theme development, theme revision and description, and interpretation. This systematic approach facilitated a thorough comprehension of the pertinent themes concerning students' metacognitive learning perspectives in Wushu teaching.	
		5.1 After the initial review of all data transformations and facilitators, researchers thoroughly examine the data, reading through it twice to become familiar with its content. They highlight in red certain content, concepts, and ideas highly relevant to the topic, and make notes in annotation form to capture initial impressions and insights.	Data familiarization
		5.2 Building upon the prior familiarization with content and highlighting of key points, researchers utilize an inductive reasoning approach to categorize, archive, and assign codes, or labels to all data according to different 3 research questions. Subsequently, the data is inputted into NVivo software based on these classifications, and with the assistance of the software, the initial level data extraction for each subgroup is completed. This involves the initial stage of coding, where the data is broken down into primary codes or categories based on the content.	Data primary coding
		5.3 Based on the initial data extraction results from NVivo software for four different questions, codes extracted more than 5 times within each question are organized and grouped to form the primary-level coding. Subsequently, to further refine the coding by grouping similar primary codes into broader themes or categories through detailed reading and review, similarities and differences between codes are identified, and they are clustered into meaningful themes reflecting potential patterns in the data. The overall significance of the data is analyzed to determine the secondary-level thematic coding for each group. Then, through further detailed reading of the underlying patterns within each theme, summaries are made, and they are condensed into tertiary-level coding.	Theme development
		5.4 The process involves researchers conducting a thorough review of each tertiary-level coding procedure within each dataset. They refine, clarify, and establish preliminary themes for the entire dataset, making adjustments and modifications as necessary to ensure that the themes accurately represent the data's meaning. Additionally, two peer reviewers were invited to review the entire iterative process. In cases of disagreement, collective discussions are held until consensus is reached.	Theme revision
		5.5 Based on the emergence of new themes under each question, researchers	Description and

		integrated existing literature and previous research findings to engage in dialogue with prior studies and current literature. We provided detailed descriptions and explanations of the identified themes, drawing upon the evidence collected from the data collection process, including images and visual materials, and offering insightful interpretations of the significance of the themes. This process forms an interwoven chain of evidence, establishing potential analytical themes.	interpretation
6	Ensuring Rigor and Trustworthiness	The researcher herself has dedicated 16 years to physical education teaching and research in Wushu teaching, possessing extensive experience in both physical education instruction and qualitative research. Additionally, two peer reviewers, one Wushu professor and one associate professor specializing in sports psychology, were invited to oversee and review the entire data analysis process, ensuring the rigor and accuracy of the data analysis.	Quality Data Generation
		6.1 Researcher experiences; triangulation: different data sources; using member checking and peer examination; direct participation and observation.	Validity
		6.2 For each phase, a detailed interview outline, timetable, and activity table were developed. Observation time, frequency, notes, and recordings were meticulously recorded. Four experts were invited to revise the interview protocol. During the data collection process, one assistant was invited to assist, while Professor Duan Limei and Associate Professor Wang Jianzhou were invited to review the data analysis process. Following the conclusion of data analysis, Dr. Zainab Hubby Seyedali was invited to conduct a final review.	Reliability
		6.3 This study implemented informed consent, privacy, data ownership three measures to ensure the reasonableness and legitimacy of ethical issue.	Ethical considerations
7	Report Writing	After completing the initial draft, it underwent three rounds of review. Firstly, the researcher conducted three self-checks. Secondly, four experts were invited to review each chapter, providing detailed feedback. The researcher then made revisions based on the feedback from each expert. Finally, the revised draft was submitted to the supervisory committee for review and ultimately finalized	Rigorous review process

Appendix E

The Interview Protocol

RQ1	**What do the students understand of MCL in Wushu Learning?**
Interview Guide	1.How do you understand Chinese Wushu? 2.How do you understand metacognitive learning? 3.Do you think Wushu learning is related to metacognition?
Sub-Questions	4. Could you please provide a brief overview of your understanding of metacognitive learning? 5. Do you think there is a metacognitive learning element in Wushu learning? 6. What do you think are the benefits of learning Wushu? 7. Why do you think metacognitive learning is helpful for Wushu learning?
RQ2	**What are the Component Dimensions of MCL in Wushu Learning?**
Interview Guide	8. What do you think are the Component Dimensions of MCLE in Wushu Learning? 9. What metacognitive learning factors do you think in your Wushu learning? 10. What knowledge, behaviours and emotions do you think are related to metacognitive learning in your Wushu learning?
	11. Why did you choose to specialize in Wushu? 12. What do you like about Wushu? 13. Have you set a learning plan for yourself? 14. What are your learning goals for Wushu? 15. Do you know what you need to learn in Wushu learning? 16. Can you clearly understand the strengths and weaknesses of yourself in learning Wushu? 17. Do you have problems with the practice of Wushu and other learning? 18. When learning Wushu is difficult, what kind of learning strategy will you choose? 19. Do you think about how to do better before learning new actions? 20. Do you change your learning method when you encounter difficulties?

Sub-Questions	21. Do you sometimes lack confidence or nervousness in Wushu learning? How did you deal with it? 22. How to adjust yourself when you are emotionally low? 23. What is your feeling when you study Wushu in class? 24. By learning Wushu, have you achieved the expected learning goals? 25. What is your biggest achievement in learning Wushu? 26. What do you think of your performance in the process of learning Wushu? 27. On a scale of ten, how would you rate your performance in martial arts training over the semester?"
RQ3	**What are Influencing Factors and Challenges of MCL in Wushu Learning?**
Interview Guide	28. What objective factors and subjective factors do you believe can influence students' metacognitive learning during the process of Wushu learning? 29. What personal factors do you think can influence students' metacognitive learning during the process of Wushu learning? 30. What challenges do you think can influence metacognitive learning during the process of learning Wushu?
Sub-Questions	31. Which practices do you think teachers can employ in the classroom to influence your metacognitive learning? 32. What factors do you believe can influence your metacognitive learning during the process of learning Wushu? 33. In Wushu learning(teaching), what do you perceive as the greatest challenge in implementing metacognitive learning?

Appendix F

The Process and Details of a Tertiary Coding for Each Research Question

RQ1	What do the students understand of MCLE in Wushu Learning?	
Initial codes	**Sub-themes**	**Main Themes**
Having a good self-awareness, knowing what one's want to do and having clear goals Having a higher level of thinking about one's own thinking processes Comprehend the benefits of learning Wushu for personal development Spirituality, insight innate abilities genetics, self-awareness Feel one's own body Controlling Wushu movements	**Self-Awareness** Understanding of oneself Feel one's own body and thoughts Generally understanding the intentions and thoughts of the teacher	**Advanced Cognition**
To specialize in Wushu is for the purpose of pursuing a master's degree, obtaining a teaching position, joining the military, self-defense, and personal interest Approaching every task with clear motivation and goals	**Learning Motivation** Approaching tasks with clear objectives and a strong understanding of personal desires	
Setting specific learning goals before each session Firstly, it's important to excel in English. Secondly, mastering the theoretical knowledge of the profession is necessary, and one should also	**Learning Strategic Planning** Setting goals for oneself each semester or academic year; Planning before tackling each new subject	

practice Wushu basic skills extensively Having a higher-order thinking skills Having a unique understanding of the teaching methods employed by teachers Comparing teachers, textbooks, as well as other information and viewpoints available online Avoiding blind conformity to teachers or others' opinions Seeking assistance from teachers, peer, classmates, and internet Exploring online videos is utilized to proactively identify and address issues. Addressing problems promptly without procrastination Acting decisively without hesitation Implementing new ideas promptly and making decisive, unwavering choices when faced with challenges Accurately assess one's own learning and anticipate the outcomes of one's studies. Frequently reflecting on one's learning process Regularly checking whether one's have achieved their goals	**Critical Thinking** Having own insights on individual issues **Problem Solving and Execution Capability** Addressing problems immediately Demonstrating decisiveness and independence in approach to tasks Decision-making Actively seeking solutions When facing challenges **Self-Assessment** Clearly aware of the strengths and weaknesses in learning Wushu Able to discern the specific Wushu discipline that suits his/her abilities best **Self-Reflection** Having a clear understanding of oneself	

The perception of physical and mental states With little influence from external observers Possesses the ability to regulate emotions such as apprehension, fear, and anxiety Faced with unfamiliar movements, the approach involves initial independent practice. Recognizing when movements are incorrect Controlling one's body movements, feel breathing, dantian (an energy center in traditional Chinese Wushu), and exertion	**Self-Regulation** Having a high degree of self-awareness and control. Capable of promptly adjusting one's body movements Capable of promptly regulating one's negative emotions **Self-Monitoring** Exercises control over body movements and performances	**Metacognitive Skills**
Really love Wushu Proactive and enthusiastic attitude towards learning Strong initiative and proactiveness in learning Taking initiative in learning and actively addressing challenges	**Learning Attitude** Passion for learning is soaring, with an upright attitude **Learning Motivation** Clear learning motivation **Learning Strategies** Proactive pursuit of learning strategies	**Ownership of Learning**
RQ2	**What are the Component Dimensions of MCL E in Wushu Learning?**	
Initial codes	**Sub-themes**	**Main Themes**
Being aware of how one's think, learn, and solve problems Understanding one's own strengths and weaknesses in learning and problem-solving Being conscious of one's own thoughts and understanding how to optimize them Understanding the nature of different tasks, including their difficulty level, the strategies required to tackle them effectively, and how to allocate resources appropriately.	**Metacognitive Awareness** ***Person variables:*** The ability to understand and control one's own cognitive processes. ***Task variables:*** Understanding the difficulty level of different tasks ***Strategy variables:*** Understanding Which learning strategy is most effective for learning Wushu **Understanding of Wushu Knowledge**	**Metacognitive Learning Knowledge**

Grasping various aspects related to the practice Wushu Recognition the historical development and cultural significance of Wushu Mastering the concepts of harmony, balance, and self-cultivation in the philosophy of Wushu Understanding the cultivation of both internal and external techniques and spirituality in Wushu learning Advocating ethical values and principles such as respect, discipline, humility, and integrity in Wushu.	A holistic appreciation of its technical, cultural, philosophical, and ethical values Technical Skills Cultural Awareness Philosophical Insights Ethical Values	
Define specific objectives in Wushu practice Break down larger goals into smaller, actionable steps Establish a training schedule Choosing effective methods and techniques to enhance the acquisition and mastery of Wushu skills Watch demonstrations of Wushu forms and techniques by skilled students or teachers Analyze videos of own practice sessions Regular and consistent practice Seek feedback from Wushu teachers or experienced students Implementing intermittent adjustment exercises through methods such as strength training and	**Setting Goals and Planning** Setting Goals Planning **Selecting and Applicating of Learning Strategies** Observation Practice Feedback Cross-training Rest and Recovery	**Metacognitive Learning Behaviour**

endurance training When experiencing physical fatigue, ensure to allocate sufficient rest and recovery time to prevent fatigue and overtraining Identifying obstacles or difficulties encountered during learning Seeking guidance from teachers or peers Experimenting with different approaches Breaking down the problem into smaller components Monitoring their own thinking processes, evaluate their understanding of a movement Adjusting learning strategies accordingly Objectively assessing one's own technique, skill level, strengths, and areas for improvement Deeper introspection and analysis of one's experiences, challenges, successes, and setbacks in Wushu practice	**Problem-Solving and Self-monitoring** Identifying obstacles or difficulties Try different approaches Monitoring their own thinking processes and performances **Self-Evaluation and Reflection** Assessing one's own performance Deeper introspection and analysis	
The awareness and management of emotions during the practice and performance of Wushu Understanding how emotions affect the performance of Wushu techniques Understanding Positive emotions such as calmness, focus, and mindfulness can enhance performance by boosting confidence, increasing motivation, improving overall mood and promoting mental clarity, concentration, and presence in the	**Metacognitive Emotional Experiences:** **Positive Emotions** Confidence, motivation, excitement, calmness and focus positive self-talk **Negative Emotions** Fear, frustration, anxiety, tension, nervousness, anger, and worry	**Metacognitive Learning Emotions**

moment. Students who feel confident and motivated are more likely to perform techniques with precision, speed, and power. Understanding negative emotions such as fear or frustration can impair performance by causing distractions, reducing focus, and hindering coordination. Understanding anger can lead to aggressive behavior and loss of control, which may compromise technique execution and increase the likelihood of injury Recognizing, understanding, and managing one's emotions and emotional responses in the context of learning and practicing Recognizing the emotional states that optimize or hinder performance. Employing strategies to regulate emotions Applying strategies to manage both cognitive and emotional aspects of the learning experience.	**Metacognitive Emotional Regulation** Actively seek ways to regulate your negative emotions	
RQ3	**What are Influencing Factors and Challenges of MCLE in Wushu Learning?**	
Initial codes	**Sub-themes**	**Main Themes**
Thoughts from individual teachers Teachers express their personal thoughts and opinions	**Educational Philosophy** Teachers' ideas and thoughts Teachers' guidelines	**Teacher Factors**

Teachers teach as they see fit Traditional teaching methods often focus on rote learning and repetitive practice, leaving little room for self-reflection and metacognitive awareness Traditional teaching methods prioritize students receiving instructions from coaches rather than actively engaging in the learning process. Traditional teaching methods often emphasize replicating techniques and forms exactly as demonstrated by the teachers. Let students practice the same action many times. Traditional teaching methods provide limited feedback to practitioners, focusing primarily on correcting technical errors rather than fostering metacognitive skills Traditional teaching methods often follow a rigid training structure, with little flexibility for individualized learning or exploration	**Routing Teaching Strategies and Methods** Limited Self-Reflection Opportunities No room for students Passive Learning Teacher-centered Emphasis on Replication The teacher's word is final Limited Feedback Not providing any feedback Rigid Training Structure Not adapting randomly	
Allowing students to take ownership of their learning process Collaborative learning environments Encouraging students work together, share ideas, and provide support Providing clear expectations and goals Providing opportunities for practitioners to gain diverse perspectives, receive constructive criticism Encouraging students to take risks, seek feedback,	**Learning Environment** Positive and Supportive Atmosphere Facilitates Collaboration Clear Expectations and Goals Encourages Reflection Constructive Feedback Timely guidance **Feedback Mechanisms**	**Teaching Factors**

and engage in reflective practices Providing timely, specific, and constructive feedback Prompting students to think critically about their performance Encouraging students receive feedback from their peers	Peer feedback Peer assessment mechanism Self-Reflection prompts Group teaching	
Visual learners excel in observing and replicating the movements, forms, and techniques demonstrated by instructors or peers Auditory learners are particularly adept at drawing inspiration from verbal cues provided by instructors, peers, and themselves Kinesthetic learners enjoy practicing and challenging themselves with high-difficulty martial arts techniques Read/write learners prefer acquiring information from textbooks, instructional materials, and reflective writing, deepening their understanding of techniques and concepts Multimodal learners prefer integrating various methods and resources, including visual, auditory, and kinesthetic approaches, to enhance their learning Accumulate extensive experience and knowledge about Wushu The longer the studying, the richer the knowledge The longer the practice, the better the skills	**Learning Styles** Visual learners Enjoys watching videos Auditory learners Enjoys calling it out Kinesthetic learners Enjoys advanced maneuvers Read/write learners Enjoys theoretical learning Multimodal learners No particular preference for any one type **Learning Experiences** Experience-Based Knowledge Skill Development Adaptability	**Students Factors**

		Students Factors
Understanding of Wushu techniques, strategies, and training methods The longer the practice, the stronger the adaptability. Developing higher levels of skill proficiency Better understanding of their own strengths and weaknesses Better equipped to adapt to different training scenarios and learning environments Coincide setting and pursuit of long-term goals The longer the practice, the more emphasis on reflection Likely to engage in systematic reflection on one's training experiences Taking on mentoring roles within their training community Responsibility and leadership Men tend to exhibit higher self-efficacy in demanding techniques, strength, and endurance, while women excel in emotional control and flexibility in physical attributes Females more inclined to compare themselves with others and seek feedback Males may focus more on individual performance	Reflective Practice Mentoring and Leadership **Gender:** Social Comparison Feedback Processing Experience and Skill Development **Age:** The older one gets, the stronger of MCL	

Higher-grade students typically have more experience and skill proficiency Advanced students or higher-grade practitioners often set more specific and challenging goals Higher-grade students may be more adept at processing and utilizing feedback from instructors and peers to enhance their learning Without a clear understanding of one's abilities and areas Limited awareness of one's own strengths, weaknesses Inability to recognize one's own learning issues and lack of monitoring one's own progress and performance in Wushu Limited understanding of different learning strategies and their effectiveness Setting objectives that are objective, realistic, and suitable for oneself can be challenging. Always complaining when encountering problems, poor adaptability. Deep understanding of their own capabilities and limitations Setting specific objectives related to mastering new techniques, refining existing skills, or achieving proficiency in a particular form or routine Ability to integrate feedback from mentors, peers and self-assessment Mastering advanced Wushu technical skills	**Metacognitive Skills** Self-Assessment Self-Monitoring Self-Control Learning Strategies Goal Setting Adaptability **Technical Skills** Understanding oneself Problem-Solving and Adaptability Reflective Practice Periodic summaries	**Students Factors**

provides a solid foundation for problem-solving and adaptability in Wushu learning Not complaining, adept at understanding		
Providing positive, empowering, and diverse cultural values in Wushu Be mindful of cultural differences and avoid making assumptions or judgments based on stereotypes Creating an inclusive and supportive environment for Wushu learning. Utilizing the cultural influence of Wushu's history and philosophy to enrich teaching and create meaningful learning experiences. Creating an ethical learning environment all practitioners have equal opportunities Providing each student with fair and equitable learning and feedback opportunities Serving as positive role models for learners.	**Cultural Considerations** Cultural Values Cultural Sensitivity Historical and Philosophical Influences **Ethical Considerations** Respect and Trust Fairness and Equity Equal opportunities Role Modeling Setting a good example	**Social Factors**

Appendix G

The Specific List of Expert Information

Name	Orgamization	Title&Degree	Area Research
Seyedali Ahrari	University of Religions and Denominations	Doctor of Philosophy	Qualitative Research
Shi Yan	ShanXi University	Professor, Doctor of Philosophy	Sports Psychology
Duan Limei	Yuncheng University	Professor, Doctor of Philosophy	Wushu Teaching
Wang Jianzhou	Yuncheng University	Assocoate Professor, Doctor of Philosophy	Sports Psychology;

Appendix H

Example of Classroom Observation Notes

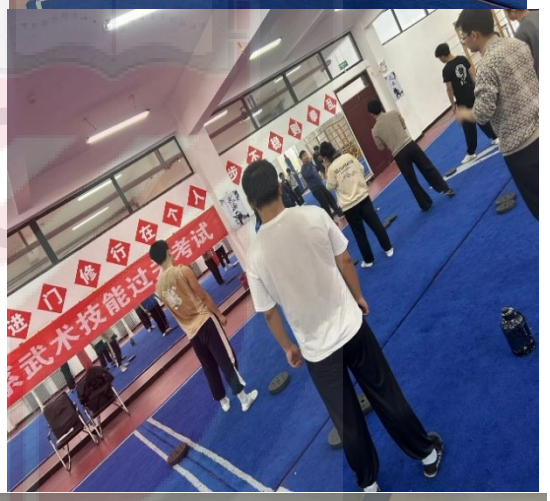
Date	November 20, 2023
Time	10:00 AM - 12:00 PM
Location	Wushu Hall, Guan Sheng Building, Yuncheng University
Background	The course observed this time was the Wushu specialization course in the first semester of the fourth year of the Physical Education major, aimed at understanding students' metacognitive learning behaviors during Wushu learning. The focus of this observation was on the metacognitive learning strategies demonstrated by students, including self-monitoring, self-regulation, and the application of learning strategies.
Observation Records	**1.Setting Goals and Planning**: At the beginning of the class, the teacher clearly delineated the learning objectives and tasks for the session. It was observed that upon hearing the learning objectives for the class, some students exhibited enthusiasm and eagerness (SLP, LYP, LCY), while others displayed apprehensive emotions. During the subsequent practice, it was noticed that students with stronger motivation consciously compared the learning objectives with their own learning needs, establishing the focus of their learning for the session.
	2. Selecting and Applicating of Learning Strategies: Firstly, during the Wushu practice, it was observed that students with proficient Wushu skills tended to focus on their own technical movements, displaying confidence in their execution. When encountering difficulties, they would first seek guidance from the teacher. On the other hand, students with less developed Wushu skills would spend time observing the performance of other classmates, seeking out those they perceived as excelling and attempting to emulate their learning strategies. This demonstrates that students with different levels of Wushu proficiency choose different learning strategies. Secondly, there were slight differences observed between male and female students in their choice of learning strategies. Male students typically preferred to seek assistance from their peers, while female students tended to seek help from the teacher.

	3. Problem-Solving and Self-monitoring: Observations revealed several common learning strategies employed during Wushu practice, including: individual repetitive practice, seeking guidance from peers, seeking assistance from the teacher, engaging in peer discussions, and imitation of others. Most students, when encountering ineffective learning strategies during the learning process, promptly adjusted their approach, actively seeking more effective methods. Additionally, during breaks between classes, some students utilized the time to ask the teacher or peers for assistance, while others employed proactive relaxation strategies to prepare for subsequent practice. Some students quietly observed others, while others simply rested. This illustrates that students employ different self-monitoring strategies.
	4. Self-Evaluation and Reflection: During the practice session, some students would pause to reflect and mentally rehearse their movements when they encountered failures or mistakes, attempting to identify the reasons for the errors. Some students would compare their movements to those of the teacher reflected in the mirrors around the classroom, paying attention to whether their actions were standardized and met technical requirements, and promptly identifying and correcting errors. Additionally, some students would actively seek feedback from peers to gain a more comprehensive understanding of their performance. Before the end of the class, the teacher organized a summary and feedback session, providing students with the opportunity to share their learning achievements and insights. It was observed that students with strong technical skills were able to clearly summarize their progress in the class and identify issues for improvement, while also outlining specific plans and prospects for future learning. However, some students were ambiguous in their expressions, lacking clarity in articulating their thoughts. This illustrates differences in students' self-evaluationt and self-reflection abilities, which are related to their learning motivations and metacognitive skills.
Conclusion and Reflection	Through observing the metacognitive learning behaviors of Wushu specialization students in the physical education major, I have come to deeply understand that the majority of these students demonstrate a high level of autonomy and self-management during the learning process. They are able to clearly define learning objectives, flexibly apply learning strategies, promptly adjust learning methods, and effectively evaluate and reflect on their own learning process. The cultivation of such metacognitive learning abilities not only contributes to the improvement of students' Wushu skills but also lays a solid foundation for their future learning and career development. In future teaching, educators should also change traditional teaching methods, provide students with more opportunities for self-directed learning, and fully unleash their initiative and learning potential.

Appendix I

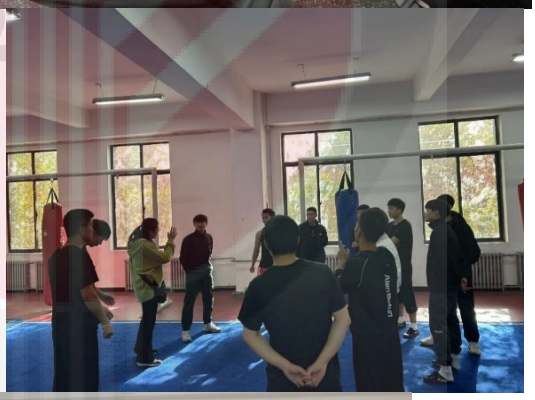
Some Pictures of Fieldwork Observations



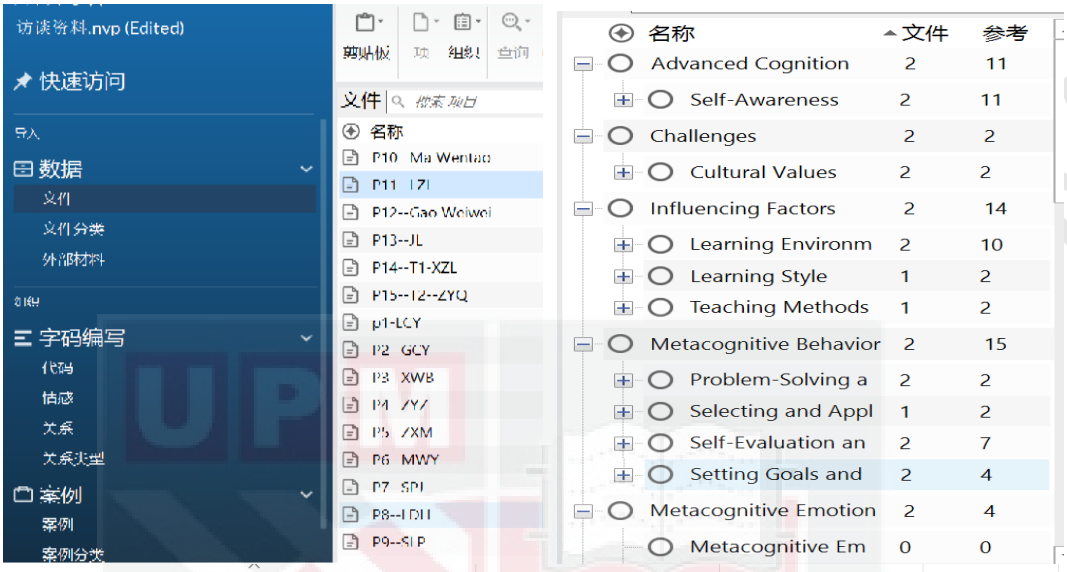

Appendix J

Some Pictures of Focus Group Interview



Appendix K

Sample of In-Depth Interviewer Database and Coding Process



名称	修改日期	类型	大小
1LCY	2024/1/14 10:08	XLSX 工作表	13 KB
2GCY	2024/1/14 10:38	XLSX 工作表	11 KB
3XWB	2023/11/18 21:12	XLSX 工作表	11 KB
4ZYZ	2024/1/12 15:56	XLSX 工作表	13 KB
5-ZXM	2024/1/14 11:21	XLSX 工作表	13 KB
6-MWY	2024/1/12 16:08	XLSX 工作表	11 KB
7-SPJ	2024/1/12 16:06	XLSX 工作表	11 KB
8-LDH	2024/1/14 15:50	XLSX 工作表	11 KB
9-SLP	2024/1/14 16:06	XLSX 工作表	11 KB
10-MWT	2024/1/14 16:38	XLSX 工作表	11 KB
11-LZL	2024/1/12 16:31	XLSX 工作表	13 KB
12-GWW	2024/8/2 20:46	XLS 工作表	18 KB
13-JL	2024/1/15 14:59	XLSX 工作表	2,283 KB

名称	修改日期	类型	大小
1.Personal profile information	2023/12/25 18:37	Microsoft Word 97 ...	210 KB
2.First - Audio Recording--10.8 AM-10,00-...	2023/11/29 15:54	M4A 文件	6,607 KB
3. Second - Audio Recording-11.27AM10; ...	2023/11/29 15:58	M4A 文件	32,004 KB
4. Third - Audio Recording-12.23pM14; 30...	2023/11/29 15:56	M4A 文件	3,091 KB
5. Transcribed text 11月27日上午10; 30-11...	2023/12/8 19:18	Microsoft Word 文档	40 KB
6. Video recording	2023/12/7 17:34	MP4 视频	19,336 KB

LISTS OF PUBLICATIONS

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Lixia Bao et al.(2023) Effect of Teaching Interventions on Metacognitive Skills in Physical Education: A Systematic Review. Int. J. Sport Psychol., VOL 54.N.6-2023: 509-538;

Lixia Bao et al. (2024) Unveiling the Impact of Metacognition on Academic Achievement in Physical Education and Activity Settings: A Comprehensive Systematic Review and Meta-Analysis of Qualitative Insights. Psychology Research and Behavior Management,VOL(3):973-987;

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Junlong Zhang, Lixia Bao et al. (2024). The Effect of Sport Education Model in Physical Education on Student Learning Attitude: A Systematic Review. BMC Public Health,2024.

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The 9th Peking University Forum on Humanities and Sports Leadership,2023,10.27-28.

Poster Presentation at the 12th China Sports Science Conference, 2022