



THE UNIVERSITY OF  
**WAIKATO**  
*Te Whare Wānanga o Waikato*

Research Commons

<http://researchcommons.waikato.ac.nz/>

## Research Commons at the University of Waikato

### Copyright Statement:

The digital copy of this thesis is protected by the Copyright Act 1994 (New Zealand).

The thesis may be consulted by you, provided you comply with the provisions of the Act and the following conditions of use:

- Any use you make of these documents or images must be for research or private study purposes only, and you may not make them available to any other person.
- Authors control the copyright of their thesis. You will recognise the author's right to be identified as the author of the thesis, and due acknowledgement will be made to the author where appropriate.
- You will obtain the author's permission before publishing any material from the thesis.

# **Enhancing teacher mediation to foster students' metacognition in flipped learning**

A thesis  
submitted in fulfilment  
of the requirements for the degree  
of  
**Doctor of Philosophy in Faculty of Education**  
at  
**The University of Waikato**  
by  
**Lina Guo (Paiyue)**



THE UNIVERSITY OF  
**WAIKATO**  
*Te Whare Wānanga o Waikato*

2022

## **Abstract**

This research focuses on enhancing teacher mediation to foster students' metacognition in flipped learning classrooms in a middle-high school in China. A series of designed workshops aimed to develop teachers' professional understanding of metacognitive engagement in flipped learning classrooms and facilitate their exploration of classroom talk with a view to enhancing students' metacognitive thinking to assist their learning.

Flipped learning, as one example of digital learning, is increasingly pervasive in many educational settings. Research suggests that self-regulated learners benefit more in the flipped learning pedagogical environment than those who have low self-knowledge and self-management. Self-regulation is one of the main subcomponents of metacognition. There is a need to help teachers to be metacognitive teachers, so that in turn, metacognitive learners may be cultivated through daily classroom instructional activities and teacher practice. The school in this study had identified a need to further develop metacognition in their flipped classroom learners.

The study used an interpretive methodology and a qualitative research approach to explore the use of dialogic talk processes by teachers to engage in metacognitive thinking with their students within the flipped learning context. Data were gathered through classroom observations prior to and after a series of designed professional learning workshops for the teachers. Key incidents of teachers using dialogic talk were captured by video during further classroom observations and post-observation interviews with teachers, and student focus groups and analysis of student work completed the dataset. The participants in this study included five teachers and their students, to investigate the phenomena of teacher mediation in students' development of cognition and metacognition in a flipped learning approach.

In this study, the use of flipped learning suggested a need for metacognitive learners and metacognitive teachers. I worked with teachers to develop their own and their students' metacognitive thinking. The reflective practice process of teachers was an aspect of the professional learning workshops, which provided me with teacher input into a theoretical framework, which resulted in an extended and detailed dialogic talk process, generated to guide teachers in designing their instructional activities and further applications in their classroom practice.

The classroom practices of one English, one Maths and one Chemistry teacher were used to exemplify how the professional learning about mediating metacognitive development could be put into practice. The study attempted to highlight the complexities of dialogue that shape learners' sense making and influence future effective pedagogical practices. At the final stage of the research, through teachers' and students' reflections on metacognitive teaching and learning, classroom atmosphere, power, talk and nonverbal behaviours were identified as the factors that influence the engagement of metacognitive teaching and learning in flipped learning.

This study has furthered the understanding of the nature of teachers' mediation and the practices of teachers and students in mutually engaged dialogic talk concerning the development of metacognition within a school-wide flipped learning adoption context. The design and outcomes of this research may help teachers create an interactive environment in both online and offline learning, incorporating metacognition instructions to facilitate students' ability to become increasingly autonomous and self-regulated in their learning.

## Acknowledgements

Many people have kindly contributed time, expertise, and support during my research:

- My supervisors Chris Eames, Kerry Earl Rinehart and Cathy Bunting for their invaluable contribution support and encouragement that sustained me as I progressed through my doctoral journey. I thank you all for providing me very thoughtful and adequate support at where I needed it. In addition, I would like to acknowledge Wendy Fox and Elizabeth Reinsfield for their supervision in the early stages and for encouraging me to embark on this journey.
- My Chief supervisor, Associate Professor Chris Eames, for his unwavering support through my journey in TEMS Centre and the critical feedback that has helped shape my thesis. You saw value in my thesis and agreed to work with me till the completion of my thesis. Thank you very much. You have made a significant contribution, not only to this thesis but also to my life.
- The research participants who generously gave their time and support me, that enabled this research to be undertaken.
- Academic Liaison Librarians Alistair Lamb and Mel Chivers for their technical support. My thanks also go to all the staff and fellow students at the TEMS Centre.
- Finally, I thank my father and mother, whose untiring patience, support and encouragement to my education made my future.

## Table of Contents

Abstract .....	ii
Acknowledgement .....	iv
Table of Contents .....	v
List of Figures .....	viii
List of Tables .....	x
Chapter 1 Introduction .....	1
1.1 This study .....	1
1.2 Interest in the topic .....	1
1.3 Values and educational system in China .....	3
1.4 The conflict between teachers' practice and parents' expectations in China .....	4
1.5 The educational change in China.....	5
1.6 Technology integration in education .....	5
1.7 Flipped learning.....	6
1.8 Statement of the research.....	9
1.9 Importance of the topic.....	10
1.10 Main research questions .....	11
1.11 Outline of the thesis .....	12
Chapter 2 Literature Review .....	14
2.1 Metacognition and higher-order thinking .....	14
2.1.1 Metacognition.....	14
2.1.2 Higher-order thinking in the Chinese context .....	14
2.1.3 Defining higher-order thinking .....	15
2.1.4 Transition between cognition and metacognition does not happen automatically .....	17
2.2 Teacher mediation .....	18
2.2.1 Defining mediation and its significance.....	18
2.2.2 The role of mediation in effective problem solving .....	19
2.3 The role of metacognition in learning .....	20
2.3.1 Self-regulation as a main component of metacognition .....	21
2.3.2 Self-knowledge as a main component of metacognition.....	22
2.4 Students can be supported to be metacognitive .....	24
2.4.1 Metacognition can be taught .....	24
2.4.2 Metacognitive strategies in teaching .....	26
2.4.3 Classroom talk in metacognition.....	28
2.5 Developing metacognitive teachers.....	30
2.5.1 Beginning to develop a framework for this study .....	32
2.6 Flipped learning as a context for this study .....	36
2.6.1 Flipped learning and the interactive learning environment.....	34
2.6.2 Flipped training model for teachers.....	35
2.7 Summary –Theoretical framework for this study .....	38
Chapter 3 Methodology .....	43
3.1 Introduction .....	43
3.2 Research paradigm .....	44
3.3 Interpretive paradigm .....	45
3.4 Interpretive paradigm for this Study.....	47
3.5 Qualitative research .....	48
3.6 Case study with intervention .....	49

3.7 Methods .....	52
3.7.1 Process of identification of participant school .....	52
3.7.2 Background of the participant school.....	53
3.7.3 My preparations before Data collection .....	55
3.7.4 Participants .....	56
3.7.5 My role .....	57
3.7.6 Research design.....	58
3.8 Research Methods.....	60
3.8.1 Workshops (Intervention) .....	60
3.8.2 Workshop design in this research.....	64
3.8.3 Classroom observation .....	79
3.8.4 Interviews .....	82
3.8.5 Document analysis .....	85
3.8.6 Data handling and analysis.....	86
3.9 Trustworthiness of the study.....	91
3.9.1 Credibility.....	92
3.9.2 Transferability .....	95
3.9.3 Dependability .....	96
3.9.4 Confirmability .....	97
3.9.5 Ethical Issues.....	98
3.10 Summary.....	99
<b>Chapter 4 Pre-Intervention classroom practice .....</b>	<b>100</b>
4.1 Introducing the setting: The Class AB model.....	100
4.2 Two trajectories of students' learning behaviours.....	105
4.2.1 Students' time management .....	105
4.2.2 Help-seeking behaviors .....	110
4.2.3 Summary .....	113
4.3 Teaching at pre-intervention.....	113
4.3.1 Beliefs about teacher-centred classroom.....	114
4.3.2 Classroom talk.....	116
4.4 Summary.....	118
<b>Chapter 5 Intervention in classroom practice .....</b>	<b>120</b>
5.1 Introduction of the professional learning.....	120
5.2 A dialogic talk process generated for metacognitive teaching .....	124
5.3 Application of metacognitive teaching.....	126
5.3.1 The dialogic talk process exemplified in Summer's English class .....	126
5.3.2 The dialogic talk process exemplified in Yuan's Chemistry class.....	131
5.3.3 The dialogic talk process exemplified in Zhang's Mathematics class .....	136
5.4 Summary.....	140
<b>Chapter 6 Perceptions of metacognition development .....</b>	<b>141</b>
6.1 Introduction .....	141
6.2 Students' perceptions of metacognitive teaching process .....	141
6.2.1 Student's perception about metacognitive development.....	143
6.2.2 Students' perceptions of learning environment.....	145
6.3 Teacher's perceptions of dialogic talk process .....	160
6.3.1 Dialogic talk process of teaching provide teachers a tool of thinking.....	160
6.3.2 Sustained use of the dialogic talk process is needed .....	162
6.3.3 Teachers' perceptions of learning environment .....	164
6.4 Chapter summary.....	169
<b>Chapter 7 Discussion, conclusions and implications .....</b>	<b>170</b>
7.1 Introduction .....	170

7.2 AB class model of flipped learning requires metacognitive learner and teacher .....	170
7.2.1 Time management .....	171
7.2.2 Help seeking .....	172
7.2.3 Responsibility of learning in classroom .....	173
7.2.4 Classroom talk .....	175
7.2.5 Summary .....	175
7.3 Teacher mediation in student metacognitive development .....	176
7.3.1 Mediation through assessment as learning .....	176
7.3.2 Consolidation of prior knowledge .....	178
7.3.3 Facilitate self-regulation in problem solving .....	181
7.3.4 A thinking tool for metacognitive teaching .....	183
7.3.5 Summary .....	185
7.4. Students and teacher's perceptions of metacognition development .....	186
7.4.1 Students' perceptions on metacognition development .....	186
7.4.2 Students' perceptions of their learning environment .....	188
7.4.3 Teacher's perceptions on metacognition development .....	193
7.4.4 Constraints of creating an interactive learning environment .....	196
7.4.5 Summary .....	199
7.5 Conclusion .....	200
7.5.1 Implications .....	203
7.5.2 Limitations .....	205
7.5.3 Suggestions for further research .....	207
References .....	209
Appendices .....	230
Appendix A: Ethical approval .....	230
Appendix B: Consent forms .....	231
Appendix C: Classroom observation protocol .....	235



## List of Figures

Figure 2.1 <i>Theoretical framework for teacher workshop learning</i> .....	33
Figure 2.2 <i>Overall Theoretical framework built on Figure 2.1 for this study</i> .....	39
Figure 3.1 <i>Methodological framework</i> .....	44
Figure 3.2 <i>Overall theoretical Framework</i> .....	66
Figure 3.3 <i>The framework guiding workshop 2</i> .....	68
Figure 3.4 <i>The shared content in workshop 5</i> .....	72
Figure 3.5 <i>The dialogic patterns in the process of metacognitive mediation between teachers and students, derived from Guo (2020)</i> .....	77
Figure 3.6 <i>One example of an instructional co-designing scene with one of the teachers</i> .....	88
Figure 4.1 <i>Students in class A watch a video and make notes on textbook</i> .....	103
Figure 4.2 <i>Example assessment completed at the end of class A</i> .....	104
Figure 4.3 <i>Teacher and students in class B, English 1</i> .....	104
Figure 4.4 <i>Kate's assessed paper from class A returned to student on class B</i> .....	106
Figure 4.5 <i>Tom in class B writes down the answers as the teacher calls them out</i> .....	107
Figure 4.6 <i>Summer's class</i> .....	108
Figure 4.7 <i>Student is doing practice in class A English 2 (captured on video)</i> .....	110
Figure 4.8 <i>Mark in-group discussion</i> .....	111
Figure 4.9 <i>Ling's representation of her image of teaching in the classroom</i> .....	114
Figure 4.10 <i>Wen's representation of her image of teaching in the classroom</i> .....	115
Figure 4.11 <i>Summer's representation of her image of teaching in the classroom</i> .....	117
Figure 5.1 <i>The dialogic patterns in the process of metacognitive mediation between teachers and students derived from Guo (2020)</i> .....	125
Figure 5.2 <i>The Sum of squares formula derivation process</i> .....	137
Figure 6.1 <i>Kelly's perceptions on metacognition development</i> .....	143

Figure 6.2 <i>Jon's vision of classroom atmosphere</i> .....	146
Figure 6.3 <i>May's views</i> .....	146
Figure 6.4 <i>Jessica's drawing</i> .....	147
Figure 6.5 <i>Jia's drawing</i> .....	148
Figure 6.6 <i>Jill's perceptions</i> .....	151
Figure 6.7 <i>Mandy's drawing</i> .....	153
Figure 6.8 <i>Jim's views of communication</i> .....	154
Figure 6.9 <i>Mark's view</i> .....	154
Figure 6.10 <i>Frank's view</i> .....	155
Figure 6.11: <i>Yi's drawing</i> .....	156
Figure 6.12 <i>Xiang's drawing</i> .....	157
Figure 6.13 <i>Yuan's drawing of a preferred classroom</i> .....	158
Figure 6.14 <i>Lan's drawing</i> .....	158
Figure 6.15 <i>Dan's drawing</i> .....	159

## List of Tables

Table 3.1 <i>The graphical information of 5 teachers and their teaching classes</i> .....	57
Table 3.2 <i>Overall research design</i> .....	58
Table 3.3 <i>Overview of workshops and their aims</i> .....	65
Table 3.4 <i>The graphical information of the three participants and their taught topic of the lesson and strategies used in the class</i> .....	76
Table 5.1 <i>Graphical information for the three teacher participants</i> .....	121
Table 5.2 <i>Tabulated data in English class cited from Guo (2020)</i> .....	129
Table 5.3 <i>Tabulated data in Chemistry class cited from (Guo, 2020)</i> .....	134
Table 5.4 <i>Tabulated data in Math class cited from (Guo, 2020)</i> .....	139

## **Chapter 1 Introduction**

### **1.1 This study**

This study focuses on enhancing teacher mediation to foster students' metacognition in flipped learning. It explored how teachers and their students developed and engaged in metacognitive thinking within the flipped learning context in a middle-high boarding school in China. A series of designed workshops aimed to develop teachers' professional understanding of metacognitive engagement in flipped learning classrooms and facilitate their exploration of classroom dialogue with a view to enhancing students' metacognitive thinking to assist learning. The study used a qualitative research method within a sociocultural paradigm to explore the processes that enable or constrain teachers to engage in metacognitive thinking with their students within the flipped learning context.

### **1.2 Interest in the topic**

During my formative years, I was educated in a lecture-based classroom in China until I went abroad to Malaysia for my master's degree in 2015. The teacher-student relationships and pedagogies are quite different in Malaysia. I enjoyed the new learning experience through group discussions, project-based learning, and a flipped approach to classroom teaching. However, I found that even though I participated in the process of learning, I did not think or manage my participation in the group work effectively. I passively accepted my part in the group under the guidance of my group leader. On reflection, my thinking process remained, at the time, unexplored.

After graduating, I successfully won a position in a top junior secondary school in China. With the high value of this position, I dedicated all my passion and time into teaching. I held the

philosophy that no one in my class should fall behind. I often felt obliged to stop and explain concepts, to ensure that each student was able to make sense of the topics I had discussed in class - to continue with the learning. Everything seemed good. However, when I got my evaluations from students at the end of my semester two words are noticeable - “nagging and repetition”. I reflected on my teaching and realised that I was teaching the same way that I was taught.

To make my teaching more effective, I realised that technology would be a powerful tool to utilise in the design of instructional activities. I made use of various teaching strategies by incorporating technology tools into my class. One was to make videos for the students to watch at home, to encourage them to pause or go backward in the video when they were unsure. In the class, I also randomly grouped the students and facilitated learning through role-playing and discussion. This helped me to organise my time in a manner that facilitated individual discussion with my students.

Unexpectedly, I found that a large number of my students had no idea how to participate in the discussion or to be aware of their thinking and keep themselves on track with their tasks. They behaved as I had - they were compliant but not reflective about the learning process. I figured out that technology integration and innovative pedagogy adoption into class cannot secure students’ learning effectiveness. The teachers’ mediation mattered when designing learning to facilitate students’ higher level of thinking in the learning process. Teachers need to provide a higher level of instruction when scaffolding students’ learning. Further reflection inspired me to research teacher practices, students’ cognitive development, and self-regulated learning behaviors. With the ubiquity of technological resources, using technology to enhance effective

teaching intervention is one of the potential supports to facilitate learning autonomy towards metacognition development.

### **1.3 Values and educational system in China**

The schooling system in China is highly competitive and academically oriented with an emphasis on educational achievements from a young age. For a developing country, the number of places available in the key schools is highly inadequate compared to the number of students applying for admission, since the vast majority of parents hope and expect that their children would secure admission in a key school (high-ranking school). Summative assessment is dominated by the Ministry of Education (Muthanna & Sang, 2015). In order to meet these requirements, students need to get fully prepared for the high school entrance examination and pass the Provincial Exam (Zhong Kao) and the National Exam (Gaokao) before they can secure admission to highly regarded senior high schools and universities. These factors bring great pressure to parents, teachers, and students.

The Ministry of Education in China (2019) prescribes seven subjects, including Chinese, maths, English, physics, chemistry, political education, and history, all of which are tested in the exam. But not all the subjects carry the same weight in the examination. Chinese, maths, and English have the highest scores of 150 allocated points while the others range from 60 to 90. Teachers are placed under pressure from their school to deliver all the content in the curriculum. In China, educators believe that homework is a key method to consolidate knowledge. To accomplish this, teachers tend to act as information transmitters and cut down on students' classroom practice activities (Qi-quan, 2006). Consequently, they give more homework to their students - to practice at home alone or with the help of their parents.

#### **1.4 The conflict between teachers' practice and parents' expectations in China**

Many parents lack the ability to directly assist their children in their schoolwork at home and thus promote their children's skills (Kim & Fong, 2013). Recently, a new network term has appeared - "kong fu zheng" - named by a young father who supervised his primary school son for homework for almost one year after work at home (Tencent News, 2018). This term was defined as a medical symptom and suggests that once a parent begins to supervise his or her child to do homework, one would autonomously lose control of their temper. There are the suggestions that parents get irritated easily and shout at their children whenever they made unexpected mistakes. This made relationships between parents and their child (ren) tense. However, teachers, in an effort to ensure student success in examinations, give lots of homework. Because of the homework, more than 80 percent of students go to bed later than 10 pm every day (Liu et al., 2019; Pan, Wu, Liu, Li, & Zhong, 2018; Wu, 2015). Thus, experts and parents have called for reasonable amounts of homework and an evaluation system for students based on more than just examinations, and teachers advise parents not to focus on competition.

The warning call from both parents and teachers has driven school leaders to take into account how to facilitate school change for effective teaching and learning by integrating technology. Teachers cannot teach what they do not know; primarily, teachers need to engage in professional development to develop their own competencies of utilising digital resources, and pedagogic competence to transmit this knowledge to their students by implementing in the teaching and learning process. To do so means to facilitate learner's competencies of both subjective matters and the digital competences in using technology to source information, communicate and collaborate in life and study.

## **1.5 The educational change in China**

Since the release of the *Outline of China's National Plan for Medium- and Long-term Education Reform and Development (2010–2020)* in 2010, China has paid more and more attention to the informatisation of education and has been promoting the idea that effective classrooms require technological innovation. Even though much effort has been put into meeting the requirements of curriculum reform, the results are still not satisfactory (Qi-quan, 2006). When the concept of the flipped classroom emerged in 2011, many classrooms in China adopted this student-centred teaching model with technological support (Wang, 2017). The literature internationally tells us that students' perceptions of using a flipped classroom approach are usually positive, and that learning is more interesting (Lee and Wallace, 2018). Similarly, researchers found that students performed significantly better when they are learning in a flipped classroom approach (Webb & Doman, 2016). With this approach, research suggests students are able to learn at their own pace, prepare for lessons in advance, and participate more in lessons (Wang, 2017).

## **1.6 Technology integration in education**

We live in a constantly changing world, and nowadays, young learners live in a world surrounded by many existing technologies, which they use daily for entertainment, education and communication (Simon et al., 2021). As a teacher, we see children and young adults are growing up in a world where digital technologies are ubiquitous. Digital learning is imperative in the current situation due to the ubiquity of digital technologies and the pandemic worldwide. Digital learning, these two words capture the application of digital technologies to pedagogical processes and learner experiences. Digital learning is broad enough to encompass learning about, with and through technologies, incorporating shifts from basic digital literacy to fluency and digital competence capability (Forbes, 2018).



Consequently, communicating or exchanging thoughts using digital technology has become part of a young person's everyday life. With the emphasis on the interconnection between the senses and the environment in which the sense is made, integrating technology into educational practice making interactive environments for students to construct knowledge in online activities is significant. According to Daniels and Pethel (2005), students in the online learning environment are more interactive, having a higher subjective satisfaction in the overall quality of educational experience than in their role in the traditional learning environment. It allows students and instructors to communicate synchronously, emphasising learning flexibility, effectiveness, engagement, adaptivity, and reflectiveness. The interactive online environment caters to the individual learning preferences situated in online or real-world contexts (Gros, 2016). Nikolaos (2014) suggested that learners could be guided to become self-directed, self-motivated, and self-learning, aspects of metacognition, by actively engaging in formal and informal learning contexts with a learner-focused online environment. As a result, students' learning experiences can be enriched, and learning effectiveness enhanced. In this study, flipped learning was researched to assist teachers to engage and empower their learners.

### **1.7 Flipped learning**

The flipped classroom design has arguably revolutionized teaching across the globe, from requiring students to watch instructional videos or predesigned readings at home and to do what had traditionally been 'homework' in class. The term *flipped* or *inverted* was used to define this type of classroom practice, that is, "schoolwork at home and homework at school" (Bergmann & Sams, 2012, p. 13). This time shift allows direct instructions to be delivered to students outside of class using videos, with more strategic use of in-class time for group work and individualized attention.

However, the flipped classroom approach has supporters as well as critics. For example, some researchers have argued that the “flipped class is all about videos”, in other words, using the flipped classroom approach is easy and any teachers who use instructional videos for teaching are using a flipped classroom approach (Bergmann & Sams, 2016). Additionally, Jacot et al. (2014) dispute the nature of preassigned content and contend that a pre-recorded lecture is not better than a live lecture. This view is also supported by Ash (2012), who argues that the flipped classroom approach is a poor method of instruction, simply turning lectures into videos when having students watch videos instead of listening to lectures does not guarantee that they will be more engaged.

A broader perspective has been adopted by Bergmann and Sams (2014) and other empirical researchers (e.g., Kirch, 2012) who argue that a flipped classroom is only an entry point, and flipped learning is still evolving to meet the needs of the learners. Even though early attempts at flipped classroom models only involved students watching instructional videos at home and subsequently doing their course work in class, gradually teachers have found that the power of flipped learning goes beyond using videos as homework. Rather, its strength lies in the delivery of instructions to individual learners and giving students ownership of their learning, with technological support.

Further, Bergmann and Sams (2014) proposed a new concept of flipped *learning* as an educational approach enabling students’ access to direct instruction, experienced individually at their own time, space and pace, often enabled by digital technologies. Compared with the concept of flipped classrooms, flipped learning is a more flexible in theory, it is not limited in time and space for viewing the videos. Flipped learning allows a focus on digital pedagogical

implementation with a view to meet the diverse needs of learners. Students can access the videos before learning, in learning or after learning. In the same vein, Ash (2012) notes that flipping learning supports every student's learning in and out of the classroom. In addition, it seems that teachers who are most effective at using flipped learning are thoughtful and reflective about their teaching practice in making best use of the technology and resources in general (Kirch, 2016).

A flipped learning approach does not make teaching easier. Wang (2017) indicated that a successful flipped learning approach requires motivated and confident teachers, who also require appropriate levels of time, resources, and technological support to develop a flipped model that best fits for the embedded social settings. In other words, flipped learning should support an environment where a classroom is a place of learning where the students are empowered to learn (Bergmann & Sams, 2012; Galindo, 2014; Israel, 2014; Kirch, 2016). Importantly, flipped learning as a context provides affordances for greater dialogue between teacher and students, and therefore potential for focusing more on metacognitive processes. Therefore, flipped learning does not make teaching easier; instead, it raises questions about how to make the best use of the face-to-face time and technological tools in classroom practice (Kirch, 2016). In this study, the use of flipped learning suggested a need for metacognitive learners and metacognitive teachers to make the best use of the face-to-face time.

Flipped learning, is increasingly pervasive in many educational settings. Research suggests that self-regulated learners benefit more in the flipped learning pedagogical environment than those who have low self-knowledge and self-management (Broadbent & Lodge, 2021). Self-regulation is one of the main subcomponents of metacognition. There is a need to help teachers to be metacognitive teachers so that, in turn, metacognitive learners may be cultivated through

daily classroom instructional activities and teacher practice. This study introduces a framework for teachers' instructional activity design in flipped learning pedagogical environments to enhance the effectiveness of school wide technology integration. The framework derives from Vygotsky (1987)'s aspects of learning, incorporating theories of metacognition, dialogue, and a flipped learning approach. Teachers when designing and practising their instructional activities to foster students' metacognition could use this theoretical framework as a guide.

However, the direct flipped learning adoption without reform and contextualisation has created a dilemma in the flipped classroom, with students feeling they are required to "teach themselves" and teachers feeling that they do not know how to implement a flipped classroom approach (Miles & Foggett, 2016). Likewise, Yang (2017) argues that not all students perceive the equivalent benefits as expected, and more specifically, the learners who benefit most are those who have a high level of motivation for achieving success in learning. Facilitating students' motivation in flipped learning requires the provision of solid preparation of the teachers. In this research, the learning needs and difficulties experienced by students and teachers encouraged teachers to engage in professional learning in order to engage students in effective learning when using technology (Teng et al., 2022).

### **1.8 Statement of the research**

This research aimed to enhance teacher mediation to foster students' metacognition in flipped learning in a middle-high boarding school in China. Designed workshops provided teachers with opportunities to enhance classroom dialogue with a view to enhance their students' metacognitive thinking. To investigate this, I used qualitative research methods within a sociocultural paradigm to explore the processes that enable teachers to engage in mediational metacognitive thinking with each other and their students within the flipped learning context.

Sociocultural theory is an emerging field of psychology that looks at the contributions of society to individual development. Vygotsky (1987) believed that parents, caregivers, peers, and the culture at large are responsible for developing the brain's higher-order functions. According to Vygotsky, human development relies on social interaction and, therefore, can differ among cultures.

In this study, the argument is: the transition of cognition to metacognition doesn't happen automatically, teacher mediation is needed. Articulating the role of dialogic talk in regulating learning, Vygotsky (1987) emphasized that teachers use language to regulate students' learning behavior. If this learning behavior becomes metacognitive this can then become a tool of self-regulation for students to apply in similar situations in the future (Daniels, 2016). However, unless the teachers have experience of student-centred learning as learners themselves (through carefully designed professional learning workshops that they can draw on) then their own metacognition may be limited, and their understanding of dialogic and practice strategies to use to mediate cognitive to metacognitive student thinking.

### **1.9 Importance of the topic**

Lifelong learning and flexibility for rapid change in a global and digital world requires students to be more autonomous in study and life. The development of self-regulation is imperative through a teacher mediation process. The current educational system in China is very high-pressured due to the competitive work market and high stakes testing. Thus, there is a need for Chinese students to maximise all learning opportunities. Literature (Guo, 2020; Livingston, 2003; Paris & Winograd, 1990; Teng et al., 2022) suggests that developing metacognitive skills

and practice enhances students' learning. In addition, metacognitive learners are aware of how to plan, monitor, and assess their own learning.

In this study, I worked with teachers to develop their own and their students' metacognitive thinking. It provides insight into how they enact their professional understanding in classroom practice and how mutual influence works between teachers and their students in the process of metacognitive engagement in a flipped teaching context. The study attempted to highlight the complexities of dialogue that shapes learners' sense making in the flipped learning context and influence future effective pedagogical practices in English, mathematics, chemistry in the school. Flavell (1979) expressed a broad vision in respect to metacognitive engagement, teaching students (and adults) to make wise and thoughtful life decisions and learn in informal educational settings. The research also provides insights into the necessity to provide professional learning for teachers' competence and further facilitate students' learning in order to better prepare them for life and work in the digital age.

### **1.10 Research questions**

The research questions which guided this study were:

1. What are teachers' beliefs and students' needs for developing metacognitive thinking in flipped learning?
2. In response to professional learning, how do teachers enact strategies to elicit students' metacognitive thinking in the classroom?
3. What are teachers' beliefs and students' perceptions of factors influencing student metacognition development in the flipped learning context?

## **1.11 Outline of the thesis**

This thesis organised into a further six chapters as outlined below.

### **Chapter 2 – Literature Review**

Chapter 2 reviews the literature related to metacognition mediation. It begins with a look at its need in the background of schooling systems middle high school in China. This chapter discusses literature related to metacognition, professional learning and flipped learning in order to build a framework that underpins the research. This chapter also concludes with an outline of the significance and rationale of the study.

### **Chapter 3 –Research Methodology and Methods**

This chapter discusses various research paradigms and justifies the methodological paradigm adopted for this study. This chapter further outlines the background, research design, my role as researcher, methods and processes used for data analysis and identifications of themes. It also includes ideas of rigour and ethics.

### **Chapters 4-6**

These chapters present findings of this research.

Chapter 4 presents the findings from the classroom observations and interviews prior to the teacher workshops. The findings respond to research question 1: What are teachers' beliefs and students' needs for developing metacognitive thinking in flipped learning contexts?

Chapter 5 presents data to answer the research question of "In response to professional learning, how do teachers enact strategies to elicit students' metacognitive thinking in the classroom?"

Chapter 6 presents the findings from the interview data and generated documents from both teachers and students after the intervention and the end of the research stage. The findings respond to the research question "What are teachers and students' perceptions of factors influencing student metacognition development in the flipped learning context?"

### **Chapter 7**

The purpose of the research was to enhance teacher mediation to foster students' metacognition in a flipped learning context. This chapter discusses the main findings to answer the research questions. Conclusions and implications are also presented.



## **Chapter 2 Literature Review**

As outlined in Chapter 1, this research explored how teachers and their students developed and engaged in metacognitive thinking within a flipped learning context in a middle-high boarding school in China. This chapter discusses literature related to metacognition, professional learning and flipped learning in order to build a framework that underpins the research.

### **2.1 Metacognition and higher-order thinking**

As introduced in Chapter 1, the shift from teacher-centred to student-centred education in flipped learning contexts requires students to possess the tools they need to direct the educational process: the metacognitive skills.

#### ***2.1.1 Metacognition***

The term metacognition was introduced by Flavell (1979) to refer to an individual's awareness and reflection on their cognitive procedures and strategies. Therefore, metacognition denotes the unique human capability to be self-reflexive: not just to think and know, but to think about thinking and knowing. Prior to Flavell's definition of metacognition, Vygotsky (1978) had emphasized that conscious reflective control was an essential factor in school learning. Vygotsky suggested that there were two factors in the development of knowledge: automatic unconscious acquisition and a progressively increased active awareness and control over that knowledge. The two factors, according to Karpov and Haywood (1998), essentially marked the separation between cognitive and metacognitive aspects of performance. Anderson (2002) also asserted that metacognition is different from cognition in the sense that the latter focusses on gaining knowledge, but the former considers the categorisation and management of the acquired knowledge. The ability to categorise and manage knowledge ensures that learners are effectively using their intellect and by extension taking control of their learning. More recently,

Basu and Dixit (2022) pointed out that metacognition refers to higher-order thinking that involves active control over the cognitive processes engaged in learning. Research suggests that learners with higher-order thinking have a learning advantage in technology-enhanced environments over those with low self-knowledge and self-management (Avargil et al., 2018). Higher order thinking is discussed as a key construct of metacognition.

### ***2.1.2 Defining higher-order thinking***

Two orders of thinking are involved in learning: lower order thinking and higher order thinking. Newman (1994) defined that lower order thinking demands only routine or mechanical application of previously acquired information, such as listing information previously memorized or inserting numbers into previously learned formulas. In contrast, higher order thinking, according to Newman, occurs when the student is required to interpret, analyze, or manipulate information. Higher-order thinking facilitates learning. Research also suggests that metacognition is important for higher order thinking. For example, Sternberg (1985) argued that tasks that particularly require metacognition in order to be successful are more likely to require higher-order thinking. Moreover, tasks that can be completed without any metacognition are lower-order tasks. Sharing this view, Anderson (2002) stated that metacognitive learners think at a higher order and are more likely to be able to judge when one task is slightly harder than the last task, they can make connections to their previous learning.

However, arguments have also been raised by researchers that a situation that requires higher-order thinking by one person may need only lower-order thinking by another person (Miri et al., 2007; Wilson, 2010). Therefore, the teaching of lower and higher order thinking skills are likely to be interwoven. Guo (2020) argues that the most effective approaches to metacognitive instruction involve providing the learner with both knowledge of cognitive processes and

strategies and experience or practice in using both cognitive and metacognitive strategies. However, the transition between the two does not happen automatically.

### ***2.1.3 Higher-order thinking in the Chinese context***

Higher-order thinking is linked with metacognition. Higher order thinking and learning are important in the Chinese context. This argument is articulated based on (a) educational policy, and (b) school changes and subsequent requirements for learning.

In the educational policies released in China in 2020, the Ministry of Education planned to mobilize the teaching resources from advanced educational areas (e.g., Beijing, Shanghai) to build stronger and better free online learning resources that promote educational equity countrywide (Chinese Ministry of Education, 2020). For example, the Cloud Platform of National Primary and Secondary School Network (website: [ykt.eduyun.cn](http://ykt.eduyun.cn)), administered by the Ministry of Education to integrate high-quality teaching resources from the countryside, provinces, cities, and schools, started operation on the February 17<sup>th</sup>, 2020. The launch of the platform at first aimed to support local governments for "suspending classes without stopping school" during the period of Covid-related lockdowns and help students to study at home. The Cloud Platform supported by digital companies worked smoothly and well. Users were from 31 out of 34 provincial-level administrative units across the country, and the number of views reached more than 8 million on the first day of the platform running.

Meanwhile, the Covid-lockdowns promoted the technological transformation within schools when students returned to campus: many schools continued using the Internet as a platform to transmit teaching content (Chen et al., 2022). In part, this shift acknowledged the benefits of vivid images and extensive high-quality resources. For instance, the Cloud Platform enables

users to access and watch the instructional videos online produced by well-known teachers asynchronously (Chen et al., 2022). Whilst the free digital resources provided by the Cloud Platform benefit students in relation to accessing high-quality teaching resources, challenges are also being raised when students are required to use higher order thinking to process the information into practice.

#### ***2.1.4 Transition between cognition and metacognition does not happen automatically***

Transition between the two levels of learning usually does not take place automatically, but it can be stimulated through explicit guidance and various practice (Karpov & Haywood, 1998). According to Flavell, Miller, and Miller (1985), Vygotsky (1962) and Anderson (2002), effective learning consists of two levels: cognitive level and metacognitive level. Taking the same line of argument, Wood (1988) utters that learning is taking place on at least two levels: the learner is learning about the mission, emerging local knowledge, and learning how to construct his own knowledge and thinking. It is the subsequent level of learning as suggested by Wood (1988), and discussed further below, that comprises metacognitive capabilities.

Vygotsky's (1978) sociocultural theory emphasizes that guidance through mediation could be effective in bridging the gap between the two levels of learning (Crawford & Capps, 2018; Daniels, 2016; Miri et al., 2007). Rowan et al. (2019) also stress the essential role of teacher mediation in the transition of a student's knowledge from a cognitive to metacognitive level and suggest that educating teachers to be better mediators is crucial. Metacognitive skills can help students to transfer what they have learnt from one context to the next or from a previous task to a new task (Halpern, 1998). Teacher mediation is important in this research. Because of this, the next section defines teacher mediation and its significance in learning.

## **2.2 Teacher mediation**

Teacher mediation is a critical factor in this study. In this section, teacher mediation is defined, and its significance and role in problem solving are discussed.

### ***2.2.1 Defining mediation and its significance***

The central concept in Vygotsky's cognitive psychology is mediation (Karpov & Haywood, 1998). According to Vygotsky (1978), all specific human psychological process is mediated by psychological tools such as language, signs, and symbols (Daniels, 2016). In the process of mediation, teachers teach these tools to students in the course of their joint activity, the students internalize them, and these tools then function as mediators of the students' more advanced psychological processes (Capobianco et al., 2020; Daniels, 2016; Moll, 2013; Wertsch, 2007).

Thus, mediated learning relies on the guidance of an advanced learner such as a teacher, whose role is to help interpret the complex world of input from the environment so that the learner can focus, frame and consider relationships (Daniels, 2016; Friedman, 2003). As far as framing and examining relationships in problem-solving is concerned, Bruer (1997) asserts that the only way students can develop meaningful knowledge and hence attain metacognitive skills is to marry concepts to procedures. In essence, Bruer (1997) advocates for teaching by demonstrating the links between concepts and procedures in order to achieve successful outcomes in problem-solving. In this study, I interpret cognitive knowledge as knowledge of defined concepts, and metacognitive knowledge as self-monitoring skills and processes.

Vygotsky (1978) asserts that effective problem solving depends on the ability of students to work independently with internalized tools. However, Vygotsky (1978) indicates that despite the impressive complexity of the human brain, it is limited in capacity (Daniels, 2005; Moll,

2013). Capacity in this regard refers to the potential or suitability for holding, storing or accommodating information in a particular period (Flavell, Miller, & Miller, 1985). For students to work independently with internalized tools and solve problems accurately, the mental capacity of the students must be increased. An increased functional mental capacity can be achieved via teacher mediation (Karpov & Haywood, 1998) and involves cognitive and metacognitive mediation and mediation from cognitive to metacognitive development (Meichenbaum, 1977). I will discuss more in section 2.4 about supporting students to be metacognitive learners.

### ***2.2.2 The role of mediation in effective problem solving***

Problem solving can be characterized as a cognitive process that is goal-directed and requires effort and concentration of attention (Van Someren et al., 1994). When people engage in problem solving, they need three parts of thinking: cognition, metacognition, and the transition of the two by matching what they know and the incoming information. The increased functional capacity frees up more attention and time to devote to a higher level of executive or metacognitive processing.

In other words, the person has some capacity left over for selecting problem solving strategies, for regulating their activity, and for monitoring their effectiveness (Flavell 1979; Vygotsky & Cole, 2018). Therefore, only if the interplay of the cognitive information and metacognitive function works well, then capacity can be freed for solving problems productively. In this study, teachers' mediational behaviour is situated in the cognitive process of problem solving. It involves knowing where students are in this cognitive process, then giving the knowledge they need and lastly monitoring the problem-solving process with them to form a tool for independent learning.

The overarching theory that influenced the development of teachers' mediational processes in this study is Vygotsky's (1978) mediated theory. Flavell's (1985) cognitive theory and the language tool of Buber's (1970) dialogic theory also informed the mediational approach of the study. Vygotsky's mediated theory is emphasized because teachers' mediation as a phenomenon of this study aligns with Vygotsky's core understanding of learning, that is, learning is mediated historically and culturally within dialogic talk (MacBlain, 2018). Further, Buber's (1970) dialogic theory emphasizes the need for mutuality, reciprocity and equality through dialogue between the teacher and students to create a dynamic learning environment. With a vision of this environment, the goal of this study was to facilitate students' metacognition in classroom practice.

### **2.3 The role of metacognition in learning**

Flavell (1979) expressed a broad vision of metacognitive engagement and emphasized the relevance of metacognition for making wise and thoughtful life decisions as well as to comprehend and learn better in formal and informal educational settings. Similarly, Hofer and Pintrich (2002) highlighted the influence of metacognition on the development of epistemological thinking, assisting learners to understand the nature of their beliefs and motivations in their life and study. In addition, Artman and Garbis (1998) asserted that metacognition is especially important because it affects acquisition, comprehension, retention, and application of what is learned, in addition to affecting learning efficiency, critical thinking, and problem solving.

Perkins and Salomon (1992) defined four levels of metacognitive learners: tacit, aware, strategic, and reflective. 'Tacit' learners are unaware of their metacognitive knowledge. They

do not think explicitly about any particular strategies for learning and merely accept if they know something or not. ‘Aware’ learners know about some of the kinds of thinking that they do – generating ideas, finding evidence, etc. – but thinking is not deliberate or planned. ‘Strategic’ learners organize their thinking by using problem solving, grouping and classifying, evidence seeking, decision making, etc. They know and apply specific strategies that help them learn. ‘Reflective’ learners are not only strategic about their thinking, but they also reflect upon their learning while it is happening, monitoring the success of any strategies they are using and then changing them as appropriate. Therefore, taking the significant role of metacognition in students’ effective learning, there is a need to break down metacognition into more concrete components to see how it functions in learning. In this study, I categorized metacognition into three main functional components: cognitive knowledge, self-regulation and self-knowledge. (See Figure 2.1, Section 3.8.2). I interpret cognitive knowledge as knowledge of defined concepts; therefore, it relates to learned subject matter knowledge. In the next section, the other two main components, self-regulation and self-knowledge, are unfolded and discussed.

### ***2.3.1 Self-regulation as a main component of metacognition***

Zimmerman and Schunk (2011) emphasized that an important quality of humans is the capability to self-regulate; self-regulation refers to self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals. Boekaerts et al. (1999) added that though every person attempts to self-regulate his or her functioning in some way to gain goals in study and life, it is inaccurate to speak about anyone who is absent in self-regulation. Nevertheless, it is the gap between effective regulating and ineffective regulating of themselves that forms self-regulation. Individuals need to know themselves well to be able to take action to make progress.



Metacognitive awareness enables self-regulation over thinking and learning processes and products. More broadly, metacognitive development is a construct that describes people becoming aware of and reflective about their own thinking, and ability to regulate and manage the ways in which it is influenced by external sources, in both academic, work, and personal life settings (Kuhn, 2000). Hattie (2012) emphasized that self-regulated learners allocate appropriate amounts of time and resources to learning, engage in self-testing, and evaluate the products and outcomes of their learning.

Paris and Winograd (1990) clarified that metacognition enables learners to have personal insights into their own thinking and fosters self-regulated learning. Further, students who are metacognitive effectively have greater autonomous learning ability and better learning outcomes; students who are not good at using the metacognitive thinking are usually in the passive state and have poor self-regulated learning ability in decision making (Basu & Dixit, 2022). Metacognition can help learners to know themselves better in order to better manage what they know, how to know, and why and when this knowledge should be used. Self-knowledge as another critical component of metacognition is discussed next.

### ***2.3.2 Self-knowledge as a main component of metacognition***

Self-knowledge enables learners to better understand what they know and what they do not know about themselves as learners and it is a critical construct of metacognition (Flavell & Miller, 1998; Flavell et al., 1999; Kuhn, 2000). In other words, they do not own their knowledge if they do not know they know it (Kuhn, 2000). However, one's self-knowledge is invisible; metacognition can help make self-knowledge visible (Flavell & Miller, 1998). For instance, Nielsen et al. (2009) indicated that metacognition enables students to verbalize their thinking, making their exhibited knowledge reachable by themselves through the process of negotiating,

sharing knowledge and collaborating with others. As such, the learner knows what they know and learns from what they do not know. Therefore, knowing themselves better helps learners explore fully in their learning.

Paris and Winograd (1990) argued that children frequently encounter situations in the classroom where they must ask questions of themselves such as: What do I know about this topic? How much should I try? The forethought of self-exploring helps learners make actions to achieve the goal. However, at times, learners whose skills or knowledge is weak in a particular area can overestimate their ability in that area (Kruger & Dunning, 1999; Pintrich, 2002). Even though confidence as a learner is necessary to take risks and surpass regular performance, overestimation of knowledge is problematic. This can lead to wrong choices. For example, a student preparing for a test who overestimates their knowledge may choose not to review the content thoroughly before the test, which may result in failing the test. Miller (1993) emphasized the importance of knowing self because:

It is one of the essential features of such incompetence that the person so afflicted is incapable of knowing that he is incompetent. To have such knowledge would already be to remedy a good portion of the offense. (p. 4)

Supporting Miller's views, a study by Kruger and Dunning (1999) with 65 participants from Cornell University psychology undergraduates asked the participants to assess their ability and test performance. The findings posit that participants tend to hold overly optimistic and miscalibrated views about themselves. The study further clarified that those with limited knowledge in a domain suffer a dual burden: Not only do they reach mistaken conclusions and make regrettable errors, but also their incompetence stops them from realizing this. In other

words, if one has a low score, one has a higher chance of overestimating one's performance than underestimating it.

On the other hand, learners whose knowledge or skills are strong may underestimate their ability, which may result, for example, in losing a good chance to volunteer to participate in a competitive game. Therefore, there is a need to teach learners metacognitive ability at all ability levels to self-assess their performance more accurately. A critical aspect of teaching includes the ongoing assessment of learners' knowing and gaps in learning (Giles & Earl, 2014). However, self-knowledge is often invisible to others (Teng et al., 2022). Helping students to express their self-knowledge is important so that teachers can know what students know about their understanding and themselves.

This research is based on the view that metacognitive learners are able to self-plan, self-monitor, self-check and self-evaluate, and that they have an accurate understanding of their knowledge and how they can reach their goals in both study and life.

## **2.4 Students can be supported to be metacognitive**

Section 2.2 discussed the important role of teacher mediation in metacognition development from a theoretical perspective. This section presents the literature to evidence that metacognition can be taught through classroom practice.

### ***2.4.1 Metacognition can be taught***

Because metacognition plays a critical role in successful learning, it is important to study metacognitive activity and development to determine how students can be taught to apply their cognitive resources through metacognitive control. Researchers have shown that students can

be taught metacognitive skills through teacher intervention of practice, feedback, and coaching. For example, Anderson (2002) examined the role metacognition can play in the teaching and learning of a second language and developed a model of metacognition that is made up of five components: preparing and planning for learning, selecting and using learning strategies, monitoring strategy use, orchestrating various strategies, and evaluating strategy use and learning. Anderson reflected that the teaching of metacognitive skills is a valuable use of instructional time for a second language teacher. This is because when learners reflect on their learning strategies, they become better prepared to make conscious decisions about what they can do to improve their learning.

Rather than focus students' attention solely on learning the language, second language teachers can help students learn to think about what happens during the language learning process, which leads to the development of stronger learning skills. This finding is also evidenced by Perry et al's. (2019) meta-analysis of over 50 studies on teaching metacognition in schools. The findings showed that teaching metacognition in schools could have a very positive effect on students' learning outcomes and well-being.

In other words, metacognitive training can enable learners to make progress and solve problems. In China, Lan et al. (2019) conducted experimental research involving 111 student participants at a public research university in Beijing. The sample included students majoring in physics, educational science, psychology, politics, management science, economics, and educational technology. Participants were divided into small groups and assigned to experimental and control conditions. Students in the experimental group received group metacognitive scaffolding during an online collaborative learning process, including evaluating the tasks; sharing information and engaging in discussion to solve problems; then conducting

self-testing to evaluate whether they had achieved the expected outcomes. Those in the control group performed online collaborative learning without group metacognitive scaffolding.

The results indicated that group metacognitive scaffolding had significant impacts on group performance. This suggests that teachers should pay more attention to whole-group metacognitive knowledge and skills. Likewise, Paris and Winograd (1990) pointed out teachers can promote metacognitive awareness directly by informing students about effective problem-solving strategies. Therefore, effective teachers are those who can make deliberate and informed adaptations in response to different educational settings and learning individuals while teaching metacognitive strategies (Hoffman & Pearson, 2000). Identifying metacognitive strategies and teaching these to students is a core focus of the research reported in this thesis because the aim of this research was to enhance teacher mediation to foster students' metacognition in flipped learning classrooms in a middle-high school in China.

#### ***2.4.2 Metacognitive strategies in teaching***

Previous research has found that metacognitive strategies are important for metacognitive facilitation of effective problem solving. Such metacognitive strategies are ones that students can further develop with practice and explicit instruction. For example, Gordon and Braun (1983a) explored the importance of assembling a set of organised notes in reading comprehension and found that well-organised data charts could be powerful tools to take the pressure off memorising details. In another study, Gordon and Braun (1983b) found that recognising an explicit storyline in the reading was beneficial for students to understand and recall stories effectively. Importantly, Van Merriënboer and Paas (1990) pointed out that detailed procedural knowledge is often implicit and not easily verbalized in instructional talk. The authors investigated visualised worked examples as an alternative way to communicate

the detailed procedural knowledge and identified that worked examples as concrete metacognitive strategies helped students make the steps in the problem solving explicit.

Various strategies can guide students towards building well-arranged content knowledge (e.g., chart, story structure) for metacognition development. For instance, Shintani et al. (2016) investigated the learning effects of a visual grammar-teaching method in which images were used to assist students' grammar learning and found that the participating students had positive views of the visual grammar teaching method. Moreover, in Zhang and Qin (2018)'s research, the authors invited a total of 400 year-two Chinese English language learning students from an Eastern Chinese university to respond to a questionnaire on language learners' metacognitive writing strategies in multimedia environments. The study found that a three-factor metacognitive structure was helpful for students' writing: advanced planning before writing, elaborate monitoring during writing and prompts evaluating after writing. Metacognitive strategies have also been researched in students' listening comprehension practice. For example, Zheng (2018) showed that metacognitive strategies facilitate secondary school students' listening comprehension. The authors suggested that students should be intentionally trained to be conscious of metacognition, helping them better plan their learning and improve their ability to self-monitor and self-evaluate their learning.

Together, the findings reported in this section underscore how metacognitive strategies can enhance metacognition mediation (e.g., visualising tools); however, more attention needs to be paid to supporting and empowering the teacher to know how the instructional activities are constructed and applied in the classroom practice. Supporting students to develop metacognitive strategies can be challenging for teachers. Empirical studies demonstrate that teaching metacognitive skills is much harder than teaching cognitive ones (Tempelaar, 2006).

Loughran and Menter (2019) further assert that making teaching applicable and articulable is a necessity in achieving metacognition among students. In this research, teacher mediation of student metacognition development is researched through classroom talk in a flipped learning context. Talking about their learning can empower students to reflect on their thinking and take responsibility for their learning (Daniels, 2016). Through talk, learners build consciousness, learn control over internal cognitive functions, and develop conceptual tools for thinking (Fisher et al., 2007). Classroom talk as a tool of metacognition facilitation is used in this study, and this is discussed in the next section.

### ***2.4.3 Classroom talk in metacognition***

Articulating the role of talk in regulating learning, Vygotsky (1987) emphasized that teachers use language to regulate students' learning behavior, which can then become a tool of self-regulation for students to apply in similar situations in the future (Daniels, 2016). Talk is also deemed as a key tool that teachers use to diagnose and assess the level of content knowledge that students bring to the classroom in order to prepare and construct learning opportunities for students (Giles & Earl, 2014).

Pintrich (2002) emphasized that teachers can start a discussion, ask questions, listen to the answers, and talk with the students to make an initial judgment about the depth of their content knowledge. This type of informal assessment can inform the instruction and support students to develop both content knowledge and metacognitive knowledge (Friedman, 2003). From these informal assessment conversations, teachers also may be able to make inferences about the level of metacognitive knowledge of individual students. In other words, teachers can talk to students individually or in small groups to estimate levels of cognitive and metacognitive knowledge.

Instructional talk is a form of a discussion-based lesson that develops students' conceptual knowledge and understandings through guided dialogue where all students are held accountable for participation (Goldsmith, 2013). In instructional talk, which is also called dialogic teaching (Lyle, 2008), teachers listen carefully, interpret the intended meaning, and adjust responses to assist the students' efforts in ongoing learning activities. Alexander (2008) defined dialogic teaching as using dialogue to teach as a collective and collaborative inquiry in which respondents and solutions appear in the open-ended recursive talking about the learning content. Dialogic talk in teaching is a pedagogical approach that uses the power of talk to help shape learners' thinking and to support their engagement and learning. Subsequently, Alexander et al. (2016) pointed out that language provided the tool that mediates the associated mental activities in the internal discourse of inner speech. In other words, in dialogic teaching, the teacher harnesses the power of talk to engage children, stimulate and extend their thinking, and advance their learning and understanding (Daniels, 2016).

A teacher needs support in using talk to intervene in students' metacognition development. For instance, Zepeda et al. (2019) compared teacher talk from 20 middle school mathematics classrooms with large increases in conceptual mathematics scores with teacher talk from 20 classrooms with low growth. For each of these classrooms, they examined the amount of teacher talk that supported metacognition during one regular class period. Observations revealed that the high-conceptual growth classrooms had more metacognitive support for personal knowledge, monitoring, evaluating than the low-conceptual growth classrooms. As a result of their findings, they developed a metacognitive support framework consisting of two dimensions. They used this framework to support teachers' talk in metacognitive teaching. Their first dimension focuses on the metacognitive content of the support, which includes



metacognitive knowledge (personal, strategy, or conditional) and metacognitive skills (planning, monitoring, or evaluating). The second dimension focuses on metacognitive delivery, which is defined as including the manner of the delivery (directives, prompting, or modelling), and the framing of the delivery (i.e., whether it is problem specific, problem general, or domain general). Similarly, in another study, Griffith et al. (2016) explored classroom practice as a means to promote awareness of, and engagement with, in-the-moment teaching decisions. The authors used examples from mathematics, social studies, and literacy methods courses and identified that teachers' ongoing metacognitive decision-making skills in teaching can be cultivated from professional learning.

However, students' ongoing classroom responses to teachers can be unpredictable in advance; teachers may need to engage in professional learning about the role and use of metacognition theories in classroom practice to develop their ongoing metacognitive decision-making skills (Avargil et al., 2018).

## **2.5 Developing metacognitive teachers**

As addressed in section 2.6, metacognitive training is challenging in teacher professional development programmes to develop metacognitive skills and developing metacognitive teachers seldom works because classroom teaching cannot be predicted in advance as the knowledge construction is situational (Duffy, 2006; Tempelaar, 2006). In addition, teachers must make ongoing responses to students' emerging understandings. The ongoing nature of this process increases the level of difficulty in developing teaching skills for metacognition development in students. Duffy (2006) clarified that metacognitive skills training for teachers should be based in within a constructivist approach to learning, that is, teachers construct new knowledge and understanding about how to teach based on what they already know and believe.

Effectiveness in fluid classroom environments, as referenced above, requires teachers to know where to be and what to do and say at the right time (Berliner, 1994). This is, in short, to be metacognitive.

Whilst research suggests that metacognition may be difficult to teach (Duffy, 2006; Tempelaar, 2006), in fact, metacognition is composed of several elements, some of which are difficult to teach (about how) and some of which are not very difficult to teach (about what). In other words, some elements may be more difficult to teach than others. For example, traditional teacher professional development focuses on the knowledge components (Duffy, 2006), which are the most teachable. Therefore, traditional professional development programs seldom help teachers to be in charge of their own teaching. However, metacognitive teachers are those who take charge of their work and are adaptive decision makers. Duffy (2006) clarified that supporting teachers to become metacognitive cannot be superficial, only emphasizing passive accumulation of knowledge and compliance with expert recommendations, which in turn causes teachers to do exactly as they were told to do.

In contrast, Duffy gives four suggestions on developing metacognitive teachers in professional learning. Firstly, teacher professional learning should promote teachers' personal agency. This means that teachers must be freed of the traditional expectation that the *experts* will provide the *right answers*. Instead, the priority task is to support participating teachers to self-regulate and make their own decisions. In this study, I gave the ownership of workshop learning to teachers by having a variety of activities and discussions to develop their own teaching plan. Secondly, teachers decide on the goals on how to proceed with implementation and on how to evaluate their efforts to establish learning groups and community. In this study, teachers implement the metacognitive strategies to elicit students' thinking in classroom practice.

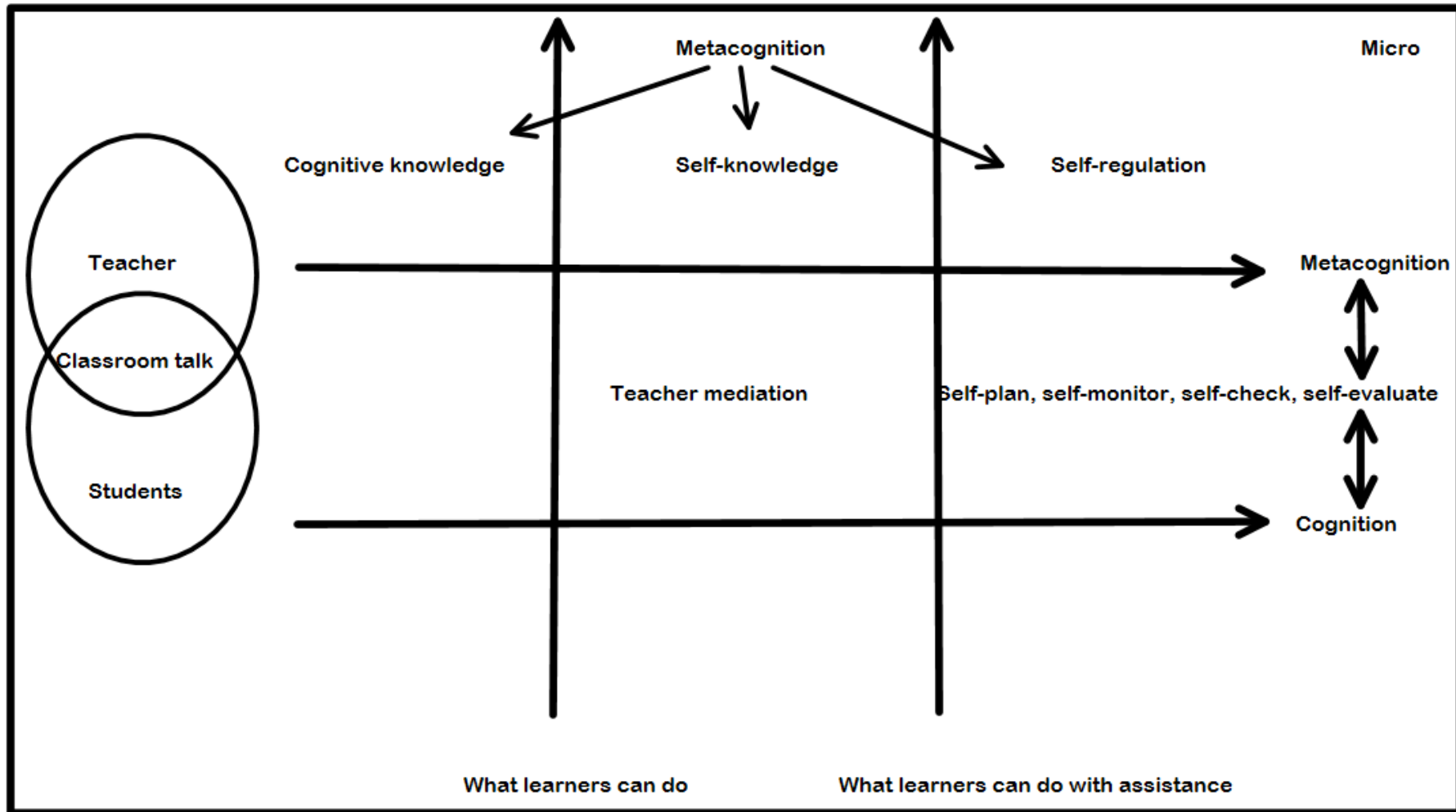
Thirdly, self-regulated teachers do not simply use knowledge; they adapt it as they teach. Consequently, whereas content knowledge is often associated with successful professional development efforts (Garet et al., 2001), the curricular responsibility of professional learning providers is to help develop participating teachers' abilities to transform knowledge to fit different demands in different learning situations. In this study, teachers used a theoretical framework as a thinking tool to transform knowledge to address different students' learning needs.

Fourthly, teacher-led collaboration and reflection should be prioritised in professional learning provision (David & Ball, 1999). In addition, extensive time must be devoted to practice in real teaching situations because metacognitive teaching is a subtle and essential artful process. In this study, I worked with teachers for 5 months in implementing the cyclical research design from observation, workshop to classroom practice, ending up with reflective interviews.

### ***2.5.1 Beginning to develop a framework for this study***

To support this study, the framework I developed and shown in Figure 2.1 aligns metacognition (upper horizontal arrow) with Vygotsky's learning aspects of theories (lower horizontal arrow: cognitive development). Vygotsky's concept of zone of proximal development (the gap between what learners can do and what learners can do with assistance) is visualized to make correlation with metacognition development in the framework. There are three core elements in metacognition: knowledge of cognition (links with prior knowledge), knowledge of self (links with zone of proximal development), and knowledge of self-regulatory skills (four skills: self-planning, self-monitoring, self-checking, and self-evaluating) (Karpov & Haywood, 1998).

Figure 2.1 Theoretical framework for teacher workshop learning



As illustrated in Figure 2.1, the left-hand side of the framework shows the mediation process between the teacher and students. Through this process, teachers focus on supporting students to identify their current level of cognitive understanding, and to use this to facilitate their metacognitive thinking (cognitive knowledge or knowledge of cognition; self-knowledge; self-regulation). This involves four self-regulatory steps: self-planning (what is my goal and how long I need to do it or what resources I have, what help I need to seek), self-monitoring (utilize the resources available to actively reach the goal being set in planning stage ), self-checking (am I still on track?), and self-evaluating (how does this experience inform my further learning?). This partial framework formed the theoretical basis for the workshop series that was key to this study (see Section 3.8.2).

Sections above emphasized the mediating role of teachers, and the importance of teacher professional learning to develop teachers' abilities to support metacognitive behaviors of students. The next section considers flipped learning as a context for this study.

### ***2.5.2 Flipped learning and the interactive learning environment***

Garmston and Wellman (2016) suggested that flipped learning could transform classrooms from teacher-centered to student-centered. For example, within a flipped learning context, when using flipped learning videos, students can learn at their own pace. Teachers can make all resources available to students in class and make technological devices available for video lecture viewing with the school information technology groups (Bergmann & Sams, 2016; Hwang et al., 2015). This approach allows all students to move through the content at their own pace with the teacher's support, as and when they need it. As discussed in Section 2.4.3, creating a learning environment that supports metacognition promotes students to engage in talk and internalize the instructions they get. Bergmann & Sams (2016) emphasized that a

teacher is the primary mediator of children's cognition and metacognitive awareness. Teachers can encourage students to be interactive and responsive in learning, as such questions and opinions are encouraged in ongoing learning activities on class. Such a climate will in turn provoke teachers to devote more time to the process of teaching. As argued in Section 2.2.1, the pedagogical implication of Vygotsky's theories is that teacher-student interaction can contribute to high-quality thinking (Livingston, 2003). Flipped learning as a pedagogical approach promotes students go through concept development without receiving prior instructions (Kirch, 2016).

Similarly, Nerantzi (2020) pointed out that flipped learning enhances the active and autonomous learning of students, changes the relationships between them and with the teacher, and encourages innovation within the learning process. However, students need scaffolding to become capable of self-regulated learning. Otherwise, there may be a classroom environment where students "self-paced became no pace" (Ash, 2012, p. 4). In other words, when students have ownership of when they view the videos, there is a risk that they may lack self-regulation in managing the time and utilizing the information in problem solving.

### ***2.5.3 Flipped training model for teachers***

There are various ways for teachers' professional learning; a flipped training model is used as one way of training teachers. In a flipped training model, teachers can access the digital content independently so that face-to-face time can be used for other areas of focus. This model provides the opportunity to develop greater collaborative idea sharing among teachers and a fully embedded use of technology. For example, Romero García et al. (2018) investigated and implemented flipped training model in the curricular design course offered in two different departments, Mathematics and Computer Science, as part of the master's degree program in

secondary education teacher training, taught online by the International University of La Rioja. The findings suggested that the teachers were satisfied with and found this model useful, and that they attained better academic performance and fostered very positive attitudes among the teacher students as a whole.

Bergmann and Sams (2016) support this view, as they asked: “how can educational class time and professional training time be maximized to meet the demands of specialized instruction, difficult schedules, various learning styles, expensive travel costs and constantly changing curriculum?” (p.29). As a result, this flipped training model is likely to be a loud voice shaping the future of training and development (Tolks et al., 2016). This research used a flipped learning approach for the teacher workshops, modeling a flipped learning pedagogy to attempt to create a supportive environment for teacher-learners to be active learners who take responsibility for their learning and teaching. The next section draws on the literature discussed above in order to introduce the theoretical framework that underpins this research.

## **2.6 Teacher beliefs and challenges in PD**

Studies have shown that teacher beliefs about learning have direct relationships with how teachers use technology in the classroom, thus translating technology availability into actual practice (Cheng et al., 2020; Ertmer et al., 2012; Vongkulluksn et al., 2018; Wozney et al., 2006; Xie et al., 2019). One way to help teachers use technology effectively is through professional development (PD). However, understanding of how exposure to PD relates to teachers’ personal characteristics is complex. For example, Bowman et al. (2022) did a study to investigate the relationships among PD exposure, teachers’ abilities and values, and teachers’ quality of technology integration, according to Bloom’s taxonomy. By surveying 724

middle and high school teachers, results suggested that PD may be most effective when targeting improving teachers' values in addition to enhancing technology-related skills.

Timperley et al. (2007) pointed out the challenges of teacher PD, arguing that much PD has not been effective in terms of achieving change in teacher practice. They acknowledge that there are multiple layers to be uncovered in teacher PD. This multiple layering means that the connections between cause and effect are complex. For example, teacher can experience that a sustained training time rather than one off workshop would help more efficiently, and that subject matter-specific related training might be more useful to theoretical ideas in general.

These authors use a 'black box' as their metaphor for the relationship between teacher learning and student learning. However, Phillips and Hardy (2002) used 'teacher agency' instead of 'black box', stating that teacher agency in PD is easily impacted by the environment directly or indirectly accommodating them, including multilayers of school systems, family, collegial community, school policymakers, and the ideology of society. In this study, teacher participants' agency in practice was explored to examine teachers' behaviours in how they enact any pedagogical changes in their classroom and their willingness to engage in the school community.

Effective technology integration begins with teacher change (Ertmer & Ottenbreit-Leftwich, 2010; Harris, 2005). Therefore, PD programs aiming to influence change in how technology is used in the classroom should target changing teacher-related factors (Ertmer & Ottenbreit-Leftwich, 2010). This not only includes improving teachers' strategic and instructional knowledge, but also their perceived ability and attitudes. For example, Ertmer et al. (2012) conducted interviews with twelve teachers who had previously won awards based on their

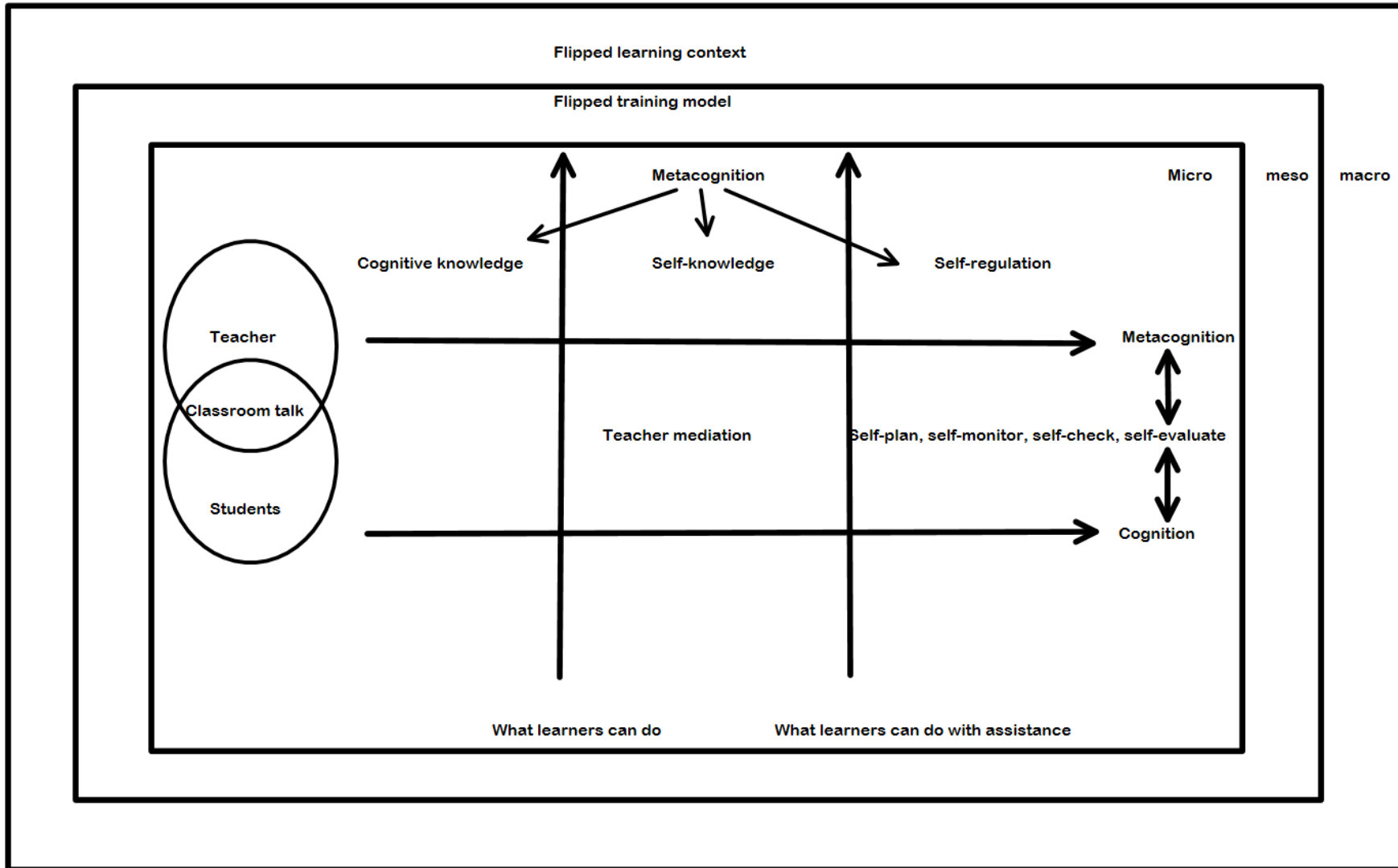


classroom technology integration practice. In these interviews, the teachers indicated that internal factors were key to their classroom practices when any innovative teaching needed to be applied.

## **2.7 Summary –Theoretical framework for this study**

This study focuses on enhancing teacher mediation to foster students' metacognition in flipped learning. It explored how teachers and their students developed and engaged in metacognitive thinking within the flipped learning context in a middle-high boarding school in China. The overall theoretical framework for this study is introduced in Figure 2.2.

Figure 2.2 Overall Theoretical framework built on Figure 2.1 for this study



Building on Figure 2.1 introduced earlier, Figure 2.2 shows the theoretical framework for the study. The outer two boxes represent the context of the study (flipped learning approach adoption in the school and the flipped training model that was used for professional learning).

This study brings together the three core elements of metacognition, teacher professional development for mediation of student metacognition development, and a flipped learning context. The framework can be seen to be situated in three layers: macro, meso, and micro. At the macro level, the framework highlights the flipped learning context of the participating school to create a supportive environment to encourage and facilitate the dialogue in the classroom. At the meso level, it focuses on the function of modelling and practice in teacher workshops, that is, teachers getting ready to implement changes at the micro level, i.e., in their classrooms. The micro level focuses on an explicit, rigorous, and transparent process to lead the way to maximize student learning by teacher mediation of cognition and metacognition development through incorporating self-plan, self-monitor, self-check and self-evaluate as steps to achieve this.

In sociocultural theory, Vygotsky (1978) defined mediation as an action when using available resources to facilitate the learning process for a common purpose. The teachers in this study engaged in learner-centered learning environment that was enabled by the flipped learning approach. Daniels (2016) suggested that teachers and students both act as mediators within the learning context, mutually influencing each other by interactions (dialogic talk) to maximize learning. These interactions are socially and culturally embedded, influenced by teacher and student experiences and the context of the school and community.

Likewise, Bronfenbrenner (1979) states that there are four different systems in our social surroundings. At the micro level, the settings contain a direct interaction between the teacher

and students. At the meso level, the relationships between teachers and parents influence teacher agency practice. At the macro level, the ideology of society affects teachers' beliefs and agency practice through their experiences with people from society. This model shaped the theoretical framework of this study by categorising the social cultural background into different blocks: classroom settings, workshop settings and school flipped learning settings and the overall Chinese educational system settings to locate this case study.

A review of the literature indicated that learners who are engaging in higher order thinking and can demonstrate self-regulation learners benefit more in the flipped learning pedagogical environment than those who have low self-knowledge and self-management. Higher order thinking is one of the main subcomponents of metacognition. It is because of the independence required of students to learn within flipped-learning approaches that they need to develop their metacognition. There is a need to help teachers to be metacognitive teachers in professional learning, so that in turn, metacognitive learners may be cultivated through daily classroom instructional activities and teacher practice.

Metacognitive strategies contribute to cultivating metacognitive learners. A variety of strategies have been used in metacognitive teaching in previous research, and findings have underscored how metacognitive strategies can enhance metacognition facilitation (e.g., visualising tools). However, less attention has been given to supporting and empowering the teacher to know how the strategies are constructed and applied in the classroom practice. Therefore, this research focuses on professional development to enhance teacher mediation of students' metacognition in flipped learning classrooms in a middle-high school in China. A series of workshops were designed to develop teachers' professional understanding of metacognitive engagement in flipped learning contexts and to facilitate their exploration of

classroom talk with a view to enhancing students' metacognitive thinking to assist their learning. In the next chapter, the methodological approach and methods used for data collection and data analysis are discussed.

## Chapter 3 Methodology

### 3.1 Introduction

This chapter discusses the methodology for this study and outlines the methods and processes used for data collection and analysis. This study focuses on enhancing teacher mediation to foster students' metacognition in a flipped learning context. A series of designed workshops aimed to develop teachers' professional understanding of metacognitive thinking in flipped learning classrooms and to facilitate their exploration of the use of classroom talk, with a view to enhancing students' metacognitive thinking to assist their learning. Data were gathered to observe the teachers' practice with students in classroom activities. Students and teachers' perceptions of the process of learning and practice were also obtained.

The main questions are:

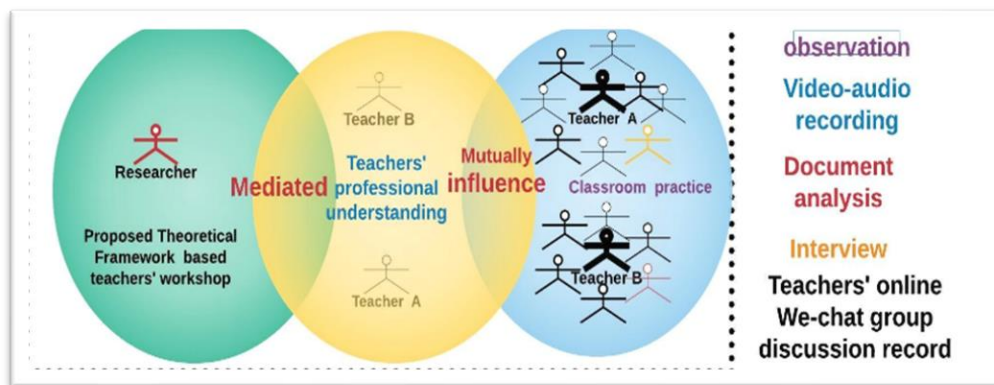
1. What are teachers' beliefs and students' needs for developing metacognitive thinking in a flipped learning context?
2. In response to professional learning, how do teachers enact strategies to elicit students' metacognitive thinking in the classroom?
3. What are teachers and students' perceptions of factors influencing student metacognition development in the flipped learning context?

To address these questions, this study employed an interpretive paradigm to investigate the how teachers prepared for, and engaged in, mediation for students' development of metacognition. An interpretive paradigm enables the researcher to understand how teachers and students make meaning of their experiences (Rowlands, 2005). Within the interpretive paradigm, this research used a case study approach. This approach enabled me to take a closer look at a case of a secondary school, which was implementing flipped learning pedagogy in

China. This involved a professional learning intervention and evaluation in the case study school. This chapter details the sampling and data gathering methods employed in this study, analysis and rigour methods, and ethical considerations. Figure 3.1 provides a methodological framework of this research, linking the theoretical basis on the left through the teacher professional learning and subsequent classroom practice on the right. The data methods are at the far right.

**Figure 3.1**

*Methodological framework*



### 3.2 Research paradigm

There are certain rules that guide a researcher's actions and beliefs, referred to as a paradigm (Bauer & Gaskell, 1999). The term paradigm was first defined by Kuhn in 1962 in his book *The Structure of Scientific Revolutions*. Kuhn defined a scientific paradigm as: "universally recognized scientific achievements that, for a time, provide model problems and solutions for a community of practitioners (p. 33)". More specifically, Blanche et al. (2006) distinguished the research process into three major dimensions: ontology, epistemology and methodology. According to them, a research paradigm is an all-inclusive system of interconnected practice and thinking that defines the nature of enquiry along these three dimensions. Furthermore, Creswell and Creswell (2018) asserted that ontology answers the question of what the nature of reality is, and leads to epistemology, which connects with the choice of the research

paradigm. Epistemology is “a way of understanding and explaining how I know what I know” (Crotty, 1998, p. 3). It is a process of learning between what the researcher sees and what the researcher knows. It is about the relationship between the researcher and knowledge (Punch, 2009).

In a similar manner, Maxwell (2008) pointed out that a paradigm “refers to a set of very general philosophical assumptions about the nature of the world (ontology) and how we can understand it (epistemology), assumptions that tend to be shared by researchers working in a specific field or tradition” (p. 224). These definitions of paradigms are a guide for the researcher that provides a vision of the nature of reality (ontology); the nature of knowledge (epistemology); and the best way of knowing the knowledge (methodology) (Bryman, 2008; Creswell & Creswell, 2018). A paradigm provides the philosophical grounding for accounting for the theoretical perspective undertaken in the research. The philosophical notions of the paradigm give us directions while conducting research (Mertens, 2010).

Taking a theoretical perspective at the beginning of the research contributes to the selection of a suitable research design and informs the procedures for data collection and analysis (Bauer & Gaskell, 1999; Zimmer, 2006). In the present study, an interpretive paradigm aligned with my beliefs that reality is socially constructed to gain a better understanding of the phenomenon of interest and this is discussed in the next section.

### **3.3 Interpretive paradigm**

Interpretive researchers believe that reality consists of people’s subjective experiences of the external world; thus, they may adopt an inter-subjective epistemology and the ontological belief that reality is socially constructed (Walsham, 1993; Willis, 1995). Creswell and Creswell



(2018) state that interpretivist perspectives emphasize that people pursue an understanding of the world as they engage in social interaction with others. The process of interaction is informed by their socio-cultural belonging. The socio-cultural background of individuals informs their interpretation. Additionally, Geoffrey (1993) argues that there is no right and wrong in interpretive traditions. Alternatively, interpretive researchers judge according to how 'interesting' the phenomenon is to them and they make meaning of the knowing from the in-depth examination of the phenomenon of interest in the fieldwork. In that case, an interpretive paradigm enables the researcher to explore how people construct their understanding of reality - based on their subjective and social experiences.

According to Crotty (1998), interpretive research holds that the knowledge about reality is generated from the interaction of reality and a researcher in the world, instead of reality lying there to be discovered. This is entirely consistent with the theoretical framework developed for this study. For example, Buber's dialogic theory, as one of the most important elements in the theoretical framework, highlighted the importance of the turn-taking, meaning-making process in a co-joint activity such as mediation in a classroom.

Reeves and Hedberg (2003) clarified that the interpretive paradigm understands the world from subjective involvement of persons. They used methods such as interviewing or participant observation, that rely on a subjective rapport between the researcher and participants. Correspondingly, Kaplan and Maxwell (2005) critiqued that interpretive research does not make assumptions before the investigation, but becomes immersive into the full complexity of human sense-making as the situation emerges. The interpretive approach aims to explain the subjective reasons and meanings that lie behind social action, in combination with the researcher's experiences and understandings.

It is worth noting that interpretive research allows researchers to shift their understandings constantly from “whole to the part and back to the whole” (Gadamer, 1976, p. 117). According to Gadamer, it is a circular relationship with human beings in a social context. In addition to the emphasis on the circular relationship of sense making, interpretive research recognizes the close rapport between the researcher and participants, and the situational limitations forming this process (Rowlands, 2005).

The intimate relationship establishment is often critical to this research because of the nature of qualitative research methods and the limited scale of the sampling. It often requires researcher involvement in the study as a participant observer by engaging in the life of the research participants as they participate in social dialogue and social interaction (LeCompte & Schensul, 2010). This immersive way of working empowers the researcher to be a part of the participants’ community and collect reliable and deeply insightful data from the participants and settings. In the next section, how the interpretive paradigm was applied in this study is discussed.

### **3.4 Interpretive paradigm for this Study**

According to Maxwell (2008), paradigm selection “is not a matter of free choice” (p. 224) but depends on the researcher’s previous expectations about the world, the topic of the study, and how the study can be clearly presented and easily understood by the readers. This study fits within an interpretive paradigm using qualitative methods. It is primarily about socially embedded actions, which seek to explain which actions teachers and students are taking within a secondary school classroom. In this study, I took the stance that the participants’ reality was mediated by their interactions with their external world including but not limited to experiences and the cultural settings in which they live (Stake, 2010).

As the purpose of the study was to investigate metacognition facilitation during a school wide initiative to implement flipped learning practices, I identified that the interpretive paradigm as a lens for the investigation would enrich the research process. My views as an interpretive researcher aligned with the research aims of the current study enabling the investigation of metacognition development in a flipped learning context. The study explored this development with three teachers of English, one teacher of mathematics, and one teacher of Chemistry, and their students along with the principal of this school. The epistemological approach adopted for this study, which focused on the lived realities of the participants, indicated that qualitative research methods might be the best to use in the study, which is discussed next.

### **3.5 Qualitative research**

Interpretive research mainly aligns with qualitative research approaches and methods. The research design for qualitative research normally encompasses approaches such as case study, phenomenology, and action research (Bauer & Gaskell, 1999; Merriam, 1988). Qualitative methods allow the researcher to gain rich, socially constructed data, to answer the research questions. A range of instruments and tools are used in research design of this nature, to obtain relevant data (Creswell & Creswell, 2018; Merriam, 1988). Qualitative research and data gathering methods usually yield abundantly descriptive data in the usage of words and images that allow the researcher to interpret the phenomena under exploration (Merriam, 1988). This study used various data including words and images to interpret the phenomena.

The study took place in a secondary school in China, which is a middle-high boarding school. It aimed to understand how developing teachers' understanding and practice of mediation of metacognition can enhance students' metacognitive processes to assist their learning in English, mathematics and chemistry. The study used a series of design-based teacher

workshops to share knowledge and to challenge and shift teachers' teaching philosophy and practice. In this study, qualitative methods were adopted because they could provide me with a unique and in-depth understanding of the teachers' and students' experiences to foster students' metacognition in flipped learning. Silverman (2020) stated, "Qualitative research is the type of research that finds out about people's experiences, and it helps us understand what is important for people (p. 3)". Qualitative research enables participants to disclose their experiences, thoughts and feelings without constraint freely.

Qualitative research often features in a case study; the case study approach is particularly useful to employ when there is a need to obtain an in-depth appreciation of an issue, event or phenomenon of interest, in its natural real-life context (Crowe et al., 2011). In addition, a case study approach allows interventions to be studied in detail in a real-life context. In this PhD research, teacher and student metacognitive practices in the flipped learning context were explored before the workshop series commencement in its natural real-life context of the school. After this pre-observation, a designed workshop series was used as an intervention for teacher professional learning, followed by an evaluation of impacts of the intervention for the teachers and students in selected classrooms. Therefore, case study as the methodology with intervention was a best fit to match the research design of this study. How this was conducted is discussed in the next section.

### **3.6 Case study with intervention**

Educational researchers need to sensitively identify the best-fit research design to meet the research aims and answer the research questions. Yin (2012) stated that educational researchers need to choose an approach that best captures the thoughts, feelings, and behaviors of the participants that interest the researchers. In addition, Yin also emphasized the chosen research

design by the researchers should best fit the questions that the research should answer, and researchers need to also identify what strategies for data analysis best match the characteristics of the design and measurements.

This study was conducted using a case study with intervention. A case study with intervention is a methodological approach that uses intervention as a tool or facilitator to get deep insights in one case study (Gilgun & Sands, 2012). A case study enables a phenomenon to be studied in detail, using whatever methods and data seem appropriate (Punch, 2009). Creswell and Creswell (2018) assert that the case study enables the researcher to explore the real dynamics of situations and people. The case study researcher aims to observe the characteristics of an individual, a class, a school or a community to understand the case in-depth, and in its natural setting, recognizing its complexity.

In this case study, based on a designed teacher intervention (the pre-designed workshop), the aspects of the subject's teaching and learning are analyzed to seek patterns and causes of behavior. The study took place in a secondary school in China, which is a middle-high boarding school. It took place over half a semester (May to July). Therefore, the context for this case study was the top-down approach through which flipped-learning had been implemented. The different participants included the school principal, teachers, myself as the researcher, and students situated in a flipped learning school context.

The case was bounded in half a semester and limited to three teachers and their students in the AB class model learning environment. The aim was to explore a unique phenomenon of teacher mediation in terms of when (top-down introduction of flipped learning by leadership management), what (teacher workshop intervention), how (through developing teacher

mediation skills in instructional talk) and why (to facilitate students' metacognitive thinking). The insights gained from the case develop additional ideas (a talk pattern) that might be explored in future studies and other cases.

In other words, this case study included an intervention to assist the exploratory process further. Methods such as researcher-facilitated teacher workshops, interviews (individual with teachers and the principal, and focus group with students), observations with video capture, and document analysis were used as tools to conduct data collection. Gillham (2000) defines a case study as an inquiry to answer specific research questions (in this study, how metacognition is mediated in the flipped learning pedagogical approach) which seek a range of different evidence (from principal, teachers, students) from the case settings (the workshops, the classrooms, the school, the wider society).

The case study with intervention approach in this study involves the development and testing of practice models, descriptions of change processes, and the application of models of practice to new populations and contexts (Gilgun & Sands, 2012), which aligns well with the interpretive paradigm. The aim of the case study is not to represent reality but to seek what can be learned from a single case (Tellis, 1997) and then advance fundamental knowledge to improve the relevant knowledge domains (Madaus & Kellaghan, 2000).

This study focused on enhancing teacher mediation to foster students' metacognition in flipped learning in one middle-high school in China. Because of the independence required of students to learn within flipped-learning approaches, they need to develop their metacognition. Therefore, the intervention I provided involved teacher workshops and one-by-one scaffolding in designing instructional activities, and then evaluation of classroom practice. It aimed to help

teachers be metacognitive teachers so that, in turn, metacognitive learners may be cultivated through daily classroom activities. Metacognitive learners are expected to take responsibility in flipped learning, something that appeared to not be satisfactorily occurring according to the school principal. To solve this problem, a case study approach with intervention was, therefore, an appropriate approach for addressing the aim (metacognition facilitation by mediation) and objectives (principal's perspectives, professional learning, and students' effective learning) of this research. Indeed, this study sought to improve the mediation of metacognition within a school-wide flipped learning adoption process in a middle-high school in China. The next section provides a brief background to the study followed by the design of the research.

### **3.7 Methods**

This section outlines the process of identification of the participant school, the background of the participant school, the sampling process and my own preparation for data collection in my home country. In addition, the participants and my roles in the study are also articulated.

#### ***3.7.1 Process of identification of participant school***

Purposeful sampling is that when obtaining a purposeful sample, the researcher selects participants according to the needs of the research (Bogdan & Biklen, 1997). Driven by the aims of the research, I set two criteria for the school sampling: a) a school using flipped learning; b) a middle-high school. These two criteria were established because the study required a technology-enhanced learning environment derived from my research interest as discussed in Section 1.1. Moreover, my teaching experiences in a middle-high school in China also facilitated this choice because of the familiarity of teaching and learning in high school settings. Afterwards, I undertook an online search and identified a target school, which fitted

these two criteria (it turned out that the target school happened to be a middle-high boarding school using a flipped learning approach in China).

After the identification of a potential school, I emailed the principal a brief introduction of myself and requested an online talk. A positive reply led to a 40-minute ‘WeChat’ conversation between the principal and myself. I discussed the research aims and design, explicitly mentioning the goal to explore teachers’ mediation of student cognition to metacognition within the school. During the discussion, the principal raised two issues: i) lack of professional learning support for teachers on how to foster higher order thinking in flipped learning; and ii) students’ lack of self-regulation skills in a technology-enriched environment, such as flipped learning. The intervention in this study aimed to enhance teachers’ mediation using dialogic talk in order to foster students’ metacognition in flipped learning. It addressed the principal’s concerns for the need to cultivate self-regulated learners who take responsibility for their own learning in a flipped learning environment. Therefore, the principal’s concerns influenced the direction of the study. In addition, the principal showed strong interest in the project, agreed to participate, and signed consent forms.

It is worth noting that the principal was also interviewed during the research to reflect and situate the preliminary findings in process of the research development. The interview data from principal was used to triangulate the interview data from teachers.

### ***3.7.2 Background of the participant school***

Green School (a pseudonym) is one of the largest experimental schools of flipped classrooms within China. The school is located in the northern part of China. It is a large middle high school with over 100 classes and more than 500 staff and 5000 students. The school has been



using a modified version of flipped learning approaches since 2015, in which the school did not just adopt the model from Bergman and Sams (Bergmann & Sams, 2016) but created an AB class model (see below) to fit the needs of a boarding school. The students are required to board not only because of they come from all over China but also due to the school policy.

The school has six grades from 7 to 12 (ages 12-15) and there are boarding facilities for all students. During this time, teacher professional learning has assisted teaching and learning through the adoption of digital technologies in the school. I determined that the pedagogical approaches and technologically equipped classrooms within the flipped learning context of this school aligned with this research scope and therefore the school would be appropriate for the study. The school was chosen for the case because it has successfully had a school-wide Information and Communication Technology (ICT)-supported instructional reform. After the instructional reform, students' learning achievements were reported to be tremendously improved.

During the instructional reform, the school implemented a flipped classroom-teaching model supported by ICT. The Green School implemented what they termed an AB flipped learning model. In A Class, the students viewed a pre-prepared video produced by a technical company employed by the school. It was noting that the teachers designed the video content with instructions. The students engaged with the video material to learn lesson content in this self-study section of the lesson - called A Class. As students viewed the instructional video, they had a lesson plan to guide their learning. A Class occurred at the school in a predetermined room at a set time. B Class involved the same group of students and their teacher later in the week. In this class, the students' workshopped activities designed by the teacher to consolidate knowledge from the videos and to formatively assess students' learning.

In A Class, every student had their iPad with earphones and logged into their student account with access to the schools' platform where the teachers posted the instructional videos. Students had control over the pace of their learning through the 'pause', 'forward' and 'backward' functions. During this time, students were required to make notes in their course book. After the video in the same session, students practised what they had learned by completing a paper given by the teacher. Teachers marked this summatively before the students attended B class later in the week. B Class was designed for consolidating and assessing knowledge gained from A Class in a formative way. The teacher provided instructions and practice activities to enable the students to solve problems using knowledge gained from A Class.

### ***3.7.3 My preparations before data collection***

After I had secured potential access to participants, the data gathering proposal approved by the University of Waikato Human Research Ethics committee was to conduct a designed workshop intervention research in the case school in China. I returned to my home country, China, to collect the data over four months, from May 2019 to September 2019, before coming back to New Zealand.

Technological support is more critical when a research team has to communicate across countries in different hemispheres. The development of ICT in China enabled me to keep very good and timely communication with supervisors and as well as being able to have a digitally equipped office provided by the school. A key element to consider was the appropriate communication tool to conduct the supervisory meetings. Technically, China has no access to Google products, such as Facebook, Gmail, and Zoom, but the University of Waikato primarily uses Google products.

My supervisors tried hard to get in contact by installing and learning to use WeChat, however, it did not work due to technical reasons. I spent almost two weeks negotiating and figuring out which tools might be best for the communication. Finally, I solved the problem by downloading and installing a virtual private network (VPN) to assist me in establishing a connection using Facebook and Gmail. The first supervisory meeting happened after all the obstacles had been cleared. In the next section, the participants' and my role in this study are discussed.

#### ***3.7.4 Participants***

The case study with intervention was initially developed by exploring the teachers and their taught subjects (English, Mathematics and Chemistry) in a middle-high school classroom (year 7, students aged 15) in a northern province in China. The participant teachers and their taught classes were recruited through an introductory meeting with staff seeking voluntary participation. Initially, three English language teachers and the students in their classes were confirmed to join and signed the consent forms. These three teachers were committed and interested in the researcher-designed professional learning workshops for teachers, and they were hoping the professional learning would help them improve their teaching skills and make students' learning more effective, so that ultimately, students' performance would be improved.

After the first round of recruitment and professional learning workshops, teachers who were teaching other subjects heard about how the workshops and theoretical framework could be beneficial for students' learning in a variety of subjects. Some requested from the school to join the workshops with me, and with the amendments from the ethics committee, a mathematics and a chemistry teacher, and their taught classes, were recruited as additional participants. Therefore, the participants in the study expanded to five teachers, and their taught classes, as well as the school principal in the school, as a single case. All the participants were

introduced to the research plan and procedures, and they signed the consent forms. Graphical information of the teachers' pseudonyms and their subjects, years of teaching experiences and gender are listed in table 3.1.

**Table 3.1** *the graphical information of 5 teachers and their teaching classes*

<b>Teacher's pseudonyms</b>	<b>Gender</b>	<b>Subjects</b>	<b>Years of teaching</b>
Wen	Female	English	6
Ling	Female	English	5
Summer	Female	English	1.5
Yuan	Female	Chemistry	6
Zhang	Male	Mathematics	7

### **3.7.5 My role**

My aim was firstly to understand the current status of teacher and student practice in metacognition in the flipped learning context, and then secondly, to provide an effective intervention for teacher professional learning in the workshops. The initial exploration of practices and the subsequent workshops were designed based on the theoretical framework of the study (see Section 2.8.2). In the workshops, I explored the notion of metacognition with the teachers and to help them to include teaching for student metacognition in their instructional design. To evaluate the effect of the intervention, I observed teachers' enactment of the mediation of metacognition development in their classroom practice .

I mediated the workshops with the teachers, building their professional knowledge, for them to enact metacognition with students in the classroom. As described next, I conducted some initial preliminary data analysis and kept a reflective journal to note down what worked well and what

did not work and how it could be improved as the workshop series progressed. Methods used to gather data for evaluation of outcomes of the interventions are described following that. I hoped that this approach, combined with other data sources would help me to then revise the theory for a broader application in the future.

### **3.7.6 Research design**

Data collection tools used in my research were interviews, observations, documentary analysis, and my reflective journal. The procedures of data collection were designed using a cyclic approach (Dewey, 2007). In the first cycle, I observed the participating teachers' current teaching practice and student response to this practice. In the second cycle, I worked with the teachers using the designed theoretical framework to improve their teaching practice. The third cycle focused on classroom observation of teachers' professional practice informed by using the designed framework. Therefore, the data collected in each cycle were analyzed in parallel with their collection with the main aim of understanding the initial interpretations of the raw data and to inform the next step of data collection. The overall design of the research is tabulated in Table 3.2.

**Table 3.2 Overall research design**

<b>Time Order</b>	<b>Aims</b>	<b>Data collected</b>
Observation 0	To explore teacher practice and student response to this practice before intervention	Audio-video recorded teaching and learning process Teacher-generated students' test results
Workshop 1	To explore teachers' epistemological beliefs	Audio-video recorded workshop activities; Teachers' hand-drawn drawings
Observation 1	To see how teachers manage "what to learn and how to learn"	Teachers' teaching process captured by audio-video recordings

Workshop 2	To explore the concept of “metacognition”	Audio-video workshop activities
Observation 2	To see how teachers verbalise thoughts in talk	Teachers’ teaching process captured by audio-video recordings
Workshop 3	To explore the inner voice by talk	Audio-video workshop activities
Observation 3	To see how the internal voice can be unfolded	Teachers’ teaching process captured by audio-video recordings
Workshop 4	To explore the four metacognitive skills	Audio-video workshop activities
Observation 4	To see how teachers and students engage in metacognitive thinking	Teachers’ teaching process captured by audio-video recordings
Workshop 5	To form a stance in relation to metacognitive and dialogic manner	Audio-video workshop activities Teachers’ hand drawings
Observation 5	To see how they put theory into practice	Teachers’ teaching process captured by audio-video recordings
Workshop 6	Reflective discussions on the intervention	Audio-video workshop activities
Interviews	To get principal’s, teachers’ and students’ insights on intervention and future applications	Audio-video recorded conversations Students’ hand drawings

An explicit approach to teacher mediation for students’ metacognition development was shared with the teachers through the workshops. As the teacher mediation approach was enacted in the classrooms, I made meaning of their experiences through the dialogue and interaction between teachers and students. I interpreted participants’ understanding of the phenomenon by juxtaposing the enactment in the classroom to the mediation process. Making meaning through the enactment process highlighted participants’ experiences and perceptions from their perspective (Flood, 2010).

Subsequent to each workshop, I observed and captured episodes of the dialogue between teachers and students in their classrooms as the mediation method was enacted. Meanwhile, I evaluated the implementation of mediation by capturing the episode of interaction between teachers and students and comparing with the overall metacognition framework. In the evaluation process, the mediation was examined to ascertain its ability to enhance student metacognition to assist problem-solving in the three subjects (see Section 6.2). More importantly, the evaluation was to assess the consistency between the mediation approach as developed in the workshop and classroom implementation. The research methods used in this study to gather data are discussed next.

### **3.8 Research Methods**

I used a range of tools to gather data including classroom observations, interviews in facilitated workshops and participant classrooms, student focus groups and analysis of documents generated during researcher-facilitated workshops. In addition, teachers' lesson plans and student work samples were collected. To begin with, I outline the intervention of workshops.

#### ***3.8.1 Workshops (Intervention)***

Originally, workshop meant "a place where things are made or repaired" ("Workshop," n.d., para. 1). Nowadays, workshop can also be understood as an arrangement for a group of target population to learn, share and gain new knowledge, practice problem solving or innovate in relation to a domain-specific subject. In this study, the workshops had a dual purpose. The first was for the teachers to develop their practice and become capable of providing effective teacher mediation in their everyday classroom practice – in other words, teacher professional learning. The second was to use the workshops as a research method that enabled me to investigate the phenomena supporting the experience's construction (Darsø, 2001).

In qualitative research, workshops provide a platform that can support researchers in recognizing and exploring related elements in a specific domain through providing means for understanding complex work and knowledge processes that are supported by technology (for example, flipped learning videos in this study). Workshops as a type of professional learning are discussed according to three different perspectives: workshops as a research method, workshops as practice, and workshops as a means (Chambers, 2012), which are discussed accordingly in the following sections.

### **Workshop as research method**

When using the workshop as method, I aimed to fulfil participants' expectations to achieve something related to their own interests. More importantly, the workshop approach as method is specifically designed to generate trustworthy data to answer the research questions (Darsø, 2001; Jaipal & Figg, 2010; Wakkary, 2007; Yurdakul et al., 2012). The workshop as a research approach is an explicit method choice that allows researchers to iterate and refine the research design over time, especially, when conducting design-based research or action research (Cobb et al., 2003). The workshop method provides ways for researchers to be immersive in negotiating with participants in sense making. Therefore, in the workshop-as-research approach, there can be an opportunity for researchers to identify new factors and create new knowledge in the communication with participants, which neither the participants nor the researchers may have expected before the workshops.

### **Workshops as practice**

Workshops as practice focuses on the format of the workshop itself in relating to the designing of the series of the workshops and the influences and outcomes of the workshops when completed. There are two major types of research about workshop as practice, which are



categorized in two domains: workshop as format (Cornwall & Jewkes, 1995; Mor et al., 2012; Phaal et al., 2007); the participants' domain specific outcomes (Jaipal & Figg, 2010; Putnam & Borko, 2000). For example, when conducting workshops as a format, the researcher may create pedagogical activities for the participants to design workshops of their own to see elements such as how they arrange the workshop and how the seating is arranged, or how many attendants the workshop site can accommodate etc. Meanwhile, when conducting a workshop to investigate the participants' domain-specific outcomes, the content design and instructional activities matter more than how the workshop is formatted.

### **Workshops as means**

Workshops as means focuses on the subjective goals which are generated by the designer by using workshops as means or ways to disseminate knowledge to achieve the goals. For example, in Ørngreen and Levinsen (2017)'s research, the literature is classically allocated into two sorts. One sort includes frameworks, guidelines, and instructions for how to design, orchestrate, conduct, and facilitate workshops (Chambers, 2012; Soneryd & Amelung, 2016). The other sort covers outcomes relating to participants' new competencies, practices, knowledge, or ideas as a result of participating in authentic workshops (Abdulghani et al., 2014; Durance & Godet, 2010; Rust, 1998).

In this research, workshops were seen as a means to assist teachers using a theoretical framework for metacognition mediation. Therefore, the ideas as a result of participating in authentic workshops are highlighted, for instance, how teachers put their professional understandings into classroom practice using the knowledge they obtained from the workshops. Therefore, in this study, the workshops only work as a means to help teachers implement their

instructional strategies to elicit students' thinking in metacognitive development. How the workshops were used as a means in this research is further discussed next.

### **Workshop as means in this research**

Workshops as means provides a powerful tool for an effective intervention on teacher professional learning when conducting intervention research in a school with teacher participants. For example, Rust (1998) summarized the advantages of workshops in qualitative research: promote changes in the practice of participants, provide participants with extra confidence in what they are already doing and confidence to innovate, and are good predictors of participants' likely impact in practice. The benefits of the workshop rely on the positive effect posing by the workshops, and the researcher needs to design and implement an effective workshop intervention. Literature demonstrates that workshops can lead to changes in practice, and that these changes are themselves deemed to be successful by those involved, using the conditions below (Chambers, 2012; Mor et al., 2012; Ørngreen & Levinsen, 2017; Rust, 1998):

- a) their organization and structure.
- b) the facilitator's skills and expertise.
- c) interactive processes, especially group work.
- d) giving practical examples and materials.
- e) the positive attitudes of the participants.

In this research, I held the effective conditions of successful workshops in mind and designed a workshop series as means to assist teachers to develop students' metacognition. The workshops were designed to be interactive in cultivating teachers' competence in teaching and

positive attitudes towards teaching. In the next section, the design of the workshops is introduced with some illustrations.

### ***3.8.2 Workshop design in this research***

I intended to co-create a learning environment to model classroom practice. Hence, I played the role of a metacognitive teacher and actively engaged participating teachers in problem solving, with the participating teachers as learners. The purpose of involving the teachers in problem solving was to enhance their awareness and understanding of metacognition. I utilized the lesson plans of the respective teachers and subjects of interest as the learning material to be used in the process of development of teacher mediation in classroom practice. Before each workshop, participants were also provided with information about the concepts and definitions of the elements in the theoretical framework.

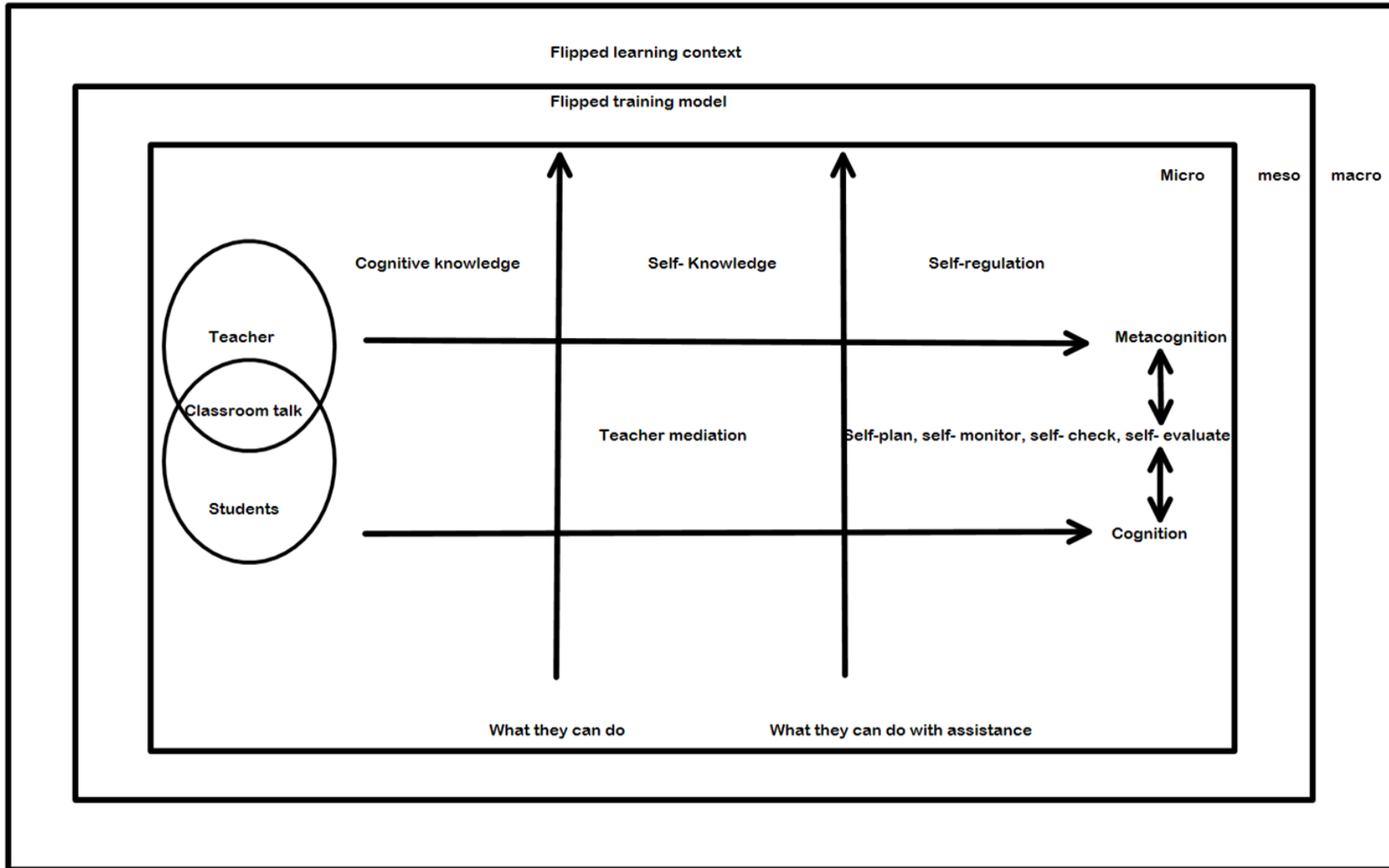
The process of the intervention in this study was cyclic and involved six workshops of 60 minutes each, with the outcomes of each workshop and subsequent classroom observation informing the design of the next workshop. The workshops were held in a meeting room in the academic building in the school. Each workshop had a focus aimed at progressing teachers' understanding of the role of metacognition in learning and how to help students develop metacognition. After the six collective workshops with all teachers present, one-to-one workshops with each of three of the teachers (Summer, Yuan, and Zhang) were held for scaffolding them on designing instructional activities by using Figure 3.5 (a dialogic talk process) provided by me and adapted to the sociocultural conditions of each teacher's class. The specific goals of each workshop are outlined in Table 3.3.

**Table 3.3** *Overview of workshops and their aims*

<b>Workshops</b>	<b>Aims</b>
Workshop 1	Introduction, exploration, and sharing of teachers' epistemological beliefs including the nature of knowledge, the nature of the learning process and the social-cultural aspects of learning.
Workshop 2	Developing awareness of the role of cognitive knowledge in developing metacognition
Workshop 3 & workshop 4	Understanding the role of mediation through talk and talk patterns in student learning  Skills and steps related to eliciting students' metacognitive thinking
Workshop 5 & workshop 6	Perceptions of future application
One on one workshop	Co-design the instructional activities and approaches to mediation of student metacognition for the three modelling classes

The six-workshop series was designed to address the overall theoretical framework shown in Figure 3.2 and the dialogic talk process shown in Figure 3.5. The workshops explored the participants' developing understandings, in terms of the research intentions and supported their conceptual frameworks being articulated.

Figure 3.2 Overall theoretical framework



The workshops were focused as follows:

### **Workshop 1**

The first workshop was designed to explore and share epistemological beliefs of the teachers including the nature of knowledge, the nature of the learning process and the social-cultural aspects of learning. Vygotsky (1978) pointed out that in the social interaction process, more knowledgeable others can give direct instructions or encouragement to facilitate the independent learner to a higher level of cognitive development, and in addition, the scaffolding process is negotiated towards equally mutual accommodation. Therefore, a Zone of Proximal Development (ZPD) is created through negotiation between the more advanced partners and the learners, rather than providing a dominant position. All the partners in the activities mutually engage in the mediated process in a co-created environment to reach their common purpose. According to Vygotsky (1978), ZPD refers to the gap between what students can do with scaffoldings and what they are able to do independently. Teachers' mediation intends to enlarge the ZPD in the process of involvement and through interaction with more knowledgeable others. By doing this, learners develop their competence that can be used in the future. With this theoretical support, workshop 1 aimed:

- a) To explore teachers' epistemological beliefs (nature of the knowledge and nature of the learning process) and socio-cultural aspects of learning.
- b) To reach an agreement about the pedagogical approaches that could be situated in the co-constructed environment between teachers and their students.
- c) To model the process of dialogic talk and communication for the classroom practice throughout the workshop.
- d) To provoke the awareness of the nature of co-constructed learning.

I created a WeChat group and made self-introductory videos and content knowledge videos regarding ZPD, more knowledgeable others, and mutual communication. The videos produced by me fitted the teachers' setting, as they are teachers who have been using a flipped learning approach for years. Teachers were asked to watch these videos before they came to the workshop. When the teachers had viewed the content knowledge videos, they were organized to engage in hands-on activities with support from me in their learning process in the workshop.

The activities designed were:

- a) Draw a picture to show the relationship between you and your students in the classroom.
- b) Group discussion on the pictures

In the first workshop, it was hoped that the participants would develop the understandings of establishing an interactive learning environment.

## Workshop 2

**Figure 3.3** *The framework guiding workshop 2*

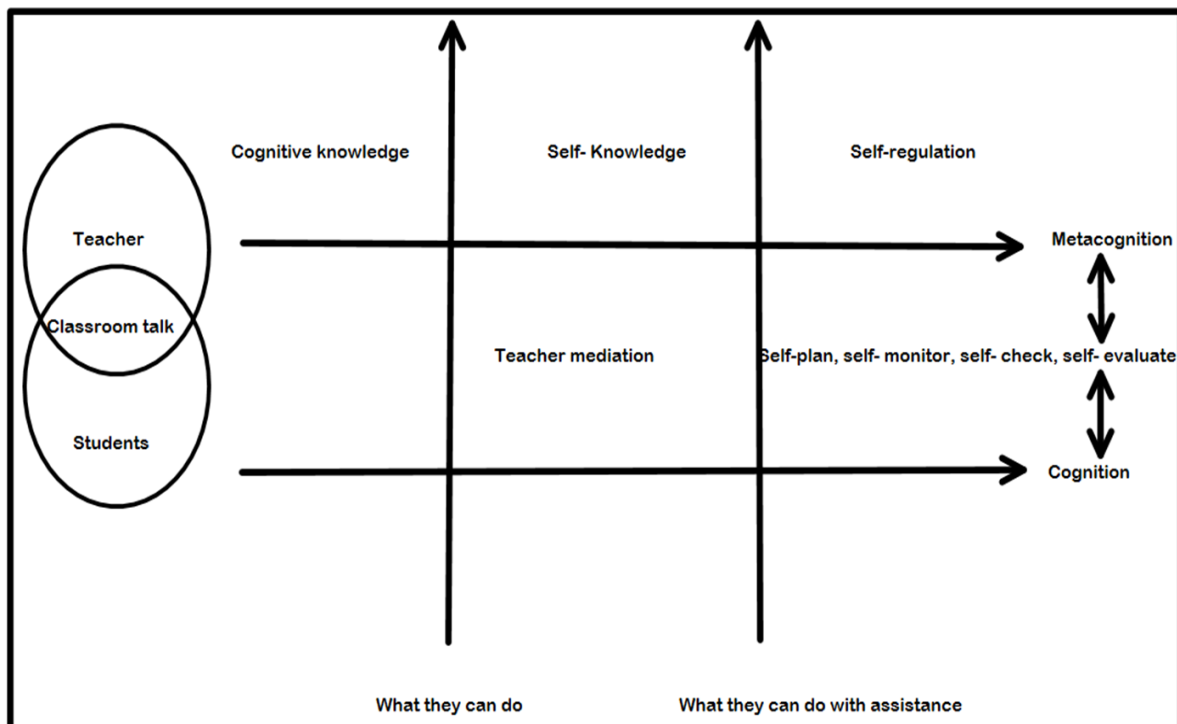


Figure 3.3 shows the framework that guided workshop 2. There are two horizontal lines: cognitive development and self-knowledge, which were designed to show the trajectory of cognition and metacognition. Two vertical lines signify the gap between what students can do independently and what they can only do with guidance. There are three aspects of metacognition shown: cognitive knowledge, self-knowledge and self-regulation. The diagram illustrates that “what they can do” is a developmental barrier between student cognitive knowledge and self-knowledge. In addition, “what they can do with assistance” is a further developmental barrier between self-knowledge and self-regulation. The aims of Workshop 2 were to help teachers establish their understanding on:

- a) The nature of teaching beyond what to teach, but also to teach students about how to learn and give them tools for thinking with.
- b) To help teachers understand that students’ cognitive development is diverse in levels
- c) To be aware of knowledge of self, knowledge of cognition and knowledge of metacognitive skills

I also made videos on metacognition and ZPD to explain these concepts. In the workshop, the activities for teachers were:

- a) I printed out Figure 3.3 for teachers and did a group discussion; teachers talked a lot in this part to ask, check and share their understandings.
- b) Role-play was used in workshop I acted as a teacher in the role-play process, and teachers played the role of learners.



### **Workshop 3 and 4**

Anderson (2002) outlined four self-regulatory skills in metacognition development in their work in a second language-learning classroom, and gave the definition of these four skills as:

- a) Self-planning strategies: what students purposefully select to use when they meet problems.
- b) Self-monitoring: by monitoring their use of learning strategies, students are better able to keep themselves on track to meet their learning objectives.
- c) Self-checking: students' thinking about how they combine various strategies facilitates the improvement of strategy; the teacher also needs to show students how to identify when one strategy is not working and how to move on to an alternative one. Students are aware of the thinking process to check if they are still on track.
- d) Self-evaluating: students are actively involved in metacognition when they attempt to evaluate whether what they are doing is effective in solving their problems.

Students' thinking is internal and kept invisible to others until it is verbalized to others. In this study, teachers were shared the four self-regulatory skills (self-plan, self-monitor, self-check, and self-evaluate) to help students verbalize their thinking and elicit thinking in problem-solving. Metacognition and dialogue in teaching can facilitate effective learning. When the dialogic process is being conducted, there is a need for the teachers to know where their learners are in their understanding and, in addition, the students have a need to know whether their teacher's knowledge of them is accurate. Therefore, the dialogic talk between them is a mutual assessment for both.

The aims of the workshops 3 and 4 were:

- a) To provoke teachers to explore the process of verbalise thinking
- b) To help teachers verbalise the internalized voice to elicit thinking in classroom practice
- c) To develop the teachers' metacognitive skills

To achieve the aims in workshops 3 and 4, I put reflective questions into our WeChat group (e.g., How to verbalize thoughts to help students improve higher order thinking?). I produced content videos regarding self-regulation and internal voice for teachers to watch before the workshops. In the workshop practice, hands on activities were engaged in to construct knowledge together with the teachers. The activities were:

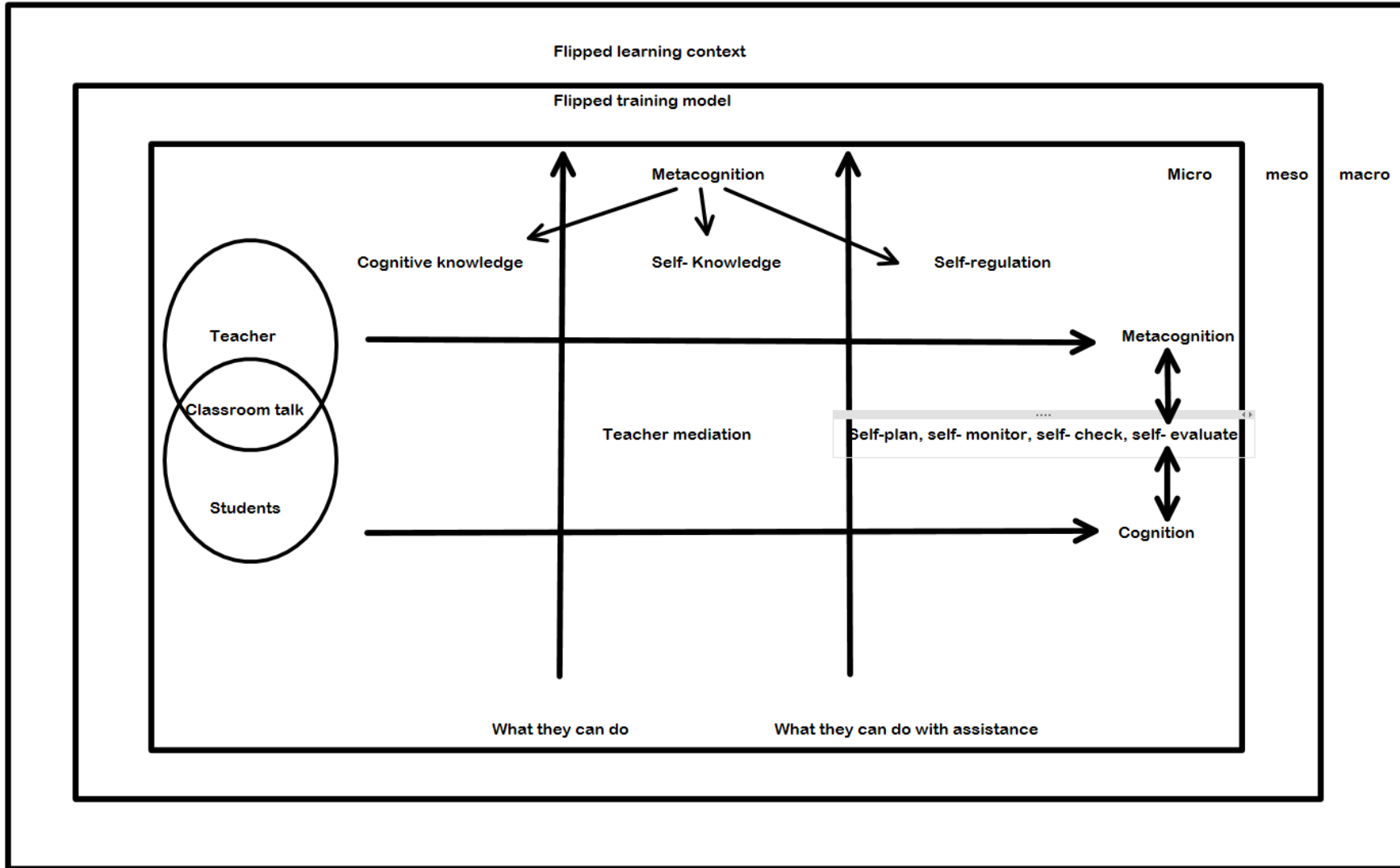
- a) Watch the video clips captured by me in classroom observations when teachers and students were doing activities.
- b) Role modelling of teaching by me relating to the content in the video clips to analyse and practice the four skills in metacognition development.
- c) Reflective group discussion

In the third and fourth workshop, it was intended that participants would develop understandings in terms of the ways of verbalizing their inner voice by using dialogic talk as a tool. The four skills they could practice were: self-plan, self-monitor, and self-check and self-evaluation.

### **Workshop 5**

Following workshops 1-4, the aim of workshop 5 was to visualize the metacognitive development framework from the earlier workshops into a whole picture (see Figure 3.4).

Figure 3.4 the shared content in workshop 5



The framework makes the central theorizing contribution by aligning metacognition (upper horizontal arrow) with Vygotsky's mediated theory (Lower horizontal arrow: cognitive development). For instance, there are three core elements in metacognition: knowledge of cognition (links with prior knowledge), knowledge of self (links with ZPD), and knowledge of self-regulatory skills (four skills). For making it more applicable, in this visualized model, I adopted the four metacognitive skills identified by Vygotsky's followers, Karpov and Haywood (1998): self-plan, self-monitor, self-check, and self-evaluate. The aims of the workshop were:

- a) To form a stance of metacognition in an interactive environment.
- b) To make sense of talk in facilitating students' metacognitive thinking.

With the aims of workshop 5, my approach was different to the previous four workshops. For instance, I sent a question to the WeChat group to initiate a discussion. The question was: "How can teachers and students mutually engage in metacognitive thinking in problem solving?" In addition, the instructional videos (with lengths from 3-5 minutes) made for the teachers to watch were for sharing the concepts in the theoretical framework, the videos were available both before and in the workshop. The activities designed were for the teachers' engagement in workshop practice. One of the most successful activities, for example, as shown below was that echoed by the activities done in workshop 1, in which the teachers were asked to redraw a picture using the same instructions in workshop 1. The instructions of the activity were:

- a) Take your previous drawing from workshop 1 and redraw a picture of your teaching considering what you have learnt in the previous workshops
- b) Draw a picture on paper about teaching and learning.

In the fifth workshop, teacher participants are hoped to have developed the holistic and overall understandings in terms of the metacognitive theoretical framework in the previous workshops. It was intended that teachers would have cultivated a metacognitive approach in their teaching and learning.

### **Workshop 6**

This workshop was the last workshop that was conducted during the fieldwork. The content focused on the macro level, to bring all the elements together: flipped learning, dialogic practice and metacognition, to make sense at a higher level. In this workshop, I led summarization and reflection: with the theoretical support through the prior workshops, a visualized framework (Figure 3.4) which derives from Vygotsky's aspects of learning theory bridging with other constructs like metacognition and dialogue, and a flipped learning approach had been embedded to guide and maximize learning.

This framework can be seen to be situated in three layers: macro, meso, and micro. At the macro level, it highlights the theoretical support from the views of Vygotsky's sociocultural theory to create a supportive environment to encourage and facilitate the dialogue in the classroom. At the meso level, it focuses on the function of modelling and practice, that is, teachers get ready for the micro level of classroom practice in workshops. In the micro level, an explicit, rigorous, and transparent process was used to lead the way to maximize student learning by extending the zone of proximal development to incorporate self-plan, self-monitor, self-check and self-evaluate (Walsh & Downe, 2005).

In this workshop, the aim was to clarify the procedures of a mediating role from a metacognitive and dialogic stance. By focusing on reflection, the activities in workshop 6 were

mainly in-depth discussion on the understanding of the ideas learned in the workshops. The questions in the group discussion were:

- a) What happened for you in these workshops?
- b) Why do you do what you did in class and what were the outcomes?
- c) What is your plan for your next practice?

With these activities and discussions in workshop 6, the teachers were intended to grasp a stance of being metacognitive and dialogic to promote their practice in line with the theoretical framework. The understandings developed in this workshop were aimed to contribute to developing effective teachers for promoting student metacognitive development for long life learners in the future.

### **One on one workshops**

When the six collective workshop series were complete, the participant teachers reflected that they needed modelling classes from peers to show them how the theory exactly can be applied into classroom practice with specific subject matter. We had a discussion in the sixth workshop to discuss who would be the teachers to provide the modelling classes. I indicated to teachers that the one who do the modelling class would have one by one scaffolding from me through one-on-one workshops. Ling and Wen did not volunteer for doing the modelling class. Summer and two other teachers, who had not been part of the six-workshop series but were given access to all the learning materials from them, volunteered and attended the one-on-one workshops with me (see Table 3.4).

**Table 3.4** *the graphical information of the three participants and their taught topic of the lesson and strategies used in the class*

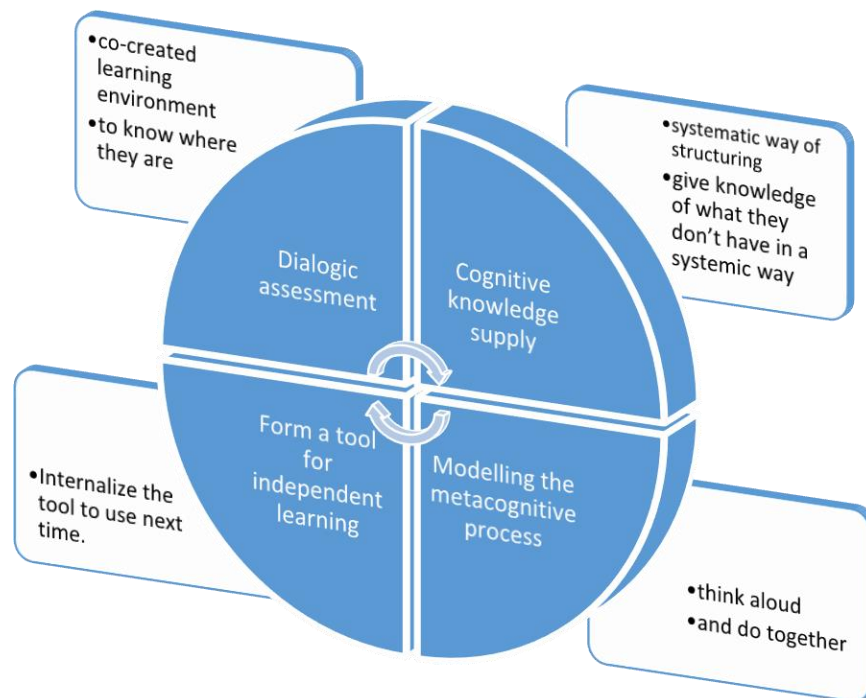
<b>Participants</b>	<b>Gender</b>	<b>Subject</b>	<b>Topic of the Lesson</b>	<b>Strategy using</b>
Summer	Female	English	Time preposition	Smooth song
Yuan	Female	Chemistry	Ions in equation	Ions categorisation
Zhang	Male	Mathematics	Sum of squares formula	Process of derivation

The action taken in the one-on-one workshops commenced after the collective workshops to help teachers have a head-to-tail summary and reflect on their learning and applications. In the one-on-one workshops, a thinking tool regarding dialogic process (see Figure 3.5) was provided for teachers to assist them in designing their instructional activities and further support their thinking in dialogic talk to elicit students' metacognitive thinking.

#### **A dialogic talk processes**

A primary concern was to examine the central feature of teacher mediation in students' metacognitive development. This took a closer look at the enactment of a teacher mediation plan developed through workshops to develop the metacognitive skills for problem solving among students. In the workshop professional learning process, the teachers were equipped with an explicit approach I designed to facilitate teacher mediation. As the teacher mediation approach was implemented in classroom practice, I interpreted teacher participants' understanding in classroom practice by comparing the enactment in the classroom to the mediation process outlined in Figure 3.5.

**Figure 3.5** *The dialogic patterns in the process of metacognitive mediation between teachers and students, derived from Guo (2020)*



I introduced participants to the explicit approach of mediation through dialogic talk as outlined in Figure 3.5. The steps of mediation were informed by the self-reflection of my own teaching methods and the theoretical framework underpinning this research (see Section 3.8.2). The explicit method of teacher mediation included using dialogic talk to access what students know about the content knowledge, then providing them with the requisite knowledge in a systematic way and afterwards guiding students to model the thinking process to solve the problem. The theoretical framework of this research supports the four steps listed in Figure 3.5. For example:

1. Dialogic assessment: a). in a co-created learning environment b). to know where they are

The first step is dialogic assessment (Giles & Earl, 2014; Tempelaar, 2006) to know what the students already know (Daniels, 2016) and what the students do not know (Karpov & Haywood, 1998) to confirm the problem (Vygotsky, 1997) in a co-created



learning environment where it is interactive, and students are empowered to learn (Kaufmann & Buckner, 2019).

2. Cognitive knowledge supply: a). systematic way of structuring b). give knowledge of what they don't have in a systematic way

After knowing what students need, next step is cognitive knowledge supply (Flavell 1979; Nielsen et al., 2009). The supplied knowledge is provided in a structured and systematic way (Avargil et al., 2018). The well-organized cognitive knowledge helps teachers' mediation in students' development from cognitive to metacognitive level, and free their mental capacity to engage in ongoing thinking in problem solving activities (Bahri, 2018).

3. Modelling the metacognitive process: a). think aloud b). and do together

When the content knowledge is supplied in an effective way, the next step is to think aloud (Van Someren et al., 1994) and do together. Teachers provide modeling in metacognitive thinking process to elicit students' thinking to develop their metacognition (Cromley & Kunze, 2020). Think aloud aims to make thinking visible to internalize the thinking process for their own use in the future (Guo, 2020).

4. Form a tool for metacognitive process: internalize the practice to use for next time.

Teacher reflection and student's reflection are used in the fourth step to help students think of their thinking (Flavell 1979) and share the thinking of their thinking with others to help them become aware of their doing and thinking processes to facilitate higher order thinking and to be metacognitive learners.

These four steps were modelled with the teachers to help them mediate student metacognition and also helped provided an analytical framework to observe the classroom practice of the three modelling classes (English, Mathematics and Chemistry) to gather data and further evaluate their implementation in an organised way. In the next section, the classroom observation is discussed.

### ***3.8.3 Classroom observation***

Observation has been characterized as “ the fundamental base of all research methods” in the social sciences (Adler & Adler, 1994, p. 389). Observation, as a method of inquiry, is defined as activity tracking and systematically describing phenomena and events taking place in activities (Creswell & Creswell, 2018). In addition, Pope and Mays (1995) define observation as “systematic watching of behaviour and talk in naturally occurring settings” (p. 43). With the traditional norms of observing in naturally occurring settings, qualitative resachers observe both the human activities and the physical settings in which such activities take place without participation.

Therefore, the observation ought to takes place naturally in the traditional norms of naturalistic observation, however, Bateson (1972) argued that the observer is inevitably tied to what is observed. The qualitative researchers have revisited their approaches of naturalistic observer to participant observation in which the observer no longer operates at a distance from those being observed but is to be involved in and making sense of what is going on by asking questions and engaging in dialogue. The participant observation method is defined as a “data collection technique that requires the researcher to be present at, involved in, and recording the routine daily activities with people in the field setting” (Schensul et al., 1999, p. 91).

Correspondingly, Adler and Adler (1987) showed great concern on observers' active role in securing the trust of the group, thus becoming a participant in his or her object of study.

In this study, the participatory observation was used because it allowed me to discover detailed information about thoughts, feelings, and behaviour of those involved in the activity through the stages and the details of the study (Cheia, 2010). For example, I walked around quietly to observe students' learning behaviors in A class, but sometimes I had an informal talk with students in their A class. This approach aligned with the purpose of this study as it assisted me in understanding what was happening and informed the next phase of the research - the workshops. Participatory observations were also used to enable me to consider the nature of teacher-student dialogue occurring.

Video records allow fine-grained analysis of complex classroom interactions, through replaying the recording and examining the interactions from multiple dimensions or perspectives (Hiebert et al., 2003). However, the camera cannot capture everything, and so researchers must make decisions about which aspects of the classroom will be within the view of a camera's lens (Chan & Clarke, 2021). These decisions regarding the physical placement and the field of vision of video cameras affect the footage that will be generated. For this reason, Chan and Clarke (2021) argued that the positioning of video within a study has a fundamental impact on the construction of a study's data source, which influences the data generated and analyzed and, in turn, affects the knowledge claims generated.

To support collecting observation data, in this study, a portable video camera was used to record the participant activities to capture classroom practice and teacher interactions in the classroom and in the workshops. However, I minimized my participation in B class as the

teacher was teaching students by doing classroom activities. My role in B class was mainly as non-participatory observer using a video camera. A classroom observation protocol was used through the process of the observation (see Appendix C). Nevertheless, reflecting on using the video camera, how the camera was employed may have influenced what data I actually collected. For example, when I walked around the classroom to capture the “talk” between students, I made my decision on which group of students had been filmed but not any other group. The talk I captured could have influenced what data I collected.

Creswell and Creswell (2018) assert that observation is a means to record everything happening. This approach also allowed me to engage in the activities in the classroom with the students and develop a friendly relationship with them. By doing this, I tried to observe and faithfully represent what was happening to minimize bias with more reliability for the data. During the classroom observation of teachers and the students, I took a portable camera to record the classroom activities, when roaming the room. During this process, I recorded when dialogue occurred between the teachers and students. The length of the observation depended on the duration of the class. Class observation of teachers took a maximum of 40 minutes as the duration of the whole class time, and in total, it took a maximum of three hours and 20 minutes to observe the classes of five teachers in their subjects of English language, Math and chemistry in class B.

The classroom practice was audio-video recorded by a portable camera, which was shot by the me walking around the classroom. The focus was on the dialogue happening in the classroom among teachers and students. Through this process, I audio-video recorded the episodes when dialogue happened between the teachers and students. Moreover, during the activities, the dialogue of peers that appeared to scaffold on the metacognition discussion was also recorded

as an indication of students' understanding. The dialogue between peers was recorded as model clips to watch and analyses at subsequent teacher workshop.

Video recording made the conversation and other communication through non-verbal interaction more visible and available for me to revisit, aiding recall of the mediational process happening. In this study, even though I was doing participatory observation, I found there was a need to have an informal talk with students after class to get their insights to reinforce the phenomena noticed from this classroom observation. For example, (see Section 4.2.2), I observed the English class 2 and noticed that a student, Mark in Figure 4.8, did not get involved in classroom activities as much as others, then I wanted to know why he didn't get into the activities, so I had a very informal talk with him to get his insight on the reasons. The data generated from the informal talk was categorized as the interview data. How interviews were used in this study is introduced in the next section.

### ***3.8.4 Interviews***

The interview is a data collection technique which enables researchers to get direct insights and perceptions of the participants. Creswell and Creswell (2018) defined an interview as the method by which the researcher collects information directly from the respondent and also proposed that the interview enables researchers to find out those things that they cannot directly observe like feelings, thoughts, and intentions. The interview is often used by qualitative researchers tied with observation tools to assess researchers' understandings and construct reality with the participants by revisiting the thoughts behind the actions in observed activities. Robson (2002) categorized interviews into three forms: fully structured interviews, semi-structured interviews, and unstructured interviews. This study utilized a semi-structured interview method to gain perspectives from the participants.

### **Semi-structured Interview**

An individual semi-structured interview facilitates conversation between interviewer and interviewees. Brinkmann and Kvale (2008) defined a semi-structured interview “as an interview with the purpose of obtaining descriptions of the life world of the interviewee in order to interpret the meaning of the described phenomena” (p. 3). In this research, semi structured teacher and principal interviews were conducted in the process of fieldwork in the school. The semi-structured interviews aimed to capture and discuss the perceptions on the professional learning in designed workshops and reflect on the teachers’ professional understanding in classroom practice regarding metacognition facilitation, and the principal’s about metacognition and flipped learning. I did not merely follow the participants’ flow of talk but had prepared questions to guide discussions. I provided several possible questions to conduct the interviews. Each interview took approximately 45 minutes with teachers and the principal and thus in total, approximately 100 minutes of interview time was completed.

### **Focus Group Interview**

In this research, focus group interviews were conducted among the teacher and student participants. A focus group interview is defined as an interacting group of individuals who have some common interests, a group organized by a moderator, who uses the group and its interactions as a way to get information about a specific problem (Cheia, 2010; Creswell & Creswell, 2018). It is said that when there is more than one participant to be interviewed in the same group, the conversation tends to be more flexible by reducing tensions when an individual interviewee is with the researcher (Cheia, 2010). In focus groups the turn taking is hoped to be distributed among all participants (Gillham, 2000). In this study, during the focus group discussion, I acted as the moderator, guiding the participants’ responses. I took notes during the discussion and audio recorded the discussion with the participants’ consent. Each focus

group interview took approximately 45 minutes each with students and thus in total, approximately 150 minutes of interview time was completed.

Rabiee (2004) reported that during focus group discussions, participants not only have the opportunity to speak, ask questions of other participants and respond to the comments of others, but more importantly they have choices to pause and to be a merely listener. The talk among the groups including the researcher is reflective and kept evolving to common agreement to the data collected. In addition, teachers in a group with peers would be more likely to relax and feel free to talk because peer interactions help to invoke empathy among students to make the thinking deeper. For example, Frey and Fontana (1991) state that researchers can use focus group interviews as a more efficient use of resources and as a means of adding valuable insight to the interpretation of a social or behavioral event.

In this study, I arranged a convenient time and place for all participants in interviews. Moreover, I also prepared Warm up activities with snacks (cookies and nuts) for the participants in the groups. The techniques of a focus group interview helped me create a relaxed environment to secure the willingness to share from the interviewees by establishing a good rapport. Boggs and Eyberg (1990) stated that engaging participants in the interview process for the purposes of establishing rapport, gathering information, and observing the participants behavior requires the researcher to be skilled in communication techniques and interviewing strategies. Chinese language was used for all the interviews so that the participants felt comfortable to get meaning across in sharing their ideas and experiences. After six weeks of workshops, informal talk and modified classroom practice, the third phase of data collection commenced in the second week of July, where teachers and the principal participated in the interviews. The interview date, place and time were decided based on participants'

convenience, after the date of the final workshop and before the date of the school summer holiday.

### ***3.8.5 Document analysis***

Document analysis is a systematic technique for reviewing documents—both written and electronic material. As one of the significant research methods in qualitative research, document analysis requires that data be scanned and interpreted so as to construct meaning, advance understanding, and develop practical knowledge (Corbin & Strauss, 2008). Documents contain text (words) and images that have been recorded without a researcher's intervention (Bowen, 2009). The document collected should be relevant to the case to be researched and the documents may present in a variety of forms. For example, the different forms cover: background papers; books and brochures; diaries and journals; event programs (i.e., printed outlines); maps and charts; newspapers; program proposals, and organizational or institutional reports; survey data; and various public records. Merriam (1988) pointed out that “Documents of all types can help the researcher uncover meaning, develop understanding, and discover insights relevant to the research problem” (p. 118). In addition, Creswell and Creswell (2018) pointed out that analysis of documents is an indirect method, which consists in the accumulation of information about the natural or the anthropic, which holds the phenomenon under investigation.

For this, in this study, I also collected documents, such as teachers' lesson plans (before and after workshops). The lesson plan helped me examine evidence of teachers' thinking development over time. From the students, teacher-generated students' test results (before and after workshops) were also collected with permission. This is because, in the context of China, marks are one of the core elements, and as a researcher using sociocultural theories, I am aware



that I have to situate myself in the environment, to get a point of view that the research intervention at least does not make the students' results worse. Teachers set the test at the beginning of the semester.

In addition, other documents analyzed included the school Principal's conference presentations (i.e., printed outlines) about the school's flipped learning process; newspaper reports of the events in flipped learning development at the school; program proposals of flipped learning development for the school; survey data of the school generated to examine students' and teachers' satisfaction levels; and various public records of the developed frameworks and models for customized flipped learning, were also collected.

### ***3.8.6 Data handling and analysis***

Qualitative researchers analyze collected data seeking the answers to the research questions. Goetz and LeCompte (1984) emphasize that the primary step in data analysis should be to revisit the research questions. The fundamental role of reviewing the research questions is to provide a clue for the researchers to know why the research was being conducted. Qualitative researchers use both deductive and inductive processes and techniques for data analysis, which means collected data are synthesized, coded and categorized into themes to identify the emerging patterns (Guest et al., 2011). For this study, the data of recorded classroom practice, workshop practice, documents, and interviews were transcribed, organized, and synthesized, based on the sources. Data were coded and categorized into themes in terms of the similarities and differences to search for emerging patterns. Thematic analysis methods were used in this study.

Boyatzis (1998) identified that thematic analysis enables researchers, as observers, to use a wide variety of types of information in a systematic manner that increases their accuracy and sympathy in understanding and interpreting observations about individuals and groups. Coding is a way of relating your ideas with your data and a process for encoding qualitative information in the search for the insights. Codes may be a list of themes. After data are coded, the researcher would categorize them into themes. Boyatzis (1998) clarified that a theme is a pattern that labels and systematizes possible observations or interprets aspects of an occurrence. A theme may be identified at the observable level or the underlying level. Thus, the themes can be generated from the raw data or generated deductively from a literature review. V-note (Goods, 2019) was used for the conceptualization and coding of data, memo writing, and generation of themes for thematic analysis. Specifically, the explanation of data from teachers and students would help identify the process of metacognitive engagement process in the classroom practice in subjects of English, math, and chemistry.

### **Analysis during Data Collection (Coding)**

To enhance the collection of rich data, the classroom observations were video recorded with appropriate video quality adjustment and camera position (Leong et al., 2006). Video observation data and interview data were transcribed verbatim in Chinese and then translated into English. After transcription, the first step of the analysis was to code the observation data. See Appendix D for an example of coding. Coding was influenced by the tasks and interactions of mediation and engagement of teachers and students in problem solving (Bell et al., 2017). Codes were further categorized, and the emerging patterns are developed into themes.

The data were recorded and further analyzed using software V-note, see one example of an instructional co-designing scene with one of the teachers in Figure 3.6. I observed and video captured the dialogue between teachers and students when the practice was being implemented.

**Figure 3.6** *one example of an instructional co-designing scene with one of the teachers*

The screenshot displays the V-Note 2.5.6 software interface. On the left, a video player shows a classroom scene with two women, one of whom is Junjun, working at a table with laptops. On the right, a transcript window lists the following dialogue:

Start	Duration	Speaker	Text
00:04:25.113	60 s	Junjun	single choices part of teh instructional leadings. let them to discuss first and then have each representative from each group to write the anser on the blackboard
00:04:53.359	3 s	junjun	first i will give them voice freely, to let she or he tell why did he choose this anser, the reason and the thinking of that time?
00:04:53.981	45 s	researcher	yes, to be able to self-monitoring in a logic as we talked to plan, manage, check, evaluate, need teacher to intervene in between, teh awareness will be cultivate
00:04:57.288	11 s	Researcher	yes, teh we can set a problem, and the situation we built there to help the kind of studnets who need help here
00:04:57.952	14 s	junjun	the activity design is like this: choose one studnet in each group then tell the anser first, if the anser is different, then choose the different studnet to explar
00:04:58.368	40 s	researcher	so you have a awareness of which level of your studnets are in the situated way, and you have your assessment from the previous performance and marking
00:05:11.364	0 s	researcher	yes, it is for bring them to a sabnce of thinking of their thinking, how they were thinking, and then now, it is think of their thinking before, it kin dod self-reflec
00:05:15.702	5 s	junjun	yes, and tehni i will ask all teh other studnets in the seat to get them invlomed as an assessor to give comments which problem solving process o fthinking logic
00:05:21.926	5 s	researcher	so this is the way of bring the studnets all together to get invlove in the learning but not only interactive with the studnets who got chance to say, teh enviro
00:05:28.696	10 s	junjun	the studnets most probably will say that they are agree with the one who choose the wright ansewer. however, the studnets who have the right ansewer may a
00:05:39.046	48 s	junjun	yes, so for single choice, you need to fit self-plan, it means you know what tehy are trying to asse you for which part of teh knowlege in English grammar. a
00:05:41.788	1 s	researcher	line 6 move here
00:05:51.837	19 s	junjun	then i will come back to the problem which the studnets there, give them a clearly instructions on what they know and what they dont know teh meaning of it
00:06:12.057	14 s	researcher	so it is exactly we talked about in teh workshops that from cognitive to metacognitive, from plan, let them know by asking them what they know and what it
00:06:14.738	34 s	junjun	so when how u know it, see the four choices they gave, u will know what they are assessing, then you bring the system you have or structure you have, sui
00:06:49.411	8 s	researcher	do u think we need to emphase the second step now ? off self-manage ? use all the knowlege and skills they have to orcheatra teh process of self-regulation,
00:06:57.522	39 s	junjun	yes, next step i will just help the process of how to do, by standing there, i will give them and help them to comb the knowlege of teh grammar being assessed,

The interview data were coded and analyzed using the thematic analysis method by identifying different themes and related sub-themes (Boyatzis, 1998). Thematic analysis is a method for identifying, analyzing and reporting patterns (themes) within data (Braun & Clarke, 2006).

In this study, firstly, I transcribed my data from the recorded interview videos. This helped me to get to know what data I had. Then I did several rounds of reading and re-reading the transcribed data, noting down initial ideas of the preliminary analysis. After the stage of familiarization, secondly, I coded the data to identify a feature of the content that appeared interesting to me and that was relevant to the theoretical framework of this study. As Braun and Clarke (2006) stated:

Coding will, to some extent, depend on whether the themes are more ‘data-driven’ or ‘theory-driven’ in the former, the themes will depend on the data, but in the latter, you might approach the data with specific questions in mind that you wish to code around. (p. 79)

In my coding process, I approached the data with specific questions in my mind that I wished to code around. For example, I sought to identify teachers' current beliefs about teaching and learning before the intervention. Therefore, the themes represent the insights that emerge from the data around what teaching beliefs teachers were holding before the intervention (see Section 4.3.1).

By way of another example, after analyzing the hand drawing of the representative images of the teaching, I discussed with teachers why they drew the pictures in those ways. Their reasonings were initially coded and collated, and a long list of the different codes was identified across the data set. For example, the codes were: classroom seating, classroom arrangement, physical detachment, standing on the platform, teacher authority, and teacher dominated talk, low-level dialogue, communication. Then I collated codes to analyses and consider how different codes may combine to form an overarching theme. For example, if all the codes featured teacher-centered classrooms, then teacher-centered classrooms may be a candidate theme.

However, when refining the themes, data were too diverse to fit a single theme of the teacher-centered classroom, so it was decided to separate data to generate new themes, including codes of teacher-dominated talk, low-level dialogue, and communication. Then, classroom communication was developed as a new theme for this section. Therefore, two themes were eventually used: Teacher-centered classroom and classroom communication. The same

procedures of coding were applied to data regarding teacher and student perceptions of metacognition development.

### **Analysis after Data Collection (Key incident analysis)**

After the data collection, the data were analyzed. One of the difficulties of analyzing interview and observation data is that they can generate large amounts of data. For example, Cohen et al. (2000) raised the issue of the overload in the amount of collected data. Therefore, care also must be paid to reduce the data to a manageable size. Coding mentioned in the last section is one way of doing it; nevertheless, key incident analysis is another strategy to reduce the redundant data in qualitative research (Kroon & Sturm, 2007).

Key incident analysis is a central part to this research as the study focused on particular activities for metacognitive teaching preparation and application which may have happened in the classroom practice, initiated by the teacher or students, or which arose in the teachers' and student interviews of their perspectives in the metacognitive teaching process. Key incident analysis helped me to reduce data, and more importantly, the reduction approach helped me keep and interpret the data to answer the research questions.

In this study, I selected the key events that appeared to respond to the idea of teacher mediation of student metacognition development (e.g., Choose Summer's instructional talk with her students), and explored links to other incidents (i.e., link the practices with Mathematics teacher, Zhang and Chemistry teacher, Yuan) to see how the thinking tool of the talk process could be applied into classroom practice in different subjects. The selected key incidents helped me to see what members of a social group (middle-high school teachers) need to know (theory), produce (instructional activities design), enact (classroom practice), interpret (innovate

pedagogic strategies) and produce to participate (learner-centered approach) in appropriate ways (customized metacognitive teaching and learning). The three incidents were chosen from Summer, Yuan and Zhang's taught English, Chemistry and Mathematics classes to illustrate the teacher participants whose practice might help to answer the research question of "how teachers enact strategies to elicit students thinking in metacognitive development". For example, the key incidents from observation data in this study selected were:

1. Kate's learning trajectory from class A to class B
2. Tom's learning trajectory from class A to class B
3. English teacher, Summer's, modelling class on topic of time prepositions
4. Chemistry teacher, Yuan's modelling class on topic of...
5. Mathematics teacher, Zhang's modelling class on topic of...

These key incidents were selected because of the relevance of answering research questions about teaching and learning in metacognitive teaching. The key incidents contributed to the reduction of the data and helped to answer the research questions. However, as the selection process is subjective, trustworthiness of the study must be considered. In the next section, the trustworthiness of the study is explained.

### **3.9 Trustworthiness of the study**

The enhanced trustworthiness of the data analysis and presentation of the results among qualitative research is significant for the completion of research tasks. For instance, Denzin and Lincoln (2011) articulate that one of the challenges of qualitative research is how the researcher can ensure the results of the inquiry are trustworthy. Qualitative researchers consider credibility, transferability, dependability, confirmability, and ethics as trustworthiness criteria

to ensure the rigor of qualitative findings (Schwandt et al., 2007). The criteria of trustworthiness of this study are discussed in detail in the coming sections.

### ***3.9.1 Credibility***

Credibility is one of the key features to ensure the trustworthiness of the study. The inquiry should be conducted in a way that is able to produce credible findings, and in addition, the findings demonstrated need to be supported in various ways (Lincoln & Guba, 1986). Lincoln and Guba (1986) advise several techniques to increase credibility in qualitative studies: prolonged field engagement, persistent observation, triangulation, debriefing by peers and supervisors, member checking and interpretation with prior knowledge and lived experiences.

#### **Prolonged field engagement**

Prolonged field engagement at the data collection site helps researchers come to know the settings better, and to establish good relationships and trust with the participants. Trustworthy relationships help identify their reality and clear up confusion during the information seeking and exploring process (Lincoln & Guba, 1985). Similarly, Krefting (1991) observed that “extended time period is important because as rapport increases, informants may volunteer different and often more sensitive information than they did at the beginning of the research project” (pp. 217-218).

In this study, I prolonged the fieldwork up to four months for one semester of the Chinese school year from May of 2019 to August of 2019. During this sustained time, the researcher engaged with teachers, students and school leaders, and learned about the school culture and social context by understanding the school tradition norms in teaching-related management and administrative management in the school-wide flipped learning adoption process. Moreover,

over this time, I co-experienced the designed activities with teachers, which helped establish rapport with the participants to understand the essence of their experiences.

### **Persistent observation**

Persistent observation refers to the researcher's focus on the features or aspects of a situation that are pertinent to the phenomena being studied. As Lincoln and Guba (1985) noted, "If prolonged engagement provides scope, persistent observation provides depth" (p. 304). The persistent observation enables researchers identify the significant factors and details to be applied. Likewise, Bitsch (2005) emphasized the key trait of persistent observation resting on the foundation of gaining details by digging into in-depth study. Additionally, Matthew and Michael (1994) reported that data collected at the beginning of the field is weaker than that collected when it is at the end of the study.

This suggests that persistent observation helps reduce the subjectivity of the researchers on their own lived experiences and prior knowledge but constructing reality with the ongoing situation. In this research, I conducted persistent observation by using a cyclical approach, observe, intervention, observe, intervention, and then back to observation and so on. With the in-depth study, the reality is constructed by minimizing the subjectivity by using of an observation protocol in the fieldwork.

### **Triangulation**

Triangulation refers to the use of multiple resources to draw conclusions about what establishes truth (Merriam, 1988). According to Denzin and Lincoln (2011), the multiple ways of triangulation minimize the bias that may be caused by the single data sources and single method. Moreover, triangulation help the researcher capture the holistic view of the phenomena



in the case being researched. There are several techniques to follow for triangulation: data source triangulation, methods triangulation, and investigator triangulation (Denzin & Lincoln, 2011; Merriam, 1988):

- a) Data source triangulation uses different sources of data such as interviews, focus group discussion or participant observation,
- b) Methods triangulation uses different research methods
- c) Investigator triangulation: uses multiple researchers to investigate the same problem

In this study, I worked closely with supervisors to meet the needs of triangulation; in addition, multiple sources were used. For example, a principal interview and teacher interviews were conducted to see how metacognition is facilitated in the technology integration process. Besides, observations and document analysis were also used to get more evidence in the fieldwork. Moreover, I used three key incidents from three modelling classes to show how the thinking tool of dialogic talk helped teachers in metacognitive teaching in the classroom. Students' hand drawings and teacher's hand drawings were analyzed with the support of teachers and students' interview data to support the representation of the pictures. For example, multiple students in their hand drawings mentioned "classroom atmosphere", the atmosphere was a theme in section 6.2. Then, teacher's interview data was also used to present views from different teachers' perspectives to reflect on the themes of "classroom atmosphere".

### **Peer debriefing and member checking**

Use of peer debriefing can allow evaluation of the quality and authenticity of research interpretations (Pitney & Parker, 2009). According to Guba (Guba, 1981), peer debriefing “provides inquirers with the opportunity to test their growing insights and to expose themselves

to searching questions”. This means that a qualitative researcher should present the study findings to peers to get their feedback. Likewise, Bitsch (2005) articulated that feedback from peers helps to improve the quality of the findings. In this study, when I presented the findings, peers’ feedback was sought in the process of coding to generate the themes. For example, I presented the preliminary findings to a faculty-organized doctoral symposium, and the professional feedback and comments were provided and considered from the seniors and peers in the conference, which helped me to produce themes.

Member checking is another technique for improving the quality of qualitative data. According to Guba (1981), the transcriptions need to be evaluated by the members from which data are solicited to reduce the bias. Member checking is a vital process that a qualitative researcher must experience because it is the core of credibility (Lincoln & Guba, 1986). In this study, after the data was fully transcribed, the manuscripts of the transcripts were sent back to the participants for a member check to ensure there were no misinterpretations from me.

### ***3.9.2 Transferability***

Transferability is also talked about as generalizability and is the extent to which the results of the qualitative research are applicable in other settings or groups. Lincoln and Guba (1986) reported that it is the researchers’ accountability that delivers adequate expressive data that readers can evaluate the transferability of the data to other contexts. In doing so, the researcher must be committed into the study to search for the details of the settings, participants and activities beneath the appearance of the phenomena. The transferability of this study was assisted through the process of capturing the detailed instructional talk between teacher and students in three different subjective classrooms (Math, English and Chemistry).

A qualitative study typically involves a large volume of researcher-generated data, including notes about the context of the study, methodological decisions, data analysis procedures, and self-awareness of the researcher. Such data are important in many aspects of the study, particularly in the development of an audit trail to substantiate trustworthiness (Rodgers & Cowles, 1993). Lincoln and Guba (1985) regarded audit trails as one of the principal techniques for establishing the ‘confirmability’ of qualitative findings. An audit trail is a qualitative strategy to establish the confirmability of a research study’s findings. In this research, I always establish findings based on participants’ responses instead of my own preconceptions and biases. For example, I recorded and analyzed the classroom practice dialogue among teachers and students to present talk patterns in metacognitive teaching in three different classes in a transparent manner. The purpose of doing these things is to clarify to the readers why I made the decisions I did and to show that the analysis follows a logical path dependent on the participants’ narratives.

### ***3.9.3 Dependability***

Credibility cannot be attained in the absence of dependability. Dependability refers to the stability (reliability) of data over time and over conditions. In other words, the findings of dependable research may be repeated if the inquiry were copied with similar participants in similar settings. The dependability of a study will be established if the credibility is reasonably established (Lincoln & Guba, 1985). In this study, the dependability was addressed through the expanded description of the process utilized for cyclic spiral design from observation to workshop and then back to observation along with in-depth interviews to obtain extensive refinement and retrieval of data through multiple methods.

### ***3.9.4 Confirmability***

Confirmability refers to objectivity—the potential for congruence between two or more independent people about the data’s accuracy, relevance, or meaning. This criterion is concerned with establishing that the data represent the information participants provided and that the interpretations of those data are not imagined by the inquirer. In this study, as a PhD student, the supervisors are one of the strong supports to minimise bias. Therefore, keeping the communication door open with research team with supervisors was imperative and being dialogic was a strong technique for the effective communication to get the credible data in data collection and handling process. Likewise, Buber (2012) stated that dialogue for meaning making only happens in a turn-taking talk between different parties; it is supposed to be mutual, open and equal. Such dialogue may provoke awareness and challenge team members’ fundamental assumptions and help to theorise (Louis & Bartunek, 1992).

Researchers, such as PhD students, need dialogue to make the ongoing situation clear and transparent to themselves and to those with whom they are engaging in the inquiry team including supervisors. From supervisors’ perspectives, they have a responsibility to provide advice on ethical considerations as well as practical aspects of post-graduate research (Rashid, 2020). This advice ranges from what they can do to ensure the research outcomes are of benefit and do not cause harm, what they do to protect the reputation of the university, and how to avoid adverse consequences for the researcher.

In this study, I found that the emailing of my research diary or journal entries served such a function to keep the project on the right track. This was an efficient way to maintain regular communication with my supervisors. The daily exchange of reflective emails with the research team informed them of the research activities and outcomes and opened the possibility for

feedback and support. To report and reflect on the journey is critical (Holian & Coghlan, 2013) and the reflective report may help supervisors provide guidance more specifically and wisely. I also tried to minimize the bias by explaining cultural background and situational changes of the school to supervisors when there were any unexpected changes in data collection. For example, more teachers were involved in the professional learning due to the learning needs in the school.

### ***3.9.5 Ethical Issues***

Ethical approval was obtained from my academic institution before the commencement of participant recruitment and data collection. Permission was also granted by the principal of the participating school. All participants accepted the invitation to participate by reading and signing an informed consent form. Parental permission was also sought from parents of students in the observation classes. Anonymity was addressed by using pseudonyms for the teachers, students and the school principal.

Permission of people involved in the research, their wellbeing, respect, prevention of emotional harm, and accurate representation of findings were highly valued. As a researcher, I have to remember that the expected benefits of the research must never be at the cost of respect of research participants. Their dignity, autonomy, and equality must be upheld throughout the research process. I had to ensure the participants knew their participation in research was voluntary, and they could withdraw their involvement from the study at any time by contacting me directly.

In addition, I kept the data confidential in the research process; personal comments about the teacher participants' behaviours and words were not shared with the principal or anyone else

on the campus. To ensure that teachers in this research were not judged or criticized in any way, especially in front of the principal, the conversation between teachers and me was kept to ourselves. What's more, teachers were busy with their teaching job and families. Therefore, requests for work for the workshops did not always get positive feedback. When these things happened, I always kept patient and professional to communicate with them until a consent agreement was reached.

All participants were ensured to have the opportunity to verify the accuracy of what has been transcribed from the interview and document analysis. As noted above, they could do so by reviewing the information from the transcript. Consent forms had detailed explanations of this. I notified participants when transcripts were available to be checked. Each participant had two weeks to make comments on the transcript. In addition, any problems from the participants would be discussed personally and be considered carefully until they have no complaints about it.

### **3.10 Summary**

This chapter has outlined the research paradigm, research methodologies, strategies and design used in the study, including procedures, participants, data collection tools, data collection, analysis methods, and data trustworthiness indicators. It concluded that an interpretive case study design was appropriate to address the aim and objective of the research. The collection and analysis of data were outlined, the issues that needed to be considered in relation to credibility, transferability, dependability, confirmability, and ethics associated with the research were addressed. The following chapters present the findings from this study.

## **Chapter 4 Pre-Intervention classroom practice**

This chapter presents the findings from the classroom observations and interviews prior to the teacher workshops. The findings respond to research question 1: What are teachers and students' needs for developing metacognitive thinking in flipped learning contexts? These findings are important because they informed the development of the teacher development workshops.

The data from the classroom observation shows how teachers teach and how students learn in the A+B classroom sessions before intervention; data from the group discussions in workshop 1 (pre-intervention) presents the evidence of how teachers think of their teaching before the intervention. As described in Section 3.8.2, during activities in the workshop 1 sought to identify what teaching philosophy teachers held before the intervention. As described in Section 3.8.5, data were collected from multiple sources, including videos; participants generated hand drawing, and workshop discussions. The themes relating to students' learning and teachers' teaching as identified from the data included: Students' time management and help seeking, teacher-centred classroom and classroom communication.

### **4.1 Introducing the setting: The Class AB model**

Green middle-high boarding school had initially implemented a Class AB flipped learning model across the school with the theoretical support of Bergmann and Sam (2012)'s concepts of flipped classroom. In class A the students independently viewed a pre-prepared educational video produced by a technical company contracted by the school. The teachers designed the video content for the company to produce the digital videos. The students engaged with the video material to learn lesson content in this self-study session. As students viewed the instructional video, they had a lesson plan to guide their learning. Class A occurred at the school in a predetermined room at a set time. The teacher was present to supervise the students, while

they may engage in marking or walk around in the classroom to offer help when students' need. There is supposed to be a test at the end of class A (based on the design of the AB flipped learning class model), which is part of design of the lesson plan in class A for getting a summative assessment to inform teachers teaching in class B. It was also worth noting that students were allowed to seek help when they need it from teachers and other students in class A.

Class B involved the same group of students and teacher later in the week. The teacher provided instructions and practice activities that required the students to solve problems using knowledge gained in class A. In other words, during class B the students' workshopped activities designed by the teacher to consolidate knowledge from the videos that they had watching during class A. The teacher could also formatively assess students' learning during class B.

The AB class Model requires independent learners. However, during my discussions with the principal about the progress of flipped learning at green school, he noted that they were facing challenges of students' lack of self-regulated learning and teachers were needing help to be able to provide students through mediation of metacognition development. He shared:

We have considerable concerns on how to help students make the best use of time in class A and, on the other hand, how to help teachers to provide a higher level of instructions when students come into classroom practice in class B. The role of teachers is irreplaceable in flipped learning, and they are more important now. The very vital factors of a teacher's role are to help students digest their learning and guide them to think and solve problems in classroom practice



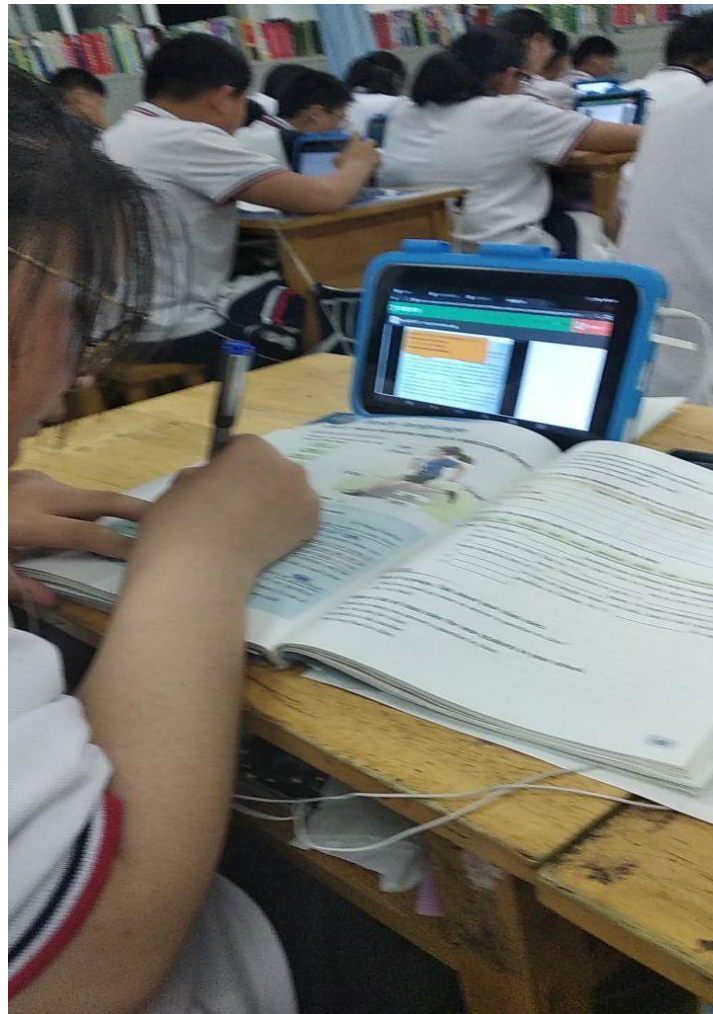
critically and independently. Apparently, our teachers are lacking in these skills, and we need the support of professional learning in helping teachers to do this....

(Informal talk, school principal)

With this practical need and the research suggestions, that self-regulated learners benefit more in flipped learning than those with low self-knowledge and self-management, I came into the flipped learning classrooms to observe what was actually happening in the AB class model.

During the pre-workshop observation of Summer's class, the students in class A watched a video about the grammatical rules for using 'past tense'. Figure 4.1 shows students watching the instructional videos and making notes on a textbook. It illustrates how students utilised an iPad to watch videos in classroom to assist their learning in class A. After the learning from the videos, students were required to complete the exercises in a teacher-generated paper at the end of the class and hand to teachers after class. The teachers marked the papers before class B commence and gave out the marked papers to students. Then the class B teacher and students did classroom practice on the most prevalent errors from students as priority and then less prevalent errors in the papers within the 45 minutes of class B.

**Figure 4.1** *Students in class A watch a video and make notes on textbook*



After the students have completed the class A self-study with the assistance of the instructional videos, they also completed a teacher-generated test. This test is collected by the teacher at the end of class A. Teachers marked the tests before class B and gave students feedback when class B begins as shown in Figure 4.2, which shows a marked paper returned to students with a big tick at the beginning of class B. The marking shows that in this case the student answered all the questions correctly.

**Figure 4.2** Example assessment completed at the end of class A

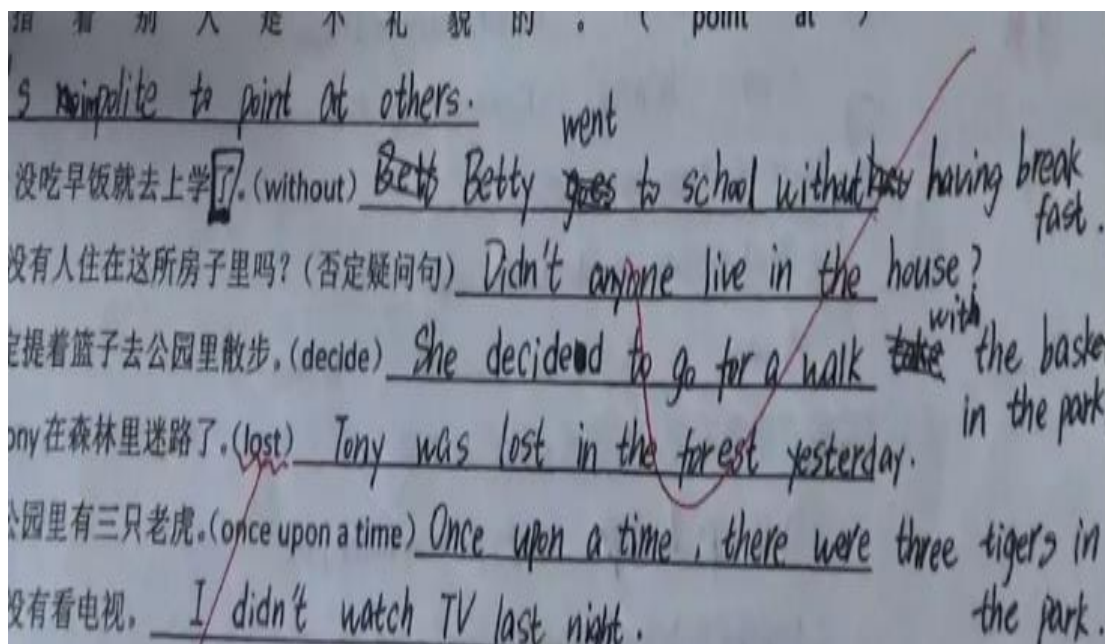


Figure 4.3 shows the teacher of English 1, Summer, and the students in class B. Summer was doing classroom activities to correct the mistakes made by students in class A and provide instructions to students. Notably, iPads are still available for students.

**Figure 4.3** Teacher and students in class B, English 1



Summer gave instructions collectively and did activities with students. One of the most frequent techniques of involving her students into the classroom activities was by nominating

one specific student to answer her questions. Group activities, as I observed, rarely happened (most probably because of the time limitation of class B). Summer was engaged in responding to specific issues that came up in many of the test results from the students from class A. The following section describes key opposing patterns (see Section 3.8.6) in learning behaviours shown in class A and B in English 1 with the same teacher (Summer). These learning behaviours are represented by two different students: Kate and Tom.

## **4.2 Two trajectories of students' learning behaviours**

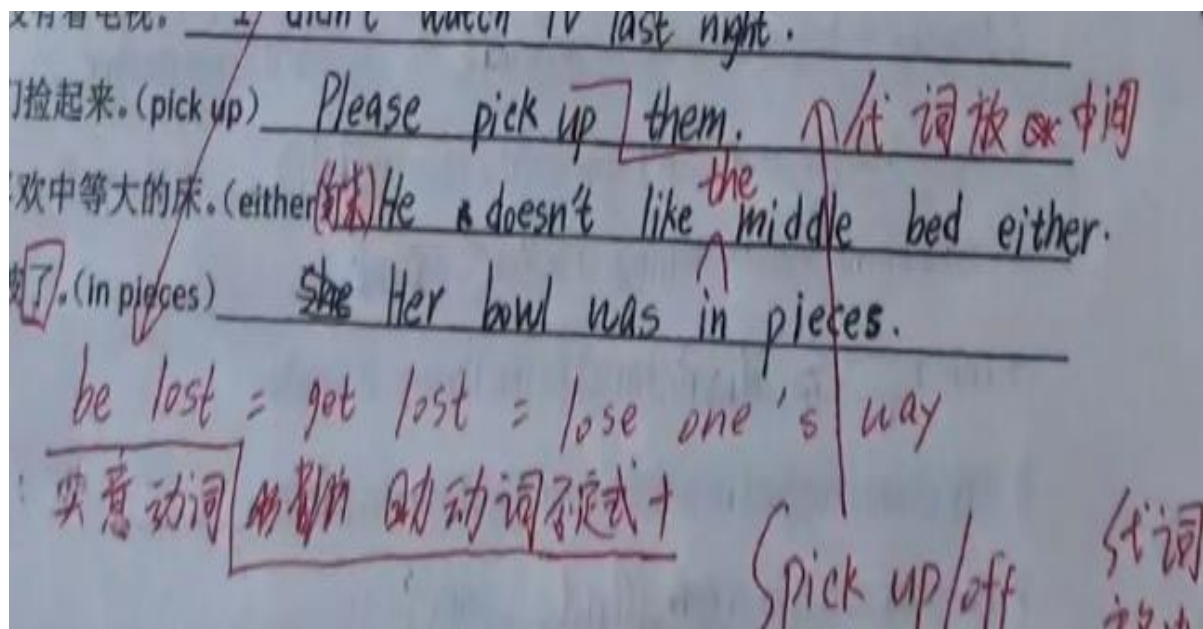
The learning interactions of two students were selected for data analysis from English 1. The purpose was to show the significant role of self-regulation in student learning. Two trajectories of students' learning were observed and recorded. One student correctly completed the test task in class A and was involved in the classroom practice with the teacher in class B; the other student did not complete the test in class A and kept busy in noting down teacher given answers in class B without being involving in classroom activities with the teacher or other classmates. Two observable features were identified as important in these different trajectories of learning interaction: students' time management and students' help seeking.

### ***4.2.1 Students' time management***

Observations in class A of English 1 indicated that students who managed their time well learned better than those who could not. 'Time management' in this study refers to behaviours that aim at making effective use of time while performing certain goal-directed activities (Waterworth 2003). The literature on time management has a main 'message' that while learning about and developing their understanding of the new content knowledge successfully, students need to plan and manage their time. Similarly, in this study, it was evidenced by the

observational videos from the classroom observations from both class A and class B. Figure 4.4 shows the corrected test from class A that is returned to the student in class B.

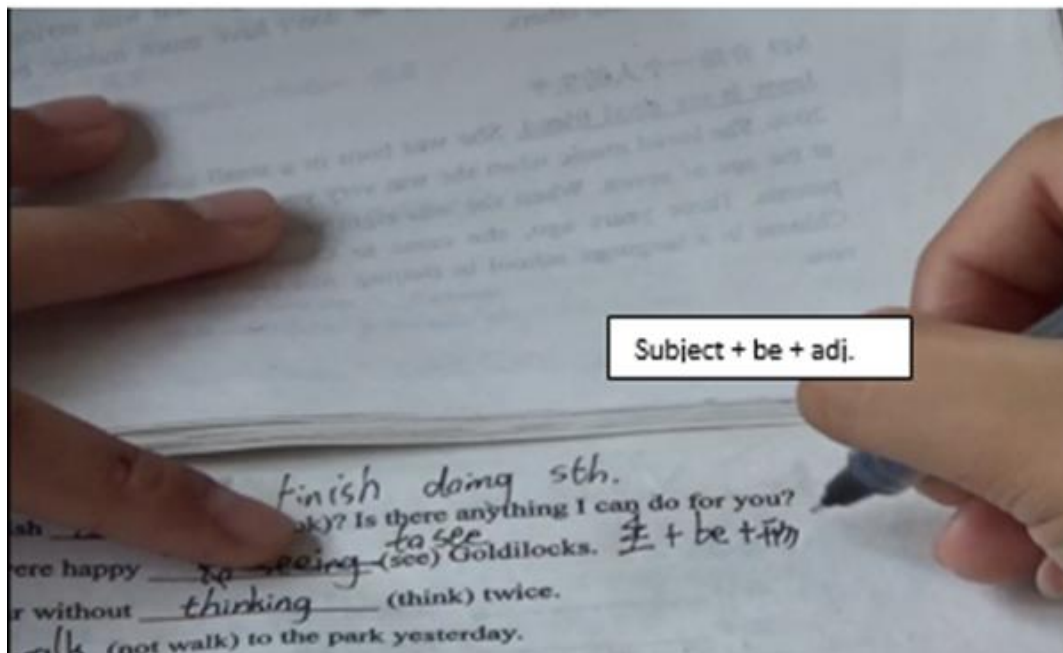
**Figure 4.4** Kate's assessed paper from class A returned to student on class B



If students in class A had answered all the questions during class A, then they could get their tests back during class B and focus on error corrections. For instance: in Figure 4.4, Kate had written during class A 'Please pick up them'. In class B, following the teacher's instructions, Kate put a correction signal to change the position of "them" and "up". In other words, Kate was able to have time to engage in the practice and follow teacher's flow of reasoning.

In contrast, Tom did not seem to be able to manage the time well in both class A and class B. Figure 4.5 shows Tom from English 1, who did not complete the test during class A, and he is writing the answers down as the teacher calls them out in class B. The evidence is that Tom's paper remained unmarked.

**Figure 4.5** Tom in class B writes down the answers as the teacher calls them out



This suggests Tom did not finish the practice as intended within the 45 minutes on class A to get ready for consolidating stage of class B. Tom, who was busy with writing answers, kept silent and did not engage in talk with their teacher or their peers. Compared with Tom, Kate was nominated to talk when she raised her hand. It showed that completing actions of class A helped her to be involved more in class B, and then she engaged more in practice, which in turn helped her consolidate the knowledge and learning new skills of solving the problem. (See Figure 4.6)

**Figure 4.6** *Summer's class*



The teachers also commented on the time management of the students, and the impact that this had on their learning. For example, Ling, a teacher from a different class, but who had the same practice, commented:

In class A, I leave all the time and ownership to students. However, with [them all having] the same resources in a flipped learning context, some students did well, the others not. I walk into them often and notice some of them can finish the self-learning and afterwards practice, some of them even managed to get extra practice to enhance learning. Others, however, [are] only able to finish the watching video and would not [be] able to even do the practice. If one student failed to manage time and use time well in class A, I really feel [it is] difficult

to make them follow me when we are doing classroom practice in class B. (Ling, workshop 1 introduction discussion)

In other words, Ling was frustrated about the different levels of students' performance in class A, which affected their engagement in class B. For some students, the self-study time of class A was not preparing them well for class B. They seemed to rely on class B to help them make sense of the materials, which they should have learned independently during class A. It resulted in the less prepared students not being able to fully participate in answering questions and engage in classroom talk with teachers and peers in class B. English teacher Wen commented on the same challenge, linking it specifically with the time management of the students during class A:

I do not think some of the students know how to plan the time they have and seemed that they did not realize the 45 minutes is too short to waste. (Wen, workshop 1 introduction discussion)

In summary, two different trajectories emerged in relation to students' learning from class A to class B, suggesting that students varied in their levels of preparation of self-study in class A for class B due to the different levels of time management. The teachers indicated that good time management skills were important for students to be able to engage with the class A materials, and therefore to learn the required content. The findings suggest that students' time management skills need to be improved to support learning in the class AB flipped learning model used in the school.

As mentioned above students were allowed to seek help from teachers and students when they needed it in class A. However, from the observation, some students were just sitting quietly and trying to complete the questions alone instead of seeking help from teachers or peers in

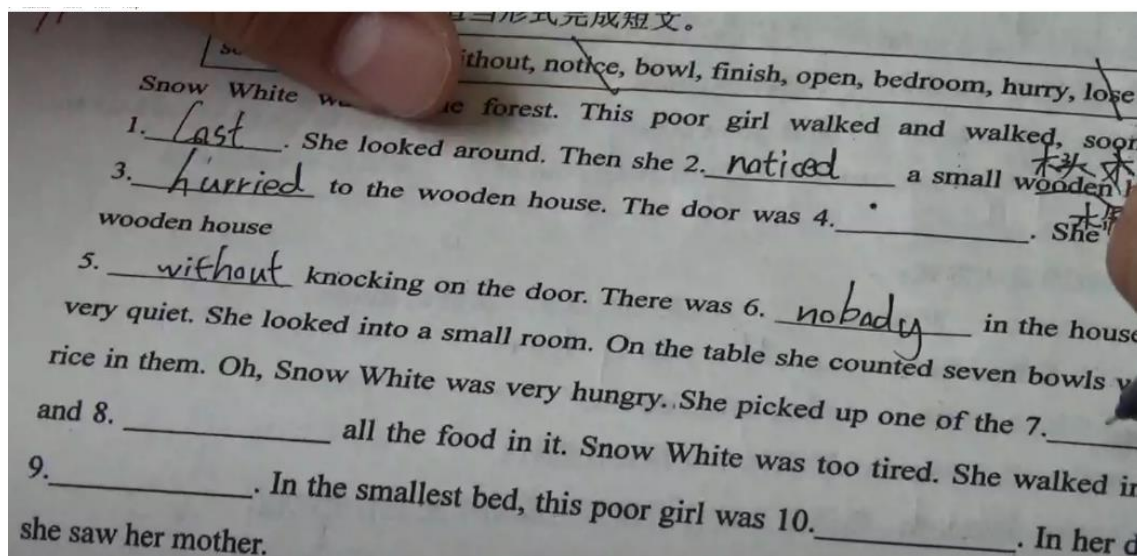


class A. In addition to time management, help-seeking behaviours were also identified as an important theme related to students' engagement and learning in the class AB flipped learning model.

#### 4.2.2 Help-seeking behaviors

Help seeking – the ability and willingness to ask for help - is an important skill for self-regulated learning (Newman, 1994). Through the observation from Class AB across all of the English classes, it was noticeable that students in the same class behave differently when coming up against obstacles. Some students stop and seek help actively from peers or teachers. However, some were less likely to approach someone else and ask his or her questions. For example, Figure 4.7 shows a worksheet being completed by a student in class A in English 1. As can be seen, question 4 has been left blank.

**Figure 4.7** Student is doing practice in class A English 2 (captured on video)



Classroom observations showed that this student did not seek help (from peers or teachers) when they faced problems they could not complete independently. The recorded classroom discussion scene from classroom observation in class B supported this claim. (See Figure 4.8)

**Figure 4.8** *Mark in-group discussion*



From the Figure 4.8, the class was involved in a group discussion as an activity. There were four students (two girls and two boys) in front of the group. The video clips from which this figure is derived showed that the talk remained between the group leader and the other two students who sit beside them. For the other peers who sit further away from the group leader, discussion for them is a form of listening (see, for example, the boy in the right lower corner who is writing and without any communications with other peers). After class, the boy, Mark, who did not involve himself in the group talk was asked about the group discussion activities, and he commented:

I also want to say something and be noticed by others in the class, but when I am in a group discussion, only the group leader has the chance to answer the questions on behalf the rest of the group members. Besides, I sit far away from them. I cannot hear them. (Mark, informal interview after the class).

Mark cannot hear clearly from others as the seating arrangement, and the role of group leader –decided by the teacher - has an influence on who speaks. One of the teachers, Ling, who is the English teacher of English 2, commented in relation to class A:

I gave instructions to them to have discussions with group members or even they can come to me when I am sitting in the front of the classroom or when I am walking around the classroom. However, I found some of the students who did not finish the practice activity on time just sitting there when they do not know what to do; they do not ask anyone for help. 45 minutes passed by easily. (Ling, workshop 1 introduction discussion)

English 2 teacher, Wen supported this view:

Class A is designed for self-study. Teacher's role in class A is to supervise student learning. Therefore, students are encouraged to ask questions when they have confusions in learning. I feel that most of the students are not active in seeking help, either from teachers or from their peers. (Wen, workshop 1 introduction discussion)

In other words, the teachers seemed frustrated that some of the students did not ask for help from them when teachers' consultation was available to them in class A. The pre-intervention classroom observations indicated that only some of the students showed skills in utilizing resources they have to solve the problems they encountered. Others were less likely to seek help from peers or teachers around them in both class A and class B. The lack of awareness of help seeking, especially, in class A, would result in less formative interactions in class B.

### **4.2.3 Summary**

The findings suggest that the student who does not prepare well for class B may lack self-regulation skills to learn independently. They need help to be aware of how to plan things and how to seek help to assist their learning: time management and help seeking indicate students' lack of learning independence. As argued previously, education literature suggests that metacognitive learners are able to self-plan, self-monitor, self-check, and self-evaluate (see Section 2.3.2). They know themselves regarding what knowledge they have and what they can do to reach their goals by planning time well and utilising available resources, including the teacher and/or their peers. Therefore, the pre-intervention observation informed the workshop design specifically in relation to teacher thinking about how to teach students to raise the awareness of arranging the time and managing to complete tasks successfully with help.

For example, how long they need for the paper test, what knowledge they already have from their previous learning and what help they therefore need to solve the problems effectively. In other words, teachers should develop strategies to help students develop their metacognitive thinking to learn independently in the class AB flipped learning model. Pedagogical approaches often relate to teaching philosophy (Noddings, 2018). Therefore, the next section describes the teacher's teaching philosophy before the intervention.

### **4.3 Teaching at pre-intervention**

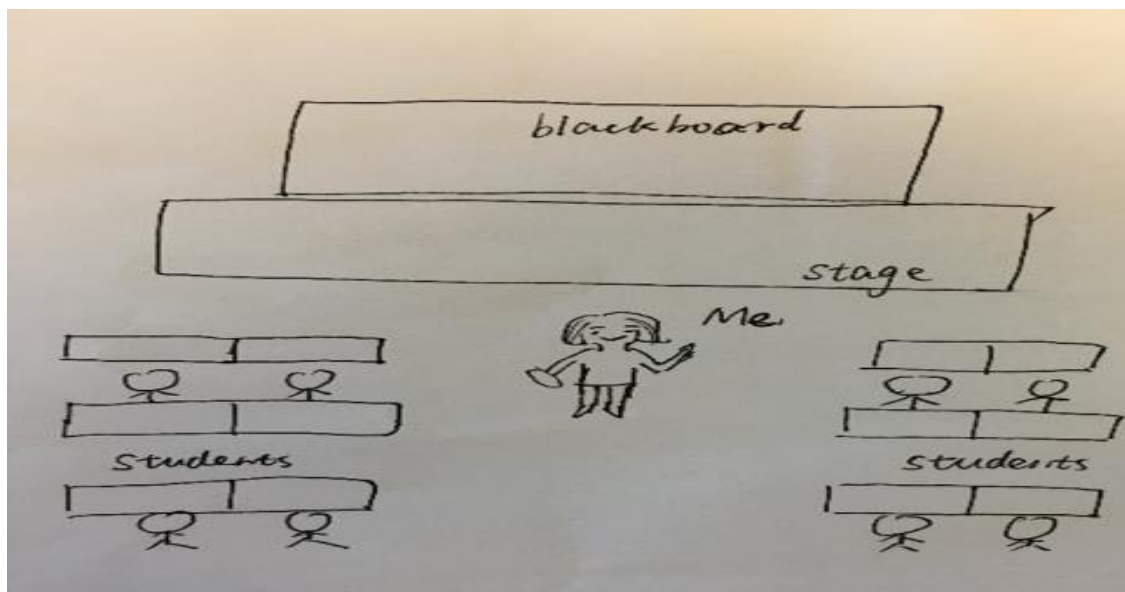
This section presents findings derived from workshop 1 introductory section before intervention, which aimed to further investigate what help teachers need to cultivate metacognitive learners. In Workshop 1, teachers engaged in professional discussion and did drawing activities to represent their current beliefs about teaching and learning before the

theories sharing. The two themes that emerged from workshop 1 were beliefs about teacher-centred classroom and classroom communication.

#### 4.3.1 Beliefs about teacher-centered classroom

An important theme emerging during workshop 1 was from the English teachers' drawings and discussions, showing views of a teacher-centred classroom. For example, Ling's picture presented a traditional arrangement for classrooms with perfectly straight rows of students' desks. (See Figure 4.9)

**Figure 4.9** Ling's representation of her image of teaching in the classroom



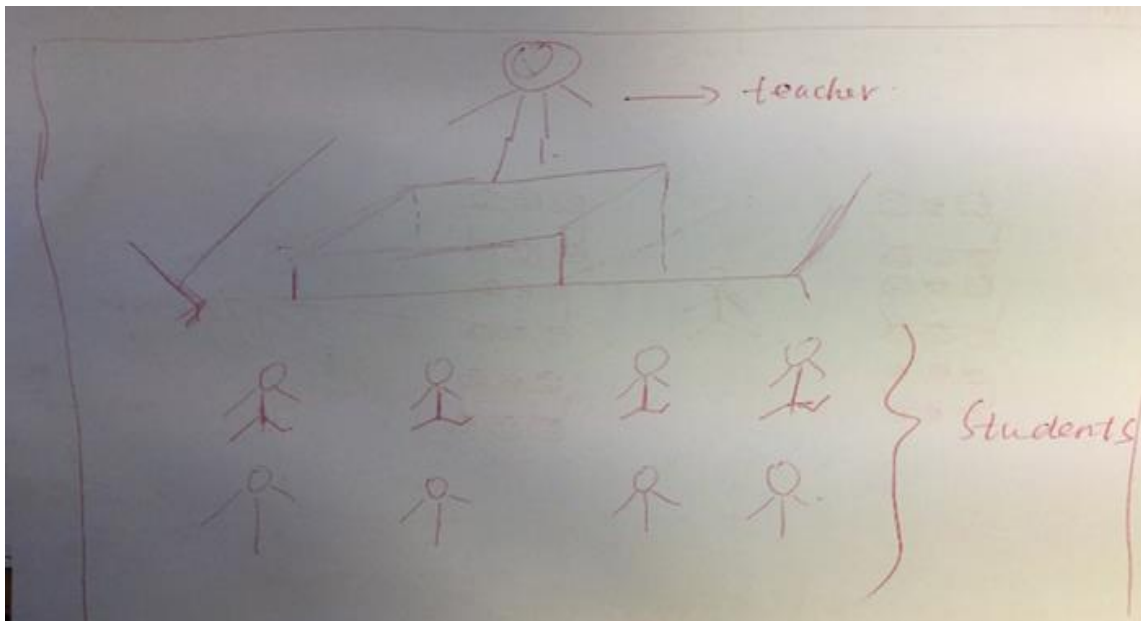
Ling represented her classroom seating and portrayed herself positioned near the blackboard. This indicated that Ling has a traditional view of a teacher-centred classroom. Ling described her thinking on why she draws picture like this:

I arrange my classroom in a very traditional way because I have been teaching like this for many years. I think this traditional way of classroom arrangement will help me direct classroom learning and keep classroom in a good order, as I

have to follow the school curriculum and to keep the same pace with other classes with a big class size and limited time of class length. (Ling, workshop 1 introduction discussion)

In other words, Ling seems to prioritise a need for orderly behaviour as she feels the pressure of covering the curriculum with her large class of students. A similar view of teaching and learning was depicted by Wen, as shown in Figure 4.10.

**Figure 4.10** *Wen's representation of her image of teaching in the classroom*



Noticeably, there was a physical detachment between teachers and students in the classroom setting in Wen's representation: the teacher is standing on the platform of the blackboard, separated from the students by the table. The students are sitting in rows. In other words, Wen placed herself in front of the classroom, away from students' seating. When asked why she constructed her image of teaching like this, Wen answered:

I put myself in front of the classroom to keep my authority. I hope that I can regulate students' actions in classroom. I know it is good to have an

environment of 'relax' in classroom, but it is not easy to do when you are teaching. Student behaviours interfere with on-task activities, I have to make them not that relaxed (Wen, workshop 1 introduction discussion).

Like Ling, Wen used a traditional classroom arrangement in order to keep good classroom order. Both Ling and Wen, who each have more than 5 years teaching experiences, seem to believe that teacher-centred classrooms help teachers maintain control and meet the curriculum requirements in terms of pace of learning.

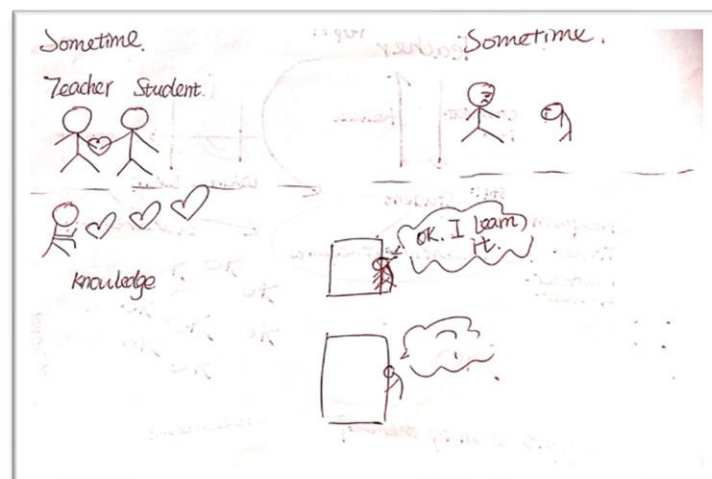
These two teachers were using a teacher-centred classroom; they felt that it was easier for them to keep in control of the classroom order and maintain the pace of learning needed to complete the school curriculum requirements. This possibly signals those teachers are worried that the students' lack of self-regulation will impede the learning in class B. In other words, teachers are reluctant to give ownership of learning to the students. Keeping authority and control in the classroom makes teachers feel secure about students' learning effectiveness and, in their view, maintains the required pace of learning. The findings generated from Summer's drawing are presented (see next section) to provide a clue of how her teaching looks like before intervention. In contrast to Ling and Wen, Summer placed greater emphasis on classroom talk in teaching and learning.

#### ***4.3.2 Classroom talk***

In contrast to some of the participating teachers' traditional approaches to the classroom environment, Summer's drawing and teacher discussions in workshop 1 presents a different kind of 'classroom communication'. As can be seen in Figure 4.11, Summer's picture indicates

a more diverse approach to teaching than the approach of Ling and Wen. Summer is a new teacher who has less than 2-years teaching experience. Summer's drawing indicates that she believes in different types of communication with her students: Informal classroom interactions (Summer drew the teacher hand in hand with students), in-class learning conversations (Summer utilised heart-like shapes to represent knowledge delivery to students) and one-on-one correction (Summer used two doors to represent her office for one-on-one interactions). The drawing in Figure 4.11 illustrated that one student entered the door with a question mark “?”, then in another door, a student comes out with words “Ok, I learned it”.

**Figure 4.11** Summer's representation of her image of teaching in the classroom



Although Summer realised the importance of communication with students, the communication appeared to be teacher-led by the giving of direct instructions. This assumption was evidenced by Summer's talk in group discussions when she talked about her drawing:

I enjoy the time when I communicate with students in the classroom and outside the classroom. However, when I teach, I just give instructions directly to save time rather than constructing knowledge with them, because sometimes some



of students are not well prepared for the practice, which makes the conversation difficult. (Summer, workshop 1 introduction discussion)

As with Ling and Wen, Summer therefore expresses the challenge she feels to cover the curriculum in the time that is available – she “just give[s] instructions directly to save time”. While she values communication with her students, the dialogue seems to be in relation to informal conversation. Summer also mentioned that students’ lack of preparation is one of the reasons that makes the dialogue at a low level. Further support is needed to help her make the conversation more constructive to elicit students’ thinking in classroom practice.

#### **4.4 Summary**

The findings presented in this chapter focused on the teaching and learning in AB class model pre-intervention and identified teachers and students’ learning needs. They showed that the class AB flipped learning model adopted by green school is likely to work most effectively when students use time management and help-seeking behaviours to maximise their learning in class A and be as prepared as possible for class B. For example, observational data of two different students suggested that those who completed the tests at the end of class A were better able to actively make use of the learning opportunities in class B, when they could focus on the aspects of the test that they still needed to learn. It appeared that students who do not prepare well for class B might lack time management and help-seeking behaviours – identified in Section 2.1 as self-regulatory skills required for learning independently.

Researcher observations were supported by views expressed by the participating teachers. In addition, Summer specifically stated that students’ lack of preparation is one of the reasons that keeps the dialogue in her classroom at a low level. In addition, teachers Ling and Wen appeared

to be hesitant to give more ownership of learning to the students because they worry students' lack of self-regulation will impede the pace of learning in class B. Therefore, students need help to plan their time and seek help to assist their learning. Self-awareness of time management and help-seeking skills are two constructs of metacognition. In other words, teachers should help students develop their metacognitive thinking to learn independently in the class AB flipped learning model. In order to do this, teachers themselves need to be metacognitive. The next Chapter focuses on how the workshop intervention might have helped teachers mediate using talk for student metacognition development in classroom practice.

## Chapter 5 Intervention in classroom practice

### 5.1 Introduction of the professional learning

This chapter presents data to answer the research question of “In response to professional learning, how do teachers enact strategies to elicit students’ metacognitive thinking in the classroom?”

The findings presented here involve three schoolteachers of Mathematics, English and chemistry and their students. In this cycle, the teachers and I co-designed instructional activities using talk as a tool to develop and facilitate the metacognitive skills of students during problem solving. Subsequent to the workshop, data were collected by observing their talk between teachers and students in their classroom practice. Observational data were further scrutinised and explicated under three themes: mediation through assessment as learning, consolidation of prior knowledge, and promoting autonomy. By unravelling the patterns of teacher-student interactions in relation to the researcher-designed mediation process, the findings highlight an explicit tool in the mediation of students’ metacognition, which could be further validated and refined.

Summer (English teacher), Zhang (Mathematics teacher) and Yuan (Chemistry teacher) were involved and engaged in co-design classroom activities with me in modelling classes to show how metacognitive teaching can be applied to classroom practice in different subjects. It was explained and clarified earlier why these three teachers and classrooms were selected in this study (see Section 3.8.6). Ling and Wen’s classroom practices were not selected due to their less involvement in designing the instructional activities with the researcher. Table 5.1 is designed to show graphical information of these three teachers and their teaching activities:

**Table 5.1** Graphical information for the three teacher participants

<b>Participants</b>	<b>Gender</b>	<b>Subject</b>	<b>Topic of the Lesson</b>	<b>Strategy using</b>
Summer	Female	English	Time preposition	Smooth song
Yuan	Female	Chemistry	Ions in equation	Ions categorisation
Zhang	Male	Mathematics	Sum of squares formula	Process of derivation

After the professional learning workshops designed to assist the teachers and students' needs that were presented in Chapter 4, some of the teachers reflected that they did not know how to incorporate the theory into their classroom practice with specific subject matter. For example, Ling commented:

From the previous workshops, I do not think I can remember all the theory, I can make sense of what is metacognition, what is cognition, and ZPD when you told us. I found that I forgot easily, and I cannot relate them to my teaching. However, now, I tried to give more chance for students to have a voice and give more time to group discussion.

Ling made changes in her classroom by giving more chances to students to talk. However, how to relate the theory to teaching is challenging for her. Wen has a similar view to Ling in that she needs to know how theories can be used in classroom practice. She commented:

I know that the theory is critical for a teacher, but it would be good if someone could give a modelling class to show how to use it in the class, and I can go and observe it and see how the instructional activities are designed to put the theories into use.

These findings suggested that although the teachers knew the theory, it does not mean that they can use it. It indicated that modelling classes to show teachers how to make the tacit theory explicit were needed. As described in Section 3.8.2, three teachers volunteered to undertake modelling classes to co-design instructional activities that could incorporate dialogic talk to stimulate student metacognition. Summer also attended the one-by-one workshop with me. She engaged in the process of co-designing her instructional activities. She reflected that my scaffolding process on her instructional activities design helped her both theoretically and practically:

I found that the help you gave on using the framework to design lesson plan is very helpful, it tells me how to design a class in which I have a stance of putting students in the centre, and it helped me to understand the theories down to earth and to know how to put them in use practically. (Discussion, in the one-by-one workshop)

Summer appreciated the process of co-designing instructional activities in the one-by-one workshops. Summer also shared that:

I learned a lot in the co-design process, I think I can design the class independently myself next time. I learned a lot not only the techniques on teaching the content knowledge but also, I know having steps to follow helps me to be a better teacher (Discussion in one-by-one workshop)

Summer perceived the usefulness of the scaffolding and that the four steps of the dialogic process could help her not only in teaching but also help her to be a better teacher by having a thinking tool for her work.

As detailed in section 3.8.2, Yuan (Chemistry teacher) attended the one-by-one workshop. She engaged in the process of co-designing her instructional activities with me. She reflected that teacher needed to be logical in designing class activities and teaching. Yuan said:

I think metacognitive teaching to me is to teach students in a flow and the class should be like a complete story, but not fragmented. Students feel easy to understand your instructions, and then they can think of their thinking in a clearer stance with teacher guidance. (Discussions in one-by-one workshop)

Yuan reflected that the importance of being logical in teaching is the key point of giving scaffolding in students' metacognitive learning. In addition, when engaging in the designing of teaching, supported by the dialogic process (Figure 5.1). She used the idea of "third voice" to present her role in metacognitive teaching. Yuan commented:

To be the third voice of students, I think it is my understanding to be a metacognitive teacher to provide a scaffolding that leads students to think and think of their thinking, the voice of me should be in a manner of being invisible to lead and facilitate their think (Discussion in one-by-one workshop)

Yuan realized that third voice is a somewhat higher level of voice to lead and elicit students' thinking. Third voice means voice of self-awareness and it keeps the behaviors and thinking in a controllable situation (Eun et al., 2008).

As detailed in section 3.8.2, a Maths teacher, Zhang, attended a one-by-one workshop with me. He engaged in the process of co-designing his instructional activities with me. He gave reflections on the significant role of thinking aloud in Figure 5.1 in eliciting students' thinking in maths class. He said:

Thinking aloud in the class is a good way to think together with students and to know why they think like this, how to correct their misunderstandings in the process of problem solving. I think a good scaffolding in metacognitive learning is that teachers know what students think and how they think and then think together with them (Discussion in one-by-one workshop)

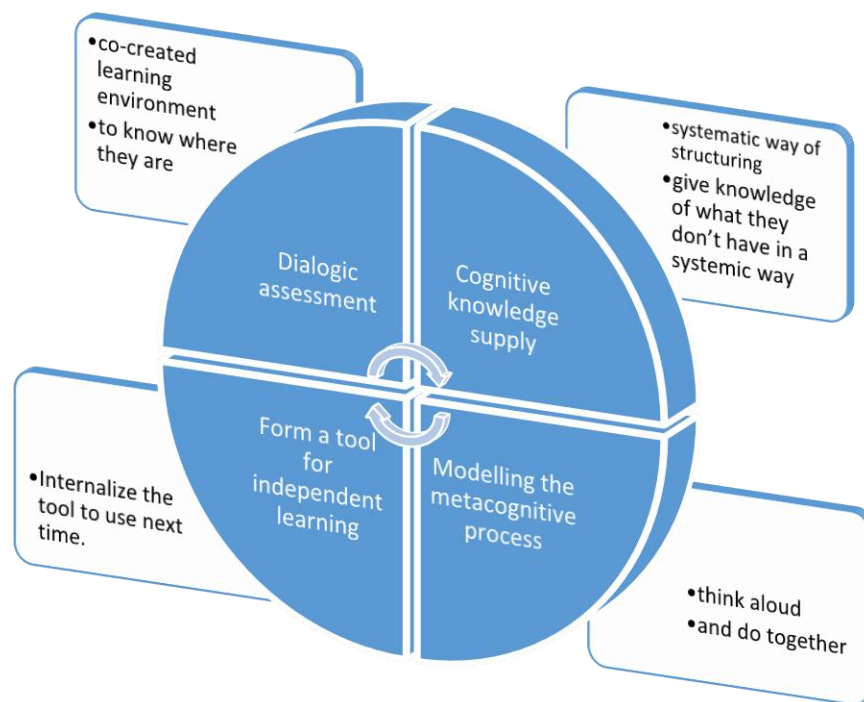
Zhang emphasized the role of thinking aloud to listen to students' thinking in problem solving. Next, evidence of the dialogic talk process in the three modelling classes is presented.

## **5.2 A dialogic talk process generated for metacognitive teaching**

The primary concern of this cycle of data collection was to see the central feature of teacher mediation in students' metacognitive development. This cycle took a closer look at the enactment of a teacher mediation plan developed through workshops to develop the metacognitive skills for problem solving among students. In the workshop professional learning process, the teachers were equipped with an explicit approach I designed for teacher mediation. As the teacher mediation approach was implemented in classroom practice, I

interpreted teacher participants' understanding in classroom practice by comparing the enactment in the classroom to the mediation process outlined in Figure 5.1.

**Figure 5.1** *The dialogic patterns in the process of metacognitive mediation between teachers and students derived from Guo (2020)*



I introduced participants to the explicit approach of mediation as outlined in Figure 5.1. The steps of mediation included in this diagram were informed by the self-reflection of the researcher's teaching methods and the theoretical framework underpinning this research (see Section 3.8.2). The explicit method of teacher mediation included used dialogic talk to access what students know about the content knowledge, then provided them with the requisite knowledge in a systematic way and afterwards guiding students to model the thinking process to solve the problem. The data regarding the application of metacognitive teaching by the three teachers is presented next.



### 5.3 Application of metacognitive teaching

This section presents the findings related to the teachers' professional learning in one-by-one workshops and further applications of the dialogic pattern in the teaching process of metacognitive mediation between the teachers and students. The findings have been published in the *Asia Pacific Journal of Teacher Education* (Guo, 2020). The patterns of student-teacher interactions within the teacher mediation are highlighted. The evidence-based findings are in the order of English, Chemistry and Mathematics teaching classes to answer the second research question of this study.

#### 5.3.1 *The dialogic talk process exemplified in Summer's English class*

The English teacher, Summer, was teaching students about the grammar of the time prepositions. She informed the students that there are different kinds of time prepositions, but in the present lesson, only three of them would be used: 'in', 'on', 'at'. The task for students was to know the functions of each three and how to use them in a sentence appropriately. The challenge for students was to know in which situations each preposition is the most appropriate. After the one-by-one workshop, the content of 'time prepositions' was taught using a fun smooth rhyme (co-designed by the teacher and myself), with students singing together while beating their hands. Below is the song to help students organize knowledge in preparation for the teaching process:

*In "year" in "month" in "season",*

*In "morning" in "afternoon" in "evening".*

*On "day" on "holiday" on "Weekday"*

*And on "with specific day's morning, afternoon and evening"*

*"At" is relatively simple*

*Just put it before the time of the hour.*

Another step the teacher employed was 'think aloud'. In the think-aloud process, students were requested to voice out what they were thinking in each step of problem solving. The teacher gave a problem to the students to solve in groups of five. These groups were given five minutes to discuss the right answer and why they chose it. Afterwards, students were required to present their thinking process. Within each group, a representative was chosen by the group to present the answer. The problem given was:

David went to school () a rainy morning.

A. in B. at C. on D. from

After three minutes, each group gave their answer by writing it on the blackboard. One group of students did not attain the right answer. The teacher asked them to think aloud. During the think-aloud process, mediation was given regarding the thinking process by Summer. *The text in square brackets links what is being said to the stages of dialogic process in Figure 5.1.*

1. *Teacher: Great. Next, tell us why you choose A. [Get students' voice to know where they are in the thinking process]*
2. *Student: Yes, now I realized I was wrong. However, at that time, I was thinking like this: reading the question and choices, I found that it is about time preposition, then I recalled the smooth song, but the meaning between the two sentences confused me: In "morning" in "afternoon" in "evening", and on "with specific day's morning, afternoon and evening". I did not understand when you told us about this, so, when I saw, "a rainy morning", I just chose "in", as "in + morning". [Think-aloud to represent the thinking process]*
3. *Teacher: yes, "rainy day" means on that day it is rainy. So, because the on "that day" is rainy, so it is not any day but a certain day which is raining. So, I use "on" but not "in". But next time, when you do not understand something about the knowledge, don't worry too much but try to focus on the monitoring process of your thinking, you*

- might manage to still get the right answer out, even though you have no idea of “rainy day”. [Modelling process of metacognitive facilitation]*
4. *Student: yes, I was not able to realise that “rainy morning” is a morning of a specific day. [Self-reflection]*
  5. *Teacher: Yes, I would give modelling here; let us think-aloud together. Let us consider the question again, the “rainy morning”, when you do not know what is “rainy morning”, you can make an analogy for yourself to compare with an example in your mind which you already know.[Modelling the thinking process by monitoring strategies and skills used in problem-solving, At this point, the teacher added guidance, not on the knowledge, but strategies the students can use to solve the problem independently in similar future situations]*
  6. *Student: you mean to replace “rainy “with another word. [Student actively engages in the sense-making process of monitoring]*
  7. *Teacher: yes, great. In Chinese, I can translate the structure as: “one morning on a rainy day”, so now, can you understand why there is an ‘on’ in front of the day. [Guide and elicit students to make a match with their prior knowledge]*
  8. *Student: yes, because the smooth song said: “on + day”, so the right answer should be C. [Make a match with their prior knowledge]*
  9. *Teacher: great, so now: you know, the rainy day is on a day, it means a morning on a specific day but not any day. [Reinforce their thinking to internalise the way of thinking]*

The themes from the analysis of the dialogue are presented in Table 5.2 and reveal the essence of mediation in teaching. The essence of mediation, patterns and themes are connected with corresponding alphabets. In the English class, the smooth song “(b)” corresponds with the pattern, cognitive knowledge “b”. The pattern “b” correlates with themes Mediation through assessment “A” and Consolidation of prior knowledge “B”.

**Table 5.2** *Tabulated data in English class cited from Guo (2020)*

Subject	Dialogic talk process	Figure 5.1	Themes
<b>English</b>	<p>Get students' voice to know where they are in the thinking process (a.)</p> <p>Smooth song (b.)</p> <p>Think aloud to represent the thinking process (c.)</p> <p>Process of metacognitive facilitation (c.)</p> <p>Self –reflection (d.)</p> <p>Modelling the thinking process (d.)</p> <p>Students actively engage in the sense-making process of monitoring (d.)</p> <p>Guide and elicit students to make a match with their prior knowledge (c. and d.)</p> <p>Make a match with their prior knowledge (c.)</p> <p>Reinforce their thinking to internalise the way of thinking (d.)</p>	<p><b>a.</b> Dialogic assessment; co-created learning environment</p> <p><b>b.</b> Cognitive knowledge supply:</p> <p><b>c.</b> Modelling the metacognitive process:</p> <p><b>d.</b> Form a tool for independent learning:</p>	<p>A. Mediation through assessment as learning (a, b ,c, d)</p> <p>B. Consolidation of prior knowledge (b)</p> <p>C. Facilitate self-regulation in problem-solving (c and d)</p>

In Summer's class, the teacher initiated a dialogic assessment to confirm students' problems in learning the time prepositions. For example, Summer asked students to tell her why they chose response A. This instruction was to [a.] get students' voices to know where they are in the thinking process. We can see from the conversation that one of the students responded to Summer's question. The student said, "...At that time, I was thinking..." The dialogic talk between Summer and the student made the first step (dialogic assessment) of the dialogic talk process happen.

In addition, the turn-taking talk co-created an interactive learning environment where students are empowered to learn with teacher guidance. After identifying the students' learning needs, Summer constructed cognitive knowledge supply by singing a smooth song. It aimed to prepare students to engage in problem-solving consequent to freeing capacity for the self-regulated monitoring process. For example, Summer explained "why it is not any day but a certain day" to correlate with the smooth song to consolidate the knowledge that "on with specific day's morning, afternoon and evening". Therefore, we should say "on a rainy day".

Summer articulated the thinking process of choosing "on" to students; it was for [d.] the modelling process of metacognitive facilitation. When the cognitive knowledge supply was completed, Summer and the students came into the think-aloud practice raising the level of internalisation. For instance, Summer said, "...can you understand why there is an 'on' in front of the day..." to [c. and d.] Guide and elicit students to match their prior knowledge. This instruction was interconnected with the dialogic process in steps three and four to model the metacognitive process and form a tool for independent learning.

### 5.3.2 *The dialogic talk process exemplified in Yuan's Chemistry class*

Beeth (1998) described a number of ways in which teachers can create an environment in which scientific concepts can be discussed and negotiated. These include encouraging children to talk about their ideas and why they think about what they think. Yuan was a participant teaching chemistry and the dialogue between Yuan and his students relating to the process of solving a chemistry problem are recorded below. The problem requires the students to choose the right answer as requested from the question.

In a *strong alkaline solution*, which of the following groups of ions can *coexist* in a large amount:

- A .  $Na^+$ 、 $K^+$ 、 $CO_3^{2-}$ 、 $Cl^-$
- B .  $Cu^{2+}$ 、 $Na^+$ 、 $NO_3^-$ 、 $SO_4^{2-}$
- C .  $Na^+$ 、 $K^+$ 、 $HCO_3^-$ 、 $Cl^-$
- D .  $Mg^{2+}$ 、 $Na^+$ 、 $NO_3^-$ 、 $Cl^-$

After the discussion among students, some of the groups were not able to solve this problem.

The teacher followed the steps showed in Figure 5.1 in the eliciting students' thinking process:

1. *Teacher: your group did not solve the problem successfully, so, now, let us go back to the beginning to know why you failed to do it and how you can solve this kind of problem successfully in the future. [Teacher expresses a clear logic in mediation to help students form a tool for themselves]*
2. *Teacher: Firstly, tell me, do you know what an "alkaline solution" is? [ Get students' voice to know where they are in the thinking process]*
3. *Students: yes, solutions contain "OH<sup>-</sup>"*
4. *Teacher: give me some examples. [Make sure students have a solid knowledge]*
5. *Students: Yes, such as Na<sub>2</sub>OH, Mg<sub>2</sub>OH...*

6. *Teacher: yes, I need to know the relevant knowledge, and then you would have more energy and time to think about the strategies used during your thinking process.  
[Telling them why they need to consolidate the knowledge to facilitate their metacognitive thinking]*
7. *Teacher: Let us summarise some relevant points in an organized way together.  
[Systematic way of cognitive supply, give them what they need]*
- *weak acid ions:  $\text{CO}_3^{2-}$*
  - *Strong alkali ions:  $\text{OH}^-$*
  - *Strong acid ions:  $\text{SO}_4^{2-}$ ,  $\text{NO}_3^-$   $\text{Cl}^-$*
8. *Students: ..... [Students make notes]*
9. *Teacher: next, tell me what you know about the second keyword: “Co-exist” [To know where they are in the thinking process]*
10. *Student: yes, the coexistence of ions depends on whether ions can react with each other. If they can react, they cannot co-exist in large amounts; otherwise, they can co-exist in large amounts.*
11. *Teacher: yes. The knowledge of ion co-existence is a hotspot of the college entrance examination, and it is a mandatory content of the college entrance examination every year. Can you give me some principles to clarify whether they can coexist or not? [By further interaction to check whether they know it by understanding or rote learning]*
12. *Student: Cannot generate gas, precipitation, water, and also have no situations like strong acid replace weak acid*
13. *Teacher: yes, now, I am ready to move from what I know to how I can do it. Next, let's consider choices of A, B, C, D [Make students aware of the talking process to form a tool of themselves as an independent thinker]*
14. *Teacher: Is there any group who chose C?*
15. *Students: Yes,*
16. *Teacher: why? Tell us your thinking process [The logic of teacher mediation is maintained in different problem-solving context to different students, then in this recursive process, students have opportunities to reinforce the right part of their understandings and correct their misunderstandings, and therefore to form a tool for them to solve the problem independently]*
17. *Student: Firstly, I excluded B. Because  $\text{Cu}^{2+} + \text{OH}^- = \text{Cu}(\text{OH})_2$ ,  $\text{Cu}(\text{OH})_2$  is hardly soluble in water, it precipitates. It means that they “can't co-exist”.*

18. *Teacher: yes, why did not you choose D? [Further assess and make them think of their thinking in a global view]*
19. *Student: As  $Mg(OH)_2$  is hardly soluble in water, therefore, there is precipitation.*
20. *Teacher: great, remember this, then how did you make your decision to choose C [reinforce the thinking process]*
21. *Students: I noticed that there is a " $CO_3^{2-}$ " in A. I thought that the equation is:  $CO_3^{2-} + OH^- \rightarrow H_2O + CO_2\uparrow$ . They generated water and loss of  $CO_2$ , so can't co-exist.*
22. *Teacher: ok, I got your thinking process. You are using the appropriate strategies and skills to get the right answer. However, you are missing one point, see this equation. [To know where they are and how they are thinking, then to elicit and guide their thinking process to solve the problem together]*
- $HCO_3^- + OH^- \rightarrow CO_3^{2-} + H_2O$  So what did you find?*
23. *Students: em... I made a mistake. In my mind, I was confused with the difference between  $CO_3^{2-}$  and  $HCO_3^-$ . It is  $HCO_3^-$  that can react with  $OH^-$  but not  $CO_3^{2-}$ . So, the answer should be "A". [Problem solved with reflective thinking]*
24. *Teacher: yes, great. When you feel that what you have is not clear and enough, don't make a decision too quickly but try to use strategies to monitor the process in your head, to double-check the difference of the two by making the match to what you know. [Help them to form a tool for themselves in metacognition]*

The dialogic talk process was tabulated in the Table 5.3 as continuous part of chemistry class teaching.



**Table 5.3** *Tabulated data in Chemistry class cited from (Guo, 2020)*

Subject	Dialogic talk process	Figure 5.1	Themes
<b>Chemistry</b>	<p>Get students' voice to know where they are in the thinking process <b>(a.)</b></p> <p>Tell them why they need <b>(b.)</b></p> <p>Metacognitive thinking <b>(d.)</b></p> <p>Systematic way of cognitive supply <b>(b.)</b></p> <p>To know where they are in the thinking process <b>(a.)</b></p> <p>By further interaction to check whether they know it by understanding or rote learning <b>(a.)</b></p> <p>Make students aware of the talking pattern to form a tool of himself or herself as an independent thinker <b>(d.)</b></p> <p>The logic of teacher mediation is maintained in different problem-solving context to different students <b>(c. and d.)</b></p> <p>Assess and make them think of their thinking in a global view <b>(a. and d.)</b></p> <p>Reinforce the thinking process <b>(d.)</b></p> <p>To know where they are and how they are thinking, <b>(a,b,c and d)</b></p> <p>Help them to form a tool of themselves in metacognition <b>(d.)</b></p>	<p>a. Dialogic assessment: co-created learning environment</p> <p>b. Cognitive knowledge supply:</p> <p>c. Modelling the metacognitive process</p> <p>d. Form a tool for independent learning</p>	<p>A. Mediation through assessment as learning <b>(a,b,c,d)</b></p> <p>B. Consolidation of prior knowledge <b>(b)</b></p> <p>C. Facilitate self-regulation in problem-solving <b>(c and d)</b></p>

Yuan found that one group did not solve the problem successfully; she gave instructions to the students that “let's go back to the beginning to know why you failed to do it and how you can solve this kind of problem successfully in the future”. In this instruction, Yuan had a clear logic in her mediation to help students become aware of the thinking process and form a thinking tool. Then she asked, “Tell me, do you know what an ‘alkaline solution’ is? “ The question raised by Yuan was to [a]. Get students’ voices to know where they are in the thinking process.

After the students’ responses, Yuan moved to the next step of providing content knowledge in a well-organized way. Notably, Yuan also told students why they need to get the content knowledge they need before coming to the problem-solving process.” You need to know the relevant knowledge. Then you would have more energy and time to think about the strategies used during your thinking process” and this instruction tended to mediate students’ thinking up to a higher level and helped them know why they need to consolidate the knowledge to facilitate their metacognitive thinking. Then, Yuan applied key bulletins to categorise Ions as a strategy to summarise the key points to provide cognitive knowledge.

The well-organized content knowledge was a powerful strategy to take the pressure off memorising details in problem solving. For example, Yuan said, “Let us summarise some relevant points in an organised way together”. Then she gave students the well-categorised Ions to differentiate their functions in chemical reactions. In addition, Yuan gave students multiple chances to state their thinking process to elicit and guide their thinking process to solve the problem together. It helped them form a tool for themselves in metacognition.

### 5.3.3 The dialogic talk process exemplified in Zhang's Mathematics class

In this example, the mathematics teacher, Zhang, agreed that metacognitive skills should be a fundamental aspect of the curriculum area and practice of mathematics. The mediation of this teacher included getting students to know “what “and “why”, so that they could be more effective in” how”. From an observation in the mathematics class, the dialogue between the teacher and his students are recorded below. The problem is given by the teacher on the blackboard:

*It is acknowledged that  $a + b = 3$ ,  $ab = -12$ , please calculate  $a^2 + b^2$*

The groups then had time for discussion. Zhang was roaming among the groups to stop by and listen, and sometimes provide mediation whenever he judged there was a need and those students in a group could not solve the problem. Zhang followed the steps in Figure 5.1 to support his thinking in response to students' reactions and elicit their thinking:

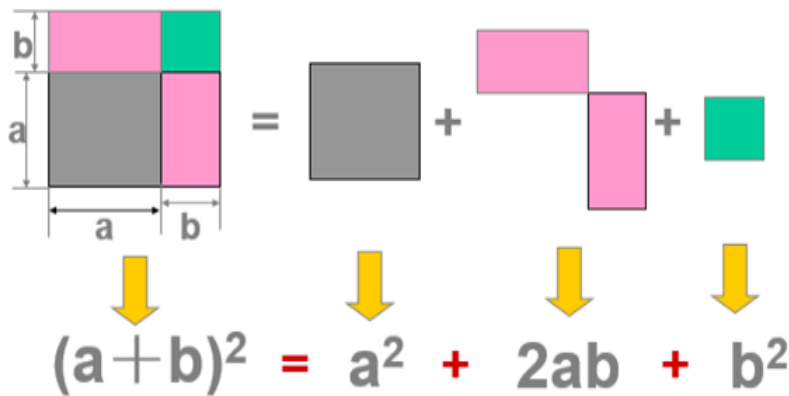
1. *Teacher: so it seems that you and your group are in trouble.*
2. *Student: yes, I am thinking about how to get  $a+b$ , and  $ab$  from  $a^2+b^2$ , but...*
3. *Teacher: yes, I think what you are managing to do is in the right direction. Could you tell me about what you can do with  $a^2+b^2$ . [See where they are and help them to match what they have with what they need]*
4. *Student: I don't think I learned anything about a formula like  $a^2+b^2$*
5. *Teacher: yes, indeed. So, when you see things like this, just try to match it with the things you have learned which have some similarities with it. Therefore, when you see this, what do you think of, to match what you have learned before? [Elicit the strategies and skills used in the monitoring process from cognitive to metacognition]*
6. *Student: yes, I see. I learned the Sum of squares formula.*
7. *Teacher: great, do you know the formula and how it was derived. [To assess whether the student's knowledge is by understanding or rote learning]*
8. *Student: I just recited it. But don't understand it.*
9. *Teacher: It is not effective learning if you can only recite. Always try to remember the formula by understanding, and then it can help you to study and think independently. You are very clear about the square area calculation, right? [Relate the new*

information to what they are familiar with, make sure they understand the essence of the equation]

10. Student: Yes, I learned that from primary school, which is very familiar.

11. Teacher: I know that the square area calculation formula is:  $a^2$ , so if each side of a plus  $b$ , see the picture here, then now, can you count how many squares I have, see Figure 5.2. [Give knowledge from what they know to make connections to the new information]

**Figure 5.2 the Sum of squares formula derivation process**



12. Student: this is clear, so I have four squares, it is,  $(a+b)^2 = a^2 + 2ab + b^2$

13. Teacher: great, this is the analogical thinking. Always try to make a correlation between the new information with your prior knowledge. What did you find from this formula? [Making learning explicit by eliciting, clarifying and responding to their thinking].

14. Student: hmm, I see, there are  $a+b$ ,  $ab$ , and even  $a^2+b^2$ . I can see some relationships among these [Students match the new information with their prior knowledge]

15. Teacher: Great, always list out what you know, and then make a correlation, then to manage, then you have to reach your destination. So now, you are ready to go for the next step: the calculation of  $a^2+b^2$  [Help them become aware of the thinking process before next move]

16. Student: so, it means  $a^2+b^2 = (a+b)^2 - 2ab$  (Students use the knowledge they have to engage in a higher level of thinking)

17. Teacher: Great, so the next step. [Eliciting]

18. Student: Bring numbers into formulas. [Students engage in problem-solving]

$$(a+b)^2 = a^2 + 2ab + b^2$$

$$a^2+b^2 = (a+b)^2-2ab$$

$$a+b= 3, ab= -12$$

$$= 9+24$$

$$= 33 \text{ [Problem solved]}$$

*19. Teacher: Great*

The essence of mediation, dialogic process and themes in the mathematics class are tabulated as shown in continuous Table of 5.4.

**Table 5.4** *Tabulated data in Math class cited from (Guo, 2020)*

Subject	Dialogic talk process	Figure 5.1	Themes
<b>Mathematics</b>	<p>See where they are (a.)</p> <p>Elicit the strategies and skills used in the monitoring process from cognitive to metacognition (c.)</p> <p>To assess whether the student's knowledge is by understanding or rote learning (a.)</p> <p>Relate the new information to what they are familiar with (b.)</p> <p>Give knowledge from what they know to make connections to the new information (a. and d.)</p> <p>Making learning explicit by eliciting, clarifying and responding to their thinking (c. and d.)</p> <p>Students match the new information with their prior knowledge (d.)</p> <p>Help them become aware of the thinking process (c. and d.)</p> <p>Students use the knowledge they have to engage in a higher level of thinking (d.)</p> <p>Eliciting (c.)</p> <p>Students engage in problem-solving (d.)</p>	<p>a. Dialogic assessment:</p> <p>b. Cognitive knowledge supply:</p> <p>c. Modelling the metacognitive process:</p> <p>d. Form a tool for independent learning:</p>	<p>A. Mediation through assessment as learning (a,b,c,d)</p> <p>B. Consolidation of prior knowledge (b)</p> <p>C. Facilitate self-regulation in problem-solving (c and d)</p>

Zhang agreed the mediation included getting students to know “what” and “why” so that they could be more effective in “how”. Zhang used a visualised “sum of squares formula derivation process” to support students having a well-organised cognitive knowledge supply (instruction). The sum of squares formula derivation process helped students engage in informative talk with their teacher to develop their metacognitive thinking. For example, Zhang learned where his students were in the thinking process. Then he elicited students’ thinking to recall the relevant content knowledge and helped them match what they had with what they needed. For example, Zhang told students about analogical thinking. That is, “...always try to correlate the new information with your prior knowledge” to make learning explicit by eliciting, clarifying and responding to their thinking. The dialogic talk between them helped students match the new information with their prior knowledge and become aware of the thinking process before the next move.

#### **5.4 Summary**

This chapter presented the findings based on three teachers’ classroom practice in metacognitive teaching by focussing on the process of teacher-student interactions and consequent student’s transfer of learning from cognition to metacognition. The findings involved three secondary school teachers of Mathematics, English and chemistry and their students. The presented process of teacher mediation in metacognition development of the three teachers answered the research question of “In response to professional learning, how do teachers enact strategies to elicit students’ metacognitive thinking in the classroom? The explicit method of teacher mediation included using dialogic talk to access what students know about the content knowledge, then providing them with the requisite knowledge in a systematic way and afterwards guiding students to model the thinking process to solve the problem. Next, perceptions of metacognition development in flipped learning are presented.

## **Chapter 6 Perceptions of metacognition development**

### **6.1 Introduction**

This chapter presents the findings from the interview data and generated documents from both teachers and students after the intervention and the end of the research stage. The findings respond to research question of “What are teachers and students’ perceptions of factors influencing student metacognition development in the flipped learning context?” The findings in this chapter are reflective views from the teachers and students, focusing on the perceptions of metacognitive teaching and learning in terms of the reflections on the dialogic talk process in modelling class and concerns for future applications of the dialogic talk process. These findings are important because they set the scene of an effective environment for metacognitive teaching and will inform future professional development programs. The findings indicate that effective metacognitive teaching needs cooperation from both teachers and students in a co-created interactive environment, in which all the participants feel free to talk and participate to construct knowledge.

### **6.2 Students’ perceptions of metacognitive teaching process**

After experiencing the teachers’ use of dialogic talk process in their class, how students felt about the teachers using the dialogic talk and their perceptions about how it impacted their metacognitive development were explored. The study found the students felt satisfied with the teacher’s modelling of dialogic talk and they were excited about the teachers' changes. A conversation between students and me after one of the classes supports this view and illustrates that students had noticed a difference and found the process and learning the knowledge easier:

Me: Do you think your teacher was different today?

Student: We communicate more

Me: What is different?



Student: Teacher told us some methods and the teacher is more logical now

Student: Yes, I feel it is easy to follow the teacher's flow and the instructions are clear

Me: How do you feel about it?

Student: I feel it is exciting to learn like this.

Student: I need to practice it more.

It is noticeable that when asked about any difference of teaching in this class, students firstly mentioned that they communicate more with the teacher. It reflects that the dialogic talk process may have helped in eliciting students' thinking in talk. In addition, students perceived those teachers are using methods to teach and they felt the teaching process was logical. It signifies those students felt positive about the teachers using the dialogic talk and they are thinking of their thinking by using "logic and flow" which is more higher-level thinking. This indicates that the dialogic process in teaching may have influenced their metacognitive development.

I also interviewed the teacher Ling who had observed the three dialogic talk modelling classes. She agreed that the modelling class was impressive to her and commented:

I can see the satisfaction from students' performance in the modelling class. I observed their discussion in the class, and the students followed the steps of the teacher. I think it is very useful for examination, but I am afraid that low-level students who have not enough content knowledge may not find it easy to follow. Teachers need to use this way of teaching more often to help students digest it.

Ling found that students benefit from the dialogic talk process from teachers, and she observed that students were engaged in a more organized way to learn through in-group discussion. However, Ling showed concern about students who are short of content knowledge. In addition,

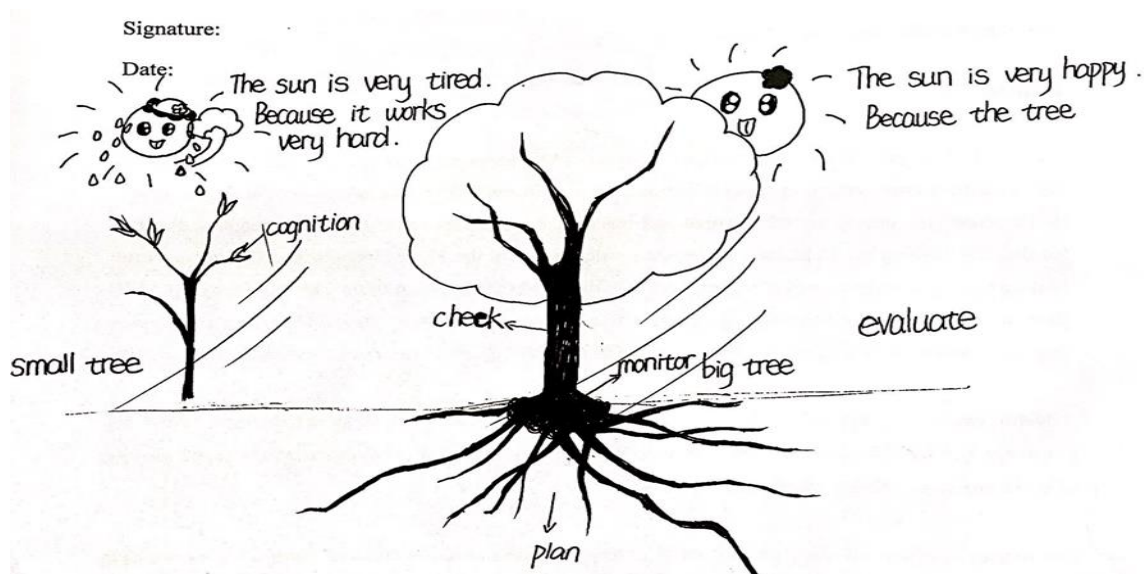
she felt that teachers needed to keep practising this way of teaching to help students adapt to this change in teaching.

The students also gave their perceptions of metacognitive development with illustrations of trees to show their desire of learning how to learn from teachers in metacognitive teaching. However, students were worried that the changes would not be sustainable. In addition, they also raised concerns about future applications; they hoped they could have an interactive learning environment in which they are able to engage in metacognitive thinking with teacher guidance.

### 6.2.1 Student's perception about metacognitive development

In the focus group interviews, I discussed with participant students about what cognition is, what metacognition is, and how it works. Afterwards, I invited the students to draw a picture to represent the influence of teachers' metacognitive teaching in your learning. One student, Kelly, drew a picture to show her opinion, as shown in Figure 6.1:

**Figure 6.1** Kelly's perceptions on metacognition development



Kelly illustrated learning with a metaphor of two trees. Further, Kelly's explanation of her

drawing was recorded:

When I was a small tree, the teacher had to work hard to give knowledge and also to regulate and guide me, so the teacher was very tired. In return, when I grew up the things changed, I have enough leaves, and I know how to grow and how to get the nutrition I need with my own roots, I monitor the process, check the track, and evaluate. The teacher can be relaxed and happy.

Kelly's drawing suggests that student needs teachers to teach them how to learn by themselves. In the extract above, Kelly indicates that if she knows how to learn, she would grow independently by self-regulatory monitoring to get nutrition with her roots and check the track and to evaluate themselves in an overall view with self-awareness. Therefore, she can grow stronger to make teachers' teaching easier. It indicates that students need the tools for independent learning. Grace agreed with the idea saying:

I cannot learn from just giving answers but without engaging in the process of doing it. I would like to see the process of how to find the answer. In addition, I think in the process of finding the answer, then I can use this next time independently, but if I cannot be involved in the process of doing, I have no confidence to do it alone next time. I hope teachers can always teach like this way even after you leave in the future.

Grace expected that a teacher would elicit her thinking and show her how to think by herself. In that way, she can learn and solve problems when teachers are not around. These students wanted to be able to solve problems independently and did not see the role of the teacher as the

provider of all the answers. She also wishes for a sustained change from teachers to help them know how to learn. In the next section, student's perceptions of a learning environment that could help this are discussed.

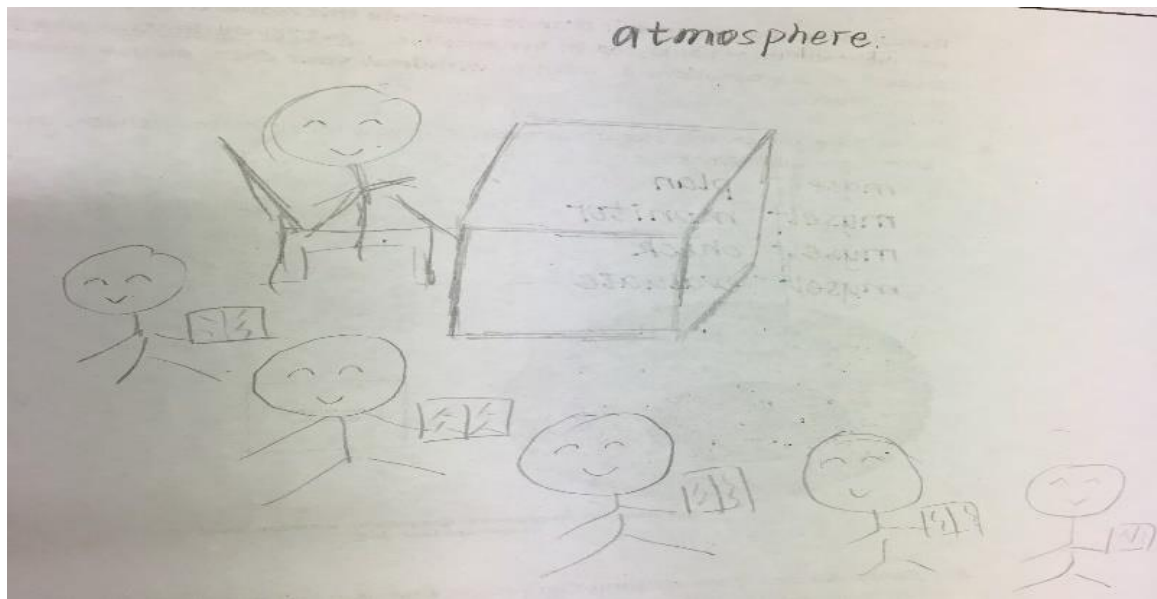
### ***6.2.2 Students' perceptions of learning environment***

This section presents the findings on students' perceptions from students' interviews and hand drawings. The findings respond to the third research question "What are teachers and students' perceptions of factors influencing student metacognition development in the flipped learning context?" The students viewed an environment for metacognitive engagement as one with a positive classroom atmosphere; teachers should use their power and nonverbal behaviours properly to promote classroom talk.

#### **Positive classroom atmosphere needed**

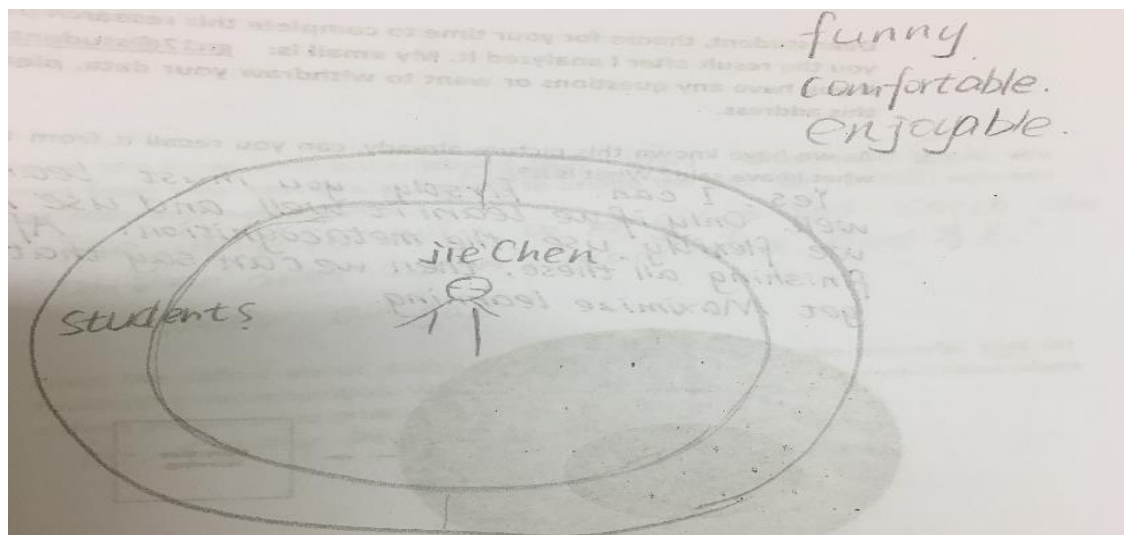
I invited students to draw "what is your preferred learning environment for metacognitive engagement?" Participant students in this study would like to have a positive atmosphere where they feel comfortable to learn. They see a positive classroom atmosphere is a warm climate of supporting and helping each other. For example, Jon, a participant student, gave his favoured vision of the classroom which highlights a positive atmosphere. (see Figure 6.2)

**Figure 6.2** *Jon's vision of classroom atmosphere*



Jon highlighted his preferred classroom where students and teachers enjoy learning together. It can be seen that everyone is wearing a smile. Similarly, another student participant, May, gave her vision of her preferred classroom in Figure 6.3.

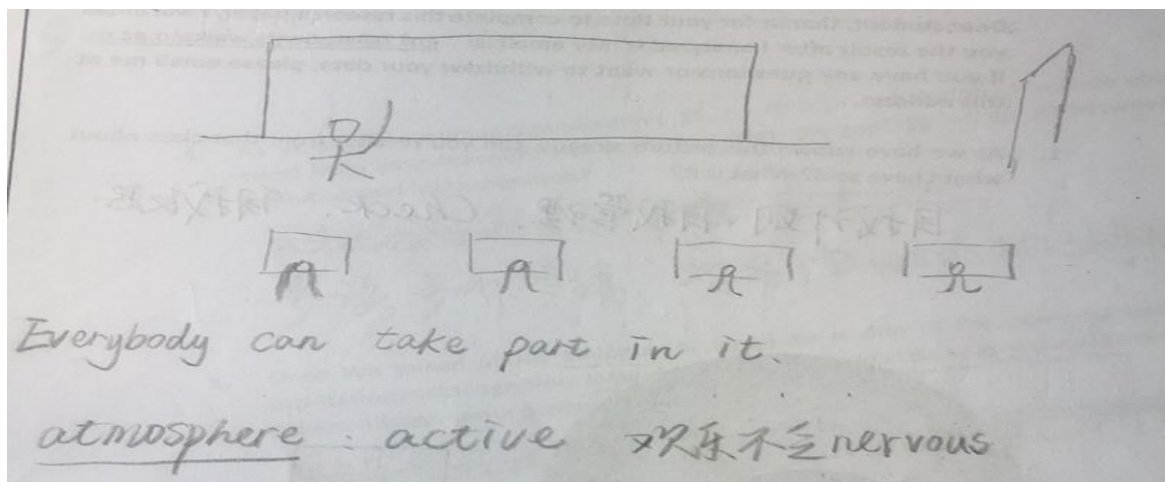
**Figure 6.3** *May's views*



The teacher is at their desk and the students are moving around and have completed workbooks. May would like to have a classroom that is “funny, comfortable and enjoyable”. Her drawing

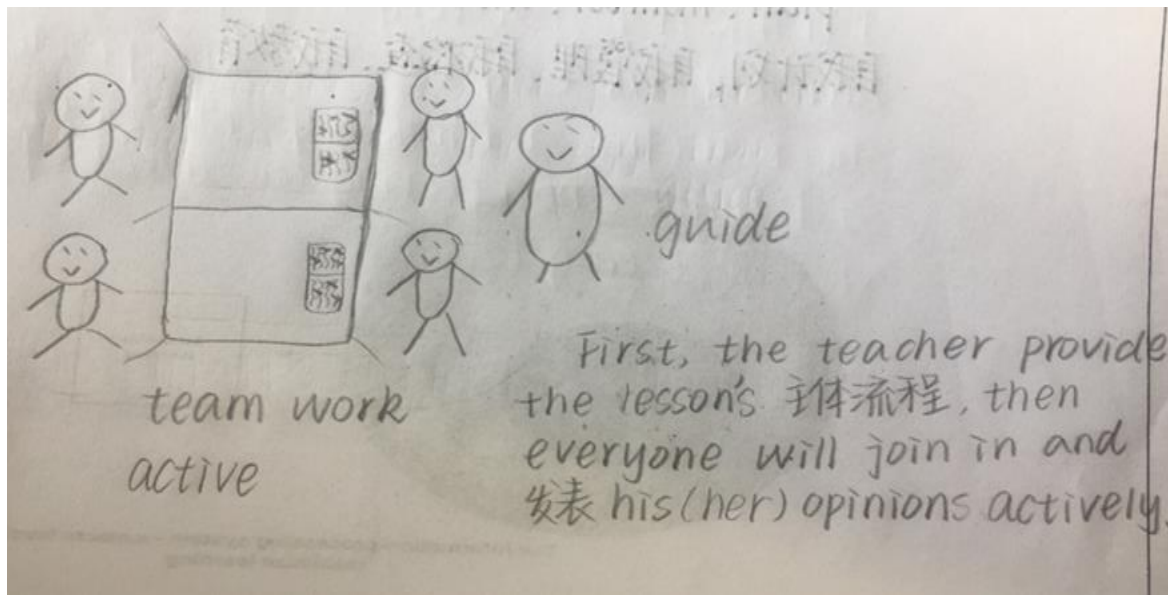
illustrated that the teacher is standing in the middle and all the students are in a circle not in rows. It indicated that she liked an atmosphere where everyone is involved. Another student supports this point of view. Jessica drew a classroom, which is different from May's and the teacher is positioned in the front of the classroom. However, she added, "everybody can take part in" as shown in Figure 6.4.

**Figure 6.4** *Jessica's drawing*



Jessica wrote that atmosphere would be active and everyone can take part in. It indicated that students would like to engage in learning with teachers. Compared with Jessica's drawing, Jia emphasized teamwork and teacher intervention in co-created activities as shown in Figure 6.5.

**Figure 6.5** Jia's drawing



In Jia's representation, she mentioned the terms like "teamwork" and "active". She gave teacher a role of "guide". Further, she explained: "first, the teacher provides the lesson structure and then everyone would join in and share their opinions actively".

In Jon's drawing, everyone is wearing a smile, and I take the smile worn by everyone in the picture to signify a relaxed atmosphere. It indicated that Jon suggests that metacognition engagement needs to be in an enjoyable environment for learners. Similarly, May prefers a classroom where she can feel "funny, comfortable and enjoyable". "Funny" means humorous, causing laughter. The laughter in the classroom can create a relaxed learning environment that could promote students' engagement in metacognitive thinking. Likewise, Jessica envisioned an active atmosphere where everyone could take part. In the same view as Jessica, Jia gave the teacher the role of "guide" when everyone would join in activities and actively share their opinions. These findings suggest that cultivating a metacognitive learner needs the learners to feel comfortable and relaxed. They feel free to participate in the classroom talk in moving the thinking from a lower order to a higher-order thinking. Thus, a metacognitive learner is hoped

to be cultivated.

### **Teachers use their power properly**

The findings in this section are that students feel teacher power overtly and this influence their level of learning talk in the classroom. The results are supported by quotes from the focus group discussion among a group of students. They gave their views on why they are timid to volunteer in class:

Me: Do you feel like you can say something in class?

Kim: yes, but I do not want to volunteer. I like to have a chance when my teacher nominates me to say.

Jay: I would like to say something, but I feel shy to raise my hand, especially since no one raises hand. I want to say something; even I do not know the correct answer, just to participate.

In this extract above, Jay showed willingness to engage in learning, however, he does not feel free to talk. It may be because of the external factors of the classroom power from teachers and students that constrained students' decision-making on whether to volunteer to talk or not. Another student in this group, Lily, pointed out that a teacher should promote students' involvement in talk, as she commented:

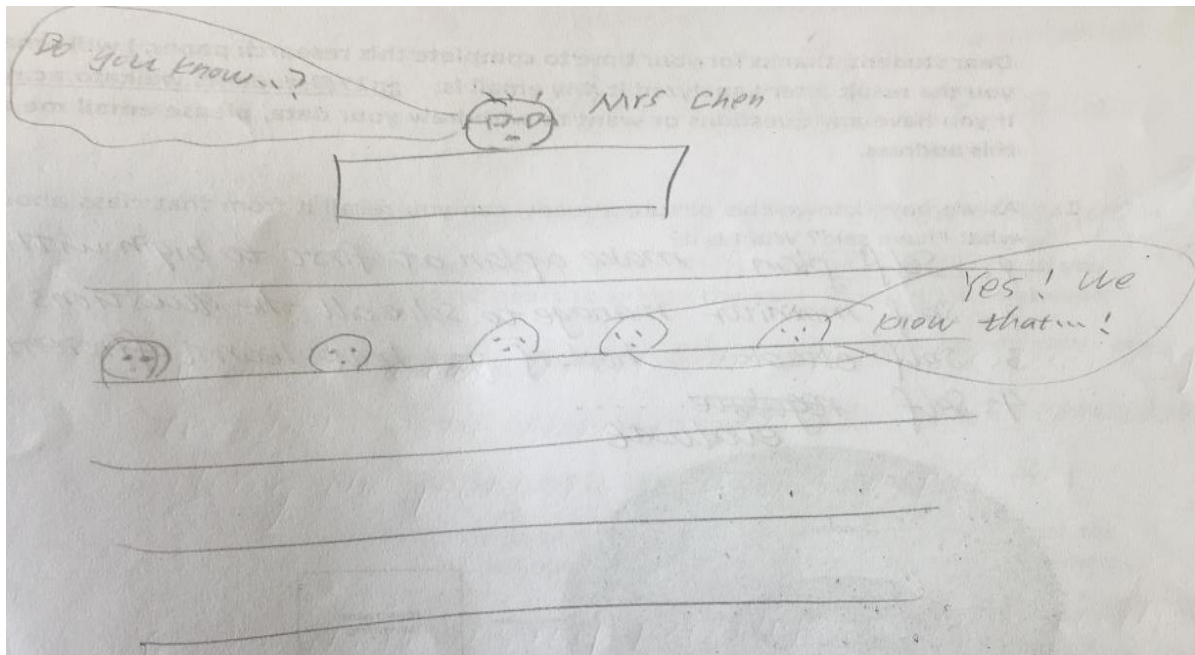
The modelling class is good. I learned a lot. I know that the teacher tried hard to involve us to create a good class to show other observers. However, I hope that anyone can participate, instead of only a conversation between the teacher and a few people with better English scores. The rest of us have no sense of participation. Teachers cannot just always ask: "Is it right?" The classroom is monotonous, without content, and I am unable to follow and learn much. I hope



that teachers can pay more attention to most of the students who have poor English scores in the middle and lower levels.

Lily liked the modelling class; she still hopes that in the future, anyone can participate, instead of only a conversation between the teacher and a few students with better English scores. In the classroom, the teacher has the power to decide who would have a chance to talk. Lily hopes the teacher can use this power to encourage low-level students to participate in the talk. It indicated that Lily's hope engages in speaking so that the metacognitive teaching works for her, not only for some of the advanced learners. In this research, I shared with the teachers in the workshops that knowledge should be constructed in the co-join activity, and the students' communications should be mutual. A teacher should minimize their overt power relationship in classroom to create an environment where students feel free to talk. Jill, another student participant, gave a drawing on how she perceives the teachers' actual teaching in the classroom, as shown in Figure 6.6:

**Figure 6.6** *Jill's perceptions*



Jill demonstrates in the picture above that classroom conversation is only between the teacher and some students who already know the answers. Others do not get involved, and they are only listening. This picture indicated that Jill might feel the power of teachers limited her engagement in the conversation. Nevertheless, we can see from the picture that the dialogue between teacher and students is not dialogic: Teacher: "Do you know ..." students: "yes, I know". Jill gave this type of communication to show her desire to have a chance to talk more. Similarly, a scenario in one of the group discussions was recorded:

Student a: (Group leader set by teachers in the start of the semester based on scores) now I will read my answer to you, so change your answer with me.

Student b: ok.

Student c: I made mistake here, why is the answer of number 10 B...

Student a: Because the tense should be "Future Tense"

Student d: (Making notes...)

Student e: (Modifying)

Student f: (Looking at the questions)

The extract above shows that students d, e and f had no voice in the discussion; they are taking the role of a complete listener in the group discussion. The group leader tells everyone what it is and the way of doing it. We see little interaction happening and talk among peers remains superficial. The finding indicated that it would be beneficial to modify the rules of setting group leaders or train group leaders to know the mediation of cognition and metacognition when the discussion happens, especially in the context of big class sizes in China.

The dialogic talk process suggests the teacher should get students' voices first to know where they are in their thinking. Overt teacher power is not desirable to students, and it means that power should be minimized, but if power already exists, we should try to use power properly to promote all learners' involvement. Such as, teachers can help nominees or invite students who talk less to answer questions in classroom practice. Teachers can also modify setting group leaders' rules to prompt dialogic talk among peers. The students' perceptions of classroom talk are discussed in the next section.

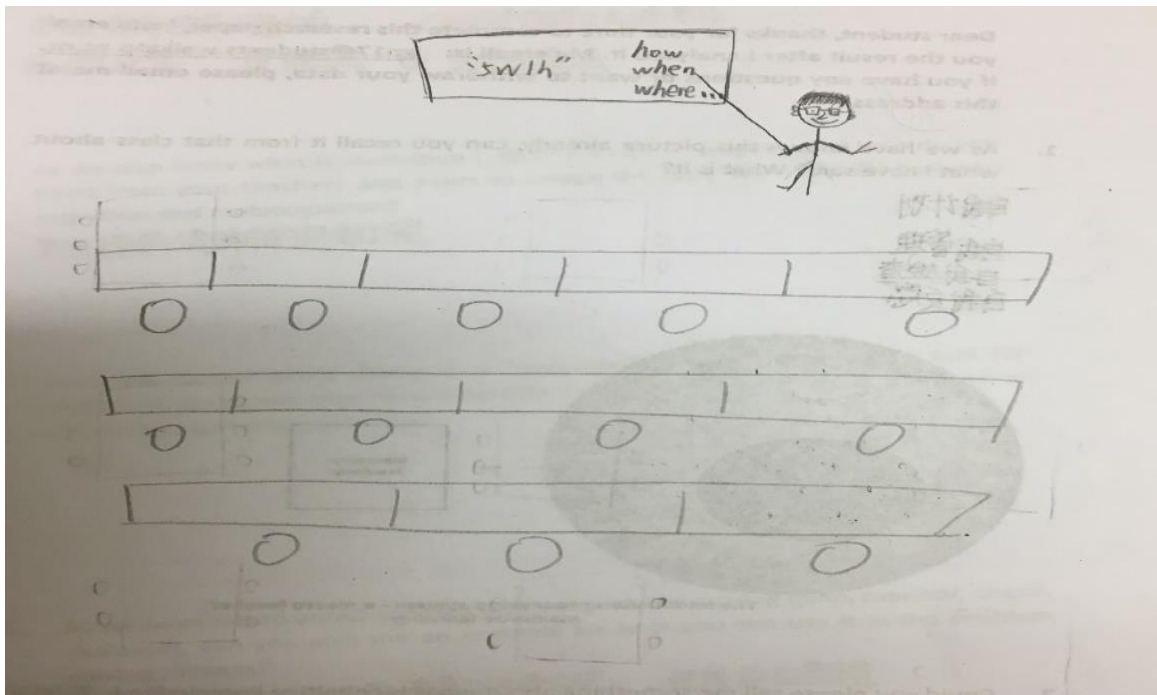
These findings suggest that cultivating a metacognitive learner needs the learners to feel comfortable and relaxed. They need to feel free to participate in the classroom talk in order to move their thinking from a lower order to a higher-order thinking. Thus, a metacognitive learner is hoped to be cultivated.

### **Desire of talk**

As discussed in Chapter 2, thinking is invisible; talking is one of the most powerful ways to make thinking visible. It is imperative for teachers to facilitate the readiness of talk to gauge

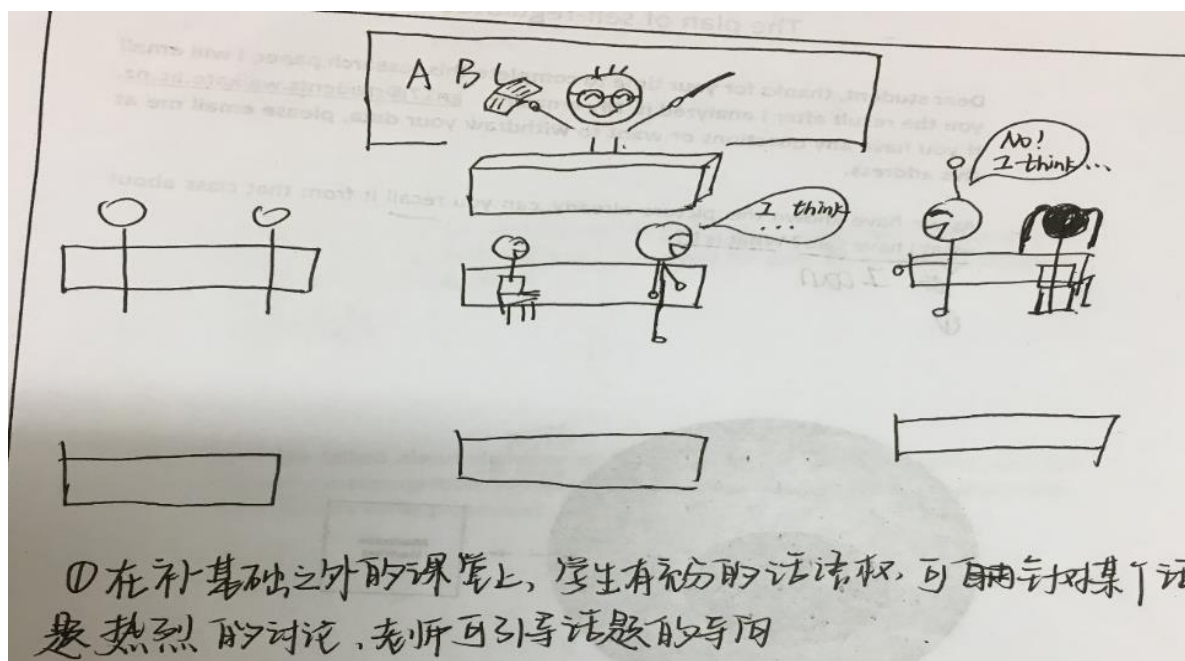
the process of students' metacognitive engagement in the learning activity. The findings in this section indicated that students desire to have more chance to talk in classroom practice. They indicated that students are expecting communication beyond the simple pattern of "Do you know ...", "yes, I know". Mandy hopes teachers can raise a question with "5w": when, what, where, why, how, to prolong the dialogue between teacher and students. (see Figure 6.7)

**Figure 6.7** Mandy's drawing



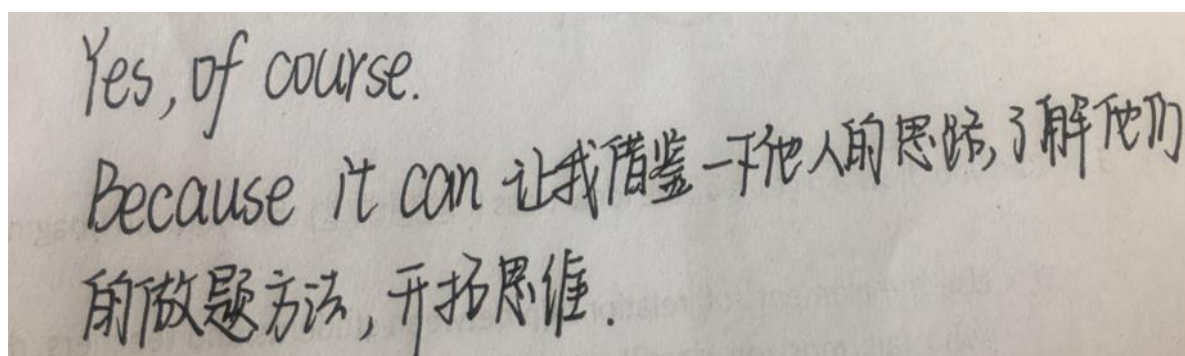
Mandy is expecting teachers to create an interactive learning environment by using how, when and where to start the conversations in classroom talk. The questioning technique of "5w" is expected to help give more chance for students to engage in classroom talks with teachers and peers. Jim, another student, showed his ideal version of the classroom. (See Figure 6.8)

**Figure 6.8** Jim's views of communication



In the picture above, Jim illustrates students are talking to each other with teachers' guidance. He also gave the notations at the bottom of the drawing with Chinese "In addition to supplementing basic knowledge, students have full discourse power and are free to conduct lively discussions on a topic, and teachers can guide topic orientation." Another student, Mark, shared the same view:

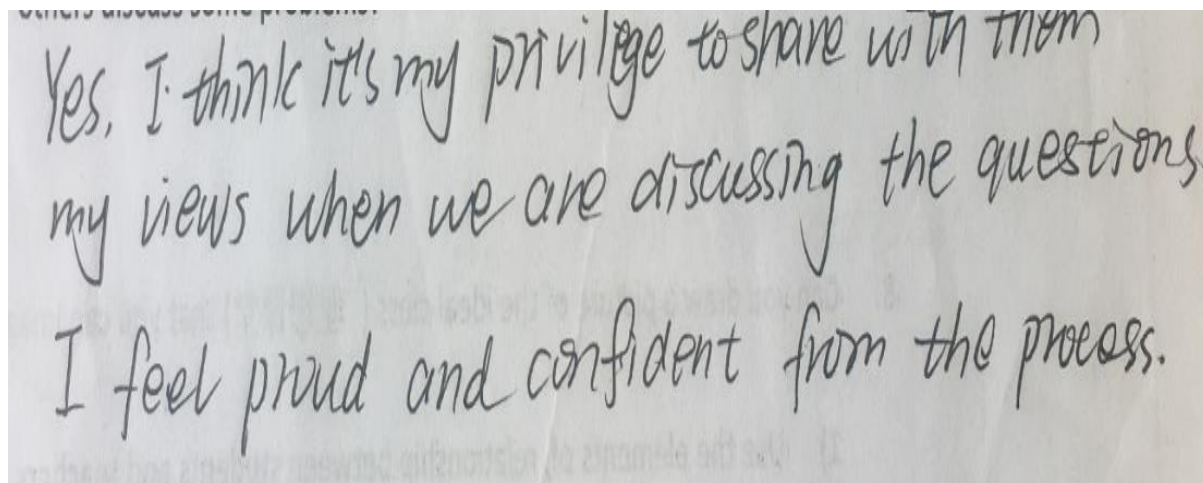
**Figure 6.9** Mark's view



In response to an invitation to answer, "Would you like to talk in the classroom? And Why?" Mark wrote down his answer on paper: yes, of course. Because it can 让我借鉴一下他人的思路, 了

解他们的做题方法，开拓思维。It means “ help me learn from other students’ ideas and understand their ways of problem-solving and broaden my thinking”. In addition to knowledge gains from the reciprocal communication with peers, another participant student gave the ideas of psychological satisfaction, see Figure 6.10.

**Figure 6.10** *Frank’s view*



Frank wrote that “yes, I think it my privilege to share with them my views when we are discussing the questions, I feel proud and confident from the process.” He enjoyed the process of the discussion as well as feeling that it raised his self-confidence.

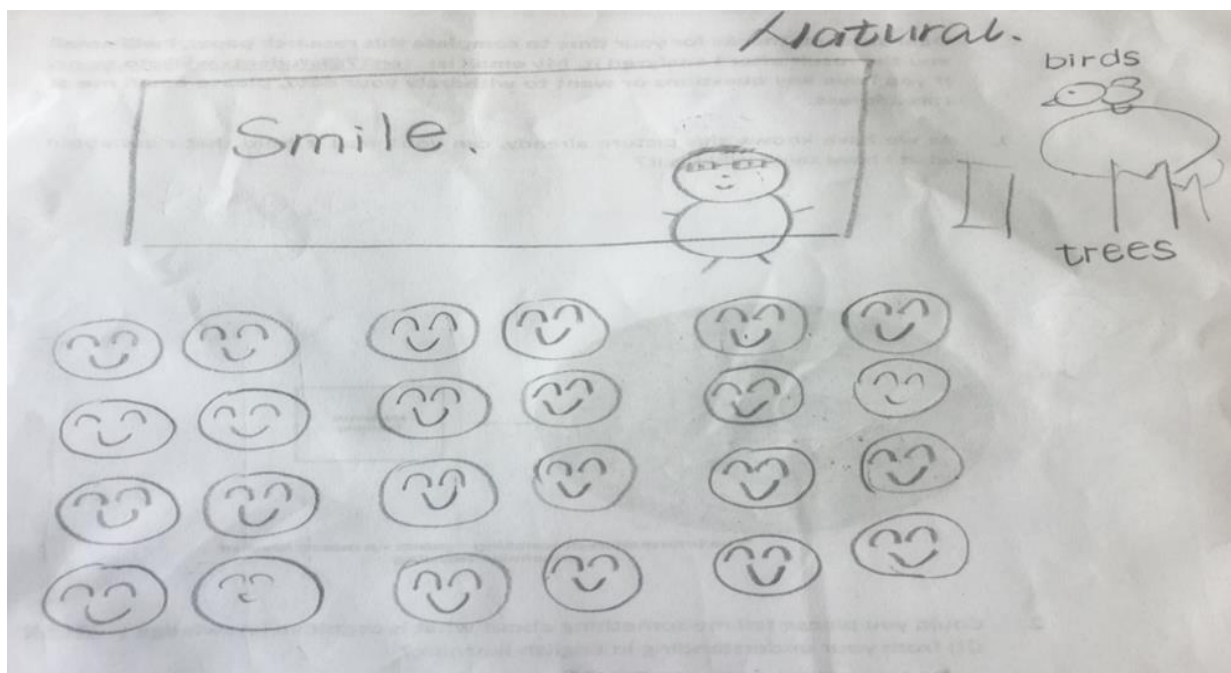
The above analysis indicates that students showed a strong desire to have his or her own voice in constructing knowledge in classroom practice. Yet. Some of them still feel timid and shyness to talk in class due to the limitations from learning environment or power relationship with teacher. The finding suggests that teachers who were participants in this study have many things to do to improve the students’ engagement in classroom talk; Possibilities from these students’ point of view include the changing of class seating, utilizing more interactive questioning techniques in classroom practice, or paying more attention in the quiet students in classroom by exercising teacher power properly. In addition to factors of classroom atmosphere, teacher

power and talk, nonverbal behaviours were also identified as an important theme related to creating an interactive learning environment in class AB flipped learning model.

### Preferred nonverbal behaviours

Participant students also perceived that teachers' nonverbal behaviours are important to have an engaging and interactive learning environment. Nonverbal behaviours of teachers are most commonly cited as body lean, physical closeness, eye contact, smiling, and touch (Andersen, 1979). In response to an invitation to draw "what is your preferred learning environment for metacognitive engagement", One student, Yi, indicated that a teacher who smiles mirrors students' smiles. She gave the topic of her drawing as "smile" and added the birds and trees to construct a harmonious learning scenario in Figure 6.11.

**Figure 6.11:** *Yi's drawing*



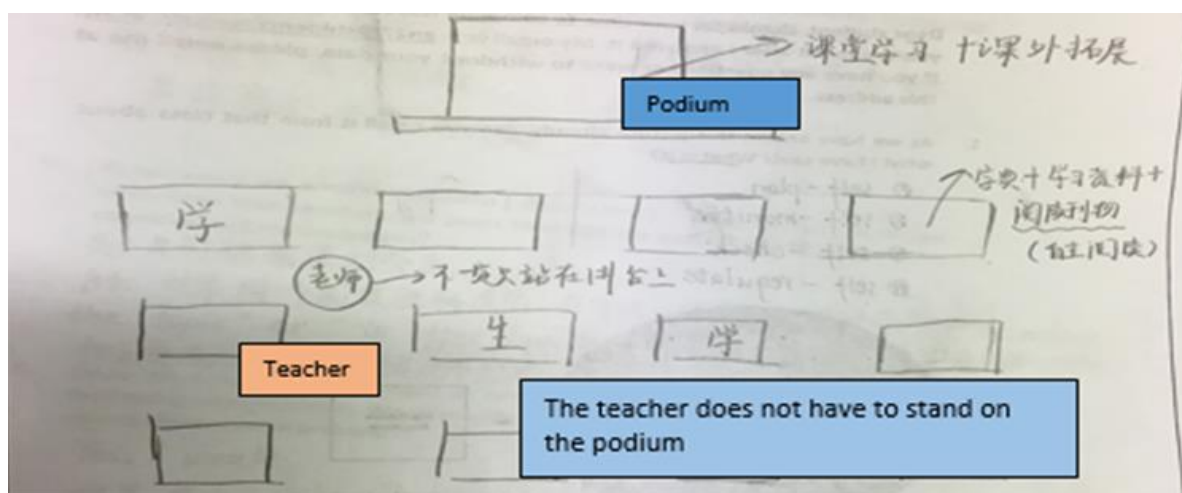
In Figure 6.11, the classroom is in a relaxed and joyful atmosphere. The influence of the teacher's smile to students' reaction suggests that actual classroom atmosphere depends on how the teachers present themselves to their students. The findings show how important teachers'

non-verbal behaviours are to students in the classroom. Another student Xin also pointed out:

I hope teachers can walk close to us as much as possible when they are giving the lecture so that we feel we are involved in the learning and the teachers walking by can hear our voice.

Xin's view indicated that a teacher does not necessarily have to be in the front of the classroom. The teacher can walk amongst students and join students by walking around them when presenting their instructions. It showed students' desire to minimize the distance from teachers so that their voice can be heard, and they can engage in thinking. Xiang's drawing echoed this view. (See Figure 6.12)

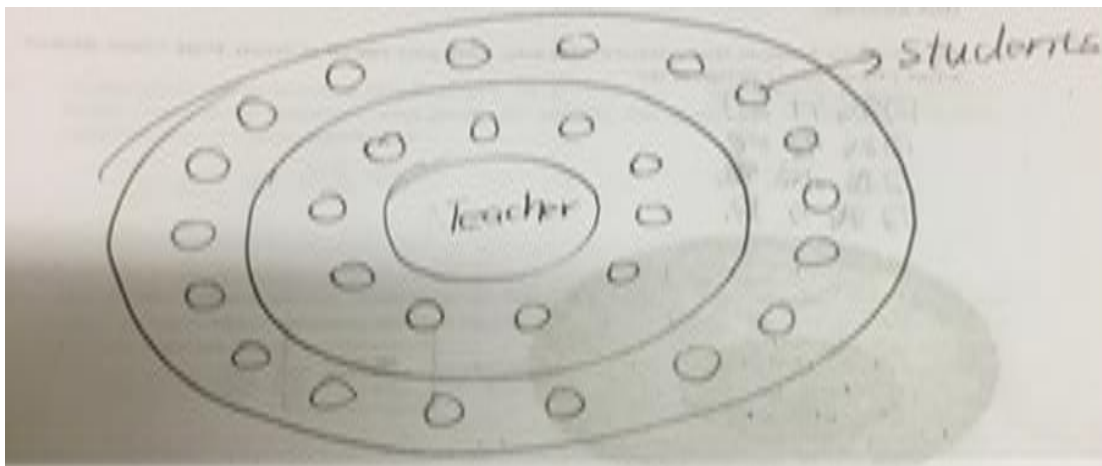
**Figure 6.12** Xiang's drawing



In Xiang's drawing above, he labelled the place where the teacher is expected by students to be with annotation: the teacher may not be necessarily standing on the stage with the blackboard. He showed the importance of where the teacher stands; he prefers to keep close with teachers in the classroom. Xiang's drawing shows the similarity with the drawing of Yuan as shown Figure 6.13:

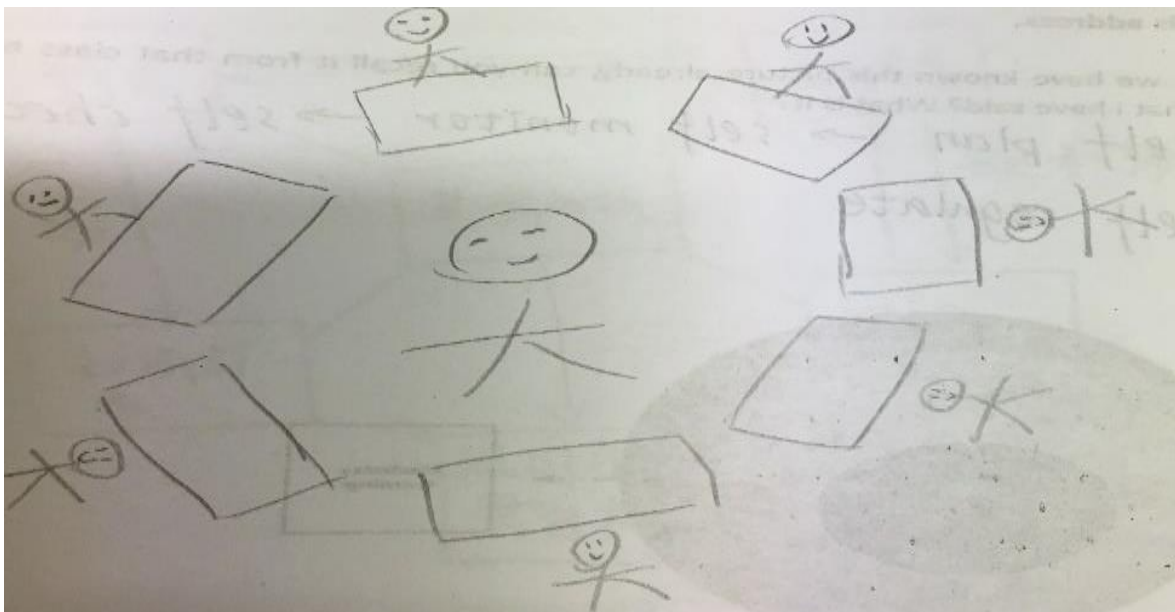


**Figure 6.13** *Yuan's drawing of a preferred classroom*



Yuan drew the classroom with an arrangement of a circle; the students surround the teacher. This was a different version of the desk arrangements from what they currently had in his class. In his drawing, he emphasized how important teachers' involvement is with physical closeness with students. Lan's drawing shows both smile and closeness as two-valued factors of teachers in the classroom she likes. (See Figure 6.14)

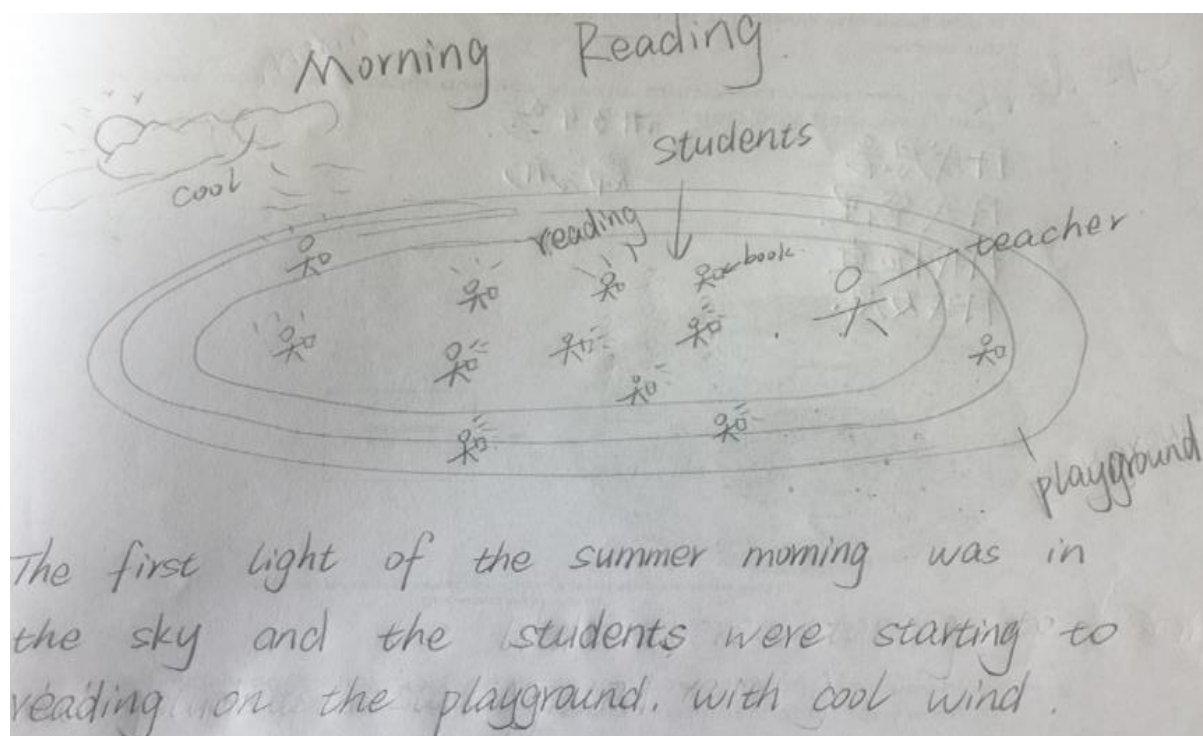
**Figure 6.14** *Lan's drawing*



In Figure 6.11. Yi's picture brought natural factors in by putting birds and trees. Another student, Dan was one of the students whose drawing showed a change to the place of learning from the

classroom to the playground, see Figure 6.15:

**Figure 6.15** *Dan's drawing*



Dan illustrates the kind of relationship and interaction with their peers and teachers that she would like. The learning environment in Dan's picture is enjoyable and comfortable.

Participant students perceived that teachers' nonverbal behaviours are essential to the engaging and interactive learning environment. Such as smiling, walking close around students, a circular arrangement of the desks and natural elements are the desirable factors in the learning environment. For example, Yi believes that a teacher who smiles mirrors students' smiles. In addition, Xin, Yuan and Lan hope teachers can walk close to us as much as possible with the desire to minimize the distance from teachers so that their voices can be heard. In this study, students' engagement in thinking aloud is a vital step for metacognitive teaching, as illustrated in figure 5.1 (the dialogic talk process). Interestingly, in her drawing, Dan moved her class to school playground to get close to the nature. Students perceived that a teacher's nonverbal

behaviours and classroom layout are important in classroom learning and help them learn effectively. All the elements mentioned are generated from the perceptions of students' side; in the next section, teacher perceptions are presented.

### **6.3 Teacher's perceptions of dialogic talk process**

After the classes in which the teachers trialled using the dialogic talk process, I asked how the teachers felt about using the dialogic talk and their perceptions about how it could impact their students' metacognitive development. The main themes in this section are: 1. The dialogic talk process provides teachers with a thinking tool in classroom practice 2. Sustained use of the dialogic talk process is needed to help students to adapt to the way of teaching. 3. An interactive learning environment is a prerequisite so that a dialogic talk process can be applied.

#### ***6.3.1 Dialogic talk process of teaching provide teachers a tool of thinking***

The participant teachers felt that the dialogic talk process provides them with a flow they can follow in their mind (a thinking tool) in classroom practice, and they feel more confident in teaching and a sense of achievement. Zhang shared after his class of modelling dialogic talk:

Now I know where I can start with my instructions, always start with what do you know and what do you need so that I provide knowledge in a well-organized way, and then think together with them. When I am doing this, students can follow me and they intend to talk more. I feel myself in a flow and a sense of achievement by seeing students' performance.

Zhang taught the modelling class, and he felt the sense of achievement in teaching when students gave very good feedback on his teaching. Summer's response aligns with Zhang's view:

I felt that my teaching is not so hurried now. I always have a flow and logic in my mind. The instruction is clear to the students. Therefore, more students can follow the steps and engage in the talk to think together.

Summer is happy that the dialogic talk process provided her with a tool for thinking in teaching. In addition, she pointed out that the logical instructional talk between her and her students would make her instructions clearer and predictable to the students, which resulted in active learning reactions from her students. The principal observed Summer's modelling class, and he commented:

The system of teaching is very good; I can see there is a system in her teaching. It is exactly what we need in the flipped learning context; it worked effectively in her class. For example, I am a physics teacher, but I really enjoyed the modelling class of Summer's English teaching class, and I felt that the students really enjoyed the class, and they were showing they were interested in learning. I think that this is a very good practice for the teacher and for the students.

The principal commented that flipped learning needs such a dialogic talk process to support teaching and learning. Summer's class was seen as a good practice for both teachers and students. Ling also observed the modelling class. After the observation, she reflected about her previous teaching:

I think I was using "the way" of teaching, but it was fragmented but not in a system. I repeat myself a lot and had no apparent steps to follow when giving instructions in talking with students. My thinking sometimes is chaotic when

responding to students in big class sizes. I enjoyed the modelling class, and I know now how to use it in my class, so it is good to have these details in the system. However, leading students' thinking is not easy, as students' response is not predictable. I will practice more with my students.

Ling reflected that she was using some of the strategies in her teaching, and she expects that the dialogic talk process would help her improve her teaching in her future classroom practice. Though she knows that dialogic talk process would be challenging, she would like to practice more with her students.

Although teachers perceived benefits of using the dialogic talk process, the challenges and concerns of using it in the future are also raised. One teacher challenge and concern is that once will not be enough practice to sustain classroom learning using dialogic talk. Another concern was that the new ways of teaching were time consuming.

### ***6.3.2 Sustained use of the dialogic talk process is needed***

Summer clarified that the sustained use of the dialogic talk process is needed, she commented:

The students were given so many new ways of learning in a clear and chunked way, but it is unused and fresh to them. However, I am afraid that it is the first time and maybe also the last time. It is a helpful way of teaching, but we need to practice with students for a long time to make them understand it fully. The critical issue here is to make sure that the teacher can practice it repeatedly with the students in the regular class in the future.

Summer expressed that a sustained practice of the dialogic talk process is needed. Yuan agreed with the concern, and she complained that the dialogic talk process requires teachers' extra time input in designing instructional activities. She commented:

My modelling class worked well because of the one-by-one workshop. The one-on-one workshop provided me with theoretical support from you and gave me a fixed time to spend designing the instructional activities. For example, I spent three self-study class times with you to create the modelling class. It was helpful; it is the prerequisite for good modelling class that practice happening. In addition, in modelling class, students are more responsive, and the learning environment is more interactive. It is very critical.

Yuan mentioned two prerequisite of effective dialogic talk practice. One is there was more input in designing instructional activities, another is an interactive learning environment where students are responsive. Yuan's concern was that without help would she be able to continue this level of planning. An interactive learning environment is one where the students articulate their ideas freely, without fear of embarrassment over wrong answers. Summer believes that an interactive learning environment helps the dialogic talk process to happen:

We should bring all students in the learning activities but not only interact with the students who volunteer to talk. The environment of learning that we co-created is very important.

An interactive environment enables teachers and students work collaboratively, they focus on deepening understanding, making connections, and mastering concepts. Buber iterated that free talk happens in an equal, reciprocal, open and mutual environment (Buber, 1970). The ideas were also echoed by Vygotsky (1978), when he emphasized that knowledge is co-constructed in which the activities happen. Teachers' perceptions of an interactive learning environment are discussed in the following section to compare with students' perceptions on the learning environment.

### ***6.3.3 Teachers' perceptions of learning environment***

In this section, further perceptions from teachers' interviews are analysed and presented. They suggest that although the teachers' realized the importance of students' voice in theory, they remained concerned about big class sizes, and that some students in the classroom were short of self-regulation. They struggled with balancing the relaxed atmosphere with students while keeping all students on track with ongoing activities in flipped learning classrooms. These teachers felt that they have to use power as classroom management techniques to discipline students' behaviours in order to follow the curriculum plan and fulfil the task of summative examinations.

#### **Teachers' perceptions of classroom atmosphere**

The classroom atmosphere is influenced by the teachers' engagement with their students and agency in terms of trying new learning ideas. It was interesting to note that in this study different classes had very different class atmospheres. The findings indicated that some teachers prefer a relaxed and cooperative atmosphere. Ling comments:

The different class have different atmosphere. I like the classroom with an atmosphere that is relaxed and cooperative. I hope my students are responsive in class. So that I know where they are in their understandings.

The evidence indicated that the classroom atmosphere is important as it influences the teacher's engagement in the innovative pedagogy applications. The different atmosphere situations in different classes affected whether the teachers felt confident to try new ideas. Zhang comments:

I think it is good to have an environment of relax, but it is not easy to do when you are teaching. Student behaviours that interfere with on-task activities based on the curriculum; I have to make them not so relaxed to keep their focus on learning.

In the extract above, Zhang perceived the pressures come from the on-task activities, sometimes; he intentionally makes the atmosphere in tension to keep all students on track for learning. A scenario from the classroom observation reflected this view:

Teacher: who have completed the task? Please hand up.

One Student: me, me, teacher, I finished. I did it ...

Teacher: Do not talk too much. Hands up only...

Student: ok.

It noted that one student was trying to tell the teacher that he finished and intended to share more about this task. The teacher stopped his sharing and gave instructions to keep him quiet. This is an example of how some teachers use power to keep students in control.

### **Teacher's perceptions of power and talk**



The study found that teachers felt that they have to use power in the classroom. They indicated that use of power is an inherent part of the teaching process due to some students lacks self-regulation in learning. For example, Wen indicated that she has to keep the authority and as well give as much freedom as they can:

Sometimes I have to use my power to keep a good order in classroom. I tried to be equal and be friends with them when I just graduated as a new teacher. I found that I struggled with the “problematic” students who just talk things irrelevant with the topic. I have to regulate them to keep focus content I am teaching.

As demonstrated above, the teacher showed her dilemmas in balancing a good classroom order as well having more students’ voice. In Ling’s case, the big class size kept her away from paying attention to each student in class:

I have a very big class size; I have two classes to teach in one day. Besides, each class has 50 students, it means that I have 100 students, it is unlikely for me to communicate and listen to them and make a connection with everyone.

The extract above showed the limitation of the large classes would make it hard for the teacher to circulate around students at their desks. The number of the students in one class also accounts for the imbalance of communication. This was supported by Yuan’s sharing:

I have to follow the school curriculum and keep the same pace with other classes with a big capacity of class size and limited time of class length.

Yuan introduces covering the curriculum at the same pace as other classes and the limited time of class sessions as factors in preventing keeping a dialogic talk process in daily practice. Wen

agreed with the view from Yuan:

There are so many new concepts need to be taught to students, we have to fulfil our tasks first. Sometimes, I prefer to give direct instructions

Because of the obstacles caused by the big class capacity, teachers found it is difficult to get to know each student and listen to the student individually. Teachers are trying hard to reach an interactive learning environment where it is mutual, equal and reciprocal by using various classroom management techniques, yet there is still a gap in between.

The evidence above showed how teachers defended their hard work, yet the interactive learning environment is not reachable in their classrooms. Teachers felt task-driven and the time limitation of each class; in addition, the class size is a constraint for them to give a chance for students to direct their learning. Teachers are trying hard to reach an interactive learning environment where it is mutual, equal and reciprocal by using various classroom management techniques, yet there is still a gap in between what they know theoretically and their practice.

### **Teachers' perceptions of nonverbal behaviours**

As discussed in the last section 6.1.4, the students showed a high desire to get close with their teachers by having non-verbal behaviours and relocating classroom-learning environment. However, teachers had a struggling issue with balancing “getting close” with students and keeping students on track with ongoing activities. Summer commented:

I did not set the classroom desks in circular way as it causes more distraction when students are face to face.

In the above extract, Summer shared the reason why she kept the traditional way of desk setting

in classroom. It was for minimizing the distractions from peers and keep them focused on learning. Interestingly, another teacher Wen mentioned another factor, which influenced her nonverbal behaviours presented in classroom:

Students come to school, take the teacher as the role of supervisor and follow their instructions, no matter it is right or wrong. The culture of being obedient contributes to the distance between teacher and students.

In the extract above, Wen showed that it is important to "follow teacher's instructions" in Chinese culture, which is also one reason why there is a subordinate relationship between teacher and students. Besides the factors mentioned above, Ling added the elements of her facial expressions presented in classrooms:

I come into the classroom, sometimes, not with a smile, because sometimes, if you are always wearing a smile, students will have no boundary of keeping discipline in the classroom.

Ling mentioned that she kept her authority by not wearing a smile intentionally. It aimed to help students follow her instructions and influence their nonverbal behaviours and attitudes when present in the classroom.

The dialogic talk process provides teachers with a thinking tool in classroom practice. Flipped learning needs the dialogic talk process of teaching. The sustained use of the dialogic talk process should be promoted to help students to adapt the new way of teaching. In addition, teachers realised an interactive learning environment is a prerequisite for how the dialogic talk

process can be applied, and the constraints for teachers to create an interactive learning environment are identified.

#### **6.4 Chapter summary**

After the modelling class, how students felt about the teachers using the dialogic talk and their perceptions about how it impacted their metacognitive development were explored. The study found students felt satisfied with the teacher's modelling class. They were excited about the teachers' changes; they gave their perceptions of metacognitive development with illustrations of trees to show their desire to learn how to learn from teachers in metacognitive teaching. However, students worried that the changes would not be sustainable. In addition, they also raised concerns about future applications; they hope they can have an interactive learning environment in which they can engage in metacognitive thinking with teacher guidance.

The dialogic talk process provides teachers with a thinking tool in classroom practice. The sustained use of the dialogic talk process should be guaranteed to help students to adapt the new way of teaching. Though the teachers' realized the importance of students' voice, in theory, they remained concerned about big class sizes, and that some students in the classroom were short of self-regulation. The teachers felt that they have to use power as classroom management techniques to discipline students' behaviours to follow the curriculum plan and fulfil the task of summative examinations. Next, in Chapter 7, the findings are discussed, and conclusions and implications are made.

## **Chapter 7 Discussion, conclusions and implications**

### **7.1 Introduction**

The purpose of the research was to enhance teacher mediation to foster students' metacognition in a flipped learning context. This chapter discusses the main findings to answer the research questions:

1. What are teachers' beliefs and students' needs for developing metacognitive thinking in a flipped learning context? (Section 7.2)
2. In response to professional learning, how do teachers enact strategies to elicit students' metacognitive thinking in the classroom? (Section 7.3)
3. What are teachers and students' perceptions of factors influencing student metacognition development in the flipped learning context? (Section 7.4)

### **7.2 AB class model of flipped learning requires metacognitive learner and teacher**

This session discusses the findings to answer the first research question: What are teachers and students' needs for developing metacognitive thinking in a flipped learning context? The main findings generated from Chapter 4 are: AB class model of flipped learning requires metacognitive learner and metacognitive teachers. The tracing and analysis of the two different trajectories of students' learning from class A to class B indicated that students varied in their levels of preparation in class A. Both time management and help seeking are features of self-regulation and self-knowledge. Students tend to learn better in the flipped learning model of class A and class B when they have time management skills and seek help than those who could not. Four subheadings are categorised: time management, help seeking, responsibility of learning, and high level of dialogue.

### ***7.2.1 Time management***

The findings suggest that learning in a flipped learning context in this school requires students to have good time management skills to learn independently. Students need help to be aware of how to plan things to assist learning in class A to engage in formative interaction in Class B with teachers.

Time management helps people use time effectively when they perform goal directed activities (Waterworth, 2003). Behaviours that indicate successful time management skills included time assessment and monitoring behaviours (Britton & Tesser, 1991). Time assessment behaviours are aimed at the awareness of now or past, present and future and of one's time use, which helps to accept tasks and responsibilities that fit within the limit of one's capabilities (Macan, 1996). More importantly, a good time management learner has intentions to monitor their behaviours after self-assessment, which aim at observing one's use of time while performing activities. The self-awareness of observing one's own time using requires students to manage their thinking to a higher level to minimize the influence of interruptions by others and keep highly goal directed (Claessens et al., 2007). Wolters and Brady (2021) clarified that time management is a significant self-regulatory process through which students actively manage when and for how long they engage in the activities deemed necessary for reaching their academic goals. In addition, this self-regulatory learning process requires consistency in self-control to plan time, monitor time and resources, and be aware of keeping on track for the goal with reflections, in other words, being a metacognitive learner.

Although the self-awareness of time management cannot be observed directly, the sequence caused by it can be noticed. For example, in this study, through the tracing of two students' learning behaviours from class A and class B, the student with better time management skills

might have assessed their behaviours by being able to be aware of their actions on class A and caused a positive effect on their performance of class B. The evidence suggests that the AB class model works well for the students who can regulate themselves on behaviours of assessing and monitoring time independently, in being a self-regulated learner. Self-regulation is one of the features of metacognition. In other words, the AB class model of flipped learning requires a metacognitive learner.

The findings imply that flipped learning needs students to be aware of self-assessment on managing their time beyond the cognitive level of knowing what they have to do and what they are doing but in a higher level of self-regulation in monitoring a limited time. Griffiths (2003) identified that time management is a sense of self-assessment and self-knowledge at the metacognitive level and argued that time management is the degree to which individuals perceive their use of time to be structured and purposive. Literature (see, section.2.3.2) suggests that metacognition helps learners harness self-knowledge to explore themselves fully in learning (Avargil et al., 2018; Basu & Dixit, 2022; Cromley & Kunze, 2020). Self-knowledge help learners assess themselves correctly, which is helpful in effective learning (Nielsen et al., 2009). Hattie (2012) emphasized that in self-regulated learning in metacognition, students allocate appropriate amounts of time and resources to learning, engage in self-testing, and evaluate the products and outcomes of their learning. Therefore, students who can self-assess are able to determine the importance of tasks or priorities in the learning and problem-solving process.

### **7.2.2 Help seeking**

Help seeking is an essential self-regulatory and metacognitive skill (Broadbent & Lodge, 2021b). Participant teachers noted that some of the students did not ask for help when teachers'

consultation was available to them in A class. The lack of awareness of help seeking, especially in A class, could result in less formative interactions in B class. The AB class model requires learners to be metacognitive, know when, and actively seek how to get help when they are not capable of solving the problem by themselves. Similarly, Paris and Winograd (1990) clarified that children frequently encounter situations in the classroom where they must assess themselves and ask questions to themselves, such as: what do I know about this topic? How much should I try? Etc. This self-assessment is a sign of their actions by knowing themselves (self-knowledge). In addition, metacognitive learners know when to ask for help wisely and when to reflect on themselves on learning.

Help-seeking contributes to high-level dialogue in the classroom. Steed and Poskitt (2010) argued that help-seeking episodes allow for formative interactions that can support further self-regulated learning. In turn, the help-seeking behaviours of the learner during learning activities also enhance the interactive classroom environment and culture (Steed & Poskitt, 2010). The responsibility of learning is discussed the following section.

### ***7.2.3 Responsibility of learning in classroom***

The current situation of the teachers' teaching showed that teachers were using a teacher-centred classroom; they felt that it is easier for them to keep in control of the classroom order and keep the pace of learning. The findings indicated that teachers are reluctant to return the responsibility of learning to students because of their perceptions of students' lack of self-regulation. Teachers felt that keeping authority and control of the classroom's learning safeguarded them about students' learning effectiveness. The concerns from teachers raised the emergent need for cultivating self-regulated and metacognitive learners. Thus, the self-regulated learners can take their responsibility in learning. Likewise, Paris and Winograd



(1990) believe students who are good at using metacognitive strategies have greater autonomous learning ability and better learning outcomes; students who are not good at using the metacognitive approach are usually in the passive state and have poor self-regulated learning ability in decision making (Basu & Dixit, 2022). Self-regulated and metacognitive learners can learn independently to help teachers raise their confidence level to minimize the control of learning.

Flipped learning approach of class A and class B aimed to enhance students' learning experiences by creating opportunities for them to improve their understanding through independent exploration and encourage greater flexibility for students to learn at their own pace (Pintrich, 2002). However, in return, flipped learning in this school raised demand on students' self-regulation and higher-order thinking. The findings suggest student centered classroom is more appropriate to create an interactive learning environment so that students share their voices to construct meaning and knowledge in co-joint activities with peers and teachers (Daniels, 2016). In addition, teachers need to return the ownership of learning to students. Literature suggests that metacognitive teachers need to be developed to help teachers plan and manage classroom activities well while facilitating classroom talk to cultivate metacognitive learners (Duffy, 2006; Vosniadou et al., 2021).

Returning the responsibility of learning to students or not is a considered decision by teachers in the AB class model where independence of learning is required. Some teachers feel reluctant to have a student-centred classroom. However, the argument here is that cultivating self-regulated learners could be a solution to giving teachers the confidence to reconsider returning the responsibility of learning to students.

#### ***7.2.4 Classroom talk***

Despite the traditional desk management and teacher-oriented learning of two teachers (Wen and Ling), another teacher, Summer, showed her awareness of the importance of classroom talk in teaching and learning. Talk is deemed a key tool for teachers to diagnose and assess the level of content knowledge that students bring to the classroom to prepare and construct learning (Giles & Earl, 2014; Herold et al., 2018). Nevertheless, Summer is interactive with her students, but their dialogue remains at low levels. As such, Summer showed difficulty having conversations with students because of their poor preparations in class A.

Students are required to get ready in class A to engage in interaction with teachers in class B; on the other hand, teachers need some support to be able to elicit thinking by increasing the level of dialogue. Literature suggests that teachers must make the ongoing responses to students' emerging understandings in the ongoing process when eliciting thinking, which increases the level of difficulty in monitoring metacognitive teaching in ongoing talk (Duffy, 2006). Therefore, developing metacognitive teachers is needed, and further support is required to help teachers make the conversation more constructive to elicit students' thinking in classroom practice.

#### ***7.2.5 Summary***

This section discussed findings to answer the first research question: What are teachers' beliefs and students' needs for developing metacognitive thinking in a flipped learning context? The findings revealed that AB class model of flipped learning requires metacognitive learner and metacognitive teachers. For addressing this need, the next section discusses the findings to answer the research question of how teachers enact strategies to elicit students' metacognitive thinking in flipped learning.

### **7.3 Teacher mediation in student metacognitive development <sup>1</sup>**

This section answers the research question of “In response to professional learning, how do teachers enact strategies to elicit students’ metacognitive thinking in the classroom?” by explicating teacher mediation of problem-solving processes and student metacognition.

Literature (see section 2.4.2) suggests when people engage in problem solving, they need three parts of thinking: cognition, metacognition, and the transfer between the two by matching what they already know with the incoming information (Basu & Dixit, 2022; Flavell et al., 1999; Flavell 1979). It suggests that if the interplay of the cognitive information and metacognitive function works well, then capacity could be freed for working memory to solve problems productively. In this study, teachers’ mediational behaviour is situated in the cognitive process of problem-solving and involves knowing where students are in this cognitive process, then giving the knowledge they need (Guo, 2020) and lastly monitoring the solving process with them to form a strategy or tool for independent learning.

The findings involve three secondary school teachers of Mathematics, English and Science and their students and generated three themes that appeared useful to explain mediation in metacognitive teaching: mediation through assessment as learning, consolidation of prior knowledge, and promoting autonomy, which are discussed accordingly.

#### ***7.3.1 Mediation through assessment as learning***

The aspect of dialogic talk in the mediation process is an integral part of the assessment as learning. As Earl (2013) opines, assessment as learning involves teacher guidance and

---

<sup>1</sup> Guo, L. (2020). Teachers’ mediation in students’ development of cognition and metacognition. *Asia-Pacific Journal of Teacher Education*, 48(1), 1-16. <https://doi.org/10.1080/1359866X.2020.1846158>

facilitation of opportunities for students by engaging in a turn-taking dialogue. Essentially, dialogic talk creates a collaborative and supportive environment for students to express their ideas (Friedman, 2003). As depicted in the English class, the teacher utilised a think-aloud (Van Someren et al., 1994) method in the dialogic process. Hence, students were requested to verbalise their approach to solve the problem (Daniels, 2016). While the student was commenting on the approach used to select the answer, the teacher was observing the thinking process. By comprehending the talk process (Figure 5.1) behind a student's choice of an answer, the teacher can articulate the appropriate answer effectively (Anderson, 2002).

Responsive feedback and teacher guidance in the mediation process of this study is also an important element in the assessment as learning. Earl (2013) suggests that teacher feedback and guidance through assessment encourages the self-assessment and reflection of students and hence enables a higher level of cognitive and metacognitive development (Crawford & Capps, 2018; Cromley & Kunze, 2020; Perry et al., 2019). The essence of teacher feedback, guidance and facilitation were demonstrated in the mathematics class.

The mathematics teacher posed a question and then considered students' answers. Through feedback in a dialogic process (Friedman, 2003), the students realised that the sum of the equation is needed to solve the problem. By further interaction, the teacher realised that some students knew the equation by recitation but not derivation. The teacher then guided the students through the process of derivation to arrive at the sum of squares equation. Guiding students in a sequential process to derive the concepts enabled them to shift from memorisation (rote learning) to a deeper understanding of concepts (Capobianco et al., 2020).

It also was noted that participant teachers used summative assessment (the test) in class A, and through marking of the test, both teachers and students know which questions they need to pay more attention to. Then on class B, formative assessment such as assessment as learning are used to support teacher guidance and facilitation of opportunities for students by engaging in dialogue (Cowie et al., 2011; Giles & Earl, 2014). The talk process in Figure 5.1 was used to support and facilitate teachers' effective use of assessment for learning (Gardner, 2012; Wiliam, 2011) in eliciting student thinking. This answers the research question of how teachers can elicit students' thinking in metacognitive thinking.

### ***7.3.2 Consolidation of prior knowledge***

Prior knowledge is the knowledge and experiences the learner already has before they encounter new information (Roschelle, 1997). Roschelle (1997) also asserts that learners' understandings and propensity to solve a problem can be improved by activating their prior knowledge. The consolidation of prior knowledge is achieved when teachers supply students with the knowledge required to solve a problem in a systematic way. There are various strategies, which can guide students towards building well-arranged content knowledge (e.g. chart, story structure, brainstorming, diagram, figure, flowchart, music and tables) for metacognition development (see section 2.5.3) (Van Merriënboer & Paas, 1990). For instance, Shintani et al. (2016) investigated the learning effects of a visual grammar-teaching method based on schema theory and revealed that most participating students had a positive impression of the visual grammar instructional method. While enabling the learning of specific strategies in facilitating metacognition, providing an explicit and overall approach in teaching metacognition presents a challenge for educators.

The findings in this study suggest that it is important to select the right strategy and tool for the particular educational activity and to scaffold the students' use of the strategy and tool carefully. For example, in this study three exemplified practices in subjects of English, chemistry, and mathematics were presented to show how the thinking was elicited by metacognitive strategies in metacognitive teaching. As such, in English teaching class, the content of 'time prepositions' was taught using a fun smooth rhyme, singing together with students while beating their hands:

In “year” in “month” in “season”,  
 In “morning” in “afternoon” in “evening”.  
 On” day” on “holiday” on “Weekday”  
 And on “with specific day’s morning, afternoon and evening”  
 “At” is relatively simple  
 Just put it before the time of the hour.

The songs are essentially poems and have a lot of meaning packed into a structure. As literature evidenced, students' mental capacity can process only a limited number of elements at a time. However, the size, complexity, and sophistication of features are not limited (Sweller et al., 1998). The well-organized content knowledge theoretically and practically helps teachers in grammar instructional design and grammar pedagogical practice to mediate the student metacognitive thinking and learning towards independence. Another example provided was in subject of mathematics, where the teacher used a visualised “sum of squares formula derivation process” to support students having a well-organised cognitive knowledge supply (see Figure 5.3).

The Sum of squares formula derivation process helped students to engage in formative talk with teachers to develop their metacognitive thinking. The literature suggests that there are

various strategies, which can guide students towards building well-arranged content knowledge (e.g., chart, story structure) for metacognition development (Gordon & Braun, 1983; Rowan et al., 2019). Gordon and Braun (1983) explored the importance of assembling a set of organized notes in reading comprehension and found that well-organized data charts could be powerful tools to take the pressure off memorizing details in problem solving. In this study, in chemistry class, Yuan applied key bulletins as a strategy to summarize the key points to provide cognitive knowledge:

- *weak acid ions:*  $CO_3^{2-}$
- *Strong alkali ions:*  $OH^-$
- *Strong acid ions:*  $SO_4^{2-}$ ,  $NO_3^-$   $Cl^-$

In these three cases, the teachers used three metacognitive strategies to help students organize the content knowledge: smooth song, Sum of squares formula and bullet points to categorise ions. According to Perkins and Salomon (1992), teachers can help students become better thinkers by purposely using designed frames to organize their thinking (Rowan et al., 2019). The three metacognitive strategies can elicit students to think with more depth and structure (Reiser, 2004). It also helps students to be aware that cognitive development is modifiable (Vygotsky, 1978). Thus, knowledge learning is accumulative and constructive: ‘I am not an expert now, but I can be more of an expert with efforts later’.

As a student’s mental capacity is limited (Karpov & Haywood, 1998), giving knowledge in an organised way frees the energy and time to think and hence expands the mental capacity (Flavell, 1979) of students to function at a higher level of thinking. In effect, a consolidated knowledge base help students move to a higher level of thinking in the course of problem-solving (MacBlain, 2018). As demonstrated in this study, the English teacher gave students well-organised and chunked information to help solve the question. It is worth noting that

systematically providing knowledge ensures that knowledge is not only confined to the aspect required to solve a given problem but help students support other knowledge. For instance, the English teacher indicated that “on” was the required answer to a given question. However, she mentioned and explicated other relevant prepositions including “in” and “at”. The essence of providing other relevant information within a systematic framework is to help students solve similar test item problems independently (Teng et al., 2022).

Consolidation of prior knowledge transcends subject knowledge and involves consolidating the process or approach to providing knowledge. For instance, in the English class, the smooth song would be mentioned repeatedly whenever the time preposition problem solving came up. By the repetition of concepts, Dewey (2007) asserted students have the opportunity to reinforce the right part of their understandings and correct their misunderstandings, and therefore develop tools for self-regulation. To consolidate the prior knowledge is another main construct in metacognitive teaching to facilitate students’ metacognitive thinking (Lan et al., 2019).

### ***7.3.3 Facilitate self-regulation in problem solving***

According to Zimmerman and Schunk (2011), self-regulation appears to be a positive indicator of performance on standardised test scores. Self-regulated learning (or self-regulation) refers to the process whereby learners personally activate and sustain cognition, affect, and behaviours that are systematically oriented toward the attainment of learning goals. Students become more self-regulated in problem solving by empowering them to be conscious of their thinking process. The process towards self-regulation includes teachers making learning explicit by eliciting, clarifying and responding to students’ thinking patterns (Hattie, 2012; Kuhn, 2000). Consequently, students match the new information with their prior knowledge,



and beyond this linking process, it helps them become aware of their thinking process (Basu & Dixit, 2022).

Jinghui et al. (2009) investigated the effects of second-year university students' metacognitive beliefs and strategies on learning Chinese as a Foreign Language and they found that there is a need for strong metacognitive beliefs and strategies to empower second language learners, foster self-esteem and improve educational outcomes. The authors in this study also confirm that students should be encouraged to analyze their own learning processes in order to improve their metacognitive learning strategies, which will reinforce motivational aspects of self-efficacy. Zhang and Qin (2018)'s research suggested that it might be more enlightening for teachers to implement a metacognitively oriented pedagogy to promote learners' strategy use. Similarly, Zheng (2018) indicated that students should be intentionally trained to be conscious of metacognition, helping them with their planning and improve self-supervision ability and self-evaluation ability.

In this study, the modelling, think aloud, and monitoring processes were the steps that enabled students to internalise and regulate the cognitive process and consequently solve problems independently. As illustrated, the English teacher actively modelled the thinking process with the students to show the correlations of 'rainy day 'and a specific day'. Correspondingly, the chemistry teacher assisted students to think together of the co-existence rules in the solution. Stimulating students' sense making in correlations helps students cultivate a tool of self-regulated learning. Students' abilities to match new information with existing knowledge enables them to monitor their thought in the self-regulatory process and represent their thinking through problem-solving (Newell & Simon, 1972). For example, Yanyan (2010) clarified demonstrated that a good command of metacognitive knowledge cultivated learners' learning

autonomy in problem solving and effective learning. Further internalisation and reflection of their own ideas can help students develop their problem-solving skills rather than learning the solution to a specific problem. Thus, a metacognitive learner can be cultivated.

#### ***7.3.4 A thinking tool for metacognitive teaching***

The study also suggested that teachers could intervene in bringing students' knowledge from cognitive level to metacognitive level automatically, thereby freeing their mental capacity to monitor and enhance their response time for the ongoing activities in classroom practice (AB-class) (Ericsson & Kintsch, 1995). To this end, teachers learned the dialogic talk process (Figure 5.1) as a thinking tool to help them develop students' metacognition through metacognitive strategies and the designed instructional talk. The thinking tool (dialogic talk process) visualises detailed steps for teachers' practice in students' metacognition development. As shown in Figure 5.1, the findings highlighted simple but clear and detailed steps for teachers in developing students' metacognitive skills through dialogic talk for problem solving. The explicit method adapted for the teacher mediation in the dialogic talk process of Figure 5.1 involved teachers: (a) using dialogic talk to assess what students know and where they are in the thinking process; (b) systematically providing the missing knowledge; and (c) monitoring the problem-solving process with students to enable them to develop tools for independent learning.

The thinking tool (dialogic talk process) supports teachers' thinking in the process of designing instructional activities and instructional practice but not for framing teachers' thinking in a box; it is cyclical. Therefore, teachers can always start the instructions with a dialogic assessment and then naturally come into the second step of cognitive knowledge supply; after that, you may think, teachers have to commence modelling the thinking process of the third step.

However, teachers in this study could stop and step back when a new conceptual or procedural gap emerged.

In other words, the thinking tool (dialogic talk process) (Figure 5.1) empowers teachers to insert a new episode occurring as part of the bigger sequence of the thinking journey. The inserted episode constructs the needed cognitive knowledge supply for problem-solving using the four sub-steps (dialogic assessment, cognitive knowledge supply, modelling metacognitive process, a tool for independent thinking). For example, the dialogic talk process (Figure 5.1) would be expected to raise the automaticity in teaching practice to attend to students' changing needs in the ongoing activities (Kotovsky et al., 1985). In turn, students are more likely to be more engaged and on track of thinking (Basu & Dixit, 2022; Goldsmith, 2013). Metacognitive support is also needed in using talk to intervene students' metacognition devotement.

For instance, in a study Zepeda et al. (2019) compared teacher talk from 20 middle school mathematics classrooms with high growth in conceptual mathematics scores with teacher talk from 20 classrooms with low growth. For each of these classrooms, they examined the amount of teacher talk that supported metacognition during one regular class period. Observations revealed that the high-conceptual growth classrooms had more metacognitive supports for personal knowledge, monitoring, evaluating, directive manners, and domain-general frames than the low-conceptual growth classrooms.

The research findings suggest that the dialogic talk process in Figure 5.1 facilitates teacher instructional talk and makes the teaching and learning approach explicit and constructive in a variety of different subjects. In this study, I provided teacher with the explicit steps for teacher mediation which involves first, using dialogic talk to assess what students know and where

they are in the thinking process, then giving knowledge of what they do not have systematically and afterwards, monitoring the problem-solving process with students to enable them to form tools for independent learning.

### ***7.3.5 Summary***

This section discussed the process of how teachers elicited students' thinking by using metacognitive strategies in classroom talk in subjects of English, Chemistry and Mathematics. In the main, it answered the research question of how to enact strategies to elicit students' thinking in classroom practice. Given that there has been an increasing recognition that enhanced metacognition enables students to learn effectively, the findings of this chapter would help teachers to follow simple but clear and detailed steps in developing students' metacognitive skills in problem-solving.

This study utilizing teachers' mediation provides the dialogic talk process that makes the approach explicit. In essence, it aims to enhance the theoretical support for teacher mediation in the transition of cognition to metacognition in flipped learning. The explicit steps adapted for the teacher mediation involves first, using dialogic talk to assess what students know and where they are in the thinking process, then giving knowledge of what they do not have systematically and afterwards, monitoring the problem-solving process with students to enable them to form tools for independent learning. In the next section, students and teachers' perceptions of metacognition development in the flipped learning context are discussed to answer the third research question.

#### **7.4. Students and teacher's perceptions of metacognition development**

After the modelling class in which three teachers engaged in the dialogue talk process, how students felt about the teachers using the dialogic talk and their perceptions about how it impacted their metacognitive development were explored. Teachers' perceptions about their mediational effectiveness are also discussed.

##### ***7.4.1 Students' perceptions on metacognition development***

Students felt satisfied with their teacher's modelling class, and they were excited about their teachers' change. They felt satisfied and excited because they found teachers communicated with them more in modelling class, and the teachers' instructions were logical and clear. Students used terms like "logic" and "flow" to reflect teachers' thinking in providing instructions in class, which demonstrated that the dialogic talk process elicited students' thinking. Literature suggests that a dialogic talk in learning can empower students to reflect on their thinking and take responsibility for their learning (Daniels, 2016). In addition, dialogic talk in teaching is a pedagogy that exploits the power of talking to shape learners' thinking and secures their engagement, learning and understanding. In this study, the dialogic talk process shaped students' thinking (logic and flow) and motivated students to learn.

Students used the metaphor of trees to show their desire of learning how to learn from teachers in metacognitive teaching. The findings suggest that students need to learn more than just the content knowledge of the subjects and that they should be more active in their learning by learning 'how to learn'. Students need to engage in the knowledge construction process; therefore, it helps them be aware of how to think and learn independently. For example, in the hand drawing, the participant students used the metaphor of a bigger tree to symbolize the learning process. Kelly illustrated a big tree, representing a metacognitive learner who knows

how to learn, and the tree is flourishing. The root of the bigger tree is deep into the earth, growing happily in sunny weather. It indicated that the tree could only grow as strong as possible by having a deep root to get enough nutrition actively and independently.

In addition, students showed the realization of the rewarding effects between teachers' teaching and students' learning. From “the sun is tired because it works very hard” to “the sun is very happy because of the tree”, Kelly used the growing trajectory of a small tree to metaphor her cognitive development process in metacognitive teaching process. She indicated that she could get the learning skills from teachers’ scaffolding and know how to learn independently, then later, teachers would not get so tired by teaching them mechanically the same cognitive knowledge. They can learn better by themselves, and the teacher would be happy like the “sun” by simply being there. The tree has grown up with self-regulated skills to get nutrition by consciously making roots deeper. Similarly, self-regulated learners are aware when they know a fact and when they do not, when they encounter obstacles such as time limitations, difficult tasks, poor resources of learning, and they find a way to succeed. Self-regulation is a main factor in metacognition, it helps the learner to realize the importance of taking the responsibilities of learning and view learning as a systematic and controllable process (Buber 2002).

Students desired to be independent learners, who can learn himself or herself, with the strong support standing at their back with guidance. For example, Grace expected that a teacher would elicit her thinking and show her how to think by herself. She said, “I would like to see the process of how to find the answer”. Likewise, Vygotsky suggested that there were two factors in the development of knowledge: automatic unconscious acquisition (cognition) and a

progressively increased active awareness and control over that knowledge (metacognition) (Daniels, 2016).

The two factors according to Vygotsky (1978) essentially marked the separation between cognitive and metacognitive aspects of performance. In this study, participant students realised that they need teachers to teach them how to categorise and manage their leaves (content knowledge) on each branch (well-organized way) of the tree (metacognition development). Similarly, Anderson (2002) also asserted that metacognition is different from cognition in the sense that the latter focusses on gaining knowledge, but the former considers the categorization and management of the acquired knowledge.

The ability to categorise and manage knowledge ensures that learners are effectively using their intellect and by extension taking control of their learning. In this study, the findings indicated that students understood that they needed to learn more than just the content knowledge of the subjects they were being taught and that they wanted to be more active in their learning. The dialogic talk process is designed to develop students' metacognition in teacher mediation; it aims to form a metacognitive learner who can independently.

#### ***7.4.2 Students' perceptions of their learning environment***

In response to an invitation to draw "what is your preferred learning environment for metacognitive engagement", students expressed hope that they can have an interactive learning environment in which they are able to engage in metacognitive thinking with teacher guidance. Participant students in this study would like to have a positive atmosphere where they feel comfortable learning and where everyone is involved. For example, Jessica wrote that the atmosphere would be active, and everyone could participate. In Jon's drawing, everyone is

wearing a smile, and I take the smile worn by everyone in the picture to signify a relaxed atmosphere. It indicated that Jon suggests that metacognition engagement needs to be in an enjoyable environment for learners.

Similarly, May preferred a classroom which is "funny, comfortable and enjoyable". Classroom atmosphere refers to a teacher's and students' general approach and attitude towards one another in the classroom, including respect, admiration, sympathy, and comradeship (Brackett et al., 2012). It is believed that the classroom atmosphere is partially determined by how the teachers present themselves to their students. In return, the response and feedback from students contribute to what the classroom atmosphere would be like. Therefore, the atmosphere in the classroom that the teachers and students cultivate would facilitate the readiness for talk, which leads to problem solving and attending to the needs of students (Ahmed et al., 2020). In this study, the dialogic talk process requires students to respond to teachers' eliciting in the thinking aloud process. A positive classroom atmosphere makes people feel mentally warm and helps students and teachers engage in thinking in co-joined activities. This view aligns with Vein et al., (2010), who opined that a classroom that does not have a positive atmosphere could be problematic, disorganized and uncontrollable, and students would lack interest in learning. These findings suggest that cultivating a metacognitive learner needs the learners to feel comfortable and relaxed. They feel free to participate in the classroom talk in moving the thinking from a lower order to a higher-order thinking. Thus, a metacognitive learner is expected to be cultivated.

Power is defined as the capacity to direct or influence the behaviour of others. In the classroom, teachers exert power through the class materials they select, the learning activities they design, and how they include students in classroom discussions (Doerry & Amy, 2017). In this study,



participant students were willing to engage in learning. However, some of them did not feel free to talk, and they may have felt teacher power overtly and power bestowed on some students by the teachers. For example, Lily hoped that in the future, anyone can participate instead of only a conversation between the teacher and a few students with better scores. In the classroom, the teacher can decide who would have a chance to talk and who would be the group leader to talk on behalf of other group members in class. Lily hoped the teacher can use this power to encourage low-level students to participate in the talk.

The findings suggest that overt teacher power is not desirable to students, and power should be minimized in the classroom. Still, where instead of it, if power already exists, we should try to use power properly to promote involvement. The finding is consistent with the literature; for example, Richmond and McCroskey (1984) investigated how the use of power in the classroom is associated with cognitive and affective learning. Based on data from 151 teachers and 2603 of their students, the results indicated that perceived use of power could account for approximately 30 per cent of the variance in cognitive learning and up to 69 per cent of the variance in affective learning. Coercive and, to a lesser extent, legitimate power was negatively associated with learning, and to a lesser extent, expert power was positively associated with learning. The authors clarified that student perceived power overtly does not benefit students' cognitive learning. In this study, participant students felt teacher power overtly, and the power of teacher or peers may decrease individual students' engagement in the classroom communication. In other words, students tend not to have their voices heard when they feel positioned as having less power than teachers or peers. The finding suggests that teachers can use their power more effectively, such as teachers can help invite students who talk less to answer questions in classroom practice. Teachers can also modify setting group leaders' rules to prompt dialogic talk among peers.

The participant students desired to have more chances to talk in classroom practice. It indicated that students expect communication with teachers to be beyond the simple “yes/no” pattern and prefer a prolonged dialogue. For example, Mandy expects teachers to create an interactive learning environment by using what, how, when, why and where to start the conversations in the classroom. Similarly, Alexander et al. (2016) clarified that in the dialogic teaching process, the teacher harnesses the power of talk to engage children, stimulate and extend their thinking, and advance their learning and understanding. The teacher shares interpretive authority with students, potentially creating a learning environment where students from all backgrounds can build upon their cultural experiences and linguistic repertoires as they explore curricular material. In addition, Buber (1970) stressed the need for mutuality, reciprocity and equality through dialogue between the teacher and students to create a dynamic learning environment in which thinking, and understanding can be shaped.

Sutiyatno (2018) pointed out that teachers should be aware of non-verbal behaviours in the classroom due to their influential relationship with students’ learning achievement. In this study, participant students showed their preferences for nonverbal behaviours, such as wearing a smile and walking close around the desks when giving lectures. For example, one student mentioned that the facial expression of their teachers, such as whether they smiled or not, influenced how they responded to the classroom practice. Another student, Xin, noted in her handwritten message, "Please walk close around us as much as possible", which illustrates her desire of being closer to the teacher to minimize the distance from teachers so that their voices can be heard.

Metacognitive thinking requires an interactive environment where students can engage in thinking and make their thinking visible to others through verbal communications. Buber (1970) highlighted that the meaning-making process happens in a dialogue of reciprocity, mutuality, involvement, and openness. The meaning of the dialogue that happens in between cannot be unfolded only from one side but based on both sides of the turn-taking movement in the talk. It highly emphasized the interchange among speakers. In this study, a positive atmosphere encouraged students to talk to each other. Student talk provides opportunities for them to share and explain their ideas, ask questions and express confusion or doubts. When teachers get students' voices, they then can mediate students' learning and thinking from a low level of knowledge categorisation and management to a higher level of self-awareness development. That is, develop their metacognition.

When cultivating a positive atmosphere to encourage talk, the teachers are expected to wear a smile more often and walk around the classroom rather than remaining up the front makes the teacher more approachable. The closer distance between teachers and students makes it easier for students to initiate a talk with the teacher. It helps keep them focused on the ongoing task and thinking activities. Only when the students are really engaged in the thinking they can have the capacity to make responsive reactions to the teacher's elicitation in metacognitive thinking. For example, Vygotsky (1978) indicates that despite the impressive complexity of the human brain, it is limited in capacity (Daniels, 2005; Moll, 2013). Thus, mediated learning relies on the guidance of an advanced learner, such as a teacher, whose role is to help interpret the complex world of input from the environment so that the learner can focus, frame and consider relationships (Daniels, 2016; Friedman, 2003).

In essence, Bruer (1997) advocates for teaching by demonstrating the links between concepts and procedures to achieve successful problem-solving outcomes. In this study, teachers' mediational behaviour is situated in the cognitive process of problem solving. It involves knowing where students are in this cognitive process, then giving the knowledge they need and lastly, monitoring the problem-solving process to form a tool for independent learning. This is an environment where students feel mutual in communication, feel reciprocal in meaning making and feel involved in decision-making. They feel the activities are open to them—a prerequisite of higher thinking engagement in metacognition development.

In this study, the theoretical framework of this study, at the macro level highlights the theoretical support from the views of Vygotsky's sociocultural theory to create a supportive environment to encourage and facilitate dialogue in the classroom. At the meso level, it focuses on the function of modelling and practice; that is, teachers get ready for the micro level of classroom practice in workshops. At the micro level, an explicit, rigorous, and transparent process was used to lead the way to maximize student learning by extending the zone of proximal development to incorporate self-plan, self-monitor, self-check and self-evaluate (Walsh & Downe, 2005). The findings help make the macro-level of the learning environment supportive by identifying factors that would influence students' engagement in learning. The findings of a prerequisite of an interactive learning environment will contribute to the micro level internalization of the students' self-regulatory process of self-plan, monitoring and evaluation for metacognitive learner development.

#### ***7.4.3 Teacher's perceptions on metacognition development***

The participant teachers felt that the dialogic talk process provides them with a flow they can follow in mind (thinking tool) in classroom practice, and they feel more confident in teaching

and a sense of achievement. The findings suggest that teachers need support from professional learning of metacognition theories in classroom practice to develop students' metacognitive skills. Ling reflected that she used to repeat herself a lot and had no apparent steps to follow when giving instructions in talking with students. The finding is consistent with the literature that metacognitive teachers are those who take charge of their work and be adaptive decision-makers in teaching (Duffy, 2006). The dialogic talk process in this study appeared to help teachers elicit students' metacognitive thinking logically and in a flow.

The dialogic talk process benefits teachers to be adaptive in responding to students' learning needs and address them in steps to help students form a tool of thinking in problem solving. Teacher Zhang pointed out that the logical instructional talk supported by the dialogic talk process between her and her students made her instructions clear and predictable to the students, resulting in her students' enthusiastic reactions. Similarly, Ling reflected that she was using some of the strategies in her teaching, but her teaching was chaotic; she expects that the dialogic talk process would help her improve her teaching in her future classroom practice. The finding suggests that metacognitive support is needed in using talk to intervene in students' metacognition devotement.

For instance, Zepeda et al. (2019) compared teacher talk from 20 middle school mathematics classrooms with high growth in conceptual mathematics scores with teacher talk from 20 classrooms with low growth. The authors found that teachers' classroom talk with the support of a metacognitive framework designed by the author, benefited students' effective learning. Similarly, in this study, the dialogic talk process provided to participants' teachers in professional learning workshops supported teachers in giving higher-order instructions and mediation in students' metacognition development. Though the teachers know that the dialogic

talk process would be challenging, they would like to practice more with their students. For example, Ling reflected that her thinking sometimes is chaotic when responding to students in big class sizes. The dialogic talk process would help her frame the theories she has into a system to use in practice. The findings are consistent with Duffy's (2006) view that metacognitive skills training should be based on the constructive idea that teachers construct new knowledge and understandings about how to teach based on what they already know and believe.

In addition, the participant teachers also specified that leading students' thinking in the dialogic talk process is not easy, as students' responses are not predictive. Similarly, Duffy (2006) argued that developing metacognitive teachers seldom works because classroom teaching cannot be predicted in advance. In other words, teachers must make ongoing responses to students' emerging understandings. The ongoing process increased the level of difficulty in monitoring teacher mediation of student metacognition. In this study, teachers were shared the four steps of dialogic talk process to mediate students' development of metacognition.

As Heap (1990, p. 43) noted, "If some activity is important in our lives, then knowing how it is organized may make a difference to how we act. This dialogic process promoted a communication between teachers and students that is mutual, reciprocal and involved and open to each other (Hall & Looney, 2021). Wen clarified that the sustained use of the dialogic talk process is needed, for example, she commented, "I am afraid that it is the first time and maybe also the last time (to use the dialogic process)". Therefore, the critical issue here is to make sure that the teacher can practice it repeatedly with the students in the regular class in the future. Yuan mentioned two prerequisites of effective dialogic talk process practice in daily classroom practice. First, teachers who would use the dialogic talk process need to allocate more time to

designing instructional activities; second, teachers will need to create an interactive learning environment where students are responsive and active in learning.

An interactive learning environment indicates that students articulate their ideas freely, without fear of embarrassment over wrong answers (Sulis & Philp, 2021). Summer believes that an interactive learning environment helps the dialogic talk process to happen. She suggests that metacognitive teachers need to bring all students into the learning activities but not only interact with the students who volunteer to talk. An interactive environment makes teachers and students work collaboratively; they focus on deepening understanding, making connections, and mastering concepts. Buber iterated that free talk happens in an equal, reciprocal, open and mutual environment (Buber, 1970). The ideas were also echoed by Vygotsky (1978); he emphasised that knowledge is co-constructed in ways which the activities happen. Next section, teachers' perceptions of the interactive learning environments are discussed in the following section to reflect students' perceptions of the learning environment.

#### ***7.4.4 Constraints of creating an interactive learning environment***

Participant teachers were trying hard to reach an interactive learning environment where it is mutual, equal and reciprocal by using various classroom management techniques, yet there is still a gap in between what they know theoretically and their practice. Participant teachers raised that an interactive learning environment is a prerequisite (precondition) to secure the practice of the dialogic talk process. Though the teachers' realised the importance of students' voice in theory, they remained concerned about big class sizes, and some students in the classroom were short of self-regulation. The teachers felt that they have to use power as classroom management techniques to discipline students' behaviours to follow the curriculum plan and fulfil the task of summative examinations.

In addition, teachers struggle with balancing the relaxed atmosphere with students while keeping all students on track with ongoing activities in flipped learning classrooms. In this study, taking into account the two different points of view from both teacher and students, the findings suggest that a positive atmosphere classroom encapsulates both teachers and students who are willing to listen, care for and help each other in the classroom and establish a good rapport.

In this study, flipped learning environment, metacognition, and teachers' mediation are three interconnected elements in teachers' professional learning in workshops. The interactive and supportive learning environment is situated in macro, meso, and micro levels. At the macro level, it highlights flipped learning context of this school to create a supportive environment to encourage and facilitate the dialogue in the classroom. Dewaele and MacIntyre (2019) suggest that those teachers may instead focus on boosting the learning enjoyment in a positive classroom environment rather than keeping orders. At the meso level of this PhD research, it focuses on the function of modelling and practice in workshops; that is, teachers get ready for the micro level of classroom practice. At the micro level, an explicit, rigorous, and transparent process leads the way to maximize student learning through teacher mediation of cognition and metacognition development (Walsh & Downe, 2005). It aimed to help teachers and students mobilize thinking in facilitating their metacognition development.

#### ***7.4.5 The changes to the theoretical framework on the basis of the findings***

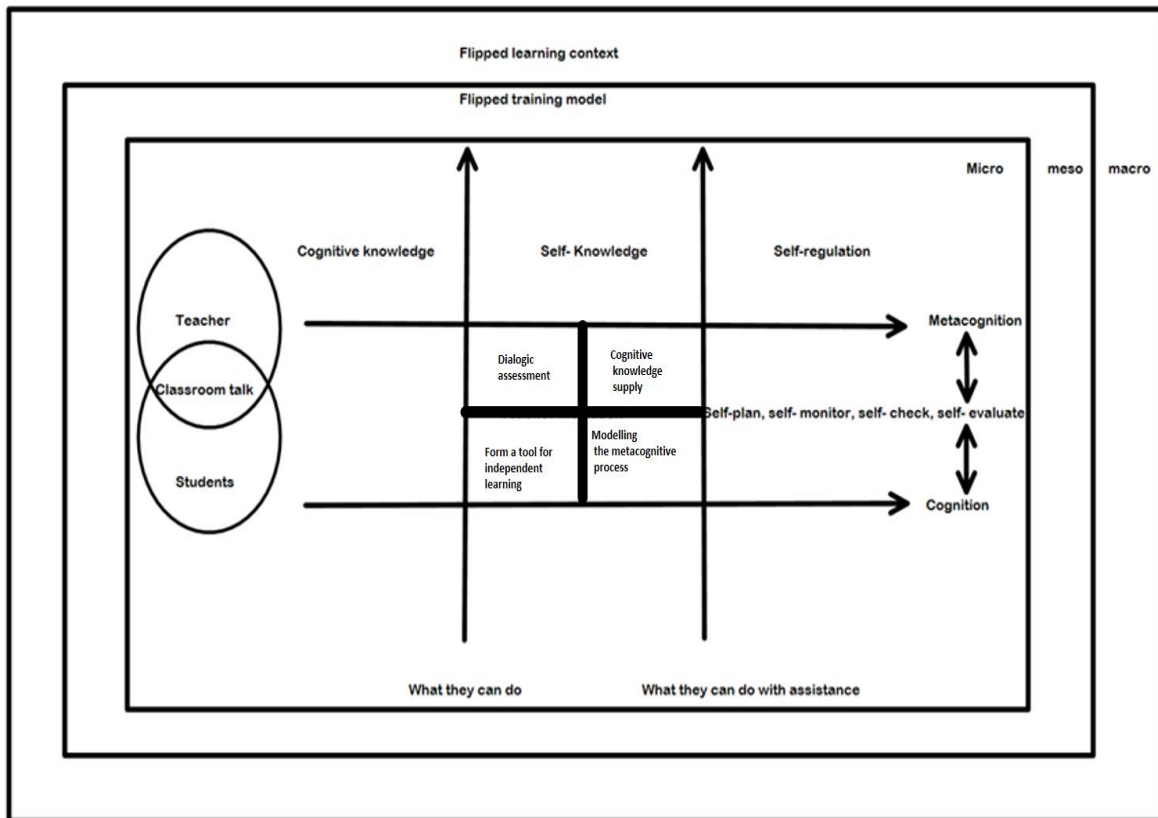
Figure 2.2 showed the theoretical framework for the study. The outer two boxes represent the context of the study (flipped learning approach adoption in the school and the flipped training model that was used for professional learning).



The findings of this study suggest an amendment to the theoretical framework by adding an explicit approach of mediation, as outlined in Figure 7.1. The steps of mediation included in this diagram were informed by the self-reflection of the researcher's teaching methods and the theoretical framework underpinning this research. The explicit method of teacher mediation included using dialogic talk to access what students know about the content knowledge, then providing them with the requisite knowledge in a systematic way, and afterwards guiding students to model the thinking process to solve the problem.

According to Pintrich (2002), in a flipped learning classroom, teachers can start a discussion, ask questions, listen to the answer, and talk with the students to make an initial assessment about the extent of students' prior knowledge. This type of informal assessment can be used to inform the instruction and support students to gain both content knowledge (whether it be factual, conceptual, or procedural) and metacognitive knowledge. From these informal "assessment conversations", teachers also may be able to make inferences about the level of metacognitive knowledge of individual students. Teachers can talk to students individually or in small groups to estimate levels of metacognitive knowledge.

**Figure 16.1** *The updated theoretical framework*



#### 7.4.5 Summary

This section discussed the findings to answer the research question of “What are teachers and students’ perceptions of factors influencing student metacognition development in the flipped learning context?” Flipped learning as a context provides affordances for greater dialogue between teacher and students, and contribute to high-quality thinking (Livingston, 2003), learners watching videos in advance of class aims for them to have some cognitive knowledge for use in class B and to be developed further through student-student interactions and activities. There is potential for focusing more on metacognitive processes (Garmston & Wellman, 2016). Similarly, flipped learning approach of class A and class B aimed to enhance students’ learning experiences by creating opportunities for them to improve their understanding through independent exploration, and encourage greater flexibility for students to learn at their own pace. However, teachers are trying hard to reach an interactive learning

environment where it is mutual, equal and reciprocal by using various classroom management techniques, yet there is still a gap in between what they know theoretically and their practice. In addition, concerns about future performance and development of the dialogic talk process are raised, such as continuing to enhance levels of classroom talk, and changes to power relations and the teacher-student relationships. Whilst both students and teachers prefer a trustworthy and interactive learning environment, the constriction of realities such as class capacity, curriculum-driven teacher planning, and low levels of self-regulation in students are the constraints of future implementation. The conclusions, implications, and recommendations are presented next.

### **7.5 Conclusion**

The focus of this study is enhancing teachers' mediation of students' metacognition through the support of the researcher-mediated workshops. The classroom practice of English, Maths or chemistry teachers was used to exemplify how the theory could be put into practice. The participants in this study included five teachers, and their students to investigate teacher mediation in students' development of cognition and metacognition in a flipped learning approach. This research aimed to explore how teachers and their students developed and engaged in metacognitive thinking within the flipped learning context in a middle high school in China. This study draws some conclusions about mediating students' metacognition within a flipped learning approach from one middle-high school in China. These are:

For flipped learning to be effective, conditions need to be suitable for enabling teacher support of, and student development of metacognition. The class AB flipped learning model adopted by green school is likely to work most effectively when students use time management and help-seeking behaviours to maximise their learning in class A and be as prepared as possible

for class B. There is a need to help teachers to be metacognitive teachers, so that in turn, metacognitive learners may be cultivated through daily classroom instructional activities and teacher practice. Teacher mediation needs well-designed instructional activities to deliver to students in an interactive learning environment through the tool of talk to facilitate independent learning.

Ideally, the talk should be in a way of turn taking among teachers and students. In addition, this study also emphasizes the importance of learning environment in contributing to the process of effective metacognitive teaching. Both teachers and students hope that they can have an interactive learning environment in which they can engage in metacognitive thinking with teacher guidance. Classroom atmosphere, power, talk, and nonverbal behaviours were identified as the factors that influence the engagement of metacognitive teaching and learning in flipped learning.

Teachers need theoretical support in the process of teacher-student interactions and consequent student transfer of learning from cognition to metacognition. The explicit method of teacher mediation included using dialogic talk to access what students know about the content knowledge, then providing them with the requisite knowledge in a systematic way and afterwards guiding students to model the thinking process to solve the problem. Teachers use the dialogic talk process to mediate students' metacognition development within the zone of proximal development by evaluating students' current knowledge, providing extra knowledge and facilitating higher-order thinking.

For students, findings concur with literature that metacognition can be taught, and students would like to learn how to learn from teachers. The research suggests that students need

teacher's mediation before being able to become independent and effective learners. Through teacher mediation, it is expected that students would not only learn the cognitive knowledge but also develop their problem-solving techniques. It is also hoped that through higher-order thinking at the metacognitive level, an independent and critical student would be cultivated. Consequently, independent students are envisioned to be better learners, to achieve better academic results and more importantly, make wise and thoughtful life decisions.

As a student's mental capacity is limited, giving knowledge in an organised way frees the energy and time to think and hence expands the mental capacity of students to function at a higher level of thinking. The findings in this study suggest that it is important to select the right strategy and tool for the particular educational activity and to scaffold the students' use of the strategy and tool carefully. It also helps students to be aware that cognitive development is modifiable. Thus, knowledge learning is accumulative and constructive: 'I am not an expert now, but I can be more of an expert with efforts later'.

The use of workshops in teachers' professional development on-site at a school for an extended period benefits researchers, PD providers and teachers in establishing good relationships and trust with the participants to consolidate their learned knowledge and understandings. In this study, during the prolonged fieldwork, I co-experienced the designed activities with teachers, which helped establish rapport with the participants to understand the essence of their experiences. Nevertheless, after the field research, teachers are also expected by the school and the students to practice it repeatedly in the regular class. The sustained use of the dialogic talk process should be guaranteed to help students to adapt the new way of teaching.

### ***7.5.1 Implications***

For schools and the school leaders who are adopting the flipped learning approach, the findings provide insights into how metacognitive teachers and learners are needed in effective flipped learning implementation and how to help teachers and students be metacognitive through classroom practice. In addition, teachers learnt how to mediate student metacognition. These insights may help school leaders organise and enhance teacher professional learning programs in the future.

For teachers, the dialogic process equips teachers with a tool by knowing how the theory is organized and unfolds into explicit and practical steps. Regarding implications for teaching, the thinking tool provided in this study would be a use to teacher education and preparation programs. The teaching examples in the three subjects may assist teachers to understand better the relevance and values of using the dialogic talk process to support their teaching aspects of metacognitive strategies in subjects' mattered knowledge.

This has significant implications for students' metacognition development in classroom talk.

For the future, the newly released educational policies in 2020 in China, the Ministry of Chinese Education, planned to mobilise the resources from advanced educational areas to build more substantial and better free online learning resources that promote educational equity countrywide (Chinese Ministry of Education, 2020). The newly released policy would increase the advantages of schools that have adopted flipped learning. The findings in this study may assist teachers in utilizing the available technological resources more effectively by cultivating metacognitive learners.

The design and outcomes of this research may help teachers create a supportive environment in both online and offline learning, incorporating metacognition instructions to facilitate students' ability to become increasingly autonomous and self-regulated in their learning. This study has furthered the understanding of the nature of teachers' mediation and the practices of teachers and students in instructional talk concerning the development of metacognition in flipped learning.

In this study, in the context of Chinese educational systems, the adapted flipped learning AB class model enables teachers to transform from a role of content deliverer to a role of thinking facilitator through mediation. The critical part is the teacher mediation, that is, when teachers and students engage in a well-designed instructional activity (dialogue), an approach of metacognition cultivation can be applied from dialogic assessment, cognitive supply, modelling and reflection.

Although students' readiness level varied in the AB class model, a sophisticated teacher mediation could be a way to turn it around for engaging all students in an interactive learning environment. It would be similar within a face-to-face environment for non-flipped learning, only if the teachers cover both levels of knowledge to secure systematic teaching to facilitate self-regulation in metacognitive learning.

For example, providing an introductory video or presentation in the beginning of the class could be a way to help a metacognitive approach of teaching. As we may wonder "how could the dialogic tool work for non-flipped learning – would there be any differences?" The dialogic tool could be used for non-flipped learning context; however, it is possible that teachers may have to deliver more content knowledge to their students as they diagnose their learning needs, which would require extra time before the next steps of the dialogic process.

Finally, I hope teachers think of what role they are taking in students' learning (epistemological perspectives). Further, I hope they will enquire of themselves: "Am I a metacognitive learner? What thinking tools am I using when eliciting thinking of students to help students transition between the two levels of thinking?" In addition, visualization of the theories in teachers' minds and discussing this with their peers for practice is important. Helping students understand the theory behind thinking could potentially help metacognitive teaching and learning.

For teacher educators and principals, it is important to understand the context, whether it is top down or bottom up, for the transformation of teaching approaches or technological transformation for learning. In other words, having principal support is key when there is an existing power relationship. Leaders also need to keep in mind how teacher agency is enabled in ecological systems (school, family, society).

For the teacher professional development workshops, I would recommend that acknowledging the subject matter as the context for student learning as part of well-designed workshop instructional activities as this will help in facilitating well-informed communication in the workshops.

### ***7.5.2 Limitations***

As a case study, this study has its limitations. Due to the geographic variations in China, this single school case study in one location is a limitation. The findings might not be transferable to other specific schools and contexts. Therefore, further investigations are needed to gain deeper insights into teachers' mediation in students' development of cognition and metacognition. In addition, the context and situation of professional learning is always different so this research cannot be exactly reproduced.



In addition, the use of the workshop intervention research method in this study worked well but it also has raised some issues. This study used a series of designed workshops aimed to develop teachers' professional understanding of metacognitive engagement in flipped learning classrooms. I worked with teachers to develop their own and their students' metacognitive thinking. The reflective practice process of teachers was an aspect of the professional learning workshops, which provided me with teacher input into a theoretical framework, which resulted in an extended and detailed dialogic talk process, generated to guide teachers in designing their instructional activities and further applications in their classroom practice.

However, the workshops in this study, used as means focused on the subjective goals, which were generated by the designer (me) to disseminate knowledge (the theoretical framework) to achieve the goals (metacognition facilitation). Therefore, in this study, the workshops only work as a means to help teachers implement their instructional strategies to elicit students' thinking in metacognitive development. The ideas resulting from participating in authentic workshops are highlighted but not the process of how teachers learned in the workshops, which resulted in a missing part of "how I elicited teachers' metacognitive thinking in the professional learning activities". Further study is needed to explore how researchers can engage in talk with teachers to prepare their metacognitive teaching in classroom practice for future teachers' professional learning program.

In addition, the limitation in the modelling class data that two (Yuan and Zhang) of the three teachers (Summer, Yuan and Zhang) did not undergo the six-workshop training. Despite this limitation, however they still provided useful insights into the value of dialogic talk process.

### ***7.5.3 Suggestions for further research***

It is hoped this study will stimulate interest in other educators and serve as a start for further research and development of similar programs in the future. For example:

- a) A study similar to this present study should be carried out that would involve a larger sample of students and teachers in China.
- b) A longer-term study is recommended in order to evaluate the learning impact of the designed theoretical framework and the talk pattern.
- c) In addition, another potential area of further research would be in tertiary education to see how young learners could be mediated to develop metacognitive skills in teacher education programs.
- d) Exploring use of the thinking tool in other situations (subject classrooms, in other than flipped learning settings, other countries, other professional learning than this one, which aimed to enhance metacognition) is recommended.
- e) Lastly, developing student metacognition may be different in different subject areas of school curriculums. There is a need for continuing research into, and the development of, effective instructional methods in other subjects of teaching, e.g., physics, biology, and arts.

The section above has given some indications of potential areas for research in enhancing metacognitive teaching and learning in flipped learning. As noted at the beginning of the thesis, supporting and empowering the teachers to know how the instructional activities are constructed and applied in the classroom practice for developing students' metacognition has

been calling for more research from its practitioners. This research has contributed to that call. Still, there remains much more to be done to ensure that the teacher mediation of student metacognition becomes a brighter future.

## References

- Abdulghani, H. M., Shaik, S. A., Khamis, N., Al-Drees, A. A., Irshad, M., Khalil, M. S., & Isnani, A. (2014). Research methodology workshops evaluation using the Kirkpatrick's model: Translating theory into practice. *Medical Teacher*, 36(sup1), S24-S29. <https://doi.org/10.3109/0142159X.2014.886012>
- Adler, P. A., & Adler, P. (1987). *Membership roles in field research*. Sage.
- Adler, P. A., & Adler, P. (1994). Observational techniques. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 377–392). Sage.
- Ahmed, I., Hamzah, A. B., & Abdullah, M. N. L. Y. B. (2020). Effect of social and emotional learning approach on students' social-emotional competence. *International Journal of Instruction*, 13(4), 663-676. <https://doi.org/10.29333/iji.2020.13441a>
- Alexander, K., Pitcock, S., & Boulay, M. C. (2016). *The summer slide: What we know and can do about summer learning loss*. Teachers College Press.
- Andersen, J. F. (1979). Teacher immediacy as a predictor of teaching effectiveness. *Annals of the International Communication Association*, 3(1), 543-559.
- Anderson, P. (2002). Assessment and development of executive function (EF) during childhood. *Child Neuro Psychology*, 8(2), 71-82. <https://doi.org/10.1076/chin.8.2.71.8724>
- Artman, H., & Garbis, C. (1998). Situation awareness as distributed cognition. In Proceedings of *ECCE* (Vol. 98). Citeseer. <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.585.3875&rep=rep1&type=pdf>
- Ash, R. B. (2012). *Information theory*. Interscience Publishers.

- Avargil, S., Lavi, R., & Dori, Y. J. (2018). Students' metacognition and metacognitive strategies in science education. *Cognition, Metacognition, and Culture in STEM Education* (pp. 33-64). Springer.
- Bahri, A. (2018). Beyond effective teaching: Enhancing students' metacognitive skill through guided inquiry. *Journal of Physics: Conference Series*, 954, 012022. <https://doi.org/10.1088/1742-6596/954/1/012022>
- Basu, S., & Dixit, S. (2022). Role of metacognition in explaining decision-making styles: A study of knowledge about cognition and regulation of cognition. *Personality Individual Differences*, 185. <https://doi.org/10.1016/j.paid.2021.111318>
- Bauer, M. W., & Gaskell, G. (1999). Towards a paradigm for research on social representations. 29(2), 163-186. [https://doi.org/https://doi.org/10.1111/1468-5914.00096](https://doi.org/10.1111/1468-5914.00096)
- Beeth, M. E. (1998). Teaching for conceptual change: Using status as a metacognitive tool. *Science Education*, 82(3), 343-356. [https://doi.org/10.1002/\(SICI\)1098-237X\(199806\)82:3<343::AID-SCE3>3.0.CO;2-C](https://doi.org/10.1002/(SICI)1098-237X(199806)82:3<343::AID-SCE3>3.0.CO;2-C)
- Bell, T., Duncan, C., & Rainer, A. (2017). What is coding? In *Creating the coding generation in primary schools* (pp. 3-21). Routledge.
- Bergmann, & Sams, A. (2016). *Flipped learning for elementary instruction*. International Society for Technology in Education.
- Berliner, D. C. (1994). Expertise: The wonder of exemplary performances. *Creating Powerful Thinking in Teachers*, 161-186.
- Bitsch, V. (2005). Qualitative research: A grounded theory example and evaluation criteria. *Journal of agribusiness*, 23(345), 75-91. <http://dx.doi.org/10.22004/ag.econ.59612>
- Blanche, M. T., Blanche, M. J. T., Durrheim, K., & Painter, D. (2006). *Research in practice: Applied methods for the social sciences*. Juta and Company.

- Boekaerts, M., Zeidner, M., & Pintrich, P. R. (1999). *Handbook of self-regulation*. Elsevier.
- Bogdan, R., & Biklen, S. K. (1997). *Qualitative research for education*. Allyn & Bacon.
- Boggs, S. R., & Eyberg, S. (1990). Interview techniques and establishing rapport. In A. M. La Greca, *Through the eyes of the child: Obtaining self-reports from children and adolescents* (pp. 85–108). Allyn & Bacon.
- Bowen, G. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, 9(2), 27-40. <https://doi.org/10.3316/QRJ0902027>
- Bowman, M., Vongkulluksn, V., Jiang, Z., Xie, K. (2020). Teachers' exposure to professional development and the quality of their instructional technology use: The mediating role of teachers' value and ability beliefs. *Journal of Research on Technology in Education*, 1-17. <http://dx.doi.org/10.1080/15391523.2020.1830895>
- Boyatzis, R. E. (1998). *Transforming qualitative information: Thematic analysis and code development*. Sage.
- Brackett, M. A., Reyes, M. R., Rivers, S. E., Elbertson, N. A., & Salovey, P. (2012). Assessing teachers' beliefs about social and emotional learning. *Journal of Psychoeducational Assessment*, 30(3), 219-236. <https://doi.org/10.1177/0734282911424879>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101. <https://doi.org/10.1191/1478088706qp063oa>
- Brinkmann, S., & Kvale, S. (2008). Ethics in qualitative psychological research. *The Sage Handbook of Qualitative Research in Psychology*, 24(2), 263-279. <https://dx.doi.org/10.4135/9781848607927.n15>
- Broadbent, J., & Lodge, J. (2021). Use of live chat in higher education to support self-regulated help seeking behaviours: a comparison of online and blended learner

- perspectives. *International Journal of Educational Technology in Higher Education*, 18(1), 1-20. <https://doi.org/10.1186/s41239-021-00253-2>
- Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Cambridge, Massachusetts and London: Harvard University Press
- Bruer, J. T. (1997). Education and the brain: A bridge too far. *Educational Researcher*, 26(8), 4-16. <https://doi.org/10.3102/0013189X026008004>
- Bryman, A. (2008). Why do researchers integrate/combine/mesh/blend/mix/merge/fuse quantitative and qualitative research. *Advances in mixed methods research*, 21(8), 87-100. <https://doi.org/10.4135/9780857024329.D9>
- Buber, M. (2012). *I and Thou*. In W. Kaufmann, Tran (Eds.). Charles Scribner's Sons.
- Capobianco, L., Faija, C., Husain, Z., & Wells, A. (2020). Metacognitive beliefs and their relationship with anxiety and depression in physical illnesses: A systematic review. *PloS One*, 15(9), e0238457. <https://doi.org/10.1371/journal.pone.0238457>
- Chambers, R. (2012). *Participatory workshops: a sourcebook of 21 sets of ideas and activities*. Routledge. <https://doi.org/10.4324/9781849772136>
- Chan, M. C. E. & Clarke, D ( 2021) Multi-theoretic research involving classroom video analysis: A focus on the unit of analysis. *Learning, Culture and Social Interaction*, 31, 100344. <https://doi.org/10.1016/j.lcsi.2019.100344>.
- Cheia, G. (2010). Research methods in tourism. *Georeview*, 19(2), 81-94. <https://doi.org/https://doi.org/10.4316/GEOREVIEW.2010.19.2.98>
- Chen, Y., Gao, B., & Cao, H. (2022). Teaching intelligence system based on the cloud platform of the Internet of things and its application in physical education. *Wireless Communications and Mobile Computing*, 2022, 7523529. <https://doi.org/10.1155/2022/7523529>

- Cobb, P., Confrey, J., DiSessa, A., Lehrer, R., & Schauble, L. (2003). Design experiments in educational research. *Educational Researcher*, 32(1), 9-13.
- Cohen, L., Manion, L., & Morrison, K. (2000). *Research methods in Education* (5th ed.). Routledge. <https://doi.org/10.4324/9780203224342>
- Corbin, J., & Strauss, A. (2008). *Basics of qualitative research: Techniques procedures for developing grounded theory* (3rd ed.). Sage. <https://doi.org/10.4135/9781452230153>
- Cornwall, A., & Jewkes, R. (1995). What is participatory research? *Social Science Medicine*, 41(12), 1667-1676. [https://doi.org/10.1016/0277-9536\(95\)00127-S](https://doi.org/10.1016/0277-9536(95)00127-S)
- Cowie, B., Jones, A., & Otrell-Cass, K. (2011). Re-engaging students in science: Issues of assessment, funds of knowledge and sites for learning. *International Journal of Science Mathematics Education*, 9(2), 347-366. <https://doi.org/10.1007/s10763-010-9229-0>
- Crawford, B. A., & Capps, D. K. (2018). Teacher cognition of engaging children in scientific practices. In *Cognition, Metacognition, and Culture in STEM Education* (pp. 9–32). Springer.
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5<sup>th</sup> ed.). Thousand Oaks, Sage.
- Cromley, J. G., & Kunze, A. J. (2020). Metacognition in education: Translational research. *Translational Issues in Psychological Science*, 6(1), 15-20.
- Crowe, S., Cresswell, K., Robertson, A., Huby, G., Avery, A., & Sheikh, A. (2011). The case study approach. *BMC Medical Research Methodology*, 11(1), 100. <https://doi.org/10.1186/1471-2288-11-100>
- Daniels, H. (2016). *Vygotsky and pedagogy*. Routledge.



- Daniels, T. & Pethel, M. (2005). Computer mediated communications. In M. Orey (Ed.), *Emerging perspectives on learning, teaching, and technology* (pp. 288-301). Global Text Project. <http://epltt.coe.uga.edu/>
- Darsø, L. (2001). *Innovation in the Making*. Samfundslitteratur.
- David, C., & Ball, D. L. (1999). Instruction, capacity, and improvement. <http://www.upenn.edu/gse/cpre/>
- Denzin, N. K., & Lincoln, Y. S. (2011). *The sage handbook of qualitative research*. Sage.
- Dewaele, J.-M., & MacIntyre, P. (2019). The predictive power of multicultural personality traits, learner and teacher variables on foreign language enjoyment and anxiety. In *Evidence-Based second language pedagogy* (1<sup>st</sup> ed., pp. 263-286) Routledge. <https://doi.org/10.4324/9781351190558-12>
- Dewey, J. (2007). *How we think*. Courier Corporation.
- Doerry, N., & Amy, J. (2017). Electric ship power and energy system architectures. In *2017 IEEE Electric Ship Technologies Symposium (ESTS)* (pp. 1-64). IEEE.
- Duffy, G. G. (2006). Developing metacognitive teachers: Visioning and the expert's changing role in teacher education and professional development. *Metacognition in Literacy Learning* (pp. 321-336). Routledge.
- Durance, P., & Godet, M. (2010). Scenario building: Uses and abuses. *Technological Forecasting Social Change*, 77(9), 1488-1492. <https://doi.org/10.1016/j.techfore.2010.06.007>
- Ericsson, K. A., & Kintsch, W. (1995). Long-term working memory. *Psychological Review*, 102(2), 211. <http://dx.doi.org/10.1037/0033-295X.102.2.211>

- Eun, B., Knotek, S. E., & Heining-Boynton, A. L. (2008). Reconceptualizing the zone of proximal development: The importance of the third voice. *Educational Psychology Review*, 20(2), <http://dx.doi.org/133-147>. 10.1007/s10648-007-9064-1
- Eames, C., & Milne, L. (2021). Innovative learning beyond the classroom walls. In N. Wright & E. Khoo (Eds.), *Pedagogy and Partnerships in Innovative Learning Environments: Case Studies from New Zealand Contexts* (pp. 121-138). Springer Singapore. [https://doi.org/10.1007/978-981-16-5711-5\\_7](https://doi.org/10.1007/978-981-16-5711-5_7)
- Earl, L. M. (2013). *Assessment as learning: Using classroom assessment to maximize student learning* (2<sup>nd</sup> ed.). Thousand Oaks.
- Fisher, H., Hills, P., & Hartman, J. (2007). Talk. (Ed.). Psychotherapy networker conference.
- Flavell, J., & Miller, P. (1998). Social cognition. In W. Damon (Ed.), *Handbook of child psychology: 5(2)*. 851–898. *Cognition, Perception, and Language*. John Wiley & Sons.
- Flavell, J., Miller, P., & Miller, S. (1999). Desenvolvimento cognitivo. *Desenvolvimento Cognitivo* (pp. 341-341).
- Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitive–developmental inquiry. *American Psychologist*, 34(10), 906–911.
- Flavell, J. H., Miller, P. H., & Miller, S. A. (1985). *Cognitive development* (Vol. 338). Englewood Cliffs, NJ: Prentice-Hall.
- Flood, A. (2010). Understanding phenomenology. *Nurse Researcher*, 17(2), 7-15. <https://doi.org/10.7748/nr2010.01.17.2.7.c7457>
- Forbes, D. L. (2018). An issue of terminology: What is digital learning anyway? *Waikato Journal of Education*, 23(2), 1-3. <https://hdl.handle.net/10289/13013>

- Frey, J. H., & Fontana, A. (1991). The group interview in social research. *The Social Science Journal*, 28(2), 175-187. [https://doi.org/10.1016/0362-3319\(91\)90003-M](https://doi.org/10.1016/0362-3319(91)90003-M)
- Friedman, M. S. (2003). *Martin Buber: The life of dialogue*. USA: Routledge.
- Gadamer, H.-G. (1976). *Hegel's dialectic: Five hermeneutical studies*. Yale University Press.
- Gardner, J. (2012). *Assessment and learning*. Sage.
- Garet, M. S., Porter, A. C., Desimone, L., Birman, B. F., & Yoon, K. S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal*, 38(4), 915-945.
- Garmston, R. J., & Wellman, B. M. (2016). *The adaptive school: A sourcebook for developing collaborative groups*. Rowman & Littlefield.
- Geoffrey, W. (1993). *Interpreting information systems in organizations* (Vol. 19). Wiley Chichester.
- Giles, D., & Earl, K. (2014). Being “in” assessment: the ontological layer (ing) of assessment practice. *Journal of Applied Research in Higher Education*, 6(1)22-29. <https://doi.org/10.1108/JARHE-01-2012-0001>
- Gilgun, J. F., & Sands, R. G. (2012). The contribution of qualitative approaches to developmental intervention research. *Qualitative Social Work*, 11(4), 349-361. <https://doi.org/10.1177/1473325012439737>
- Gillham, B. (2000). *Research interview*. A&C Black.
- Goldsmith, W. (2013). Enhancing classroom conversation for all students. *Phi Delta Kappan*, 94(7), 48-52. <https://doi.org/10.1177/003172171309400716>
- Goods, A. (2019). V-Note: a video analysis tool for teacher| researchers. *Cultural Studies of Science Education*, 14(3), 753-767.

- Gordon, C. J., & Braun, C. (1983). Using story schema as an aid to reading and writing. *The Reading Teacher*, 37(2), 116-121.
- Griffith, R., Bauml, M., & Quebec-Fuentes, S. (2016). Promoting metacognitive decision-making in teacher education. *Theory Into Practice*, 55(3), 242-249.  
<https://doi.org/10.1080/00405841.2016.1173997>
- Gros, B. (2016). The design of smart educational environments. *Smart Learning Environments*, 3(1), 1-11. <https://doi.org/10.1186/s40561-016-0039-x>
- Guba, E. G. (1981). Criteria for assessing the trustworthiness of naturalistic inquiries. *Ectj*, 29(2), 75-91.
- Guest, G., MacQueen, K. M., & Namey, E. E. (2011). *Applied Thematic Analysis*. Sage.
- Guo, L. (2020). Teachers' mediation in students' development of cognition and metacognition. *Asia-Pacific Journal of Teacher Education*, 48(1), 1-16.  
<https://doi.org/10.1080/1359866X.2020.1846158>
- Hall, J. K., & Looney, S. D. (2021). The role of self-talk in downgrading a teacher's certainty about grammar matters. *Tesol Quarterly*, 55(1), 185-218.  
<https://doi.org/https://doi.org/10.1002/tesq.583>
- Halpern, D. F. (1998). Teaching critical thinking for transfer across domains: Disposition, skills, structure training, and metacognitive monitoring. *American Psychologist*, 53(4), 449. <https://doi.org/10.1037/0003-066X.53.4.449>
- Hattie, J. (2012). *Visible learning for teachers: Maximizing impact on learning*. Routledge.  
<https://doi.org/10.4324/9780203181522>
- Herold, J., Cusack, Y., Hunter, E., & Lewis, J. (2018). Talking the talk: Using dialogic teaching strategies to develop young children's talk about text. *Practical Literacy: The Early and Primary Years*, 23(1), 38.

- Hiebert, J., Gallimore, R., Garnier, H., Givvin, K. B., Hollingsworth, H., Jacobs, J. et al. (2003). Teaching mathematics in seven countries: Results from the TIMSS 1999 video study. *Washington DC: National Center for Education Statistic.*
- Hoffman, J., & Pearson, P. D. (2000). Reading teacher education in the next millennium: What your grandmother's teacher didn't know that your granddaughter's teacher should. *Reading Research Quarterly, 35*(1), 28-44.  
<https://doi.org/10.1598/RRQ.35.1.3>
- Holian, R., & Coghlan, D. (2013). Ethical issues and role duality in insider action research: Challenges for action research degree programmes. *Systemic Practice Action Research, 26*(5), 399-415. <https://doi.org/10.1007/s11213-012-9256-6>
- Hwang, G.-J., Lai, C.-L., & Wang, S.-Y. (2015). Seamless flipped learning: a mobile technology-enhanced flipped classroom with effective learning strategies. *Journal of Computers in Education, 2*(4), 449-473. <https://doi.org/10.1007/s40692-015-0043-0>
- Jacot, M. T., Noren, J., & Berge, Z. L. (2014). The flipped classroom in training and development: Fad or the future? *Performance Improvement, 53*(9), 23-28.
- Jaipal, K., & Figg, C. (2010). Unpacking the “Total PACKage”: Emergent TPACK characteristics from a study of preservice teachers teaching with technology. *Journal of Technology Teacher Education, 18*(3), 415-441.
- Jinghui, W., Spencer, K., & Xing, M. (2009). Metacognitive beliefs and strategies in learning Chinese as a foreign language. *System, 37*(1), 46-56.
- Kaplan, B., & Maxwell, J. A. (2005). Qualitative research methods for evaluating computer information systems. *Evaluating the Organizational Impact of Healthcare Information Systems* (pp. 30-55). Springer. [https://doi.org/10.1007/0-387-30329-4\\_2](https://doi.org/10.1007/0-387-30329-4_2)
- Karpov, Y. V., & Haywood, H. C. (1998). Two ways to elaborate Vygotsky's concept of mediation. *American Psychologist, 53*(1), 27.

- Kaufmann, R., & Buckner, M. M. (2019). Revisiting “power in the classroom”: exploring online learning and motivation to study course content. *Interactive Learning Environments*, 27(3), 402-409. <https://doi.org/10.1080/10494820.2018.1481104>
- Kirch, C. (2012). Flipping with Kirch. Retrieved December, 4, 2014.
- Kotovsky, K., Hayes, J. R., & Simon, H. A. (1985). Why are some problems hard? Evidence from Tower of Hanoi. *Cognitive Psychology*, 17(2), 248-294.
- Krefting, L. (1991). Rigor in qualitative research: The assessment of trustworthiness. *The American Journal of Occupational Therapy*, 45(3), 214-222.
- Kroon, S., & Sturm, J. (2007). International comparative case study research in education: Key incident analysis and international triangulation. *Research on Mother Tongue Education in a Comparative International Perspective* (pp. 99-118). Brill.
- Kruger, J., & Dunning, D. (1999). Unskilled and unaware of it: how difficulties in recognizing one's own incompetence lead to inflated self-assessments. *Journal of Personality*, 77(6), 1121. <https://doi.org/10.1037/0022-3514.77.6.1121>
- Kuhn, D. (2000). Metacognitive development. *Current Directions in Psychological Science*, 9(5), 178-181. <https://doi.org/10.1111/1467-8721.00088>
- Lan, Z., Li, X., Zhang, X., & Sun, W. (2019). The effects of group metacognitive scaffolding on group metacognitive behaviors, group performance, and cognitive load in computer-supported collaborative learning. *The Internet and Higher Education*, 42, 13-24. <https://doi.org/https://doi.org/10.1016/j.iheduc.2019.03.002>
- LeCompte, M. D., & Schensul, J. J. (2010). *Designing and conducting ethnographic research: An introduction* (Vol. 1). Rowman Altamira.
- Lee, G., & Wallace, A. (2018). Flipped learning in the English as a foreign language classroom: Outcomes and perceptions. *TESOL Quarterly*, 52(1), 62-84. <https://doi.org/10.1002/tesq.372>

- Leong, A., Koczan, P., De Lusignan, S., & Sheeler, I. (2006). A framework for comparing video methods used to assess the clinical consultation: a qualitative study. *Medical Informatics the Internet in Medicine*, 31(4), 255-265.  
<https://doi.org/10.1080/14639230600991668>
- Lincoln, Y. S., & Guba, E. G. (1986). But is it rigorous? Trustworthiness and authenticity in naturalistic evaluation. *New Directions for Program Evaluation*, 1986(30), 73-84.
- Livingston, J. A. (2003). *Metacognition: An Overview*
- Loughran, J., & Menter, I. (2019). The essence of being a teacher educator and why it matters. *Asia-Pacific Journal of Teacher Education*, 47(3), 216-229.  
<https://doi.org/10.1080/1359866X.2019.1575946>
- Louis, M. R., & Bartunek, J. M. (1992). Insider/outsider research teams: Collaboration across diverse perspectives. *Journal of Management Inquiry*, 1(2), 101-110.  
<https://dx.doi.org/10.4135/9781412976671.n4>
- Lyle, S. (2008). Dialogic teaching: Discussing theoretical contexts and reviewing evidence from classroom practice. *Language Educational Researcher*, 22(3), 222-240.
- MacBlain, S. (2018). Hidden childhoods: the unseen challenges facing professionals in schools today. *Thriving as a Professional Teacher*. (pp. 83-98). Routledge.
- Madaus, D. L. S. G. F., & Kellaghan, T. (2000). *Evaluation models: Viewpoints on educational and human services evaluation* (Vol. 49). Springer Science & Business Media.
- Matthew, M., & Michael, H. (1994). *Qualitative data analysis: An expanded sourcebook*. Sage.
- Maxwell, J. A. (2008). Designing a qualitative study. *The SAGE handbook of applied social research methods*, 2, 214-253.

- Meichenbaum, D. (1977). Cognitive behaviour modification. *Cognitive Behaviour Therapy*, 6(4), 185-192.
- Merriam, S. B. (1988). *Case study research in education: A qualitative approach* (1st ed.). Jossey-Bass.
- Mertens, D. M. (2010). Philosophy in mixed methods teaching: The transformative paradigm as illustration. *International Journal of Multiple Research Approaches*, 4(1), 9-18. <https://dx.doi.org/10.5172/mra.2010.4.1.009>
- Miles, C. A., & Foggett, K. (2016). Supporting our students to achieve academic success in the unfamiliar world of flipped and blended classrooms. *Journal of University Teaching Learning Practice*, 13(4), 2. <https://doi.org/10.53761/1.13.4.2>
- Miller-Mclemore, B. J. (1993). The human web: Reflections on the state of pastoral theology. *The Christian Century (1902)*, 110(11), 366.
- Miri, B., David, B.-C., & Uri, Z. (2007). Purposely teaching for the promotion of higher-order thinking skills: A case of critical thinking. *Research in science education*, 37(4), 353-369. <https://doi.org/10.1007/s11165-006-9029-2>
- Moll, L. C. (2013). *LS Vygotsky and education*. Routledge.
- Mor, Y., Warburton, S., & Winters, N. (2012). Participatory pattern workshops: a methodology for open learning design inquiry. *Research in Learning Technology*, 20. <http://dx.doi.org/10.3402/rlt.v20i0.19197>
- Muthanna, A., & Sang, G. (2015). Undergraduate Chinese students' perspectives on Gaokao examination: Strengths, weaknesses, and implications. *International Journal of Research Studies in Education*, 5(2), 3-12. <http://dx.doi.org/10.5861/ijrse.2015.1224>
- Nerantzi, C. (2020). The use of peer instruction and flipped learning to support flexible blended learning during and after the COVID-19 Pandemic. *International Journal of*



*Management Applied Research*, 7(2), 184-195. <https://doi.org/10.18646/2056.72.20-013>

- Newell, A., & Simon, H. A. (1972). *Human problem solving* (Vol. 104). Prentice-hall Englewood Cliffs, NJ.
- Newman, R. S. (1994). Adaptive help seeking: A strategy of self-regulated learning. In D. H. Schunk & B. J. Zimmerman (Eds.), *Self-regulation of Learning and Performance: Issues and Educational Applications* (pp. 283–301). Lawrence Erlbaum Associates, Inc.
- Nielsen, W. S., Nashon, S., & Anderson, D. (2009). Metacognitive engagement during field-trip experiences: A case study of students in an amusement park physics program. *Journal of Research in Science Teaching: The Official Journal of the National Association for Research in Science Teaching*, 46(3), 265-288.
- Nikolaos, P. (2014). The influence of computer self-efficacy, metacognitive self-regulation and self-esteem on student engagement in online learning programs: Evidence from the virtual world of Second Life. *Computers in Human Behavior*, 35, 157-170. <https://doi.org/10.1016/j.chb.2014.02.048>
- Noddings, N. (2018). *Philosophy of education*. Routledge.
- Ørngreen, R., & Levinsen, K. (2017). Workshops as a research methodology. *Electronic Journal of E-learning*, 15(1), 70-81.
- Paris, S. G., & Winograd, P. (1990). How metacognition can promote academic learning and instruction. *Dimensions of Thinking*, 1, 15-51.
- Perkins, D. N., & Salomon, G. (1992). Transfer of learning. *International Encyclopedia of Education*, 2, 6452-6457.

- Perry, J., Lundie, D., & Golder, G. (2019). Metacognition in schools: what does the literature suggest about the effectiveness of teaching metacognition in schools? *Educational Review*, 71(4), 483-500. <https://doi.org/10.1080/00131911.2018.1441127>
- Phaal, R., Farrukh, C. J., & Probert, D. R. (2007). Strategic roadmapping: A workshop-based approach for identifying and exploring strategic issues and opportunities. *Engineering Management Journal*, 19(1), 3-12. <https://doi.org/10.1080/10429247.2007.11431716>
- Pintrich, P. R. (2002). The role of metacognitive knowledge in learning, teaching, and assessing. *Theory Into Practice*, 41(4), 219-225. [https://doi.org/10.1207/s15430421tip4104\\_3](https://doi.org/10.1207/s15430421tip4104_3)
- Pitney, W. A., & Parker, J. (2009). Qualitative research in physical activity and the health professions. *Human Kinetics Champaign, IL*.
- Pope, C., & Mays, N. (1995). *Qualitative research: reaching the parts other methods cannot reach: an introduction to qualitative methods in health and health services research*. 311(6996), 42-45. <https://doi.org/10.1136/bmj.311.6996.42>
- Punch, M. (2009). *Police corruption: Deviance, accountability and reform in policing*. Routledge.
- Putnam, R. T., & Borko, H. (2000). What do new views of knowledge and thinking have to say about research on teacher learning? *Educational Researcher*, 29(1), 4-15. <https://doi.org/10.3102/0013189X029001004>
- Qi-quan, Z. (2006). Curriculum reform in China: Challenges and reflections. *Frontiers of Education in China*, 1(3), 370-382. <https://doi.org/10.1007/s11516-006-0014-3>
- Rabiee, F. (2004). Focus-group interview and data analysis. *Proceedings of the Nutrition Society*, 63(4), 655-660. <https://doi.org/10.1079/PNS2004399>
- Reeves, T. C., & Hedberg, J. G. (2003). Interactive learning systems evaluation. *Educational Technology*.

- Reiser, B. J. (2004). Scaffolding complex learning: The mechanisms of structuring and problematizing student work. *13*(3), 273-304.  
[https://doi.org/10.1207/s15327809jls1303\\_2](https://doi.org/10.1207/s15327809jls1303_2)
- Richmond, V. P., & McCroskey, J. C. (1984). Power in the classroom II: Power and learning. *Communication Education*, *33*(2), 125-136.
- Robson, C. (2002). *Real world research: A resource for social scientists and practitioner-researchers*. Wiley-Blackwell.
- Rodgers, B. L., & Cowles, K. V. (1993). The qualitative research audit trail: A complex collection of documentation. *16*(3), 219-226.  
<https://doi.org/https://doi.org/10.1002/nur.4770160309>
- Romero García, C., Buzón García, O., & Touron, J. (2018). The flipped learning model in online education for secondary teachers. *Journal of Technology and Science Education*, *9*(2), 109-121. <https://doi.org/10.3926/jotse.435>
- Roschelle, J. (1997). Learning in interactive environments: *Prior knowledge and new experience*. Citeseer.
- Rowan, L., Brownlee, J. L., & Ryan, M. (2019). Teaching teachers: what [should] teacher educators “know” and “do” and how and why it matters. *Asia-Pacific Journal of Teacher Education*, *47*(3), 210-215. <https://doi.org/10.1080/1359866X.2019.1601837>
- Rowlands, B. (2005). Grounded in practice: Using interpretive research to build theory. *The Electronic Journal of Business Research Methodology*, *3*(1), 81-92.
- Rust, C. (1998). The impact of educational development workshops on teachers’ practice. *The International Journal for Academic Development*, *3*(1), 72-80.
- Schensul, S. L., Schensul, J. J., & LeCompte, M. D. (1999). *Essential ethnographic methods: Observations, interviews, and questionnaires* (Vol. 2). Rowman Altamira.

- Schwandt, T. A., Lincoln, Y. S., & Guba, E. G. (2007). Judging interpretations: But is it rigorous? Trustworthiness and authenticity in naturalistic evaluation. *New Directions for Evaluation*, 2007(114), 11-25. <https://doi.org/10.1002/ev.223>
- Shintani, M., Mori, K., & Ohmori, T. (2016). Image schema-based instruction in English grammar. *Focus on the Learner*, 285-296.
- Silverman, D. (2020). One introducing qualitative research. *Qualitative Research*.
- Simon, J., Helter, T. M., White, R. G., van der Boor, C., & Łaszewska, A. (2021). Impacts of the Covid-19 lockdown and relevant vulnerabilities on capability well-being, mental health and social support: an Austrian survey study. *BMC Public Health*, 21(1), 314. <https://doi.org/10.1186/s12889-021-10351-5>
- Soneryd, L., & Amelung, N. (2016). Translating participation: Scenario workshops and citizens' juries across situations and contexts. *Knowing Governance* (pp. 155-174). Springer.
- Stake, R. E. (2010). *Qualitative research: Studying how things work*. The Guilford Press.
- Sternberg, R. J. (1985). Implicit theories of intelligence, creativity, and wisdom. *Journal of Personality Social Psychology*, 49(3), 607.
- Sulis, G., & Philp, J. (2021). Exploring connections between classroom environment and engagement in the foreign language classroom. *Student Engagement in the Language Classroom*, 101-129. <https://doi.org/10.1177/13621688211044238>
- Sutiayatno, S. (2018). The effect of teacher's verbal communication and non-verbal communication on students' English achievement. *Journal of Language Teaching Research*, 9(2), 430-437.

- Sweller, J., Van Merriënboer, J. J., & Paas, F. G. (1998). Cognitive architecture and instructional design. *Educational Psychology Review*, *10*(3), 251-296.  
<https://doi.org/10.1023/A:1022193728205>
- Tellis, W. (1997). Application of a case study methodology. *The Qualitative Report*, *3*(3), 1-19.
- Tempelaar, D. T. (2006). The Role of Metacognition in Business Education. *Industry and Higher Education*, *20*(5), 291-297. <https://doi.org/10.5367/000000006778702292>
- Teng, M. F., Wang, C., & Zhang, L. J. (2022). Assessing self-regulatory writing strategies and their predictive effects on young EFL learners' writing performance. *Assessing Writing*, *51*, 100573. <https://doi.org/10.1016/j.asw.2021.100573>
- Tolks, D., Schäfer, C., Raupach, T., Kruse, L., Sarikas, A., Gerhardt-Szép, S., Kllauer, G., Lemos, M., Fischer, M. R., & Eichner, B. (2016). An introduction to the inverted/flipped classroom model in education and advanced training in medicine and in the healthcare professions. *GMS journal for medical education*, *33*(3).  
<https://doi.org/10.3205/zma001045>
- Van Merriënboer, J. J., & Paas, F. G. (1990). Automation and schema acquisition in learning elementary computer programming: Implications for the design of practice. *Computers in Human Behavior*, *6*(3), 273-289.
- Van Someren, M., Barnard, Y., & Sandberg, J. (1994). *The think aloud method: A practical approach to modelling cognitive*. Citeseer
- Vosniadou, S., Darmawan, I., Lawson, M. J., Van Deur, P., Jeffries, D., & Wyra, M. (2021). Beliefs about the self-regulation of learning predict cognitive and metacognitive strategies and academic performance in pre-service teachers. *Metacognition Learning Environments Research*, *16*(3), 523-554. <https://doi.org/10.1007/s11409-020-09258-0>
- Vygotsky, & Cole, M. (2018). Lev Vygotsky: learning and social constructivism. *Learning Theories for Early Years Practice*, *10*(7). 58.

- Vygotsky, L.S. (1978). Socio-cultural theory. *Mind in Society* (pp. 52-58). In Cole. M. (Eds.), Harvard University Press
- Vygotsky, L. S. (1987). *The collected works of LS Vygotsky: Problems of the theory and history of psychology* (Vol. 3). Springer Science & Business Media.
- Vygotsky, L. S. (1997). *The collected works of LS Vygotsky: Problems of the theory and history of psychology* (Vol. 3). Springer Science & Business Media.
- Wakkary, R. (2007). A participatory design understanding of interaction design. *Environment*, 5, 18.
- Walsh, D., & Downe, S. (2005). Meta-synthesis method for qualitative research: a literature review. *Journal of Advanced Nursing*, 50(2), 204-211. <https://doi.org/10.1111/j.1365-2648.2005.03380.x>
- Walsham, G. (1993). *Interpreting information systems in organizations*. John Wiley & Sons
- Wang, F. H. (2017). An exploration of online behaviour engagement and achievement in flipped classroom supported by learning management system. *Computers Education*, 114, 79-91. <https://doi.org/10.1016/j.compedu.2017.06.012>
- Webb, M., & Doman, E. (2016). Does the Flipped Classroom lead to increased gains on learning outcomes in ESL/EFL Contexts? *CATESOL Journal*, 28(1), 39-67.
- Wertsch, J. (2007). National narratives and the conservative nature of collective memory. *AKJournals*. 34(2), 23-33. <https://doi.org/10.1007/s11059-007-2003-9>
- Wiliam, D. (2011). What is assessment for learning? *Studies in Educational Evaluation* 37(1), 3-14. <https://doi.org/10.1016/j.stueduc.2011.03.001>

- Willis, J. (1995). A recursive, reflective instructional design model based on constructivist-interpretivist theory. *Educational Technology*, 6(35),5-23.  
<https://www.jstor.org/stable/44428302>
- Wilson, B. (2010). Using PLS to investigate interaction effects between higher order branding constructs. *Handbook of Partial Least Squares* 35(6). 621-652. Springer.  
[https://doi.org/10.1007/978-3-540-32827-8\\_28](https://doi.org/10.1007/978-3-540-32827-8_28)
- Wolters, C. A., & Brady, A. C. (2021). College students' time management: A self-regulated learning perspective. *Educational Psychology Review*, 33(4), 1319-1351.
- Workshop. (n.d.). In *The Britannica Dictionary*. Encyclopedia Britannica.  
<https://www.britannica.com/dictionary/workshop>
- Yanyan, Z. (2010). Investigating the role of metacognitive knowledge in English writing. *HKBU Papers in Applied Language Studies*, 14, 25-46.
- Yin, R. K. (2012). Case study methods. In H. Cooper, P. M. Camic, D. L. Long, A. T. Panter, D. Rindskopf, & K. J. Sher (Eds.), *APA handbook of research methods in psychology, Vol. 2. Research designs: Quantitative, qualitative, neuropsychological, and biological* (pp. 141–155). American Psychological Association.  
<https://doi.org/10.1037/13620-009>
- Yurdakul, I. K., Odabasi, H. F., Kilicer, K., Coklar, A. N., Birinci, G., & Kurt, A. A. (2012). The development, validity and reliability of TPACK-deep: A technological pedagogical content knowledge scale. *Computers Education*, 58(3), 964-977.
- Zepeda, C. D., Hlutkowsky, C. O., Partika, A. C., & Nokes-Malach, T. J. (2019). Identifying teachers' supports of metacognition through classroom talk and its relation to growth in conceptual learning. *Journal of Educational Psychology*, 111(3), 522.  
<https://doi.org/10.1037/edu0000300>

Zhang, L. J., & Qin, T. L. (2018). Validating a questionnaire on EFL writers' metacognitive awareness of writing strategies in multimedia environments . *Metacognition in Language Learning and Teaching* (pp. 157-178). Routledge.

Zimmer, L. (2006). Qualitative meta-synthesis: a question of dialoguing with texts. *Journal of Advanced Nursing*, 53(3), 311-318. <https://doi.org/10.1111/j.1365-2648.2006.03721.x>

Zimmerman, B. J., & Schunk, D. H. (2011). *Handbook of self-regulation of learning and performance*. Routledge/Taylor & Francis Group.



## Appendices

### Appendix A: Ethical approval

PVC's Office  
Division of Education  
The University of Waikato  
Private Bag 3105  
Hamilton, New Zealand

Phone +64 7 838 4500  
[www.waikato.ac.nz](http://www.waikato.ac.nz)



#### MEMORANDUM

**To:** Lina Guo  
**cc:** AProf Wendy Fox  
**From:** Dr Noeline Wright  
Co-chair Division of Education Research Ethics Committee  
**Date:** 17 March 2020

#### Request for Extension to Research Ethics Approval – Student (FEDU012/19)

---

Thank you for your request for an extension to the ethics approval for the project:

#### **Mediational metacognitive engagement in flipped learning: A case study in a junior secondary school in China**

It is noted that you wish to extend the scope of your participants beyond the initial group from your original ethics application to include senior secondary school and the subjects of Maths and Science (Chemistry).

I am pleased to advise that this extension has received approval.

The memo you have provided will be kept on file.

Please note that researchers are asked to consult with the Division's Research Ethics Committee in the first instance if any further changes to the approved research design are proposed.

The Committee wishes you all the best with your research.

**Dr Noeline Wright**  
Co-chair Division of Education Research Ethics Committee

## Appendix B: Consent forms

### Consent Form for Principal

In signing this form, I acknowledge that:

- I give permission to the investigator for:
  - Working with the teacher(s) in planning and executing observation, workshop, and interview through the second semester of the year 2019
  - Collecting relevant data related to the classrooms in form of audio and video provided consent is obtained from teachers and students
  - Contacting the parents of the students in the specific classrooms.
- This form will be held for five years. The data gathered will be kept securely for the same length of time.
- I have been given an explanation of the research project.
- I understand that the teachers, parents, and students can withdraw any data provided before they give approval of the transcripts to the researcher and the final transcripts being provided to them.
- I have had an opportunity to ask questions and have them answered.

The teacher(s) who will be working in this project are:

*Name*

*Year*

Name of the school:

Name of the Principal:

Signature: Date:

## Consent Form for teachers

In signing this form, I acknowledge that:

This form will be held for five years. The data gathered will be kept securely for the same length of time.

- I have been given an explanation of the research project.
- I have had an opportunity to ask questions and have them answered
- I consent to plan the lessons with informed by workshops in the year 2019 and execute the lessons using the researcher proposed metacognitive engagement framework
- I give permission to the investigator for:
  - Audio and video recording my English language teaching classrooms
  - Collecting relevant data related to the classrooms in form of audio and video recording
  - Collecting lesson planning documents, audio, and video of classroom teaching
  - Attend the flipped training workshops and participant the activities organized by the researcher.
  - Join the WeChat group discussion, share ideas with other teachers.
- I understand that I can withdraw any data provided before I give approval of the transcripts to the researcher and the final transcripts being provided to me.

Name of the teacher:

Year level:

Classroom number:

Number of students in class:

Boys:

Girls:

Signature:

Date:

### Consent Form for parents

In signing this form, I acknowledge that:

This form will be held for five years. The data gathered will be kept securely for the same length of time. I understand the main aim of the research project and understand that I can withdraw my permission at any time.

By signing this form, I consent to allow the researcher to observe, record (audio and video) and conduct an interview with my child (ren). I understand that if any of the following are not ticked, I have given full consent.

- I DO NOT give permission to observe an audio/video record my child in the classroom practice and interview them after class.
- I give permission to observe my child and audio-video recording of the classroom practice, conduct an interview with them but DO NOT give permission to use their data in any reports
- Yes, I agree my child (ren) can fully participate in this research.

Name of the parent:

Name of the student:

Name of the teacher:

Year level:

Classroom number:

Signature:

Date:

**Consent Form for students**

I am happy for you to observe, audio and video record me in the classroom and participate in the interview if I am selected in the third phase.

- Observe me and you can take audio and videos
- Observe me but do not take my audio or video
- I do not want to participate
- Observe me but I do not want to participate in the interview
- I will fully participate in this research. You can observe me and take audio and videos.

I also would like to share my ideas in the focus group discussion.

Name of the student:

Name of the teacher:

Year level:

Classroom number:

Signature:

Date:

**Appendix C: Classroom observation protocol**

1. What kind of relationship between teachers and students?
2. To what extent those students are responsible for their learning. In addition, how about the teachers?
3. What pedagogical approach that is using in the current teaching? Will the flipped inquiry-based dialogic teaching help in that situation?
4. What artifacts are using to facilitating flipped learning?
5. What kind of talk is taking in the current classroom? One way or two way?
6. Are they using dialogic teaching? Do the students voice in the classroom?
7. To what extent the flipped learning they are using is effective. What help does the teacher provide to maximize learning?
8. What kind of flipped learning videos are they using? Who made it, when and how often they update it?
9. What stance do the teachers take when they are talking with their students? Dialogic or monologic? In addition, how?

## Appendix D Coding example

This example is from an observation on (give date) of Summer's classroom. In this excerpt the teacher has asked the class to solve a multiple choices question about time prepositions together. After three minutes, each group gave their answer by writing it on the blackboard. One group of students did not attain the right answer. The teacher asked them to think aloud. During the think-aloud process, mediation was given regarding the thinking process by Summer. *The text in square brackets links to coding to the stages of dialogic process in Figure 5.1.*

1. *Teacher: Great. Next, tell us why you choose A. [Get students' voice to know where they are in the thinking process]*
2. *Student: Yes, now I realized I was wrong. However, at that time, I was thinking like this: reading the question and choices, I found that it is about time preposition, then I recalled the smooth song, but the meaning between the two sentences confused me: In "morning" in "afternoon" in "evening", and on "with specific day's morning, afternoon and evening". I did not understand when you told us about this, so, when I saw, "a rainy morning", I just chose "in", as "in + morning". [Think-aloud to represent the thinking process]*
3. *Teacher: yes, "rainy day" means on that day it is rainy. So, because the on "that day" is rainy, so it is not any day but a certain day which is raining. So, I use "on" but not "in". But next time, when you do not understand something about the knowledge, don't worry too much but try to focus on the monitoring process of your thinking, you might manage to still get the right answer out, even though you have no idea of "rainy day". [Modelling process of metacognitive facilitation]*
4. *Student: yes, I was not able to realise that "rainy morning" is a morning of a specific day. [Self-reflection]*
5. *Teacher: Yes, I would give modelling here; let us think-aloud together. Let us consider the question again, the "rainy morning", when you do not know what is "rainy morning", you can make an analogy for yourself to compare with an example in your*

*mind which you already know. [Modelling the thinking process by monitoring strategies and skills used in problem-solving, At this point, the teacher added guidance, not on the knowledge, but strategies the students can use to solve the problem independently in similar future situations]*

6. *Student: you mean to replace “rainy “with another word. [Student actively engages in the sense-making process of monitoring]*
7. *Teacher: yes, great. In Chinese, I can translate the structure as: “one morning on a rainy day”, so now, can you understand why there is an ‘on’ in front of the day. [Guide and elicit students to make a match with their prior knowledge]*
8. *Student: yes, because the smooth song said: “on + day”, so the right answer should be C. [Make a match with their prior knowledge]*
9. *Teacher: great, so now: you know, the rainy day is on a day, it means a morning on a specific day but not any day. [Reinforce their thinking to internalise the way of thinking]*

The themes from the analysis of the dialogue are presented in Table 5.2 and reveal the essence of mediation in teaching. The essence of mediation, patterns and themes are connected with corresponding letters. In the English class, the smooth song “(b)” corresponds with the pattern, cognitive knowledge “b”. The pattern “b” correlates with themes Mediation through assessment “A” and Consolidation of prior knowledge “B”.