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Enhancing Self-regulated Learning through Prompts and Modeling: An Action Research with Virtual Flipped Classroom

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Enhancing Self-regulated Learning through Prompts and Modeling:

An Action Research with Virtual Flipped Classroom

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A thesis submitted in partial fulfilment of the requirements

for the degree of

Doctor of Education

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March 2022

DECLARATION

I hereby declare that this thesis represents my own work which has been done after registration for the degree of EdD at Hong Kong Baptist University, and has not been previously included in a thesis or dissertation submitted to this or any other institution for a degree, diploma or other qualifications.

I have read the University's current research ethics guidelines and accept responsibility for the conduct of the procedures in accordance with the University's Research Ethics Committee (REC). I have attempted to identify all the risks related to this research that may arise in conducting this research, obtained the relevant ethical and/or safety approval (where applicable), and acknowledged my obligations and the rights of the participants.

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ABSTRACT

The overarching aim of this study is to enhance self-regulated learning of upper primary students through prompts and modeling in an extra-curricular program using the virtual flipped classroom mode. Specifically, it studies the effectiveness of prompts and modeling in enhancing students' self-regulation as well as learning outcome and the process of regulating cognition, behavior, context and motivation. Additionally, it explores the perception of students, parents and the teacher on learning self-regulation via prompts and modeling in the virtual flipped classroom.

A quasi-experimental design with mixed methods was adopted to conduct this action research in a local primary school. Questionnaires, students' notes, interviews, log data and lesson observation data were collected to provide a holistic understanding of the outcome and process of self-regulation. Speaking tests were administered to compare the effects of prompts and modelling in enhancing students' abilities of giving a Chinese speech. Interviews and questionnaires were used to explore perceptions of learning self-regulation.

Data analysis includes statistical analysis using Wilcoxon signed rank test, Quade's test and Mann-Whitney U test using SPSS (Version 26), content analysis manually with assistance of Microsoft Excel, thematic analysis with constant

comparison and computing percentage of students rewinding and the average number of occurrence of lesson observation items using Microsoft Excel.

The findings indicate that both prompts and modeling effectively enhanced students' regulation of cognition, context, behaviour and motivation, and modeling was more effective than prompts. Prominent differences were observed between the two groups in the enhancement of regulation of cognition, context, behaviour and motivation in terms of self-efficacy. Process data showed that local primary students successfully regulated the four aspects of self-regulation in the virtual flipped classroom. This study also provided triangulated data showing the transfer of self-regulatory strategies from the pre-class stage to the in-class stage within the virtual flipped classroom. In addition, it shows that students continued to use these regulative strategies in the regular online classes upon completing the course, which implied the transfer of strategies for self-regulation from the virtual flipped classroom to regular online classes. Additionally, the results showed that the learning outcomes of presenting Chinese speech differed between the groups – students learning self-regulation via modeling outperformed those learning self-regulation via prompts. The students, parents and teacher expressed positive views towards learning self-regulation in the virtual flipped classroom as well as learning self-regulation via prompts and modeling.

This study has theoretical and practical significance. Theoretically, it is a pioneering study on enhancing self-regulation in the virtual flipped classroom, comparing prompts and modeling and exploring regulation of cognition, context, behavior and motivation to provide a comprehensive understanding of self-regulation in the virtual flipped classroom. Practically, the study provides implications for learning self-regulation progressively as well as guidelines for effective use of prompts and modeling for learning self-regulation.

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Chapter 1 Introduction

1.1 Theoretical Background and Major Research Gaps

With advancements in digital technologies, researchers and educators have explored how technology can enhance students' active learning. The flipped classroom is an increasingly popular mode of learning in schools (Akcayir & Akcayir, 2018) that consists of a pre-class stage and an in-class stage (Bergmann & Sams, 2012). In the pre-class stage, students learn the core concepts through videos (Yang, 2017), readings and exercises (Clark, 2015; Unal & Unal, 2017), which leaves sufficient time for further activities or practice during the in-class stage (Bishop & Verleger, 2013). Hence, the flipped classroom is more student-centred than the traditional classroom (Akcayir & Akcayir, 2018), and it facilitates active learning (Bergmann & Sams, 2016; Clark, 2015).

The virtual flipped classroom is a recent emerging field. The main difference between the virtual flipped classroom and the traditional flipped classroom is in the learning mode in the in-class stage: the traditional flipped classroom adopts a face-to-face in-class mode (Jensen et al., 2018), whereas the virtual flipped classroom adopts synchronous online in-class learning (Ismail & Abdulla, 2019). The pre-class stages in the two are similar because students learn at home on their own (Akcayir & Akcayir, 2018), which requires self-regulatory strategies (Lai &

Hwang, 2016; Li et al., 2019). Therefore, training for self-regulated learning is crucial for effective traditional and virtual flipped classrooms. However, most studies on the traditional flipped classroom have focused on comparing it with the traditional face-to-face classroom (e.g., Clark, 2015; Yang, 2017), and only a few studies have focused on enhancing self-regulated learning (e.g., Lai & Hwang, 2016; Moos & Bonde, 2016). Research on enhancing self-regulated learning in the virtual flipped classroom is still in the early stages.

Self-regulated learning is considered to be vital for academic success (Jansen et al., 2019; Sitzmann et al., 2011; Zimmerman, 2011). Thus, training for self-regulated learning is crucial for improving learning outcomes (Theobald, 2021) and developing self-regulated learning (Dignath & Büttner, 2008). Pintrich's (2000) model is the overarching theoretical framework for the present study. The model was selected because it has been widely adopted in empirical studies (e.g., Arsal, 2010; Çetin, 2017; Fadlelmula & Ozgeldi, 2010), is comprehensive (Vandevelde et al., 2013) and is suitable for upper primary students (Dignath & Büttner, 2008). Self-regulated learning involves the regulation of four aspects of learning: cognition, behaviour, context and motivation (Pintrich, 2000). The regulation of each aspect involves four phases: planning, monitoring, controlling and reflection (Pintrich, 2000).

As training is useful for enhancing self-regulated learning, this study explored two approaches for learning self-regulation: prompts and modeling. Prompts refer to the cues that focus on facilitating self-regulation during learning. Only a few studies have been conducted on prompts for the traditional flipped classroom (e.g., Lai & Hwang, 2016; Moos & Bonde, 2016; Van Alten, 2020a; Van Alten, 2020b), and these studies have found inconsistent results regarding the effects of prompts on enhancing self-regulation. Some of the studies have found primarily positive effects (e.g., Lai & Hwang, 2016; Moos & Bonde, 2016; Van Alten, 2020b), whereas others have did not find positive effects (e.g., Van Alten, 2020a). Additionally, these studies applied self-regulatory prompts to facilitate the regulation of cognition. Studies are lacking on the use of prompts to enhance students' regulation of cognition, motivation, context and behaviour.

Modeling is another useful means of enhancing self-regulated learning (Pintrich, 2000; Schunk, 1995; Zimmerman & Clearly, 2000). Studies have shown that modeling self-regulatory strategies positively influence students' regulation of cognition (Raaijmakers et al., 2018; Wijnia & Baars, 2021, Clearly & Zimmerman, 2004). Few studies have been conducted on enhancing self-regulated learning in the traditional flipped classroom, and research on modeling is still in the early stages in terms of regulating cognition. In addition, the regulation of other aspects has rarely been examined in modeling and prompts.

To the best of my knowledge, the enhancement of self-regulated learning in the virtual flipped classroom has not yet been explored. To address this research gap, this study integrated Pintrich's (2000) theoretical framework into course design and explored the regulation of cognition, motivation, behaviour and context.

1.2 Contextual Background

1.2.1 General Contextual Background

The unexpected outbreak of the COVID-19 pandemic attracted considerable attention to online learning globally and in Hong Kong. In response to the outbreak, the Hong Kong Education Bureau (2020) closed schools and suspended traditional face-to-face classes. Schools then opted for online learning, which teachers and students were unfamiliar with. Students had to study on their own using online materials or attend online lessons with their teachers. Most students lacked self-regulation, which is crucial for effective online learning, especially during COVID-19 (Li & Zhang, 2021). Hence, students faced enormous challenges in learning online (Rornert-Ringleb et al., 2021), indicating an urgent need to provide training and support for self-regulation in online learning (Gentry et al., 2020).

1.2.2 Researcher's Contextual Background

This study was planned before the COVID-19 pandemic. Based on my observations and the teacher's observations, we realised that students lacked self-regulation in learning. Unexpectedly, the COVID-19 pandemic occurred. Consequently, schools were closed and traditional classes were suspended. I observed that my students learning online faced the same problem of lacking self-regulation. For instance, some of the students did not submit their online assignments or watch instructional videos. The teacher I collaborated with also observed that students lacked self-regulation when she attempted to adopt a virtual flipped classroom model. My study focusing on promoting students' self-regulation became more imperative. As this study was action research, there was a need to solve the problem of the teacher participant. The problem of the teacher participant was situated in the virtual flipped classroom. Therefore, the virtual flipped classroom instead of general online learning was focused. The study is mainly based on several lines of theoretical background including the flipped classroom, self-regulated learning and training for self-regulated learning.

1.3 Research Purposes and Questions

This study focused on primary school students in Hong Kong. The training for self-regulation was implemented in the Speech Club using the virtual flipped classroom mode. The students were divided into two groups: learning via prompts and learning via modeling. The study had three research objectives. The overarching objective was to enhance the self-regulation of primary school students through prompts and modeling. Particularly, the study compared the effects of prompts and modeling on enhancing students' (1) self-regulation of cognition, behaviour, context and motivation and (2) learning outcomes of giving a Chinese speech. An additional objective was to understand the perceptions of students, parents and the teacher on self-regulation training via prompts and modeling in the virtual flipped classroom. The research questions were developed based on these research objectives.

The first research question (RQ1) addressed the main purpose of the study: comparison of prompts and modeling for learning the self-regulation of cognition, behaviour, context and motivation. In other words, the study explored self-regulated learning from a multi-dimensional point of view following Pintrich's (2000) model. It aimed to provide a comprehensive understanding of the process of self-regulated learning and the self-regulatory outcome. More importantly, the study investigated the possibility of transferring self-regulation learnt from asynchronous online learning to synchronous online learning in the virtual flipped classroom.

RQ1: To what extent and how do prompts and modeling affect primary school students' regulation of cognition, behaviour, context and motivation in the virtual flipped classroom?

The first research question was further divided into eight sub-questions based on Pintrich's (2000) model. Research question 1a and 1b focus on the regulation of cognition. Research questions 1c and 1d are related to the regulation of behaviour. Research questions 1e and 1f focus on the regulation of context. Research questions 1g and 1h are related to the regulation of motivation. For each aspect, one question pertained to the self-regulatory outcome and the other focused on the process of self-regulated learning. The sub-questions about the process of self-regulated learning explored how students perform self-regulated learning in the pre-class and in-class stages of the flipped classroom. The sub-questions of research question 1 are listed below:

- ✓ To what extent (RQ1a) and how (RQ1b) do prompts and modeling affect the regulation of *cognition* in an extracurricular programme using the virtual flipped classroom?
- ✓ To what extent (RQ1c) and how (RQ1d) do prompts and modeling affect the regulation of *behaviour* in an extracurricular programme using the virtual flipped classroom?

- ✓ To what extent (RQ1e) and how (RQ1f) do prompts and modeling affect the regulation of *context* in an extracurricular programme using the virtual flipped classroom?
- ✓ To what extent (RQ1g) and how (RQ1h) do prompts and modeling affect the regulation of *motivation* in an extracurricular programme using the virtual flipped classroom?

Additionally, the study aimed to determine whether the learning outcomes of giving a Chinese speech differed between learning self-regulation via prompts and via modeling.

RQ2: Is there any difference in the learning outcomes of primary school students who receive self-regulation training through prompts and those through modeling in the virtual flipped classroom?

The study also aimed to understand participants' views on the training of self-regulated learning with prompts and modeling in the virtual flipped classroom. Research question 3 (RQ3) explored the perceptions of students, parents and the teacher.

RQ3: What are the perceptions of students, their parents and the teacher on learning self-regulation using prompts and modeling in the virtual flipped classroom?

1.4 Overview of the Study

This study is an action research with a mixed method intervention design. The problems of a lack of self-regulation and research gaps in the literature were identified; a plan was then developed to provide self-regulation training using two primary approaches: learning via prompts and modeling. The plan was implemented in a primary school in Hong Kong. Forty-two students were randomly assigned to two groups, where they received self-regulation training in the virtual flipped classroom via prompts or modeling. After the four-week training course, the students had regular schooling in online classes for four weeks. Questionnaires and pre-speaking tests were administered before the course. Notes and in-class lesson observation data were collected during the course. Questionnaires and post-speaking tests were conducted after the course. Individual interviews with all students, parents and the teacher were performed after another four weeks of regular online classes. After the three-month project, I reflected on the effectiveness of prompts and modeling. Both prompts and modeling were effective in enhancing self-regulated learning, although modeling was more effective.

Different ways were used to analyse the data. Concerning self-regulation, Wilcoxon signed rank test and Quade’s test, were conducted using SPSS (Version

26) to analyze data from pre- and post- questionnaires. Content analysis was conducted manually to analyse students' notes with assistance of Microsoft Excel. Thematic analysis and constant comparison were used to analyse interview data about self-regulation. Microsoft Excel was used to compute the percentage of students rewinding from log data and the average number of occurrences of each observation item among the four sub-sessions of each lesson . Concerning the ability to give a Chinese speech, Wilcoxon signed rank test and Quade's test were conducted using SPSS (Version 26) to analyse the data from pre- and post-speaking tests. Concerning data about perceptions, Mann-Whitney U test was conducted to analyse the questionnaire items about students' opinions on the course. In addition, thematic analysis and constant comparison were used to analyse interview data about perceptions.

1.5 Significance of the Study

This study has several practical implications for teachers and theoretical implications for researchers interested in self-regulated learning. Practically, the results of the study provide insight into the design of pre-class videos. In particular, the findings can inform how to facilitate the learning of self-regulation through modeling and prompts and how to integrate self-regulation training in the virtual flipped classroom. Theoretically, the study extends research on prompts by presenting a framework for learning self-regulation via prompts. The study also provides a better understanding of the adaptation of strategies when learning through modeling. Finally, the study extends the theory on self-regulation training in the virtual flipped classroom to the possibility of transferring self-regulatory strategies to regular online classes, thus implying a connection between the two learning modes.

1.6 Organisation of the Dissertation

This dissertation consists of six chapters. The current chapter sets the contextual and theoretical background of the study, states the research purpose and questions and highlights the significance of the study and definitions of terms. The second chapter is the literature review, which introduces related theories and empirical studies on the flipped classroom, the concept of self-regulated learning, the need for self-regulated learning in the flipped classroom, and training for self-regulated learning through prompts and modeling. The third chapter describes the methodology and design of the virtual flipped classroom, the research procedure, data collection methods and data analysis. The fourth chapter presents the findings that correspond to the research questions listed in the first chapter. The fifth chapter discusses self-regulation in terms of process, outcome and transfer regarding the four aspects of Pintrich's (2000) model (that is, regulation of cognition, behaviour, context and motivation). The fifth chapter also discusses the outcomes of giving a Chinese speech and the opinions of students, parents and the teacher on the virtual flipped classroom and the two approaches for enhancing self-regulated learning. The last chapter highlights the major findings and contributions of the study.

1.7 Definitions of Terms

The flipped classroom: The flipped classroom involves pre-class asynchronous learning and in-class synchronous learning. In pre-class asynchronous learning, students watch videos at home (Bishop & Verleger, 2013), whereas in in-class synchronous learning, students engage in practical activities suitable for active learning in a real classroom (Akcayir & Akcayir, 2018).

The traditional flipped classroom: Based on the definition of the flipped classroom, the traditional flipped classroom consists of the pre-class asynchronous stage, in which students watch pre-class videos at home, and in-class face-to-face teaching for active learning at school.

The virtual flipped classroom: The virtual flipped classroom has the features of the flipped and virtual classrooms (Phillips & O'Flaherty, 2019). In the pre-class asynchronous stage, students also learn by watching pre-class videos at home. However, the in-class synchronous stage occurs in the virtual online classroom

(Ismail & Abdulla, 2019).

Synchronous online learning: In synchronous online learning, students in the same class learn online from the teacher at the same time.

Asynchronous online learning: In asynchronous online learning, students in the same class learn independently online at different times using materials such as video lectures pre-recorded by teachers (Ng et al., 2020).

Self-regulated learning: Self-regulated learning is a process of learning that is directed towards a goal (Zimmerman, 1998, 2013; Pintrich, 2000). Self-regulated learning involves the regulation of cognition, behaviour, context and motivation (Pintrich, 2000). Each aspect involves four phases: planning, monitoring, controlling and reflection (Pintrich, 2000). 'Self-regulation' is used interchangeably with 'self-regulated learning' in this dissertation.

Metacognition: Metacognition refers to the 'control and regulation of cognition' (Pintrich & Schunk, 2002: 405).

Learning through modeling: Students pattern the thoughts and actions demonstrated in the modeling segment embedded in pre-class instructional videos. Learning through modeling can be explained in detail by observational learning (Bandura, 1986).

Learning through prompts: Students learn self-regulation through the prompts embedded in pre-class instructional videos. Prompts in this study refer to self-regulatory cues that facilitate self-regulated learning (Bannert & Reimann, 2012).

Self-efficacy: Self-efficacy is a person's perceived ability to execute actions to attain a specified level of performance (Bandura, 1986).

Transfer of strategies: Transfer of strategies refers to the application of strategies learnt to new instances (Salomon & Perkins, 1989, 2012).

Low road transfer: Low road transfer refers to automation resulting from sufficient practice (Salomon & Perkins, 1989).

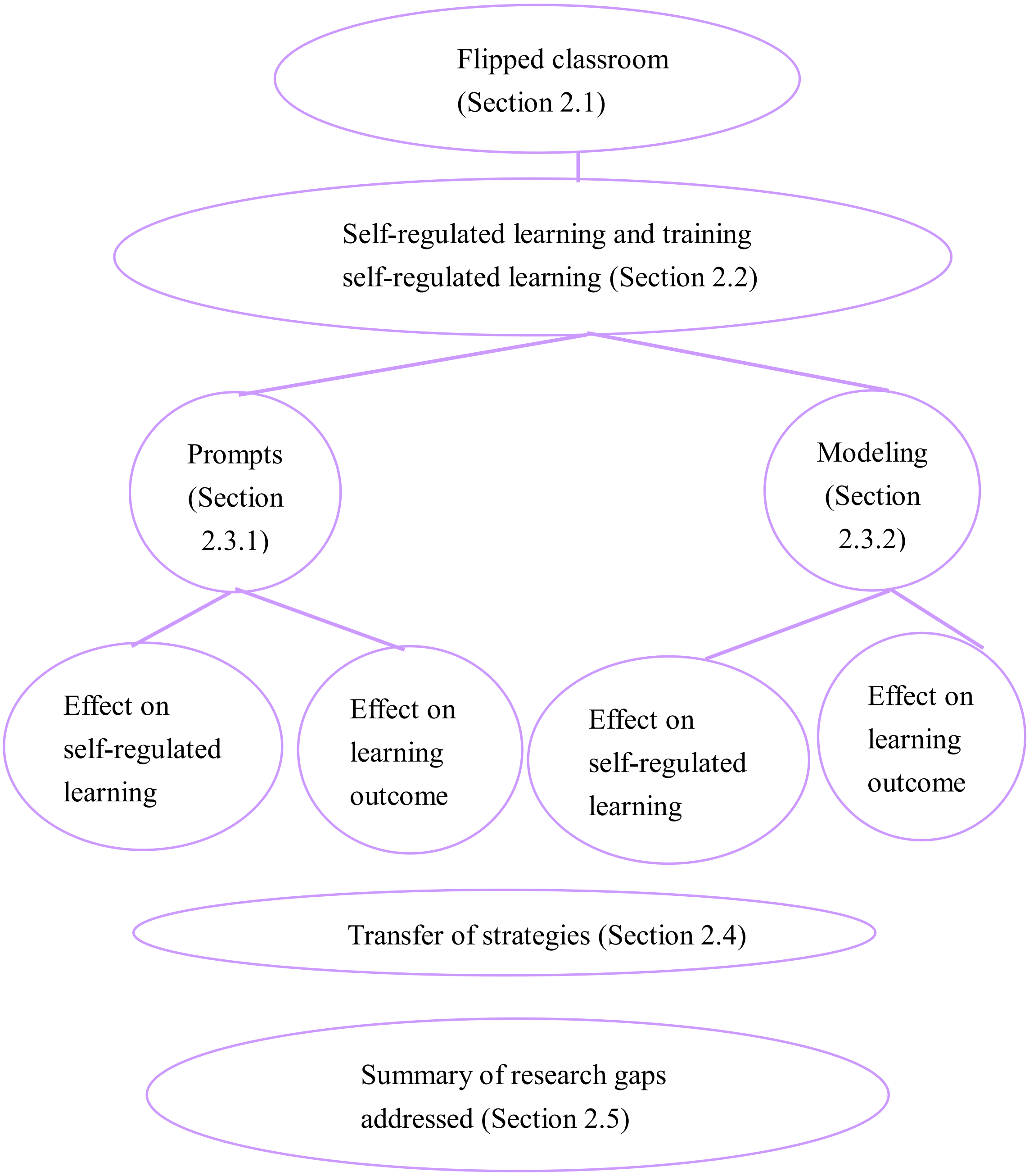
High road transfer: High road transfer refers to the 'intentional mindful abstraction of something from one context and application in a new context' (Salomon & Perkins, 1989:113).

Chapter 2 Literature Review

This chapter introduces the flipped classroom (Section 2.1) and self-regulated learning (Section 2.2) models. The empirical studies on two primary approaches of self-regulation training (that is, prompts (Section 2.3.1) and modeling (Section 2.3.2)) are also presented. The transfer of strategies in learning is further highlighted (Section 2.4). Finally, it summarizes the research gaps addressed in this study (Section 2.5). Figure 2.1 provides an overview of this chapter.

Figure 2.1

Overview of Literature Review



2.1 Flipped Classroom

Technological advancements and Internet access have increased tremendously in the last decade (Deng, 2019; Jdaitawi, 2020). Technological advancements enable the implementation of the flipped classroom (Abdullah, 2020), which is also called the inverted classroom (Strayer, 2012). Although earlier studies defined the flipped classroom as the inversion of in-class and out-of-class activities (Lage et al., 2000), scholars have reported the use of technology for transmitting learning contents (Bishop & Verleger, 2013).

Research on the flipped classroom has attracted increasing attention (Akcayir & Akcayir, 2018) in various disciplines such as language (e.g., Yang & Chen, 2020), mathematics (e.g., Lo, 2017; Song & Kapur, 2017), science (e.g., Bergmann & Sams, 2012; Lee & Choi, 2019) and information technology (e.g., Ismail & Abdulla, 2019). Empirical studies have reported that the flipped classroom is more effective than the traditional classroom at the primary (e.g. Lai & Hwang, 2016; Wei et al., 2020; Yang & Chen, 2020), secondary (e.g. Clark, 2015; Lo & Hew, 2017) and tertiary levels (e.g. Unal & Unal, 2017).

2.1.1 Pre-class Asynchronous Stage

The flipped classroom model ensures that sufficient class time is available for active learning activities by shifting lectures to the pre-class stage (Akcayir &

Akcayir, 2018). The pre-class stage is in an asynchronous mode in which students learn independently. Empirical studies have shown that the pre-class asynchronous stage is unique. First, this stage delivers conceptual knowledge in different forms such as readings (Clark, 2015; Unal & Unal, 2017), videos (Yang, 2017) or a combination of the two (Lee & Choi, 2019; Phillips & O'Flaherty, 2019). In this mode, teachers can pre-record videos (Lin et al., 2021) and make voiceovers for presentation slides (Schlairet et al., 2014). Alternatively, they can use the videos available online (Lee & Choi, 2019; Yang, 2017). Recent studies on the pre-class stage have shown that videos are more effective than readings in enhancing students' learning outcomes (Jenson et al., 2018; Lee & Choi, 2019). For example, Lee and Choi (2019) provided videos for half of a class and readings for the remaining half, and they found that students in the video group performed better in the assessments than students in the reading group. Additionally, the pre-class stage often complements videos or readings with an exercise that can provide teachers with information about students' comprehension in the pre-class stage (Clark, 2015). This information provides direction for the further development of in-class learning (Lo, 2017). Moreover, pre-class learning is a foundation of in-class learning because in-class learning requires the application of knowledge acquired from the pre-class stage (Han & Klein, 2019).

2.1.2 In-class Synchronous Stage

In-class learning is also crucial for effective learning in the flipped classroom. In-class learning may involve various activities, such as discussing difficulties encountered during pre-class learning (Phillips & O'Flaherty, 2019), group work (Bergmann & Sams, 2012; Jensen et al., 2015; Lage et al., 2000) and individual practice (Bergmann & Sams, 2012; Clark, 2015; Lin et al., 2021). In this way, in-class learning is changed from a teacher-centred style (pre-recorded lectures) to a student-centred style (Akcayir & Akcayir, 2018). Thus, in-class learning may enhance collaboration between students by providing opportunities for group work (Hoshang et al., 2021). Additionally, it affords teachers more time to interact with students (Wei et al., 2020). Recently, Jang and Kim (2020) reviewed 43 studies on the implementation of the flipped classroom in universities. They reported that the flipped classroom had a considerable effect on interpersonal outcome, which may be attributed to the effectiveness of the flipped classroom.

Furthermore, the flipped classroom is beneficial for active learning, notably for its in-class stage (Bergmann & Sams, 2016; Clark, 2015). Students construct knowledge as they interact with the teacher or classmates. During individual practice, students actively apply their new knowledge. However, in-class learning, which relies on knowledge gained from pre-class learning, may depend on the effectiveness of pre-class learning (Han & Klein, 2019).

2.1.3 Virtual Flipped Classroom

Recently, the virtual flipped classroom has started to emerge. The traditional and virtual flipped classrooms consist of a pre-class asynchronous stage and an in-class synchronous stage. Concerning similarity, they both require students to learn independently at home in the pre-class stage. The major difference between the traditional and virtual flipped classrooms is the learning mode of the in-class synchronous stage. For the traditional flipped classroom, the in-class synchronous stage is implemented in a real classroom where the teacher and students can interact face-to-face. For the virtual flipped classroom, the in-class synchronous stage is implemented through video conferencing, which allows a teacher and students from different places to communicate online (Ismail & Abdulla, 2019).

Studies on the virtual flipped classroom have mainly focused on the tertiary level and have reported varied findings. Phillips and O'Flaherty (2019) compared a group of students learning in the virtual flipped classroom with another group learning in the mixed-mode classroom offering bi-weekly face-to-face lessons. After 12 weeks, no significant difference in learning outcome was observed between the two groups. Stohr et al. (2020) compared the virtual flipped classroom with traditional teaching (face-to-face lectures and tutorials). The authors found no significant difference in learning outcomes between the two groups and noted that the attendance for the in-class stage of the virtual flipped classroom varied throughout the course. Ismail and Abdulla (2019) conducted a quasi-experiment to study the virtual flipped classroom with one group of students. A pre-test and post-test analysis demonstrated significant knowledge gain by the students.

2.1.4 Design of Flipped Classroom

Research on the flipped classroom has focused mainly on comparisons of learning outcomes with the traditional classroom (e.g. Clark, 2015; Yang & Chen, 2020). Recently, the design of the flipped classroom has attracted increased attention (Hew et al., 2021; Lai & Hwang, 2016; Song et al., 2017). Generally, pedagogical design includes the consideration of content, materials and order of activities (Abdullah, 2021), and good pedagogical designs facilitate learning (Abdullah, 2021; Deng, 2019). Lawson et al. (2019) suggested that the design of the flipped classroom should be based on theory. Although the flipped classroom addresses active learning, which can be achieved in the in-class stage, the design of pre-class learning should also be addressed (Lee & Choi, 2019). Therefore, this study emphasises the design of the flipped classroom for scaffolding self-regulation in pre-class learning.

Several studies have focused on pedagogical design to facilitate students' learning in the flipped classroom. Song et al. (2017) emphasised the importance of investigating how to design the flipped classroom. Song and Kapur (2017) designed a new model to facilitate how students learn mathematical problem solving. Their new model involves engaging students to ask questions and to discuss and solve mathematical problems during the lesson. After the class, students learnt independently. This approach ensures that students can be guided by teachers when faced with difficulties or problems and can consolidate their knowledge after class. As can be seen, Song and Kapur (2017) came up with a very thoughtful and creative design that can facilitate problem solving and cater to students' learning needs.

Apart from problem solving, studies have been conducted on the design of the flipped classroom for improving self-regulated learning. Lai and Hwang (2016) focused on integrating self-regulated learning with mobile learning. The authors added goal-setting before the usual pre-class stage and reflection after the in-class stage. For the pre-class stage, students learnt with prompts in electronic books and completed a quiz. Self-regulated learning was embedded in each lesson and reviewed as a complete learning cycle of regulation.

The present study focuses on the design of the virtual flipped classroom, with an emphasis on learning videos for independent learning in support of self-regulated learning. However, unlike the study of Lai and Hwang (2016), this study regards the pre-class stage as a complete cycle of regulation and the in-class stage as another cycle of regulation. Considering the period between the two stages, it may be better for students to reflect on their learning, completing one cycle in the pre-class stage first. Moreover, the pre-class knowledge serves as the prior knowledge of the in-class learning. It is necessary to start a new cycle of self-regulation for the in-class stage, especially regulating cognition. Students had better think about their learning goal for the in-class learning and activate prior knowledge gained in the pre-class stage. This study is governed by a different theoretical framework (Pintrich's (2000) model) and has different aims and rationale. The study design is presented in detail in Section 3.3.

A number of studies have compared the traditional flipped classroom with the traditional face-to-face classroom, yet virtual flipped classroom research remains in a nascent stage. Only a few studies have investigated the virtual flipped classroom; however, self-regulation training has not yet been explored. How can teachers design the virtual flipped classroom to train students in self-regulation? Would self-regulation training in the virtual flipped classroom enhance students' self-regulation and learning outcomes? This study addresses these research gaps.

2.2 Self-regulated Learning

As addressed in Sections 2.1.1 and 2.1.2, the in-class stage is strongly linked to the pre-class stage, as the knowledge gained in the pre-class stage must be applied to in-class learning (Han & Klein, 2019). The pre-class stage is in the asynchronous learning mode, in which students learn independently. Thus, learning in the pre-class stage requires self-regulation strategies (Lai & Hwang, 2016; Li et al., 2019). Self-regulated learning is crucial for successful learning in the flipped classroom (Moos & Bonde, 2016). However, students need guidance to learn at home independently (Akcayir & Akcayir, 2018). Hence, it is essential to provide support on self-regulated learning for the flipped classroom.

2.2.1 Theoretical Background and Basic Characteristics

Various self-regulated learning models have originated from different theoretical backgrounds; thus, the models have slightly different characteristics. For example, Zimmerman's (1998, 2003) model originated from Bandura's social cognitive theory (Zimmerman, 1998, 2003). According to Bandura (1986), human beings can function well because of three major elements – personal elements, behaviour and context. A reciprocal relationship exists between these three elements (Bandura, 1986). In other words, these three elements affect one another.

The personal elements include motivational constructs such as self-efficacy and motivation that Zimmerman's (1998, 2003) model focuses on. Models based on the volitional theory emphasise how to maintain the willpower to complete a task (Kuhl, 1985), whereas models based on information processing may emphasise how to interpret and process perceived information (Winne & Hadwin, 1998).

The models have some general agreements on self-regulated learning irrespective of the different sources. Self-regulated learning can be viewed as a process involving different stages moving towards a goal (Pintrich, 2000; Winne & Hadwin, 1998; Zimmerman, 1998). An individual may adopt different orientations for setting a goal, such as aiming to master learning or outperform others (Pintrich, 2000; Zimmerman, 2003). The self-regulatory process is multi-faceted, involving regulation of cognition as well as regulation of motivation, context and behaviour (Pintrich, 2000; Zimmerman, 2003).

2.2.2 Theoretical Framework of Self-regulated Learning for the Present Study

Pintrich's (2000) model was selected as the theoretical framework for this study. The model was developed based on the similarities of the existing models (Pintrich, 2000); hence, the model showed a wider view of self-regulated learning. The model divides self-regulated learning into four major aspects, including regulation of cognition, behaviour, context and motivation (Pintrich, 2000). These aspects include four stages: planning, monitoring, controlling and reflection (Pintrich, 2000). Although the four stages can occur sequentially, Pintrich (2000) also noted that stages such as monitoring and controlling may occur simultaneously in practice.

Pintrich's (2000) model was selected as the theoretical framework for this study for several reasons. First, it has been widely adopted as a self-regulated learning model in several empirical studies (e.g., Arsal, 2010; Çetin, 2017; Fadlelmula, & Ozgeldi, 2010; Vandevelde et al., 2013). Second, the model is highly comprehensive (Pandero, 2017; Vandevelde et al., 2013), as it clearly describes the four aspects of self-regulation and the four stages of implementing self-regulation. The description efficacy makes the model unique. Although other models (e.g., Winne & Hadwin, 1998; Zimmerman, 2003) also consider other aspects, such models do not describe each stage of regulating each aspect. Additionally, Pintrich's (2000) model is particularly useful for primary students, as it includes motivation and emotion, which are vital social cognitive elements for learning at the primary level (Dignath, & Büttner, 2008). Empirical studies (e.g., Vandevelde et al., 2013) have also demonstrated the feasibility of applying the model in the primary context.

Although regulating all four aspects of Pintrich's (2000) model (cognition, behaviour, context and motivation) involves planning, monitoring, controlling and reflection, the regulation of each aspect has unique characteristics. The regulation of cognition consists of four phases: cognitive planning, cognitive monitoring, cognitive controlling and cognitive reflection (Pintrich, 2000). Cognitive planning includes not only planning for learning contents, but also planning for self-regulation. It involves setting goals and recalling previous knowledge for both learning contents and self-regulation (Pintrich, 2000). It also entails individuals judging their personal understanding of learned content (Pintrich, 2000). Cognitive controlling further involves choosing learning strategies such as rehearsal strategies (e.g., repetition for memorisation), elaboration strategies (e.g., rephrasing) and organisation strategies (e.g., using a concept map for organising ideas) (Flavell, 1979). Cognitive reflection involves evaluating learning with respect to the goal and attribution of learning effectiveness (Pintrich, 2000).

Additionally, regulation of behaviour includes behavioural planning, behavioural monitoring, behavioural controlling and behavioural reflection (Pintrich, 2000). Behavioural planning refers to planning the time and effort for studying, whereas behavioural monitoring refers to the awareness of the sufficiency of available time (Pintrich, 2000). Behavioural controlling involves controlling efforts and decisions to persist in learning. Behavioural reflection refers to the process of reflecting on the decision to persist in learning (Pintrich, 2000).

In addition to the regulation of cognition and behaviour, the model includes the regulation of context, which has four stages: contextual planning, contextual monitoring, contextual controlling and contextual reflection (Pintrich, 2000). Contextual planning means thinking about the current learning context (Pintrich, 2000). Contextual monitoring refers to being aware of distractions in the current learning context (Pintrich, 2000). Contextual controlling involves selecting strategies for improving context, and contextual reflection refers to reflecting on the changed context (Pintrich, 2000). Aside from the physical learning context, the regulation of the learning task is inclusive (Pintrich, 2000). Regulation of the learning task involves thinking about the learning task, being aware of the planned learning task, changing the learning task and reflecting on the changes in the learning task (Pintrich, 2000). Regulation of the learning task may be challenging for students because students do not directly control the learning task (Pintrich, 2000).

Motivation is also an important aspect to be regulated. Regulation of motivation involves motivational planning, monitoring, controlling and reflection (Pintrich, 2000). Motivational planning involves considering the value of learning a particular topic and the interest in learning the topic. It also involves considering the level of self-efficacy required in learning the topic. Self-efficacy in learning may be affected by the level of difficulty. Motivational monitoring refers to being self-aware of whether one is motivated. Motivational controlling refers to selecting strategies for maintaining motivation. Motivational reflection involves reflecting and making attributions of the feelings of reaching or not reaching goals.

Pintrich's (2000) model is the critical theoretical framework for this study. The four aspects and stages of regulation were integrated into the design of the videos for the pre-class stage, as elaborated in Section 2.3. The four aspects also serve as the basis for analysing and reporting the data from different sources.

2.3 Training for Self-regulated Learning

The fundamental premise of this study is that self-regulation can be acquired through training. This section first explores the role of training in developing self-regulated learning. The two ways (prompts and modeling) of training for self-regulated learning emphasised in the study are then discussed.

Training for self-regulated learning benefits students at different levels, from primary and secondary students (Dignath & Büttner, 2008; Dignath et al., 2008) to university students (Jansen et al., 2019; Theobald, 2021; Zheng, 2016).

Training for self-regulated learning is crucial, as it may positively influence self-regulation and academic performance (Dignath et al., 2008; Theobald, 2021). In a meta-analysis of 49 empirical studies, Theobald (2021) reported that training for self-regulated learning had the largest effect on developing strategies for regulating cognition and the lowest effect on learning strategies, with strategies for managing resources, learning outcomes and motivation falling in between. In meta-analysis of 30 empirical studies involving primary students, Dignath et al. (2008) noted that self-efficacy had the largest effect size, whereas motivation had the lowest effect size. A comparison between these two meta-analyses showed that the effect sizes of all of the categories were higher for primary students in the meta-analysis of Dignath et al. (2008) than for university students in the meta-analysis of Theobald (2021). Dignath and Büttner (2008) noted that children are in the process of developing knowledge and strategies for regulating cognition, which might explain the high effect of self-regulated training on primary students.

In addition to the effects of training, some studies explored the relationships between training, self-regulation and learning outcomes. Sitzmann and Ely (2011) reviewed studies of over 400 independent samples and reported that learning performance could be predicted by different factors, including self-efficacy, goals, strategies for regulating cognition, strategies for managing time as well as strategies for structuring context, motivation, and effort spent. This meta-analysis showed that self-regulation is positively associated with learning outcome. Similarly, Jansen et al. (2019) conducted a meta-analysis on 126 studies and identified self-regulated training as a mediator of the relationship between self-regulation and academic learning outcomes. In other words, training increased the activities of self-regulated learning, which improved academic learning outcomes. However, the findings showed that this mediation effect was weak, implying that other factors may be mediators.

2.3.1 Training in Self-regulated Learning via Prompts

2.3.1.1 Self-regulatory Prompts. Self-regulatory prompts are cues specifically used to guide students to regulate their own learning (Bannert & Reimann, 2012). Empirical studies have used self-regulatory prompts in the form of questions (e.g., Lai & Hwang, 2016; Moos & Bonde, 2016), phrases as options (e.g., Müller & Seufert, 2018) and statements as instructions (e.g., Müller & Seufert, 2018). Self-regulatory prompts can be provided before, during and after learning (Davis, 2003). Prompts have been widely used to foster self-regulated learning in traditional (e.g., Ferreira et al., 2015; Osborne, 2020) and online learning contexts (e.g., Daumiller & Dresel, 2019; Englemann & Bannert, 2021; Hsu et al., 2017; Lehmann et al., 2014; Müller & Seufert, 2018; Schumacher &

Ifenthaler, 2021; Sonnenberg & Bannert, 2019). Only a few studies have focused on self-regulatory prompts for the traditional flipped classroom (e.g., Lai & Hwang, 2016; Moos & Bonde, 2016; Van Alten et al., 2020a; Van Alten et al., 2020b). Hence, this section first addresses prompts in online learning and traditional learning contexts and then considers the traditional flipped classroom.

2.3.1.2 Prompts Used in Traditional and Online Learning Contexts. In the traditional classroom, prompts may be embedded in learning diaries. According to Pintrich's (2000) model, self-regulation involves the regulation of four aspects: cognition, behaviour, context and motivation. Previous studies have focused on only one aspect of self-regulated learning, especially regulating cognition. For example, Ferreira et al. (2015) solely focused on regulating cognition. They studied two groups of primary students for six weeks and found that the group with prompts in learning diaries displayed more activities of regulation of cognition in Zimmerman's (1998) performance and reflection phases. These performance and reflection phases are equivalent to cognitive monitoring, controlling and reflection of Pintrich's (2000) model.

In addition to the traditional classroom, some studies on online learning also have solely focused on regulating cognition. Sonnenberg and Bannert (2019) embedded prompts in online learning with hypermedia in two sessions of a laboratory setting. Sixty-nine university students thought aloud while learning online. The authors reported that the group receiving prompts showed a higher frequency of cognitive monitoring of understanding. Hsu et al. (2017) is another example of concentrating on regulating cognition. The authors regarded their studies as a multiple case study that compared students of different inquiring abilities. Twenty secondary three students were trained on prompts for regulating cognition. Data from screen logs showed that both groups reviewed the prompts and set their learning goals. Students with higher ability displayed more cognitive reflection and monitoring.

Summarily, these three highlighted studies attempted to determine the phases in which students applied regulation of cognition while learning. The studies measured the regulation of cognition in the process using various means, such as learning diaries, thinking aloud and log data. These provided insights into capturing the process of regulation; however, these methods might not be appropriate for this study. Learning diaries might be unsuitable because the prompts need to be included in pre-class videos. Although thinking aloud benefits university students, it may have been too challenging for the primary students in this study, who were beginners at self-regulated learning and inexperienced in communicating their thoughts. Log data – specifically the percentage of students rewinding – were used in this study to determine cognitive controlling. To supplement thinking aloud and learning diaries, blank sheets for note-taking were used to determine whether the effect was due to the two training methods (prompts and modeling).

Previous studies have examined more than one aspect of self-regulated learning, and motivational regulation is an emerging aspect. However, these studies have reported varied findings. In this section, I first summarise previous studies, compare them and discuss the reasons for the variations in their findings. Lehmann et al. (2014) investigated the effect of prompts for reflection and planning on online learning as related to the regulation of cognition and motivation. The authors analysed the questionnaire and reported an increase in the regulation of cognition, especially the cognitive planning phase. They also noted that enhanced motivational regulation increased the intrinsic value for beginners. Similarly, Daumiller and Dresel (2019) studied the use of prompts in supporting regulation of cognition and motivation during online learning. The authors reported that the experimental group was significantly better in cognitive controlling and intrinsic value because of the use of more motivational regulation strategies than the control group.

Schumacher and Ifenthaler (2021) studied university students learning online in a laboratory context. They measured students' confidence and reported a significant difference between students that received prompts and those that did not. They also used notes to collect data and found that the students receiving prompts appeared to write notes, but those in the control group did not. Thus, the study demonstrated not only regulation of motivation but also cognitive control during online learning with the support of prompts. However, the authors did not provide further details on how the students took notes or the specific strategies they used. This study addresses this gap.

Müller and Seufert (2018) measured motivation in terms of self-efficacy in addition to measuring regulation of cognition. They provided prompts for the regulation of cognition to one group and did not provide any prompts to another group. No difference in self-efficacy or regulation of cognition was observed in two separate sessions. Englemann and Bannert (2021) recently studied two groups of university students: a group with prompts and another without prompts. The authors reported activities related to the regulation of cognition when learning with hypermedia. These activities included thinking about the information, analysing information in hypermedia, searching for other information and reading it. The authors found that the group that received prompts outperformed the group that did not receive prompts at cognitive planning in goal setting, cognitive monitoring and cognitive reflection.

Daumiller and Dresel (2019) and Lehmann et al. (2014) reported enhanced intrinsic value, and Schumacher and Ifenthaler (2021) reported enhanced self-efficacy; these studies provided prompts for regulation of motivation. Conversely, Englemann and Bannert (2021) and Müller and Seufert (2018) reported no significant differences between the experimental and control groups in motivation in general and self-efficacy in particular. Englemann and Bannert (2021) and Müller and Seufert (2018) did not find support for regulation of motivation, emphasising the need to provide prompts for each aspect of Pintrich's (2000) model, which highlights the unique characteristics of the four phases in the four aspects of self-regulation. Although all of the aspects cover all four phases, each aspect has a unique way of regulating these phases. To examine the effects of prompts on each aspect, it is necessary to provide the prompts related to the regulation of individual aspects.

Relatively few studies have examined the regulation of behaviour in terms of time management or showed the positive effects of prompts in managing time. For instance, Chorng et al. (2019) conducted a one-group quasi-experiment on prompts in electronic journals and found that prompts can help students plan for their studies. Similarly, Wong et al. (2021) studied the effect of prompts in an online course and reported that prompts can improve time management. Additionally, only a few studies have considered the regulation of context. For instance, Osborne (2020) conducted multiple case studies on seven university students. The author provided prompts in learning diaries for practising the piano for 12 weeks and found increased self-efficacy and self-regulatory monitoring as well as structuring of the learning context. Despite being one of the most prominent aspects in Pintrich's (2000) model, regulation of context is the least addressed aspect in previous research (Hensley et al., 2021). This study attempts to fill this research gap.

2.3.1.3 Self-regulatory Prompts in the Flipped Classroom. Few studies have explored the effect of self-regulatory prompts on self-regulated learning in the flipped classroom, and these studies reported varied findings. In an experiment on the traditional flipped classroom, Moos and Bonde (2016) divided 32 university students into two groups: a control group receiving no prompts and an experimental group receiving prompts in a video for regulation of cognition. Data obtained from thinking aloud showed much higher frequencies of activating former knowledge, monitoring understanding and pausing or restarting the video in comparison with the control group. These were matched with cognitive planning, monitoring and controlling, respectively, in Pintrich's (2000) model.

The results showed that neither group monitored time perhaps because the study focused on regulation of cognition and did not provide any prompts for time management.

In another study, Lai and Hwang (2016) conducted a quasi-experimental study involving primary students learning mathematics. The prompts provided for the experimental group were on the regulation of cognition and time management. The authors reported that primary students became more aware of goal setting, applying task strategies and managing time. These findings imply that the prompts were effective in raising awareness of cognitive planning, cognitive controlling and behavioural planning in Pintrich’s (2000) model.

However, Van Alten et al. (2020b) recently reported different findings. The authors studied two groups of secondary school students in the traditional flipped classroom: one group without self-regulatory support and the other group with self-regulatory prompts in videos and reasons for self-regulation. The authors provided prompts for regulation of cognition, behaviour and context and found that prompts significantly affected rewinding, managing time and structuring of the environment.

2.3.1.4 Self-regulatory Prompts and Academic Learning Outcomes. Self-regulation training positively affects not only self-regulation but also academic learning outcomes. This section reports insights on learning outcomes from self-regulatory prompts in traditional learning diaries and online learning, as well as the findings of the few studies on self-regulatory prompts in the flipped classroom.

Generally, studies on traditional learning diaries and online learning have reported a positive effect of prompts on learning outcomes. For learning diaries, Ferreira (2015) studied 100 primary students for six weeks and found that the group receiving prompts in learning diaries improved in English vocabulary more than the group without prompts. Similarly, Hsu et al. (2017) studied 20 secondary students to determine the effect of training students for self-regulated learning. The authors reported that prompts provided in learning diaries improved learning outcomes.

Apart from studies of traditional offline learning diaries, prompts are embedded in online learning. Van Alten (2020b) provided self-regulatory support, including prompts and reasons of use, for secondary students to learn history. The group that received self-regulatory support achieved significantly better learning outcomes than the control group. Similarly, Schumacher and Ifenthaler (2021) found that university students who received self-regulatory prompts outperformed those who did not receive prompts immediately after intervention. However, this research was conducted in a laboratory setting and may not accurately reflect a real classroom context.

Limited studies on the traditional flipped classroom have also reported positive results of self-regulatory prompts on learning outcomes. Moos and Bonde (2016) studied the effects of prompts on university students in a traditional flipped classroom and found that the group that learnt with prompts achieved better learning outcomes. The study involved only one session, which may be insufficient. From another perspective, the results of using a single session might indicate that prompts can be effective even when they are provided for a short time (e.g., one session). Lai and Hwang (2016) studied the effects of prompts in the traditional flipped classroom for primary students and found that the experimental group that received prompts performed better in mathematics than the control group. More recently, Van Alten et al. (2020a) implemented the traditional flipped classroom in history classes for secondary students for six weeks. The authors found no significant difference in learning outcome between the group with prompts and that without prompts; however, the authors noted that the non-significant difference resulted from students not complying with prompts.

These studies show that prompts can enhance learning outcomes in different conditions, such as offline, online and in traditional flipped classrooms. The studies also show that prompts can enhance learning outcomes for students at different educational levels (primary to higher education) and in different subjects. However, concerns persist regarding whether students will comply with prompts.

The review of research on training for self-regulated learning via prompts highlights five major research gaps. First, there are insufficient studies on all four aspects of self-regulation. As self-regulation entails various aspects, it is necessary to consider self-regulation comprehensively, which most prior studies did not do. Second, previous studies have mostly focused on outcomes. It has been suggested that processes should also be addressed because self-regulated learning can be considered as a dynamic rather than a static concept (Winne, 2010). Third, to the best of my knowledge, no studies have been conducted on the use of prompts to support self-regulated learning in the virtual flipped classroom. Fourth, the varied findings on self-regulatory prompts indicate the need for further studies on self-regulatory prompts, especially at the primary level. Additionally, studies have not yet explored the transfer of self-regulatory strategies to different learning settings. Fifth, some studies were conducted under laboratory settings, which differ considerably from real classroom settings. Empirical studies conducted in real classrooms are thus likely to be more relevant and beneficial for practising teachers. Therefore, this study examines both the outcomes and process of self-regulation and includes self-regulatory prompts in all four aspects.

2.3.1.5 Factors Affecting the Use of Self-regulatory Prompts. Based on the review of empirical studies about self-regulatory prompts, this section discusses several factors that affect the effectiveness of prompts and recommends instructional considerations.

First, learners' compliance might affect the effectiveness of prompts. The existing studies attributed non-positive effect of prompts on learning outcomes to learner's compliance to prompts (e.g. Lehmann, et al., 2014; Van Alten, 2020a). Learners who read the prompts but do not follow them may not execute self-regulatory strategies. Without using self-regulatory strategies, they may not enhance self-regulation. As the level of self-regulation is linked to learning outcome (Zimmerman, 2011), low level of self-regulation could have negative influence on learning performance. Therefore, instructional design of prompts may need to ensure learners' compliance.

Second, mental effort was another concern. Yet, scholars have not come up with a consensus on this issue. Bannert and Reimann (2012) argued that prompts might require extra mental effort in processing. As learners without much prior knowledge needs more mental effort in processing subject knowledge, they might not be able to process and comply with prompts (Bannert & Reimann, 2012).

However, Moos and Bonde (2016) reported that the mental effort of the group receiving prompts was lower than that of the control group. As learners were prompted to regulate cognition in learning, their mental effort in processing subject knowledge was lowered (Moos & Bonde, 2016). To avoid the potential factor of mental effort, instructional design for using prompts need to consider the overall mental effort needed for the learning content and self-regulatory prompts.

Third, the salience of prompts might affect their effectiveness. Lehmann et al. (2014) reported that some participants did not notice the prompts and suggested the possible reasons of limited time, unfamiliarity or instructional design. Muller and Seufert (2018) also suggested saliency of prompts as a potential way of improving the positive effects of prompts. Prompts were supposed to have the function of activating use of self-regulatory strategies (Daumiller & Dresel, 2019). If prompts are not salient enough for leaners to notice, hardly can prompts function as strategy activators. Therefore, instructional design of prompts should be salient enough so that learners can notice them.

Fourth, opportunities for practice might affect the effectiveness of prompts. Bannert and Reimann (2012) did not find the positive effects of prompts in one experimental session. Practising more frequently is necessary for developing the habit of self-regulation (Bannert & Reimann, 2012). It might be better to provide opportunities for practice.

2.3.2 Training of Self-regulated Learning through Modeling

Compared with prompts, relatively few studies have trained students for self-regulation via modeling. This section introduces a theoretical foundation and empirical framework for modeling.

2.3.2.1 Theoretical and Empirical Foundation for Modeling. Modeling is crucial for teaching and learning (Bandura, 1977, 1986, 1997) and has been advocated for training self-regulated learning (Dignath & Büttner, 2018; Pintrich, 2000; Schunk, 1995; Zimmerman & Clearly, 2000). According to Bandura (1986), modeling involves a person or a virtual character demonstrating actions and thoughts. Learning through modeling can be explained by observational learning (Bandura, 1986). In Bandura's (1986) observational learning, the success of learning through modeling depends on four prominent processes. First, students must attend to the events demonstrated by the model (Bandura, 1986). The students' ability to successfully attend to the events demonstrated by the model depends on the attractiveness, salience and degree of complexity of these events (Bandura, 1997). The less complicated the demonstrated events are, the higher the chance of the students attending to them. Second, the students must retain the demonstrated events (Bandura, 1986). Students are expected to change the demonstrated events into codes symbolically, forming rules that govern the new behaviour and rehearsing the events cognitively for retention (Bandura, 1997). Third, the students are expected to produce the newly modified behaviour (Bandura, 1986). The students produce the events and may adjust the behaviour by comparing the behaviour produced with the concepts built earlier (Bandura, 1997).

Another important process involves motivation (Bandura, 1986). Vicarious consequences may affect motivation (Bandura, 1997), and whether a person follows depends on a particular reaction (Pintrich & Schunk, 2002). That is, if the consequence of the model is positive, learners will be more likely to follow the demonstrated events. Why can the positive consequence of a model enhance the students' likelihood of emulating the demonstrated events? Vicarious mastery experience means that the successful experience of the model can enhance self-efficacy (Bandura, 1997, 2012). Empirical evidence supports this effect (Kitsantas et al., 2000; Zimmerman & Kitsantas, 2002). Kitsantas et al. (2000) studied the effect of modeling on secondary students in learning dart throwing and found that students who watched and followed a videotaped demonstration of dart throwing had significantly higher self-efficacy. Zimmerman and Kitsantas (2002) studied the effect of different types of modeling and feedback on writing in an experimental setting. The authors reported that students watching the model showed higher scores in terms of self-efficacy than those of the control group. As these two studies did not provide any training on the regulation of motivation, they might only provide evidence of the effect of vicarious mastery experience on self-efficacy.

Schunk and Zimmerman's (2007) model, which was developed based on Bandura's theory, provide insights for understanding modeling in improving learners regulation of reading and writing. In this model, there are four main stages. The first stage involves observing the model to learn the skill. The second stage involves emulating the skills. The third stage is internalizing the skills for independent application. The final stage involves adapting the skills. The first and the second stages can be understood based on Bandura's (1986) observational learning. The model adds further insights on what would happen after emulating the skills demonstrated by the model. Internalisation and adaptation are advanced stages that may occur for successful learning and application. The model provided in the early phases is important for reaching a high level of acquisition of the skills (Schunk & Zimmerman, 2007).

Common types of models include peer and teacher models. Studies have shown the usefulness of both teacher (Chiou & Yang, 2006) and peer models

(Schunk, 1995). As scholars have disagreed on which is more effective, a number of studies have compared these models. Sani-Bozhurt and Ozen (2015) investigated the use of peer and adult models in teaching play skills but did not find any significant difference in students' performance in such skills. In contrast, Hoogerheide et al. (2016) studied the effect of adult and peer models in teaching adolescents to solve electrical circuit problems and found that adult models were more effective.

Modeling can be classified based on delivery mode, whether live or symbolic modeling. Live modeling refers to a person demonstrating during delivery, whereas symbolic modeling refers to a recorded version of the demonstration of real people or virtual characters (Bandura, 2012). Video demonstration can be considered a type of symbolic modeling.

2.3.2.2 Modeling of Self-regulatory Strategies. Live modeling and symbolic modeling (particularly video-based) have been studied for various subjects such as reading (e.g., Ardiansyah, 2020; Asress, 2020), sport (e.g., Lao et al., 2016), reasoning (e.g., Kant et al., 2017) and special educational needs (e.g., Sani-Bozhurt & Ozen, 2015; Seok et al., 2018). However, these studies did not focus on the modeling of self-regulatory strategies or measuring self-regulatory competence.

Few studies have focused on the modeling of self-regulatory strategies. Similar to studies on prompts, studies using modeling of self-regulatory strategies have focused on regulation of cognition. Raaijmakers et al. (2018) used video-based modeling for students to pattern how to rate their own learning and choose subsequent tasks. The authors reported that students successfully applied such skills in problem solving tasks in biology. Wijnia and Baars (2021) provided video-based modeling for students to pattern the regulation of cognition when solving problems and assessing themselves against the standard after problem solving. Clearly and Zimmerman (2004) also focused on regulating cognition through an enhancement programme of self-regulation that combined cognitive modeling and questioning. The authors reported that the programme was useful in enhancing learners' regulation of cognition, such as goal setting. However, the effect may not entirely depend on modeling.

Few studies have considered the regulation of other aspects aside cognition. Orange (1999) demonstrated modeling regulation of motivation and behaviour in addition to regulation of cognition. The author divided 63 university students into two groups, one of which received training on self-regulated learning through two methods – modeling and a plan for studying for a session and the other group did not. The study reported a significant increase in the post-test scores for self-regulated learning for the experimental group.

2.3.2.3 Modeling of Self-regulatory Strategies and Learning Outcomes.

Studies have examined the effects of modeling on self-regulatory strategies with other instructional methods. These studies have demonstrated that modeling of the regulation of cognition had a positive academic learning outcome. Rodriguez-Malaga and Rodriguez (2021) provided six training sessions to support self-regulatory strategies for primary students. Students in the experimental groups learnt through modeling, direct instruction and peer practice, and they significantly outperformed the control group in organisation and coherence of writing. Likewise, Gierlach and Washburn (2018) provided self-regulation training and reported improvement in students' writing and explanation. Although these studies showed positive learning outcomes, they also involved other interventions such as teacher-guided discovery and direct instruction in addition to modeling.

Studies using video-based modeling as the only means for training on self-regulated learning also obtained positive results on learning outcomes. For example, Raaijmakers et al. (2018) found that providing video-based modeling improved students' problem solving. Similarly, Wijnia and Baars (2021) studied video-based modeling support for regulating cognition, which resulted in enhanced post-test problem-solving performance.

Five research gaps were identified in studies related to self-regulation training via modeling. First, training on self-regulated learning via modeling in the virtual flipped classroom has not yet been explored. Second, studies on self-regulation training via modeling rarely focused on all the four aspects mentioned in Pintrich's (2000) model. Prior studies mostly emphasised regulation of cognition; regulation of behaviour and regulation of context were seldom addressed. Third, self-regulation training via modeling was mainly related to the outcome rather than the process of self-regulation. Fourth, self-regulation training via modeling in the local primary context is awaiting to be explored. Moreover, it seemed that there has not yet been studies comparing the use of modeling and prompts in self-regulation training.

2.4 Transfer of Strategies

Self-regulation training is effective for enhancing students' self-regulation. However, to what extent can self-regulation be applied to other contexts? The application of self-regulation to other contexts involves transfer, which is thus a vital point of discussion. Transfer refers to the application of strategies or knowledge on a situation that is different from that of training (Salomon & Perkins, 1988). Salomon and Perkins (1989) noted two types of transfer: low road transfer and high road transfer. Low road transfer refers to automation resulting from ample practice in varied conditions. High road transfer involves ‘intentional mindful abstraction of something from one context and application in a new context’ (Salomon & Perkins, 1989, p. 113). High road transfer can further be divided into two kinds: backward-reaching high road transfer and forward-reaching high road transfer (Salomon & Perkins, 1988). In backward-reaching high road transfer, students note the problem in the new situation, abstract the features from the new situation and search for relevant past experience (Salomon & Perkins, 1988). Forward-reaching high road transfer involves students abstracting what they learnt and applying the knowledge to another context (Salomon & Perkins, 1988).

Transfer of strategies may be affected by the similarity between the contexts of learning and application. A higher similarity in contexts may facilitate transfer (Gluck, 2014). That is, the more similar the new situation is to the situation of learning the strategies and knowledge, the easier the transfer of strategies and knowledge. Retrieval is affected by the similarity of the hints formed during encoding and in the new situation. If the hints found in the new situation are similar to those formed during encoding, a higher possibility exists of a successful retrieval of related knowledge and strategies. However, the transfer of self-regulatory strategies has not been sufficiently investigated (Raaijmaker et al., 2018; Schuster et al., 2020). Studies have typically adopted a knowledge transfer test to assess students' ability to apply knowledge in new cases (e.g., Bannert, 2015; Müller & Seufert, 2018). Schuster et al. (2020) studied primary students in two groups: one group received cognitive prompts and the other received self-regulatory prompts and cognitive prompts. The authors reported that those receiving self-regulatory prompts in addition to cognitive prompts could better transfer self-regulatory strategies to a similar learning task. Likewise, Raaijmaker et al. (2018) studied video-based modeling and reported that the experimental group successfully transferred monitoring and selecting tasks in solving problems of a different subject.

These few studies demonstrated that training for self-regulation is beneficial to transferring self-regulatory strategies. However, existing studies only focused on regulation of cognition. To address this research gap, this study also investigated whether regulation of motivation, behaviour and context can be transferred. To the best of my knowledge, no study has been conducted on the transfer of self-regulatory strategies within the flipped classroom. Thus, the design of this study considered transfer from the pre-class asynchronous mode to the in-class synchronous mode. Additionally, the study also explored the possibility of transferring self-regulatory strategies from the virtual flipped classroom to regular online classes.

2.5 Summary of Research Gaps

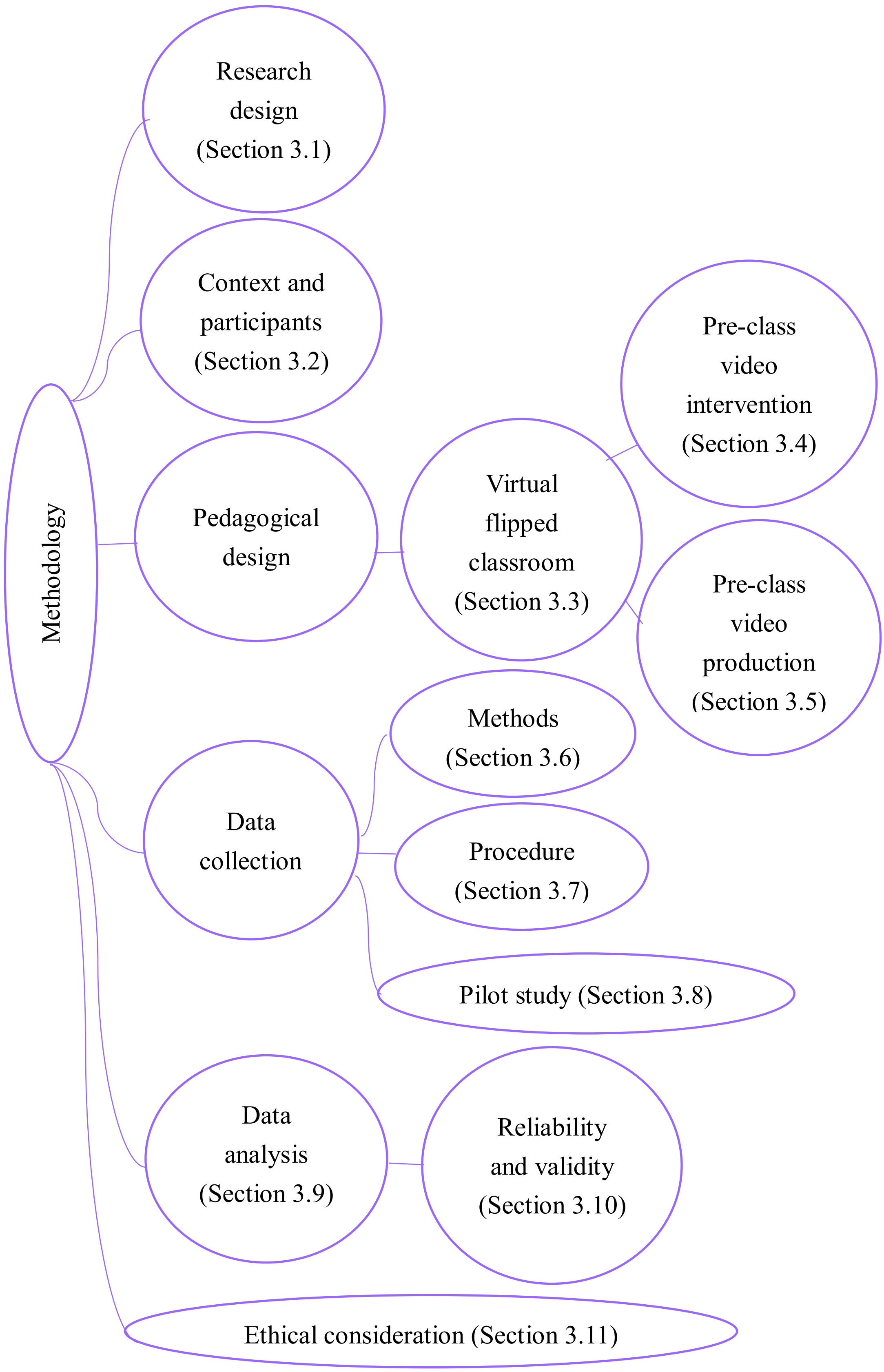
This section summarizes the major research gaps of self-regulation training in existing studies. Self-regulation training of all four aspects of self-regulation is understudied, leading to the need of gaining a holistic understanding of self-regulation. Self-regulation studies mostly focus on outcomes, neglecting the process of self-regulation. Yet, it is necessary to study the process in addition to outcomes because self-regulation can be seen as a dynamic process rather than a static concept. Self-regulation training of these two methods in the primary school context is scarce. There has not yet been studies comparing prompts and modeling in self-regulation training. The virtual flipped classroom is an emerging trend in the empirical studies. To the best of my knowledge, self-regulation training via prompts or modeling in the virtual flipped classroom has not yet been explored. In addition, how students use prompts in learning and applying self-regulation during the pre-class stage has not yet been explored. Furthermore, adaptation of strategies for self-regulation is an understudied area. Transfer of strategies from the pre-class to in-class stages has not yet been studied. Therefore, this study aims to address these research gaps.

Chapter 3 Methodology

This chapter introduces the methodology of the study. It begins with the research design (Section 3.1) and describes the context and participants (Section 3.2). The chapter also introduces the pedagogical design for enhancing self-regulated learning in the virtual flipped classroom (Section 3.3). The chapter then introduces prompts and modeling for pre-class learning (Section 3.4) and the preparation of learning materials – video production (Section 3.5). Additionally, the chapter describes the methods of data collection for measuring self-regulation (as a learning outcome and as a process) and the ability to give a Chinese speech and retrieving opinions from students, parents and the teacher (Section 3.6). The data collection procedure (Section 3.7) and the pilot study (Section 3.8) are then described. The chapter also describes data analysis (Section 3.9) and discusses data reliability and validity (Section 3.10). Finally, the ethical consideration of the study is presented (Section 3.11). Figure 3.1 illustrates an overview of the methodology.

Figure 3.1

Overview of the Methodology



3.1 Research Design

3.1.1 Justification for Using Mixed Methods

Quantitative and qualitative research have distinct features. Quantitative research became prominent in the social sciences in the early 19th century and is based on positivism (Creswell, 2007). In ontology, positivists believe in objective reality (Bergin, 2018). Thus, scientific methods, in the form of stringent experiments, should be conducted and hypotheses tested rigorously using statistical methods (Tashakkori & Teddlie, 2010). The methodology, which includes research design and data analysis, is mainly deductive. That is, they are derived from theories that are the core basis guiding studies. In this study, Pintrich’s (2000) model of self-regulated learning is the core theoretical framework guiding this study.

In contrast, qualitative research, which involves detailed evaluations of human experience, has gained increasing attention since the 20th century (Greene, 2007). According to ontology, interpretivists believe that the understanding of reality is subjective (Creswell, 2007) because human experience can be ambiguous (Greene, 2007). Qualitative research aims to gain an in-depth understanding of participants’ experience from jointly constructed data by the researcher and participants (Olson, 2011). In this study, qualitative data capture students' experiences and provide a deeper understanding of how they applied self-regulated learning. Additionally, qualitative research design with a strong contextual focus (Greene, 2007) makes it possible to collect emerging data during the process of learning self-regulation in this study.

The fundamental differences between quantitative and qualitative research have facilitated the debate on mixed methods research. Guba and Lincoln (2005) argued that quantitative and qualitative research have distinctive characteristics that make it inappropriate to combine the two. However, other scholars have support mixed methods research by arguing that the distinctive characteristics between quantitative and qualitative research can effectively complement the weaknesses of each (Tashakkori & Teddlie, 2010).

Although the proponents of mixed methods generally accept paradigm pluralism, have differing views on how to mix them. For example, people who hold the 'complementary strengths' stance believe that mixed methods are applicable by keeping the two paradigms separate, whereas people who hold the 'aparadigmatic' stance support the mixing and combination of the paradigms in various ways (Creswell, 2010, p. 54). This study agrees with the latter, and it combines the two paradigms to fully capture self-regulated learning. Using mixed methods, researchers can select the most suitable approach to answer their research questions (Tashakkori & Teddlie, 2010). The primary aim of using mixed methods is to obtain a more comprehensive understanding of the subject matter through inductive and deductive means (Tashakkori & Teddlie, 2010).

However, scholars have not reached consensus regarding the types of mixed method research. The most common types of mixed method research in the literature include concurrent or parallel mixed method research and sequential mixed research (which is further subdivided into exploratory or explanatory research, embedded mixed methods research and triangulation mixed methods research) (Creswell, 2019; Tashakkori & Teddlie, 2009). According to Tashakkori and Teddlie (2009), these studies are characterised by the following features. In concurrent or parallel mixed methods research, the qualitative and quantitative approaches are used simultaneously and weighted equally. In sequential mixed methods research, the exploratory approach emphasises and starts with the qualitative approach, whereas the explanatory approach emphasises and starts with the quantitative approach. In the triangulation mixed methods approach, qualitative and quantitative approaches are used to triangulate the data. Although this study is not based on the triangulation mixed methods approach, the integration of mixed methods can still enable triangulation, thus enhancing the credibility of the findings and interpretation.

Other advanced types of mixed methods design include the intervention design, which involves the sequential and concurrent use of quantitative and qualitative approaches (Creswell, 2015), and on which this study is based. It started with the quantitative method to measure the original level of self-regulated learning of both groups. It then collected quantitative and qualitative data concurrently during the course and self-regulated learning data after the course. The details are described in the methods and process of data collection (Sections 3.6 – 3.7). Mixed methods can capture the progression and learning outcomes of self-regulated learning and thus provide a broader understanding of the intervention effects.

3.1.2 Mixed Methods and Action Research

As mixed methods have frequently been used in action research studies in the twenty-first century, the method is now considered the pragmatic paradigm (Ivankova & Wingo, 2018). Action research is similar to mixed methods research in data collection but with a strong emphasis on solving the identified problem (Creswell, 2019). Mixed methods action research is used for integrating qualitative and quantitative methods to solve a problem (Clark & Ivankova, 2016). Action research aims to solve a particular problem in a specified context and to produce positive changes to the context (Clark & Ivankova, 2016;

Creswell, 2019).

The characteristics of action research can be identified from the similarities and differences between different action research models. Lewin (1948; 1997) termed the spiral of problem identification, planning, action and evaluation as action research. Stringer (2007) included observing, taking actions and reflecting in the spiral process. Mertler (2012) proposed planning, taking actions, developing and reflecting. Costello (2011) suggested steps of planning, taking actions, observing and reflecting. The models show that action research is systematic – it works through different stages in a stepwise manner. Although most models show the reflective nature of action research, the aforementioned models differ. Lewin (1946), Stringer (2007) and Costello (2011) suggested reflecting at the end of a cycle, whereas Mertler (2012) suggested reflecting after developing a plan for the next cycle. Costello (2011) and Stringer (2007) emphasised observation, but Lewin (1948) discussed data collection in general.

Action research studies the problem of the teacher teaching context (Ivankova & Wingo, 2018). Action research is suitable for the current study because the study is problem-based and aims to solve the difficulty posed by the lack of self-regulation for online learning during the COVID-19 pandemic. To solve the problem, students received training of self-regulation via prompts and modeling in an extracurricular activity using the virtual flipped classroom.

Although stringent scientific design such as random assignment and large sample size are required for quantitative studies, a less stringent approach is accepted in the action research. Quasi-experimental design is often used in the action research because of infeasibility in the random assignment of participants at schools or other ethical consideration (Clark & Ivankova, 2016). A control group was not included in this study because of ethical considerations; it is fairer for both groups to receive training on self-regulated learning at the same time. An intervention delayed approach was not used because it could pose differences in the length of the course and the total number of sessions. Apart from a quasi-experimental design, a small sample size, which is common for action research, is acceptable because action research aims to solve problems rather than generalising the research findings (Clark & Ivankova, 2016). In action research, the practitioner can work individually or as part of a team to implement the plan (Clark & Ivankova, 2016). In this study, I worked with a teacher to form a team. The teacher, not the researcher, was responsible for teaching for better objectivity in analysing the data and interpreting the findings.

3.2 Context and Participants

3.2.1 The School and the Extracurricular Programme

The participating school is a private primary school in Hong Kong. During the critical period of the COVID-19 pandemic, the lack of self-regulation became severe when the school suddenly transitioned from traditional face-to-face learning to online learning. The school offered various extracurricular programmes for students before the COVID-19 pandemic, including music, language, sports and arts. According to the teacher, she attempted to use a virtual flipped classroom in the Speech Club, but the students were still weak in self-regulation, making it suitable for testing the new intervention of teaching self-regulated learning through prompts and modeling. A four-week self-regulatory training course using the virtual flipped classroom that blends asynchronous pre-class online learning and synchronous in-class online learning was organised for the Speech Club.

3.2.2 Students

Forty-two student volunteers were recruited from the Speech Club. The students were randomly assigned to two groups. Each group comprised 21 students, with 7 students each in primary 4, 5 and 6. From the self-reported data collected via the pre-questionnaire, none of the students had learnt self-regulated learning before the study. Based on the teacher's observation, they were not particularly good at operating technological devices.

3.2.3 The Teacher and the Researcher

The teacher had 14 years of experience in teaching Chinese. Before the study, she was interested in enhancing self-regulation in the virtual flipped classroom because she had attempted the virtual flipped classroom, but the students were still weak in self-regulation. She desires to explore ways to continue the extracurricular programme under unexpected circumstances such as the COVID-19 pandemic. The teacher also had sufficient technological skills in video editing. The teacher taught the whole course in this study and wrote the expository text as the script for the pre- and the post-test because of her experience in setting and assessing speaking examinations for upper primary students. She also commented on students' formative performance during the course.

The researcher who is working in the same school had 10 years of teaching experience. The researcher (course and material designer) integrated Pintrich's (2000) theoretical framework in teaching self-regulated learning gradually throughout the course. She created videos for all of the questions using the online learning platform Edpuzzle for the prompts group, and she designed the scenes and a monologue reflecting the thought process of self-regulation. The researcher prepared all the PowerPoint slides for Chinese content after consulting with the teacher. The course content was validated by the teacher, and the researcher and teacher worked together to record, cut and combine segments to produce the videos. The researcher set all the questions for the exercises and let the teacher make amendments in order to ensure the appropriateness of level of difficulty and grammatical accuracy. The researcher prepared the exercises using Google Form. The researcher also discussed with the teacher adaptations to the assessment rubric for the speaking tests.

3.2.4 The Additional Rater of Lesson Observation

Another Chinese teacher with 12 years of teaching experience was also invited to take part in the research as one of the lesson observation raters. She observed all four sessions in each of Lessons 1 and 8.

3.2.5 The Assessor of the Speaking Test

Another Chinese teacher with 14 years of teaching experience assessed the pre-speaking and post-speaking tests.

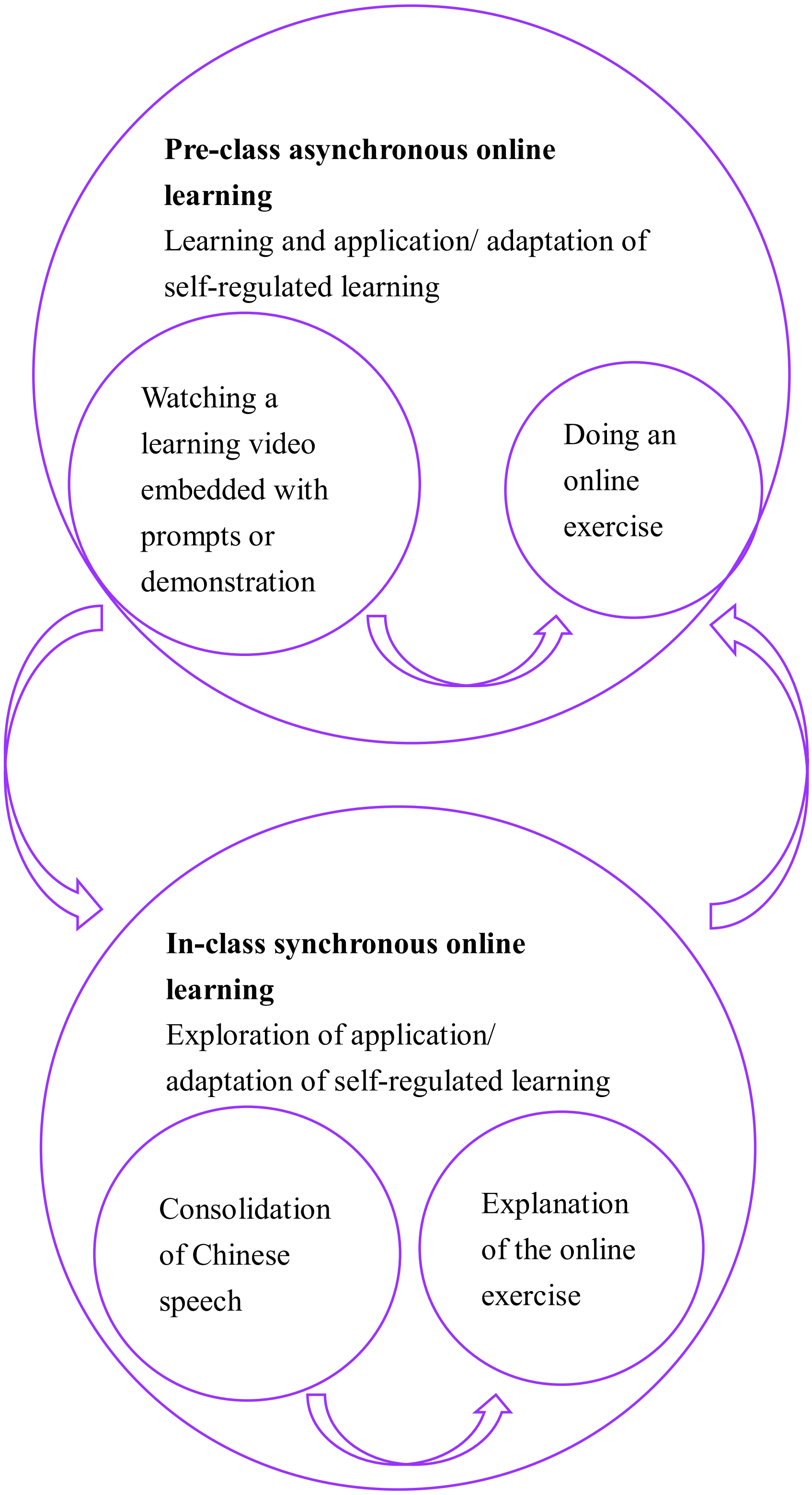
3.3 Pedagogical Design for Enhancing Self-regulated Learning

3.3.1 Structure of the Virtual Flipped Classroom

The teaching of self-regulated learning was embedded in the Chinese speech extracurricular programme. The students learnt both Chinese speech as well as self-regulated learning in the course. Each virtual flipped classroom lesson was divided into two stages: the pre-class and in-class stages. The pedagogical design for enhancing self-regulated learning in the virtual flipped classroom is shown in Figure 3.2.

Figure 3.2

Pedagogical Design for Enhancing Self-regulated Learning in the Virtual Flipped Classroom



The students learnt both self-regulation and Chinese speech during each pre-class stage lesson. The group learning via modeling learnt self-regulation by watching the modeling segment and then applied self-regulation when watching the video about Chinese speech. The other group learnt self-regulation through prompts in the form of multiple-choice questions and options that were embedded in the pre-class video to provide possible ways of self-regulation. After watching the pre-class video, the students completed an exercise to assess their understanding of Chinese speech. Once they submitted the Google form, their answers were automatically marked by the system, and they could see their mistakes with the correct answers. In other words, students could learn and assess their understanding of Chinese speech in the pre-class stage. More importantly, they could learn and apply self-regulated learning while watching the pre-class video.

After the pre-class learning, the students further consolidated their knowledge about Chinese speech during the synchronous online class. The teacher discussed common mistakes and explained difficult questions in the exercise. Furthermore, the students consolidated their knowledge by individual practice, as each student practised in the online class. Other activities included asking them questions to assess their understanding, summarising major ideas in the video and providing elaboration when necessary. As no self-regulatory support or encouragement was given for synchronous online classes, the students could apply the new self-regulated learning strategies as they deemed necessary. As such, the researcher could determine whether the self-regulation acquired in the pre-class phase can be transferred to synchronous online classes. The learning and application of self-regulated learning in the pre-class stage could thus be further explored in the in-class stage.

3.3.2 Design of Learning Content

Scaffolding was also applied in teaching Chinese speech. The course began with students' prior knowledge of solo-verse speaking: reading poems aloud. This was followed by different skills for giving speech from the second to the fifth lessons. The sixth lesson focused on the analysis of speech scripts. The seventh lesson covered the use of different speaking skills for giving speech. The eighth lesson focused on psychological preparation before speech contests. Thus, the students could learn to analyse scripts, enhance their speech with different skills and practically apply the skills, which are useful steps for preparing for speech contests.

3.3.3 Designing the Training of Self-Regulation

The training of self-regulation is based on the core theoretical framework of

Pintrich (2000), which covers four aspects: regulation of cognition, behaviour, context and motivation. These four aspects were taught consecutively. Strategies for regulating the four phases were introduced for each aspect; after the students learned one aspect, a new aspect would be added. For example, the first and second lessons focused on the regulation of cognition, whereas the third lesson focused on behaviour in addition to cognition. A new aspect was added to the previous one to integrate the four aspects gradually and smoothly. Table 3.1 describes how the four aspects were integrated in the course.

Table 3.1

Integration of Regulation of Cognition, Behaviour, Context and Motivation in the Course

	New aspect embedded	Aspect(s) consolidated
Lesson 1 and Lesson 2	Regulation of cognition	
Lesson 3 and Lesson 4	Regulation of behavior	Regulation of cognition
Lesson 5	Regulation of context	Regulation of cognition Regulation of behavior
Lesson 6	Regulation of motivation	Regulation of cognition Regulation of behavior Regulation of context
Lesson 7 and Lesson 8		Regulation of cognition Regulation of behavior Regulation of context Regulation of motivation

The students learnt four phases of the four aspects of Pintrich's (2000) model as described in Table 3.2. For cognitive planning, students set a goal and activate their prior knowledge about the learning content and of how to regulate their learning. In cognitive monitoring, students judge whether they understand the learning content. In cognitive controlling, students choose the learning strategies such as repeating ideas to enhance memory, locating key ideas, expressing key ideas in their own words, and organising ideas in a concept map. In cognitive reflection, students reflect on and evaluate what they have learned.

The regulation of behaviour was introduced after the students learnt the regulation of cognition. In behavioural planning, the students plan the length of time for pre-class learning and their daily timetable. In behavioural monitoring, students become aware of time spent on learning. In behavioural controlling, students decide whether or not to persist. In behavioural reflection, students reflect on their decisions about the choices they made, such as being persistent.

The regulation of context was added after learning regulation of cognition and behaviour. In contextual planning, students think about how they feel about the place where they are learning. In contextual monitoring, they think about whether the learning context distracts them. In contextual controlling, they think about how they can change the learning context to make themselves more focused. In contextual reflection, they reflect on the changes they made about the learning context.

Finally, regulation of motivation was integrated into the three aspects introduced. In motivational planning, students think about their self-efficacy in learning the topic. In motivational monitoring, students observe whether they are motivated in learning. In motivational controlling, students choose a strategy to motivate themselves to learn. In motivational reflection, students reflect on their feelings.

Table 3.2

Self-regulation Training in the Course (Based on Pintrich's (2000) Model)

Aspects	Description of the Phases of Individual Aspects
Regulation of Cognition	Cognitive planning ✓ Set a goal ✓ Recall prior knowledge about the learning content ✓ Recall prior knowledge about self-regulation Cognitive monitoring ✓ Judge understanding of the learning content Cognitive controlling ✓ Choose learning strategies Cognitive reflection ✓ Reflect on and evaluate what was learnt
Regulation of Behaviour	Behavioural planning ✓ Plan the length of time for pre-class learning ✓ Plan a daily timetable Behavioural monitoring ✓ Become aware of time spent Behavioural controlling ✓ Decide whether or not to persist in learning Behavioural reflection ✓ Reflect on decision made like being persistent
Regulation of Context	Contextual planning ✓ Think about how they feel about the place for learning Contextual monitoring

	✓ Think about whether the learning context distracts them Contextual controlling ✓ Think about how to change the learning context Contextual reflection ✓ Reflect on the changes made to the learning context
Regulation of Motivation	Motivational planning ✓ Think about their self-efficacy in learning the topic Motivational monitoring ✓ Observe whether they are motivated in learning Motivational controlling ✓ Choose a strategy to motivate themselves to learn Motivational reflection ✓ Reflect on their feelings

3.4 Design of Pre-class Videos

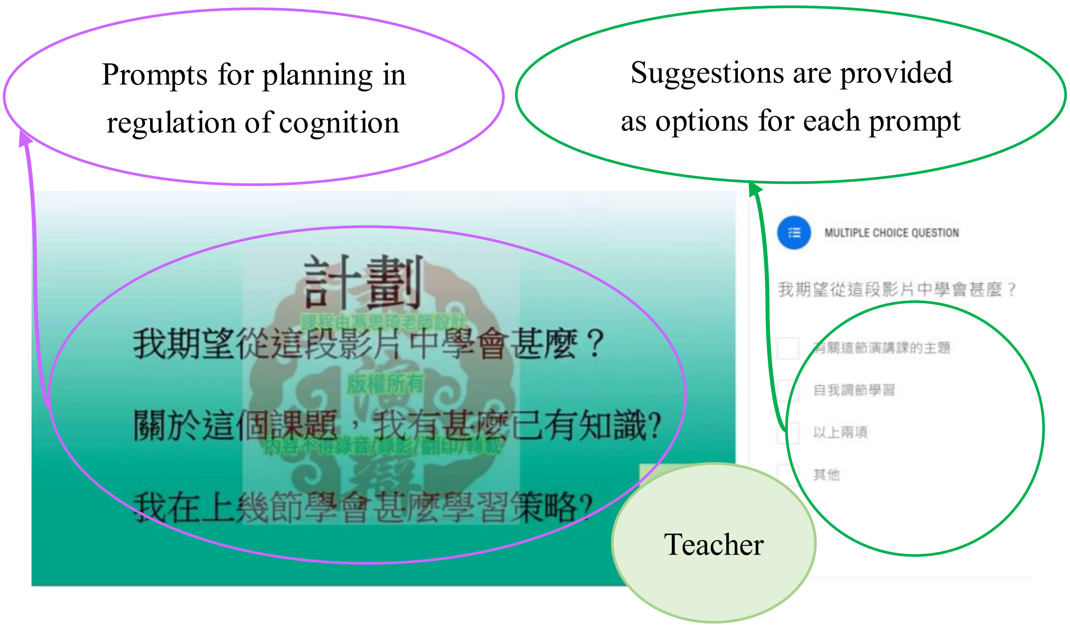
In addition to Chinese learning content, self-regulation training was embedded in the pre-class videos for both groups. As described in Section 3.3.3, both groups received the training of regulation of cognition, behaviour, context and motivation in a stepwise and additive manner. The strategies for self-regulation covered in the course for the two groups were the same. Appendix B shows an example of how regulation of context was supported in the two groups in Lesson 6.

3.4.1 Embedding Prompts in Pre-class Videos

The videos lasted about 10 minutes each. Prompts embedded in the instructional videos are mainly in form of multiple-choice questions and options which provide suggestions for regulating the four aspects. Figure 3.3 shows the screenshot of the prompts for planning in the regulation of cognition. Questions for planning were added immediately after the learning topic to help the students plan for their learning while watching the video. The options for each prompt were suggestions for the students.

Figure 3.3

The Screenshot of Prompts for Planning in the Regulation of Cognition



Questions for monitoring and controlling were embedded throughout the video, encouraging the students to monitor and control different aspects while watching. Figure 3.4 shows the screenshot of the prompts for monitoring and controlling. The questions of monitoring and controlling for each aspect were listed on the same slides because these two stages usually happen simultaneously in real practice, and the four stages can be applied in a non-sequential order (Pintrich, 2000).

Figure 3.4

The Screenshot of Prompts for Monitoring and Controlling in the Regulation of Cognition and Behaviour

Questions for reflection were added at the end of the video to guide the students in reflecting on the four aspects. The questions were set based on the concepts listed and explained in Pintrich's (2000) model. Figure 3.5 shows the screenshot of the integrated prompts for reflection. Students were prompted to reflect on all four aspects with options to facilitate reflection.

Figure 3.5

The Screenshot of Integrated Prompts for Reflection in Regulation of Cognition, Behaviour, Context and Motivation

Most of the concepts of Pintrich’s (2000) model were included. Planning and negotiation of learning tasks were not included because we had assigned learning tasks for the students and had set a teaching schedule. From my teaching experience in primary and secondary education, the planning and negotiation of learning tasks are less common at the primary level. Therefore, we focused on the regulation of the environment. Multiple-choice questions were given in Edpuzzle to prompt students in the group receiving prompts because the students were unfamiliar with typing Chinese characters. There was only one open-ended question for students – the planning of time for learning tasks – as the students might have had different activities.

3.4.2 Embedding Video Segment for Modeling

The teacher demonstrated how to think and regulate learning not only by actions, but also by verbalising and writing her thoughts. The teacher demonstrated self-regulated learning without explaining her actions to ensure that the two groups – prompts and modeling – were provided with similar information. Figures 3.6 and 3.7 show examples of screenshots using actions. In Figure 3.6, the teacher demonstrated regulating context by using a remote control to turn off an electrical appliance. In Figure 3.7, the teacher demonstrated regulation of time by pressing the start button on a mobile phone timer.

Figure 3.6

The Screenshot of Demonstrating Action for Regulation of Context

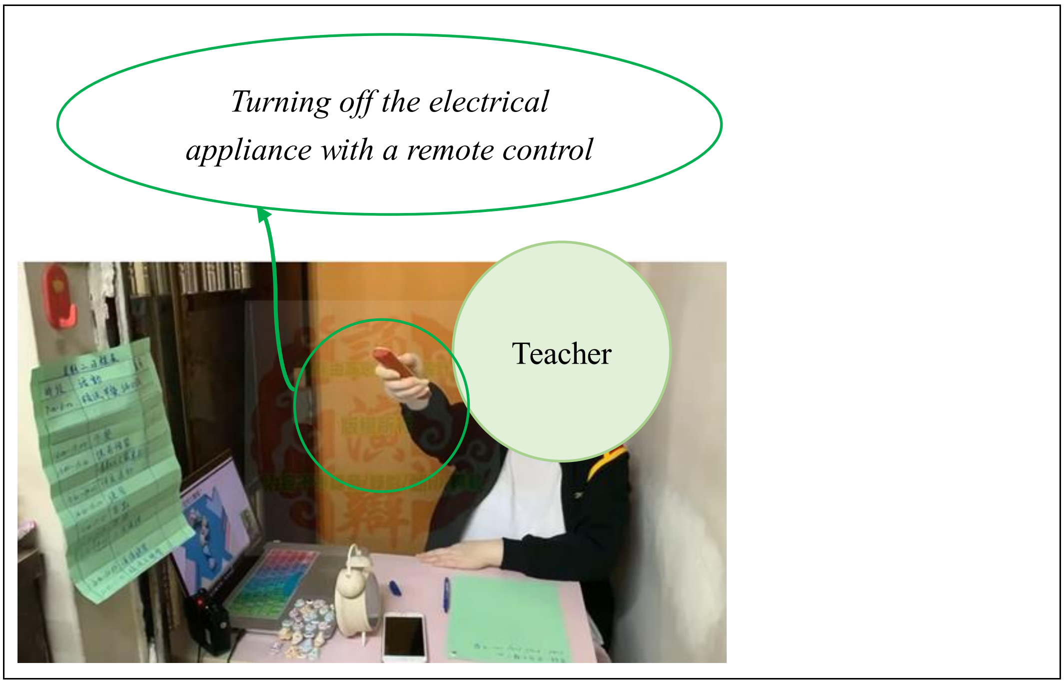


Figure 3.7

The Screenshot of Demonstrating Action for Regulation of Behaviour

Verbalisation is one of the ways to visualize what someone is thinking, and teachers should demonstrate how they think while learning using this method (Hartman, 2001). By visualising a learner's thought, the whole process of self-regulated learning can be represented more clearly in the model. The demonstration was video-taped in a flat instead of the school to model a real environment of home learning. The teacher put on a school track jacket to play the role of a student. This aimed to facilitate students' understanding of the demonstration of how to regulate their learning. The modeling segment was added before the learning content.

3.4.3 Comparison of Intervention of the Two Groups

The prompts and modeling groups received the same learning content in every lesson. The videos were embedded with the teacher's lecture of Chinese speech using the picture-in-picture effect to make the teacher's talk livelier. The video segments for the learning content were supported with pictures, and different backgrounds were used for different videos. Background music was played softly throughout the videos to make them more enjoyable. In in-class learning, both groups received the same training from the same teacher.

In addition, the content and progress of self-regulated learning were the same. The strategies demonstrated in the videos were all included in the options suggested for the group receiving prompts in videos. The difference between the groups was the modality of presentation. Prompts were presented in words and sound for the group learning via prompts. Self-regulation was demonstrated through images and sound from the teacher for the group learning through modeling.

3.5 Preparation of the Learning Materials for the Virtual Flipped Classroom

3.5.1 Producing Videos for the Virtual Flipped Classroom with Prompts Group (FCP group)

To prepare each video for the FCP group, we first recorded the teacher's lecture and prompts using our mobile phone cameras. Next, we added the segment of the teacher's speech to the slides with the picture-in-picture effect using Perfect Video video production software. We also created a QR code linking to the online exercise and added it to the video. Furthermore, we added background music at sufficiently low volume that the teacher's speech could be heard. The edited video was uploaded to Edpuzzle as a pre-class activity. I added self-regulatory prompts and a note at the end for the online exercise website link. Providing both the QR code and website link aims to make it more convenient to direct students to the online exercise. They might use different electronic devices and might have preference. Therefore, they might choose to get access the online exercise.

Afterwards, I assigned the video to the FCP group manually.

3.5.2 Producing Videos for the Virtual Flipped Classroom with Modeling Group (FCM Group)

The production of each video for the FCM group was more complicated. Each video consisted of the learning content lecture and modeling segment. For the modeling segment, the teacher demonstrated how she self-regulated her learning while watching the pre-class video. First, we made a sample pre-class video of Chinese that the teacher would watch. Then, we captured the modeling segment – that is, how the model self-regulated her learning while watching the sample Chinese lesson. After that, we attached the modeling segment to the beginning of the video. Similarly, we added background music at sufficiently low volume to hear the teacher's speech. Similar to the other group, we also added a QR code for the online exercise. The video was uploaded to Edpuzzle after production, and the online exercise website link note was added. Finally, I assigned the video to the FCM group manually.

3.6 Data Collection

To obtain a comprehensive understanding of self-regulated learning, mixed methods were used to collect data. A dynamic view of self-regulated learning refers to changes during learning progression, whereas a static view of self-regulated learning refers to the learning outcomes. For example, notes using qualitative means, interviews and lesson observations may show students' progression in learning self-regulation, whereas questionnaires using quantitative means can measure self-regulated learning as a learning outcome. Table 3.3 provides an overview of the data collection methods (indicated with ticks) used to answer the research questions. Table 3.3 shows the methods for collecting data from pre-class learning (P) and in-class learning (I) for questions related to the process of learning.

Table 3.3

Overview of Data Collection Methods

	Notes	Inter-view	Log data	Obser-vation	Question-naire	Speaking test
RQ1a *Extent* of effect of prompts and modeling on the regulation of *cognition*		✓			✓	
RQ1b *How* prompts and modeling affect the regulation of *cognition*	✓P ✓I	✓P ✓I	✓P			
RQ1c *Extent* of effect of prompts and modeling on the regulation of *behaviour*		✓			✓	
RQ1d *How* prompts and modeling affect the regulation of *behaviour*	✓P ✓I	✓P ✓I		✓I		
RQ1e *Extent* of effect of prompts and modeling on the regulation of *context*		✓			✓	
RQ1f *How* prompts and modeling affect the regulation of *context*	✓P ✓I	✓P ✓I		✓I		
RQ1g *Extent* of effect of prompts and modeling on the regulation of *motivation*		✓			✓	
RQ1h *How* prompts and modeling affect the regulation of *motivation*	✓P ✓I	✓P ✓I		✓I		
RQ2 Difference in *learning outcome (Chinese speech*)						✓
RQ3 *Perceptions* of students, their parents and the teacher		✓			✓	

3.6.1 Measuring Self-regulation as Learning Outcome

It is crucial to measure the process and learning outcome of learning self-regulation (Winne & Perry, 2000). In this study, the process and learning outcomes of learning self-regulation were measured using different methods. A questionnaire was administered to measure the learning outcomes of self-regulated learning. Notes, log data on rewinding, lesson observations and individual student interviews were applied to measure the self-regulated learning process.

3.6.1.1 Questionnaire. Questionnaires are widely used to measure the learning outcomes of self-regulated learning (Winne & Perry, 2000). The Motivated Strategies for Learning Questionnaire (MSLQ) was chosen for a number of reasons. First, MSLQ was developed by Pintrich (1991), who also developed the theoretical framework guiding this study. As the same scholar wrote the questionnaire and core theoretical framework, there is good alignment between them – what the MSLQ measures can match the aspects of the theoretical framework. However, it is worth noting that the categories of MSLQ are not exactly the same as the four aspects as it was not solely developed for measuring the self-regulated learning of his model. The shortened version measures motivation in terms of intrinsic value and self-efficacy. It also measures the use of cognitive strategies and overall self-regulation. If no item is added to the shortened version, only cognition, motivation and overall self-regulation can be measured. To measure the remaining aspects of the theoretical framework, behaviour and environment, the categories of MSLQ, time and study environment of the original version were added. This combination enables a more comprehensive understanding of improvement in all four aspects taught by the intervention in the speaking course.

Another reason for using MSLQ is its documented ability to measure self-regulated learning. Scholars have tested its reliability in measuring self-regulated learning in both western and eastern countries (including Hong Kong) (e.g., Lee, Yin & Zhang, 2010; Rao et al., 2000; Rao & Sachs, 2016; Sachs et al., 2001). The cultural and age level suitability of the questionnaire was further confirmed by Sachs and his colleagues (2001, 2010, 2016), who translated the questionnaire into Chinese and tested it with 1,292 primary five, primary six and secondary one students (Sachs et al., 2001), 1,354 lower secondary students in Hong Kong (Lee, Yin & Zhang, 2010) and 477 secondary one to four students (Rao & Sachs, 2016). The reliability of the instrument is discussed in the reliability and validity section (Section 3.10).

The Chinese version of the questionnaire was adapted to make it more suitable for this study. As discussed above, time and study environment from the original MSLQ were added to make the measurement of the questionnaire more closely related to the aspects that the study intended to measure and thus to ensure the construct validity of the study. Additionally, the general terms were changed to specific terms. For instance, 'class' was replaced with 'the public speaking class', as in 'compared to other students in the public speaking class'. To assess the use of cognitive strategies, 'public speaking' was added to these words, such as, 'when I learn public speaking'. 'School' was changed to 'the course', as in 'I like what I am learning in the course'. 'Readings', 'my course work' and 'study materials' were changed to 'pre-class learning videos' because videos were provided instead of readings – for instance, 'I make sure I keep up with pre-class learning videos'. The aim of amending the expressions was to facilitate students' understanding and make the expressions clearer and more suitable for the study.

Although questionnaires have been widely used to measure self-regulated learning, it has been argued that they should be supplemented with other means of measurement. One reason is that questionnaires use self-reported data, which rely heavily on participants' memory (Greene et al., 2011). If the participants have poor memory, the self-reported data may not accurately represent the real situation. Additionally, it has been argued that self-regulated learning should also be measured as a process (Greene et al., 2011), as it can be viewed as a learning process and not as a trait (Schmitz et al., 2011). Therefore, this study also measured self-regulated learning as a process.

3.6.2 Measuring Self-Regulated Learning as a Process

To ensure a thorough understanding of change in self-regulated learning, self-regulation was measured not only as an outcome by using questionnaires but was also measured as a process. The process of self-regulated learning was measured using notes, log data of video rewinding, observation of synchronous online classes and individual student interviews. The measurements of each method are described in the following subsections.

3.6.2.1 Notes. Students' notes were collected on a voluntary basis to gain an understanding of self-regulated learning, mainly for regulation of cognition. Students were told that they could write notes on pieces of white paper or notebooks. The format of the notes was not restricted. They could write on blank paper as they desired. The format of notes was not provided because of the following reasons. Providing the format of notes probably involves providing some headings to students. These headings might become prompts for both groups and thus might affect the results. Prompts in learning journals have positive effects on learning (Bannert, 2016). Using blank paper instead of providing format of notes can prevent any possible intervening effects of other factors other than the two interventions of this study. Use of blank paper for notes ensured that the FCM group did not receive prompts while watching the Chinese content in the videos. This also ensured that the FCP group only received prompts from videos and not from learning journals. Apart from the format, students could decide whether and when to write notes for pre-class or in-class learning. Notes are particularly useful for showing regulation of cognition, as they can be used to record learning content during pre-class and in-class learning. However, they are only a minor supplement for regulation of behaviour, context and motivation during pre-class and in-class learning.

3.6.2.2 Log data. When students monitored their understanding and noticed that they did not understand the content of pre-class videos, they tended to rewind. Thus, rewinding is one of the means of controlling cognition during pre-class learning. The number of students rewound the video of each lesson was counted, and the percentage of students rewinding the video of each lesson was recorded on an Excel file. As the rewinding rate was for the pre-class regulation of cognition and notes were mainly for pre-class and in-class regulation of cognition, other methods were added to measure the regulation of other aspects of pre-class and in-class learning. These methods include lesson observation and interviews.

3.6.2.3 Lesson Observation. Observation is also used to measure students' progress in learning self-regulation for in-class online synchronous learning. There were four groups for the Zoom lessons, two sub-groups for the FCM group and two sub-groups for the FCP group. The observations of all four groups were based on the lesson observation form. The observation form was completed at a five-minute interval. Table 3.4 lists all of the indicators and their descriptions. The indicators were brainstormed based on my previous teaching experience in synchronous online classes. Based on Pintrich's (2000) model, the possible indicators were grouped into different aspects including regulation of behaviour, regulation of context and regulation of motivation. Indicators of regulation of behaviour include leaving seats, leaving Zoom, asking the teacher to repeat questions and behaving well after misbehaviour. The indicators of regulation of behaviour imply persistence to learn. Indicators of regulation of context include family members walking nearby, background noise when unmuted, looking around, talking to family members, making siblings go away, wearing earphones and playing with things. The indicators of regulation of context shed light on whether students can successfully control the context. Indicators of regulation of motivation include turning off the camera, using a confirmed tone in practice and using a confirmed tone in answering questions. The use of a confirmed tone implies students' self-efficacy, whereas turning off the camera may imply a level of concentration resulting from learning motivation.

Table 3.4

Items for Lesson Observation during In-class Sessions

Items observed	Description
Category A: Regulation of behaviour	
1. Leaving seat	A student stands up and walks away.
2. Leaving Zoom	A student leaves the Zoom meeting.
3. Requesting that the teacher repeats questions	After the teacher asks a question, a student requests that the teacher repeats the question.
4. Behaving well after misbehaviour	A student behaves well and learns after misbehaving.
Category B: Regulation of context	
5. Family members walking nearby	A family member walks near a student.
6. Hearing background noise when unmuted	When a student unmutes the microphone, the sound of television or family members' chat can be heard.
7. Looking around	A student turns to look at people or things around.
8. Talking to family members	A student turns the head, talks or laughs. There is visible mouth movement or facial expression of communication.
9. Making siblings go away	A student shows a gesture such as pushing siblings away or pointing at the door to stop disturbances from siblings.
10. Wearing earphones or headphones	A student wears earphones or headphones during the Zoom lesson.
11. Playing with things	A student plays with toys, stationery or hair. A student keeps changing the personal background displayed in Zoom.

Category C: Regulation of motivation	
12. A confirmed tone in practice	A student's tone in practising speaking is assertive. There is no hesitation or long pausing.
13. A confirmed tone in answering questions	A student's tone in answering questions is assertive. There is no hesitation or long pausing.
14. Turning off the camera	A student turns off the camera during in-class learning.

3.6.2.4 Individual Student Interviews. In addition to the above methods, all 42 students were interviewed about the self-regulation strategies they used for regulating cognition, behaviour, motivation and context during pre-class asynchronous and in-class synchronous online learning. This study also examined the transfer of self-regulation from asynchronous to synchronous online learning. The students were interviewed on how they self-regulated their learning in asynchronous and synchronous online learning in the virtual flipped classroom. Additionally, the students were interviewed on regularly taking online classes after the course to understand the effect beyond the virtual flipped classroom to explore the possibility of transferring self-regulation to regular online classes. Open-ended questions were asked during the semi-structured Zoom interviews, such as 'During regular online classes, which frequently used strategy do you think is the most useful for regulating context? Why?'. The students' descriptions of their experiences could provide information on how they practically applied self-regulated learning during pre-class and in-class learning in the virtual flipped classroom and in regular online classes.

3.6.3 Measuring Ability to Give a Chinese Speech

Students' overall ability to give a Chinese speech was measured by pre- and post-speaking tests. In the pre-speaking test, students were given an expository text explaining the advantages of saving money. They recorded their two-minute speech for the teacher before the course started. During the course, the teacher did not explain the expository text, nor did the students practise it during any pre-class or in-class sessions. After the course, they were given the same expository texts. The same expository text was used to compare the changes in learning outcomes in giving the same speech before and after the course. Video assessment was used with reference to other public speaking competitions. During the COVID-19 pandemic, public speaking competitions such as Hong Kong Schools Speech Festival and Hong Kong Youth Cultural and Arts Competition also required participants to submit videos.

An assessment rubric was adapted from International Toastmasters Club of Taiwan (2021). This assessment rubric was chosen for the following reasons. First, it was explicitly designed for assessing Chinese speech. Second, it has been used to assess the performance of giving Chinese speeches in Asian Chinese, making it suitable for the participants of this study. Third, the assessment items were in Chinese, which is the first language of the assessor.

To make the assessment items more comprehensible, description for each grade level of each item was added to the rubric. The assessment rubric has three categories – skills, expression and pronunciation (Table 3.5). The ratio of marks allocated for the different grade levels includes *excellent*, *very good*, *good* and *fair*. The first category is skills, which is related to the goal of delivering a clear message. It is subdivided into 'stress' and 'pausing', which were learnt in the course. The second category is expression, which consists of non-verbal communication (eye contact, facial expression, hand gesture and posture), sound focusing on tone variation and confidence. The third category is pronunciation.

Table 3.5

Graded Description Added to the Assessment Rubric

Category 1: Skills - Achieving the goal of delivering a clear message It measures the clarity of the message through the use of stress and pausing.	
Items	Grade description
Stress	Excellent The student can effectively use stress to enhance the clarity of message to achieve the goal. Very good The student can use stress to enhance the clarity of message to achieve the goal. Good The student can barely use stress to enhance the clarity of message to achieve the goal. Fair The student has room for improvement in using stress to enhance the clarity of message to achieve the goal.

Pausing	Excellent The student can effectively use pausing to enhance the clarity of message to achieve the goal. Very good The student can use pausing to enhance the clarity of message to achieve the goal. Good The student can barely use pausing to enhance the clarity of message to achieve the goal. Fair The student has room for improvement in using pausing to enhance the clarity of message to achieve the goal.
Category 2: Expression (Sub-category 1: Non-verbal communication)	
Items	Grade description
Eye contact	Excellent The student can effectively use eye contact to express the message to achieve the goal. Very good The student can use eye contact to express the message to achieve the goal. Good The student can barely use eye contact to express the message to achieve the goal. Fair The student has room for improvement in using eye contact to express the message to achieve the goal.
Facial expression	Excellent The student can effectively use facial expression to express the message to achieve the goal. Very good The student can use facial expression to express the message to achieve the goal. Good The student can barely use facial expression to express the message to achieve the goal. Fair The student has room for improvement in using facial expression

	to express the message to achieve the goal.
Hand gestures	Excellent The student can effectively use hand gestures to express the message to achieve the goal. Very good The student can use hand gestures to express the message to achieve the goal. Good The student can barely use hand gestures to express the message to achieve the goal. Fair The student has room for improvement in using hand gestures to express the message to achieve the goal.
Posture	Excellent The student can effectively use posture to express the message to achieve the goal. Very good The student can use posture to express the message to achieve the goal. Good The student can barely use posture to express the message to achieve the goal. Fair The student has room for improvement in using posture to express the message to achieve the goal.
(Sub-category 2) Tone variation	Excellent The student can effectively vary the tone to express the message to achieve the goal. Very good The student can vary the tone to express the message to achieve the goal. Good The student can barely vary the tone to express the message to achieve the goal. Fair The student has room for improvement in varying the tone to express the message to achieve the goal.
(Sub-category	Excellent

3) Psychological well-being: Self-confidence	The student is highly confident to express the message to achieve the goal. Very good The student is confident to express the message to achieve the goal. Good The student is barely confident to express the message to achieve the goal. Fair The student has room for improvement in being confident to express the message to achieve the goal.
Category 3: Pronunciation	
Pronunciation	Excellent The student can pronounce words highly accurately to express the message to achieve the goal. Very good The student can pronounce words accurately to express the message to achieve the goal. Good The student can pronounce words barely accurately to express the message to achieve the goal. Fair The student has room for improvement in pronouncing words accurately to express the message to achieve the goal.

3.6.4 Perceptions of Students, Parents and the Teacher

3.6.4.1 Individual Student Interviews and Questionnaires. In this study, students' opinions were examined through individual student interviews and questionnaires. One month after the course, all 42 students were individually interviewed using open-ended questions. Each interview lasted for 15–30 minutes. Owing to COVID-19 pandemic, all student interviews were conducted online via Zoom and were recorded in audio format. Each interview was divided into two main parts. The first part mainly focused on exploring how students regulated the four aspects during the pre-class and in-class stages of the virtual flipped classroom, as well as subsequent regular online learning. The self-report description of self-regulated learning in interviews provides valuable details on the process of self-regulation. The second type of questions aimed to find out their opinions on learning self-regulation in the virtual flipped classroom by using modeling and prompts (Section 3.6.2.4).

Students' opinions were also collected through three questionnaire items that aim to answer the Research Question three: What are the perceptions of students, their parents and the teacher on learning self-regulation using prompts and modeling in the virtual flipped classroom? There are three core concepts in this question including the two ways of scaffolding self-regulated learning, the virtual flipped classroom and learning self-regulation. Therefore, three questions were designed to address these three aspects. The first question -'I am satisfied with the speaking course' - concerns students' perceptions of the whole course in general – a course learning speaking with support of self-regulation. The second question - 'I like the learning mode of the course (the online flipped classroom)' - concerns the virtual flipped classroom. The third question concerns the perceptions of either prompts or modelling. FCM group was asked: 'I think demonstration in videos can help me learn self-regulated learning' and FCP group was asked 'I think prompts in videos can help me learn self-regulated learning' . The questionnaires for the two groups were the same except for the last item, as they learnt self-regulation through two methods. Students expressed their opinions using a 7-point Likert scale (1= strongly disagree and 7 = strongly agree). These items were designed to enable triangulation of the interview data. These items were constructed using positive statements that are commonly used in course evaluation forms and they are easily comprehensible. After constructing the items, I invited the teacher of the Speech Club to proofread them and to ensure that the items were comprehensible. As she also expected students could understand them. These items were added to the opinion section of the questionnaire.

3.6.4.2 Individual Parent Interviews. After the students were interviewed, a parent of each student was also interviewed, 42 in total. The parents were interviewed online (via Zoom) because of the COVID-19 pandemic. The interviews were recorded in audio format. Each interview lasted about 10 minutes. Open-ended questions were used to allow the interviewees to share their observation of their children's online learning and express their viewpoints on the virtual flipped classroom with modeling or prompts in learning self-regulation.

3.6.4.3 Individual Teacher Interview.

After the study, a teacher was interviewed for about 30 minutes. The interview had a semi-structured and face-to-face format. It was recorded in audio format. The interview focused on her experience with and opinions on virtual flipped classroom as well as her use of modeling and prompts to enhance students' self-regulation. Open-ended questions were set to allow her to express her viewpoints freely.

3.7 Procedure of Data Collection

In August, 42 students were recruited from the Speech Club. After obtaining parents' permission for participation, I assigned them randomly into two groups, one group learning self-regulation through prompts and the other group learning self-regulation through modeling.

The eight lessons were conducted over a month, with two lessons per week. We decided to hold a four-week course in August. Holding an intensive course could ensure that the effect is mainly due to the intervention. Students were not regularly learning at school while they took the course. Online learning implemented by the school in the new semester due to COVID-19 pandemic thus did not affect their performance. We obtained permission from the principal to hold the four-week online course.

Each lesson consisted of pre-class asynchronous and in-class synchronous online learning. For pre-class learning, each video was uploaded to the online learning platform with the QR code and link to the online exercise a day before in-class learning. We shortened the time between pre-class and in-class learning for the students to retain the knowledge acquired in the pre-class video. If the video was sent too early and students forgot the content, it would be more difficult for them to catch up with in-class learning. For students who had not completed the pre-class activity, a message was sent to their parents, reminding them to complete it before attending the in-class session. A reminder had to be sent to ensure that the virtual flipped classroom could be successfully implemented. Students' performances in online exercises were collected electronically by Google form. Note-taking was voluntary for students. Photos or scanned copies of students' notes taken for pre-class or in-class learning were collected.

The in-class online session was conducted via Zoom, an online platform for synchronous online learning. Before the real-time online session, the teacher and I reviewed the students' performance on each exercise. This review was to prepare the teacher to explain their recurrent mistakes and discuss difficult questions with them during in-class sessions. To provide opportunities for the students to participate, the class size for each in-class session was limited to 10–11 students. As each group had 21 students, each group was randomly divided into two sub-groups. There were two rationales for dividing them into two sub-groups. First, it ensured that each student could have enough opportunities to have speaking practice. Second, it can enhance the accuracy of lesson observation as observers could focus on half a group of students more easily than the whole group. The learning content and lesson flow were the same. Table 3.6 shows the arrangements for pre-class and in-class learning.

Table 3.6

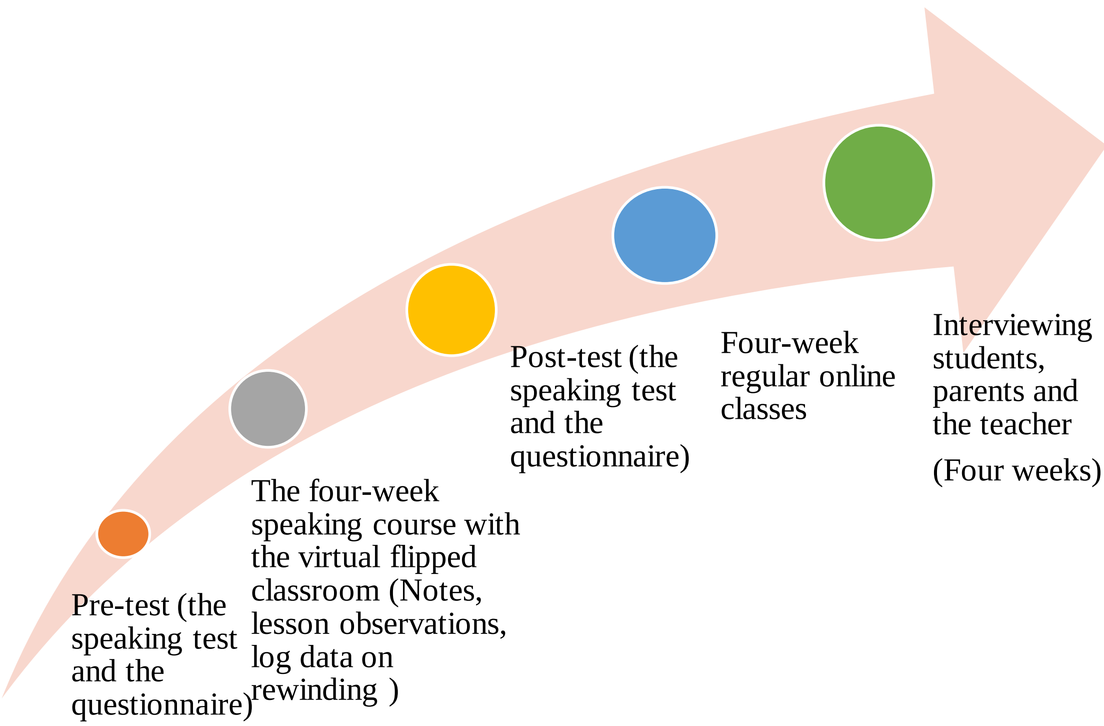
Arrangements for Pre-class and In-class Learning

	FCP group	FCM group
Pre-class learning	21 students	21 students
(online individual learning)	(same learning content)	
In-class learning	2 sub-groups	2 sub-groups
(online face-to-face	10 and 11 students	10 and 11 students
learning)	(same learning content and lesson flow)	

Upon completion of the eighth lesson, the post-questionnaire was administered and videos of the post-speaking tests were collected. Then, the students started new regular online classes at school. Regular online classes which were regular school curriculum with all subjects lasted for four weeks. Subsequently, all students, their parents and the teacher were interviewed individually. A parent of each student was interviewed (42 parents in total) and all the interviews were recorded in audio format. The whole research lasted for three months. Figure 3.8 shows the key stages of the whole research project. Finally, the data were analysed and the intervention was evaluated.

Figure 3.8

Key Stages of the Whole Research Project



3.8 Pilot Study

As an action research using mixed methods, the pilot study of the questionnaire aimed to check students' understanding of the questionnaire items and to ensure that the estimated time was sufficient. Hence, 38 upper primary students (non-members of the Speech Club) were recruited for the pilot study of the questionnaire in June. The pilot study of the questionnaire was administered in a classroom during school hours. Students were divided into three groups and arranged in rows because I was uncertain whether the students (especially the younger ones) could understand the questionnaire items. Gathering students of the same level in the same group helped me notice if students of a particular level had more difficulties. The teacher provided questionnaires to each student to complete in 20 minutes and with respect to the scale given. The students could ask questions when they encountered difficulties in filling in the questionnaire. Students of all levels understood the questionnaire items; however, slight amendments were made to address students' confusion. For example, a few of them asked if 'the class' referred to their classes at school. Also, some students asked if 'study materials' referred to materials for all subjects. Therefore, the questionnaire was streamlined to suit this study. For instance, the above terms were replaced by 'the public speaking class' and 'pre-class learning videos', respectively.

3.9 Data Analysis

3.9.1 Analysis of Questionnaire

3.9.1.1 Analysis of Self-regulation Measured by Questionnaire. The pre- and post-questionnaires were analysed using SPSS (Version 26). The numerical data were screened for missing data and outliers. No missing data were found, and all data were within the Likert scale. Basic statistical data such as the median and mode were calculated. Cronbach's alpha was calculated to ensure that each scale was reliable before analysis. Reliability of the individual scales is shown in Table 3.18. The Shapiro–Wilks test of normality was conducted. Skewness, kurtosis and box plots were also used to check for normality. As normality was violated, non-parametric tests were adopted (Allen et al., 2019).

Univariate analysis was considered more appropriate for this study than multivariate analysis because the study did not include finding the correlations between the different aspects of cognition, motivation in terms of self-efficacy, and intrinsic value, time and study environment. More importantly, univariate analysis can be used to determine the changes in the four major aspects to answer the sub-questions about the change in regulation of each aspect. Deciding between univariate and multivariate analysis may depend on the research questions and purpose of the study (Huberty & Morris, 1989). If the domains are studied separately, univariate analysis can be used (Huberty & Morris, 1989).

Therefore, non-parametric means, Wilcoxon signed rank test and Quade's test were used instead of parametric ones. The within group difference for each scale of each group was calculated with the Wilcoxon signed rank test, a nonparametric statistic that indicates the change between the pre-test and post-test within a group (Alten, 2019). Quade's test was conducted to identify the between-group differences. Quade's test can be used for rank analysis by controlling the covariate (Quade, 1967). It is a non-parametric alternative for analysis of covariance (ANCOVA) and was used in recent studies (e.g., Bruce et al., 2020, Overman et al., 2020, Maffei, 2020). Quade's test was performed for each scale of the questionnaire according to the following procedure stated by Olejnik and Algina (1985). First, the dependent variable and the covariate were ranked. Then, regression was performed on the ranked data to find the residual. Finally, the F statistic was calculated. For this study, the difference in the scale between the two groups was computed when the pre-test result was controlled as a covariate.

3.9.1.2 Analysis of Students' Opinions on Course Evaluation by Questionnaire. Students' opinions on course evaluation were analysed using SPSS (Version 26). The Shapiro–Wilks test of normality and graphical representation of normality showed that the data were not normally distributed. Therefore, a non-parametric statistical test, the Mann–Whitney U test, was used to analyse the three questionnaire items on students' opinions on the course. The Mann–Whitney U test is suitable for comparing the ranked difference between two groups (Alten, 2019).

3.9.2 Content Analysis of Notes

Notes taken by the students during pre- and in-class learning were analysed to mainly uncover how students regulated cognition during these two stages. Content analysis was used to analyse the notes. Content analysis can start with the development of a coding list from selected samples, followed by a trial coding with the coding list and finally the main analysis (Schreier, 2014). About one-third of the notes were first read through to develop the coding list before the main analysis. All self-regulation strategies were taught during Lessons 6–8; hence, the notes from these lessons were used to develop the initial coding list. They could cover as many possible codes arising from the data as possible. The concept- and data-driven strategies can be used to develop a coding list (Schreier, 2014). The concept-driven strategy is to draw categories from theories or existing research, whereas the data-driven strategy is to find new subcategories from the data (Schreier, 2014). The concept-driven strategy was firstly adopted to develop the coding list. Eight codes were drawn from the core theoretical framework, that is, Pintrich's (2000) model of self-regulated learning guiding this study. The model includes the four major aspects of self-regulated learning (regulation of cognition, motivation, behaviour and context) and the four major phases (planning, monitoring, controlling and reflection). Subsequently, the data-driven strategy was applied to the coding. General labels for topics (descriptive codes) (Saldana, 2013) were used to generate new codes from the students' notes. All of the newly generated codes were added to the coding list. The codes were defined and described with examples drawn from the data.

Through iterative reviews, the codes were then revised by rearrangement and regrouping. Some codes were combined into one item because of high similarity. For instance, a student rephrasing the teacher's speech is similar to using their own words to express understanding. Students had to summarise the teacher's speech before they rephrased or expressed it in their own words. Therefore, they were replaced by summarising teacher's talk in one's own words. Additionally, mind maps, tree diagrams and tables belong to the same type of learning skill. Therefore, they were replaced by the umbrella term 'graphic organisers'. Some deductive codes were also renamed. Originally, they were named with dashes showing different levels, such as 'cognition – planning – setting goals – Chinese'. This was changed to a single noun phrase 'setting goals for learning Chinese'. The renaming of codes is to simplify them and make them comprehensible. Regulation of cognition became a category, whereas cognitive planning became a subcategory. The four main categories are regulation of cognition, behaviour, learning context and motivation. Regulation of cognition had many codes; hence, the four phases – cognitive planning, monitoring, control and reflection – were the subcategories for grouping them.

The coding list was divided into four categories based on the four aspects of Pintrich's (2000) model. Table 3.7 show the coding list for the first category, regulation of cognition. This category was further divided into four subcategories – cognitive planning, monitoring, controlling and reflection. These subcategories were coined by Pintrich (2000) as the phases for regulating cognition. The first subcategory, cognitive planning, had four codes: setting goals for learning Chinese, setting goals for learning self-regulation, activating previous Chinese knowledge and activating previous knowledge about self-regulation. Setting goals for learning Chinese involved the students' writing what they expect to learn in Chinese in a phrase or a sentence. Writing down what they expect to learn for self-regulation was coded as setting goals for self-regulation. Activating prior Chinese or self-regulatory knowledge involves noting knowledge relevant to Chinese or self-regulation. As indicated, the codes covered not only cognitive planning for subject knowledge but also self-regulated learning. The second subcategory is cognitive monitoring. If students write explicitly that they understand through ticks or written expression, it will be regarded as cognitive monitoring. The third subcategory is cognitive controlling, which includes listing main ideas, dividing knowledge into different levels by highlighting or adding symbols, summarising teacher's speech by rephrasing, asking oneself questions about learning content and drawing pictures to supplement information. Cognitive reflection includes writing down the major topics and subtopics learnt at the end.

Table 3.7

Coding List for Regulation of Cognition

Codes	Indicators	Example
Subcategory: Cognitive planning		
Setting goals for learning Chinese	Students write the Chinese topic they expect to learn either in a complete sentence or a noun phrase, the topic.	(a) I expect to learn stress and pausing. (b) Stress and Pausing
Setting goals for learning SRL	Students write the aspects of self-regulated learning they expect to learn.	(a) I expect to learn self-regulated learning (cognition). (b) Self-Regulated Learning – Cognition
Activating prior Chinese knowledge	Students write what they know about the Chinese topic.	Prior knowledge: -Eye contact -hand gestures
Activating prior SRL knowledge	Students write what they know about SRL.	Skills learnt: (timeline)
Subcategory: Cognitive monitoring		
Monitoring cognition	Students clearly show that they understand the content either by adding ticks or expressing in words explicitly.	(a) Pronunciation – Read every word clearly. ✓ (b) Understand

Subcategory: Cognitive controlling		
Listing	Students list all the key words one after another.	Common hand gestures for public speaking - A palm - Both palms - Fingers - A fist
Dividing knowledge into different levels (highlighting/ underlining/ symbols)	Students highlight, underline, add a symbol to more important phrases.	(a) Meeting at work (b) Functions of Hand Gestures (c) * Expository Speech
Summarizing teacher's speech by rephrasing	Students express teacher's speech in their own words.	(a) To sum up, don't use hand gestures in a strange way. (b) Quiet (soft but audible)
Self-questioning on Chinese Chinese content	Students question themselves on Chinese content. They either write personal questions, write impersonal questions or write new examples which implies questioning themselves to provide more examples.	(a) What other body language should I use? (b) What is delivering a speech? (c) "gwong" "gong"
Organizing ideas using graphic organizers	Students integrate key words together by using graphic organizers like tree diagrams, mind maps and tables.	A mind map.
Using pictures	Students draw pictures to supplement the words written.	Students drew a head with arrows to show direction of turning head.

Subcategory: Cognitive reflection		
Reflecting on cognition	Students reflect on what they learnt at the end and write their reflection in sentences or phases.	(a) I have learnt: The use of stress in giving a speech (b) Summary: Learnt ways of relieving myself to lower nervousness (c) Eye contact and facial expression
Attributing cognitive reflection	Students reflect on what they learnt and account for their learning.	I can learn because I use learning strategies.

Codes for regulation of behaviour were also used (see Table 3.8). Likewise, these codes covered four phases: behavioural planning, monitoring, controlling and reflection. Writing down the length and period of time was coded as planning the time for video watching. To monitor time, students could add ticks or write in words explicitly. Writing down the decision to persist was coded as persisting to watch the video. A student deciding to persist is a sign of behavioural control. Reflecting on the time refers to students thinking about whether they can complete the task within the time limit they set.

Table 3.8

Coding List for Regulation of Behaviour

<table>
<tr><th>Codes</th><th>Indicators</th><th>Examples</th></tr>
<tr><td>Planning the time for video watching</td><td>Students write the length of time or the exact time allocated for each part.</td><td>(a) 20 minutes
(b) 4:00-4:30</td></tr>
<tr><td>Monitoring the time</td><td>Students check if they have enough time by adding ticks or expressing in words explicitly together with the question prompting for monitoring.</td><td>(a)<table><tr><td></td><td>Monitor</td></tr><tr><td>20 minutes</td><td>✓</td></tr></table>(b) Enough time (written after the question prompting for monitoring)</td></tr>
<tr><td>Persisting to watch the video</td><td>Students express in words explicitly that they persist to watch the video (together with the question prompting for controlling).</td><td>(a) Continue to persist
(b) Do I decide to persist? Yes</td></tr>
<tr><td>Reflecting on time</td><td>Students reflect if they can complete the task within preset time limit by adding ticks.</td><td><table><tr><td></td><td>Monitor</td><td>Reflect</td></tr><tr><td>20 minutes</td><td>✓</td><td>✓</td></tr></table></td></tr>
</table>

In addition to regulation of behaviour, regulation of context was also noted. Regulation of context was marked by four codes (See Table 3.9). The students' documentation of the context was coded as perception of learning context. Monitoring the learning context refers to the students stating that they were distracted by things. Controlling the learning context refers to students writing down ways to improve the context. Reflecting on the learning context refers to students writing down how the learning context affects them. These four codes are related to contextual planning, monitoring, controlling and reflection, respectively.

Table 3.9

Coding List for Regulation of Context

Codes	Indicators	Examples
Perception of the learning context	Students describe how they feel about the place where they are learning.	My environment is … - good and let me concentrate.
Monitoring the learning context	Students state the things distract them.	Toys distracted me.
Controlling the learning context	Students describe how they change the learning context.	Remove toys.
Reflecting on the learning context	Students reflect on the learning context.	(a) Is my learning context (original / changed) beneficial to my learning? Beneficial

Concerning regulation of motivation, the four codes listed in Table 3.10 are also related to the four phases. Thinking about the importance of learning was the code for students writing on the importance of learning. Monitoring motivation was the code for describing feelings in learning. Cheering oneself up was the code for students cheering themselves up through pictures, stickers or words. Reflecting on feelings was the code for describing the students' feelings at the end.

Table 3.10

Coding List for Regulation of Motivation

Codes	Indicators	Examples
Thinking about the importance of learning	Students write the importance of learning explicitly.	Very important
Monitoring motivation	Students describe their motivation explicity.	Motivated
Cheering oneself up	Students draw a picture, write a sentence or give a sticker to cheer themselves up.	Cheer up.
Reflecting on feelings	Students reflect on their feelings and express it in words explicitly after writing the question prompted for reflection.	I feel calm as usual.

A coding list can be piloted on some materials and evaluated before main analysis (Schreier, 2014). To evaluate the coding list and identify problems, about one tenth of the notes were analysed twice within a week. The criteria for coding was the presence of strategy application instead of how well they could use the strategies. This was because the presence of strategy application can provide objective data and can avoid inconsistency in judging the depth of usage. Coding of the first and second rounds were compared. The percentage agreement of the two rounds was 92%. The disagreement is due to omission of ticks as signs of monitoring in the first round. Overall, the codes in the coding list were comprehensive enough to cover all the self-regulatory strategies applied. Therefore, the remaining notes were coded using the coding list. Each code was labelled once on each set of notes. For example, when I noticed that they listed key words, I wrote the code for listing. After coding all the notes once based on the revised coding list, I printed all the notes again and coded them again to ensure the reliability of coding. Then, I compared the two sets and ensured that I marked all the codes on the notes. After ensuring the accuracy of coding, I counted the number of occurrences of each code in all the notes and recorded the number in Microsoft Excel. I invited the teacher to double count the codes to ensure the accuracy in counting. After coding, the frequency of each code for each lesson of each group was counted and inputted into an Excel table. As the notes were submitted on a voluntary basis, the number of notes collected from each group differed. The percentage of occurrence of each skill was therefore calculated separately to compare the pre-class and in-class performance of the two groups. For each group, the frequency counts of each skill were converted to the percentage of occurrence in all the pre-class and in-class notes separately. Additionally, the mean percentages of each code for the eight lessons of each group were compared. Frequency count was used to provide an objective view of the notes collected.

3.9.3 Analysis of Log Data

During the pre-class stage, the students watched the instructional videos without assistance. They could rewind any part of the video. The online platform automatically recorded the students' rewinding practice. The number of times that the students rewound the video for each lesson was counted. For both groups, the use of rewinding strategy was recorded as '1' (rewinding) or '0' (not rewinding) in an Excel file. Subsequently, the percentage of students rewinding each video was calculated.

3.9.4 Analysis of Interview Data

To produce the transcript of an interview, the audio was played segmentally. After each segment, the words were typed into a Microsoft Word file. The transcripts were printed and analysed manually using highlighters. Analysing the transcripts manually enabled me to easily iterate constant comparison of codes. Qualitative thematic analysis and constant comparison were used to analyse the interview data. Both deductive and inductive coding were used for questions concerning the self-report of the most useful strategies frequently used by the students during and after the course. Deductive coding is based on the four phases and four aspects of self-regulated learning from Pintrich's (2000) model. This coding helps to clarify the application of such strategies in self-reporting of the most useful strategies frequently used. Using deductive coding based on Pintrich's (2000) model allowed me to easily compare content analysis data. Inductive codes also arose from students' detailed descriptions of how they used these strategies. These codes provide information for understanding the details of how these strategies were applied. For questions concerning the opinions of the three parties, inductive coding was mainly used. The relevant parts of each transcript were read line by line to locate in vivo codes. In vivo codes retain the interviewees' words as codes (Corbin & Strauss, 2015). These codes helped me represent their points of view. In addition, descriptive codes were used to summarise information across several lines. Using both types of codes allowed me to take a holistic view of the data.

The transcripts and codes were reviewed iteratively and constantly compared to ensure that segments of the same codes were similar. Constant comparison allows me to note the similarity in codes (Corbin & Strauss, 2015). The coded transcript of the teacher interview was returned to the teacher to check if the codes represented her points of view. Member checking was also performed with six transcripts of parent interviews. Only a small sample of transcript was checked because I was concerned about the parents' heavy workload in their daily lives and did not want to put pressure on them. Member checking enhances the credibility of the analysis (Hays and Singh, 2012). The interviewees thought that their expressions were not misinterpreted. After member checking, all of the codes were recorded in a codebook. Common codes were rearranged under certain categories. Subsequently, the categories were reduced into themes. Semantic network analysis was applied in a secondary analysis to explore the relationships between the sub-codes, codes, themes and categories. The categories, themes, codes and sub-codes were organized using Microsoft Word. Tables 3.11-3.17 show the coding lists for interviews.

Table 3.11 shows the coding list for the description of regulation of cognition. Students described how they regulated cognition under the themes of cognitive planning, monitoring, controlling and reflection. The codes include setting goals, activating prior knowledge, checking understanding, different ways for cognitive controlling, the reasons for taking notes and reflecting on their learning.

Table 3.11

Coding List for Description of Regulation of Cognition

Category 1: Regulation of cognition		
Themes	**Codes**	**Sub-codes**
Cognitive planning	Setting goals	
	Activating prior knowledge	
Cognitive monitoring	Checking understanding	
Cognitive controlling	Rewatching videos	
	Taking notes	
	Reasons for taking notes	Recording information
		Reviewing information
		Deeper understanding
		Making learning convenient
Cognitive reflection	Reflecting on learning	

Table 3.12 shows the coding list for the description of regulation of behavior. These codes are under the themes of the four phrases of regulation of behavior including planning the timetable and the length of activities, reasons for behavioral planning, following the timetable and using the timer for monitoring, using self-talk and adjusting effort for behavioral controlling and reflecting on the choices made.

Table 3.12

Coding List for Description of Regulation of Behavior

Category 2: Regulation of behavior		
Themes	**Codes**	**Sub-codes**
Behavioral planning	Planning the timetable	
	Planning the length	
	Reasons for behavioral planning	Clear view of daily activities
		Know clearly what to do
Behavioral monitoring	Following the timetable	
	Using the timer	
Behavioral controlling	Self-talk	Verbal form of encouragement
	Adaptation for behavioral controlling	Written form of encouragement
	Adjusting effort	
Behavioral reflection	Reflecting on choices for behavioral controlling	

Table 3.13 shows the coding list for the description of regulation of context. These codes are under the themes of contextual planning, monitoring, controlling and reflection. The codes include thinking about feeling of context, being awareness of neatness and noise, focusing on oneself, requesting cooperation from others, adaptation for contextual controlling, reasons for contextual controlling and reflecting on contextual changes.

Table 3.13

Coding List for Description of Regulation of Context

Category 3: Regulation of context		
Themes	**Codes**	**Sub-codes**
Contextual planning	Thinking about feeling of context	
Contextual monitoring	Being aware of neatness	Toys
	Being aware of noise	From family members activities
Contextual controlling	Focusing on oneself	Removing toys
	Requesting cooperation from others	
	Adaptation for contextual controlling	Controlling at the beginning
		Using rewards
	Reasons for contextual controlling	Focusing on learning tasks
		Ensuring a quick response
Contextual reflection	Reflecting on contextual changes	

Table 3.14 shows the coding list for the four phrases for regulating motivation. The codes include thinking about self-efficacy, being aware of motivation, tangible rewards and self-talk, adaptation for motivational controlling and reflecting on feelings.

Table 3.14

Coding List for Description of Regulation of Motivation

Category 4: Regulation of motivation		
Themes	**Codes**	**Sub-codes**
Motivational planning	Thinking about self-efficacy	
Motivational monitoring	Being aware of motivation	
Motivational controlling	Tangible rewards	Candies Stickers
	Self-talk	
	Adaptation for motivational controlling	Desirable/ Leisure activities
Motivational reflection	Reflecting on feelings	

As shown in Table 3.15, opinions on enhancing self-regulation in the virtual flipped classroom mainly includes three themes. The codes for essentiality of learning self-regulation includes improving learning, applying to other subjects, lifelong learning, daily lives, work in the future and home-based learning under the pandemic. The codes for prominence of learning self-regulation in the virtual flipped classroom include lack of self-regulated learning knowledge and skills, the virtual flipped classroom requires self-regulation, the need of teacher's support in learning self-regulation and the opportunities for practising self-regulation. The codes for adequate integration includes embedding self-regulation in the virtual flipped classroom and gradual integration.

Table 3.15

Coding List for Opinions on Enhancing Self-regulation in the Virtual Flipped Classroom

Category 5: Opinions on Enhancing Self-regulation in the Virtual Flipped Classroom		
Themes	**Codes**	**Sub-codes**
Essentiality of learning SRL	For improving learning	
	For applying to other subjects	
	For lifelong learning	
	For daily lives	
	For work in the future	
	For home-based learning under the pandemic	
Prominence of learning self-regulated learning in the virtual flipped classroom	Lack of SRL knowledge/skills before	
	VFC requires SRL	
	Need teacher's support for learning SRL	
	Opportunities for practising SRL	
Adequate integration of self-regulated learning in the virtual flipped classroom	Embedding SRL in VFC	Not part of the formal curriculum
		Extracurricular programs – flexible
	Gradual integration	Facilitate learning

As shown in Table 3.16, there are four themes for the category of opinions on prompts. The codes for functions of prompts include reminders of using self-regulation, guidance for learning self-regulation and increasing interaction with the system. The codes for multiple-choice questions are not discouraged, no technical problems and importance of options. The codes for the need of demonstration are concepts may be less concrete and anticipation of watching demonstration. The codes for how to make use of prompts include reading prompts, following prompts to self-question, reading options, thinking about options, brainstorming other possibilities, choosing options and acting out.

Table 3.16

Coding List for Opinions on Prompts

Category 6: Opinions on Prompts		
Themes	**Codes**	**Sub-codes**
Functions of prompts	Reminders of using SRL	
	Guidance for learning SRL	Provides flow of thought
		Know when and what to ask questions for self-regulate
	Increasing interaction with the system	
Multiple-choice questions	Not discouraged	Easier to answer than/ resistant to open-ended questions
		When not coming up with ideas
	No technical problems	Typing

	Importance of options	Using different devices Suitable for children Provides possible ways Help beginners
Need of demonstration	Concepts may be less concrete Anticipation of watching demonstration	
How to make use of prompts	Reading questions	
	Following prompts to self-question Reading options Thinking about options Brainstorming other possibilities Choosing options Acting out	

As shown in Table 3.17, the three themes are functions of modeling, teacher-in-role and process of adaptation. The codes for functions of modeling are helping students understand self-regulation thoroughly and facilitating memorisation. The codes for teacher-in-role include teacher as an actor and roleplaying a student. The codes for process of adaptation includes recalling similar events, comparing with recalled events and thinking about one’s own needs.

Table 3.17

Coding List for Opinions on Modeling

Category 7: Opinions on modeling		
Themes	**Codes**	**Sub-codes**
Functions of modeling	Helping students understand SRL thoroughly	Say teacher's thought
		Action
	Facilitating memorisation	
Teacher-in-role	Teacher as an actor	Expert Persuasive Strong effect on students Influence stronger than parents More likely to accept
	Roleplaying a student	Feeling of echoing Relate/ resonate with the events demonstrated Interesting and enjoyable
Process of adaptation	Recalling similar events Comparing with recalled events Thinking about one's own needs	

3.9.5 Analysis of Lesson Observation Data

There were four sessions for each lesson, two sessions for FCP group and two sessions for FCM group. Lesson observation was based on the indicators for regulation of context, behaviour and motivation, as listed in the observation form

(Table 3.2). The lesson observation form was completed at a five-minute interval. The number of occurrences of each item listed in the observation form of each session was counted. The number of occurrences of each item in the four sessions were added. By dividing the total by four, the average number of occurrences of each item in the four sessions was computed using Microsoft Excel. Line graphs were plotted to show the changes throughout the eight lessons for each group.

Concerning inter-rater reliability, the number of occurrences of each item for each session between the two raters were compared. By dividing the number of agreed-upon items for all four sessions by the total number of items for all four sessions, the percentage agreement of Lesson 1 was computed. The percentage agreement of Lesson 8 was computed in the same way. The percentage agreement of inter-raters for Lesson 1 was 81% and that for Lesson 8 was 85%.

3.9.6 Analysis of Speaking Test

The reliability of the speaking test was calculated using SPSS (Version 26). The reliability of the speaking test was 0.713, which is acceptable for educational research (Alten, 2019). Similarly, the data of the speaking test were not normally distributed according to the Shapiro–Wilks test of normality ($p < 0.05$). Therefore, two non-parametric tests were conducted: Quade's test was conducted to find the group difference by controlling the pre-test and the Wilcoxon signed rank test was conducted to find the within group difference before and after the intervention.

3.10 Reliability and Validity

The reliability of these instruments refers to their generalisability to different settings and times (Bergin, 2018). The instruments used in this study were reliable. MSLQ is a popular instrument for measuring self-regulated learning. The original version has been shown to have high reliability (Pintrich et al., 1993). The coefficient alphas of all of the scales except the help seeking scale were .69 or above (Pintrich et al., 1993). The coefficient alpha of time and study environment added to this study was also higher than .70. Some Hong Kong scholars have developed and studied the Chinese version of the shortened version of MSLQ and have tested it with primary and secondary students in Hong Kong (Sachs et al., 2002) and with secondary students only (Sachs et al. 1999, Lee et al., 2010). Sachs et al. (2002) reported that the scales can differentiate traits well. Reliability was relatively high, as reflected in the coefficient alphas of all scales, which ranged from .75 to .88 (Sachs et al., 2002) and varying from the lowest .78 to the highest .95 (Lee et al., 2010). This study used the Chinese version of the shortened version of MSLQ with addition of time and study environment of the original questionnaire. The reliability of all of the scales was measured and tested. Coefficient alphas of .70 or above are acceptable in educational research (Allen et al., 2019). In other words, the instrument used in this study was reliable. Table 3.18 shows the reliability of the scales of the questionnaire for the pre-test and the post-test. As can be seen, the Cronbach's alphas for all of the scales were over 0.70, ranging from 0.708 to 0.827.

Table 3.18

Reliability of the Scales of the Questionnaire for the Pre-test and the Post-test

	Value of Cronbach's alpha	
	Pre-test	Post-test
Use of cognitive strategies (8 items)	0.793	0.808
Study environment (3 items)	0.751	0.792
Time (4 items)	0.778	0.747
Intrinsic value (7 items)	0.723	0.723
Self-efficacy (8 items)	0.827	0.712
Overall self-regulation (8 items)	0.708	0.760

An assessment form (International Toastmasters Club of Taiwan, 2021) was adapted to assess students' speaking performance. The mark allocation was reasonable and reliable. Maintaining mark allocation helps to maintain the reliability of the ratings.

For the list of codes for content analysis, one tenth of the notes were coded again within a week and the percentage agreement of the two rounds was 92%. The disagreement was due to omission of ticks as signs of monitoring in the first round instead of insufficient codes in the coding list, and the coding list is reliable for content analysis of the remaining notes.

Another Chinese teacher with 12 years of teaching experience was invited to participate in the research as a rater of the lesson observations. She observed all four sessions in Lessons 1 and 8. The interrater agreement for Lessons 1 and 8 was 81% and 85%, respectively.

To enhance objectivity, two methods were applied. First, the major teacher participant, not the researcher, was responsible for teaching the course. In this way, the researcher could be more objective in observing lessons and analysing data. Second, another Chinese teacher with 14 years of teaching experience was invited to assess the pre- and post-speaking tests. She was not familiar with the student participants because she did not teach the programme. Hence, she was able to assess their performance objectively.

Apart from reliability, efforts were made to maintain validity. A pre-test of the questionnaire was conducted to check whether original self-regulated learning was a confounding variable. A pre-speaking test was performed to check whether the original speaking ability of the two groups was a confounding variable. Non-significant differences between groups in the pre-test indicated that original speaking ability and self-regulatory competence were not confounding variables. One may argue that there is no control group and that the effect may be due to the virtual flipped classroom instead of the intervention. I understand that having a control group helps readers to easily identify the difference between groups in the pre-test. Yet the effect of the virtual flipped classroom may not be a confounding variable for self-regulation because the virtual flipped classroom was implemented in the Speech Club before. The effect of the intervention of modeling or prompts can be compared to the effect of the virtual flipped classroom by comparing students' changes in self-regulatory competence before and after the study. If there is a significant within-group difference, it may be due to the intervention instead of the virtual flipped classroom. In essence, the internal validity of this is maintained, as it shows that the result is mainly due to the intervention of modeling or prompts. Internal validity indicates the rigor of this study in showing the effect of what is being studied (Bergin, 2018).

Concerning descriptive validity, the aforementioned description of the data collection provides the details of how the data were collected. The richer the description of data collection, the higher the descriptive validity (Bergin, 2018). More importantly, the overall validity of this study was enhanced by triangulation, a crucial means for increasing validity (Hay and Singh, 2010). The present study includes triangulation of different methods and of different sources (Hay and Singh, 2010). Different methods, questionnaires, content analysis, interviews and lesson observations were used to explore the first research question. For the third research question, opinions were collected from different sources in interviews. The opinions of the students, parents and the teacher were compared.

3.11 Ethical Consideration

As the student participants are under eighteen years old, parental consent was obtained. Additionally, the right to learn self-regulation at the same time was considered. The action research includes both experimental groups because both groups received some treatment to enhance self-regulated learning. A delayed treatment group was not used, as participants in the two groups may compare the length of treatment they receive.

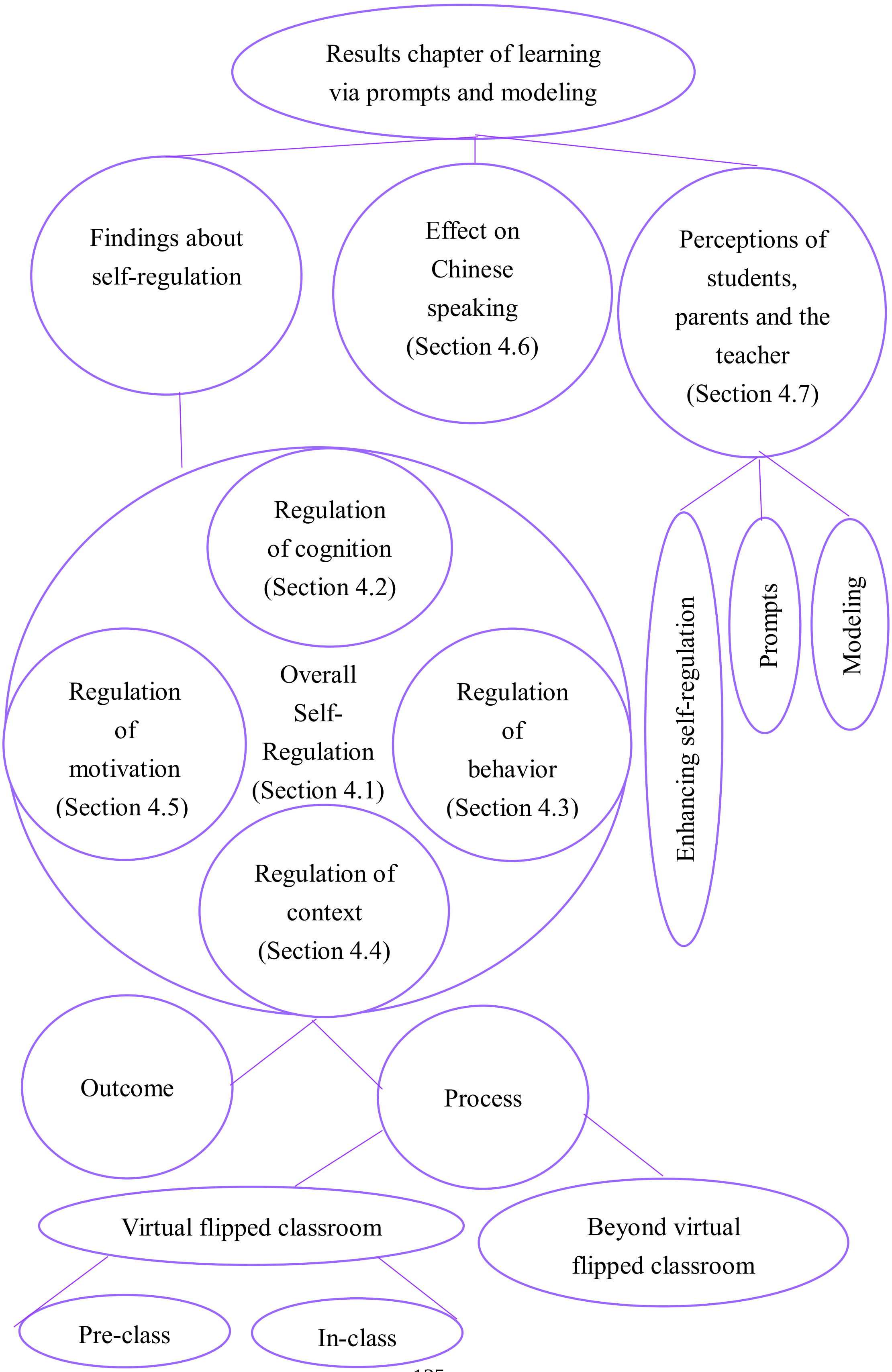
In conclusion, Chapter 3 provided a detailed description of context, participants, research design, ways of collection and analysis and reliability and validity. The next section presents the findings of the study.

Chapter 4 Results

In this section, the quantitative and qualitative results are presented by the weaving method. Weaving is a theme-based method to integrate quantitative and qualitative results into a narrative form for mixed methods research (Fetters et al., 2013). This method was adopted to assist readers in understanding how qualitative and quantitative data supplement each other to provide an overview of self-regulation. This section presents the findings of the overall effect of the intervention on self-regulated learning (Section 4.1) and provides data on regulating the four aspects: cognition (Section 4.2), behaviour (Section 4.3), context (Section 4.4) and motivation (Section 4.5). For each aspect, the self-regulation outcome (Sections 4.2.1, 4.3.1, 4.4.1, 4.5.1), pre-class self-regulation process (Sections 4.2.2, 4.3.2, 4.4.2, 4.5.2), in-class learning (Sections 4.2.3, 4.3.3, 4.4.3, 4.5.3) and regulation beyond the virtual flipped classroom (Sections 4.2.4, 4.3.4, 4.4.4, 4.5.4) are presented. This section further presents the effect of prompts and modeling in performing a Chinese speech (Section 4.6). The perceptions of students, parents and the teacher about self-regulation in the virtual flipped classroom (Section 4.7.1), prompts (Section 4.7.2) and modeling are presented (Section 4.7.3). Figure 4.1 presents an overview of this chapter.

Figure 4.1

Overview of the Results Chapter



4.1 To What Extent Do Prompts and Modeling Affect Overall Self-regulation?

This study investigated the effect of prompts and modeling on enhancing students' self-regulation. The overall change in self-regulation was recorded by the quantitative questionnaire with several scales, including cognitive strategy use, intrinsic motivation, self-efficacy, time, study and environment as well as overall self-regulation. The questionnaire was completed by 42 students (FCP: 21 and FCM: 21). The results of overall self-regulation is reported in this section. As discussed in the methodology, the data were not normally distributed. The Wilcoxon signed rank test was conducted to determine the within-group change before and after learning using prompts and modeling. Quade's test of covariance was conducted to determine the between-group variation in the post-test between the FCP group and the FCM group by controlling the pre-test.

For the within-group changes, both groups improved significantly after the intervention with a large effect size. The Wilcoxon signed rank test showed that overall self-regulation of the FCP group increased significantly (Z = -4.019, p < .001). The median of the post-test of the FCP group (*Mdn* = 5.50) was higher than that of the pre-test (*Mdn* = 3.88), which resulted in a large effect size (r = -0.62). Additionally, this test showed a significant increase in the overall self-regulation of the FCM group ($Z = -4.020$, $p < .001$). The median of the post-test of the FCM group (*Mdn* = 6.13) was higher than that of the pre-test (*Mdn* = 4.00), with a large effect size ($r = -0.62$).

For the between-group variation, the FCM group significantly performed better than the FCP group, with a large effect size. Quade's test showed a significant difference in overall self-regulation in the post-test results between the two groups with a large effect size (*partial eta square* = 0.337) when the pre-test result was controlled ($F(1, 40) = 20.335$, $p < .001$). The median of the post-test of the FCM group (*Mdn* = 6.13) was higher than that of the FCP group (*Mdn* = 5.50).

Overall, data obtained from the questionnaire show that both prompts and modeling are effective in enhancing overall self-regulation, although modeling is more effective in enhancing overall self-regulation than prompts. The following sections provide a detailed picture of the effect on self-regulation in four domains including cognition, behaviour, context and motivation.

4.2 Regulation of Cognition

As discussed in Chapter 3, qualitative data were analysed by top-down and bottom-up approaches. The top-down approach, based on the theoretical framework, is used to analyse the data in similar ways for easy comparison.

Pintrich's (2000) theoretical framework is divided into four aspects: regulation of cognition, regulation of behaviour, regulation of context and regulation of motivation. Each aspect is further divided into four phases: planning, monitoring, controlling and reflection.

This section presents the effects on cognitive regulation based on the questionnaire data and describes the process of learning based on analysis of notes, interviews and the percentage that students rewound.

4.2.1 To What Extent Do Prompts and Modeling Affect Regulation of Cognition?

The change in students' regulation of cognition was measured through the administered pre-questionnaire and post-questionnaire. The questionnaire was administered to 42 students (FCP: 21 and FCM: 21). For the within-group difference, the Wilcoxon signed rank test showed a significant increase in the FCP group when prompts were received in videos ($Z = -3.923$, $p < .001$). The median of the FCP group in the post-test ($Mdn = 5.250$) was larger than the median in the pre-test ($Mdn = 4.125$) with a large effect size ($r = -0.605$). A significant increase was observed in the FCM group ($Z = -4.017$, $p < .001$). The median of the FCM group in the post-test ($Mdn = 6.00$) was larger than the median in the pre-test ($Mdn = 4.00$), and the effect size was large ($r = -0.620$).

For the between group difference, Quade's test showed that the FCM and FCP groups differed significantly in cognitive strategies in the post-test when pre-test result was controlled ($F(1, 40) = 17.862$, $p < .001$). The effect size is large (*partial eta square* = 0.309). The median of the FCM group in the post-test (*Mdn* = 6.00) was larger than the median of FCP group in the post-test (*Mdn* = 5.250). That is, the FCM group had a significantly higher rating by adopting cognitive strategies compared with the FCP group.

The data showed that prompts and modeling enhanced students' learning of cognition regulation within the FCP and FCM groups, respectively. The group difference indicated that modeling was significantly more effective than prompts.

4.2.2 How Do Prompts and Modeling Affect Regulation of Cognition in the Pre-class Phase?

Data on the process of learning during the course were collected. They were subdivided into data from the pre-class and in-class phases. The pre-class phase is explored in the next section.

4.2.2.1 Content Analysis of Qualitative Notes of Pre-class Performance. Notes collected during the course revealed how students regulated cognition in details. A total of 179 sets of pre-class notes (FCP: 70 and FCM: 109) were collected and analysed by content analysis. Table 4.1 presents cognitive planning during pre-class learning. Overall, the FCM group showed a higher frequency of cognitive planning for their learning than the FCP group. For the goal setting for Chinese, students wrote what they wanted to learn in a phrase or sentence like 'I expect to learn stress and pausing' or 'Stress and pausing'. As presented in Table 4.1, two thirds of the FCP notes revealed goal setting for learning Chinese speaking. Over 60% of the FCM notes revealed goal setting for learning Chinese speaking and self-regulated learning. Approximately half of them displayed activation of prior Chinese knowledge, whereas approximately two fifths revealed activating prior knowledge of self-regulated learning. One fourth of the FCP notes revealed goal setting for self-regulated learning. Examples include 'I expect to learn self-regulated learning (cognition)' or 'Self-regulated learning – Cognition'. One tenth of the FCP notes revealed activating prior Chinese and self-regulated learning knowledge. When the groups were compared, goal setting was mentioned twice as frequently as prior knowledge. This suggests that both groups were more able to apply goal setting. Concerning differences, the goal setting frequency for learning Chinese and self-regulated learning in the FCM group was twice that of the FCP group. For activation of Chinese and self-regulated learning knowledge, the frequency of the FCM is three times that of the FCP. This suggests that the FCM group was more successful in learning and applying cognitive planning.

Table 4.1

Descriptive Statistics of Cognitive Planning in Pre-class Notes

Cognitive planning	Frequency (%) FCP group	Frequency (%) FCM group
Setting goals for learning Chinese	24%	64%
Setting goals for learning SRL	31%	67%
Activating prior Chinese knowledge	11%	49%
Activating prior SRL knowledge	11%	39%

On rare occasions, the students took notes to monitor their understanding of the learning content. Extremely few FCP notes clearly showed understanding as the answers to the prompt, and very few FCM notes showed subtopics that indicated monitoring of understanding. Overall, the notes of both groups demonstrated a relatively lower percentage in the monitoring of understanding compared to controlling.

Additionally, the FCM group demonstrated a higher tendency to use different strategies for cognitive controlling. As shown in Table 4.2, about three fourths of the FCP notes included listing key points, and low percentages were recorded for more advanced strategies. For instance, only one fifth of the notes included graphic organisers and asking questions about Chinese content for oneself. None of them included the division of knowledge into different levels by highlighting or underlining. For the FCM group, approximately three fourths of the FCM notes revealed listed main ideas. More than half of them include summarization and more than one third of the notes included self-questions, graphical idea organisation or the division of knowledge into different levels.

Listing key points was the major notetaking method for both groups. The FCM students were more successful than the FCP students in applying more advanced learning strategies in addition to listing. These strategies included summarising ideas by paraphrasing, differentiating information at different levels, presenting ideas using graphic organizers and asking questions about learned content. For the reflection practice, approximately one fourth of the FCP notes revealed students' reflection on what was learnt. In contrast, nearly half of the FCM notes revealed reflection. The practice of reflection shown in the FCM notes was nearly twice as frequent as that shown in the FCP notes.

Table 4.2

Descriptive Statistics of Cognitive Controlling in Pre-class Notes

Cognitive control	Frequency (%) FCP group	Frequency (%) FCM group
Listing	77%	72%
Dividing knowledge into different levels (highlighting/underlining/ symbols)	0%	34%
Summarizing teacher's speech by rephrasing	13%	57%
Self-questioning on Chinese content	21%	35%
Organizing ideas using graphic organizers	21%	35%

Regarding similarities, the notes of both groups revealed the highest frequencies in controlling, followed by planning, reflection and finally monitoring. Regarding the differences, the FCM notes revealed a higher frequency of regulation of cognition than the FCP notes in all four phases, with the exception of listing in cognitive controlling.

4.2.2.2 Qualitative Interview Data of Pre-class Performance. After the process data of pre-class notes were reported, the process of learning during the pre-class phase was further explored through qualitative interview data. Forty-two students (FCP: 21 and FCM: 21) were interviewed about pre-class learning in the flipped classroom. The FCP (52.38%) and FCM (61.90%) groups reported controlling as the most useful strategies that they frequently used. The groups described how they applied controlling by rewatching videos and taking notes. They rewatched videos when they did not understand the learning content, which suggests that they monitored their understanding while learning. For instance, a student commented: “When I did not know something, I rewound the video and listened to what the teacher said again.” Additionally, they took notes while learning. The students believed that controlling through notetaking was most useful because they could review their notes to gain a deeper understanding. A student said, “After taking notes, I read it several times. Hence, I had a clearer understanding.” They also expressed that taking notes could help them remember what they learnt more easily, as mentioned by a student, “I wrote down to ‘make it enter my brain’ (meaning making me remember it) and I could review it later.”

4.2.2.3 Video Rewinding in Pre-class Learning. In addition to qualitative interview, the percentage of students rewinding provided insights into the learning process during the pre-class phase. The online learning platform shows whether students rewound the videos. The percentages of students rewinding in both groups were calculated and analysed. The analysis provides insights into the difference in regulation of cognition in pre-class learning because rewinding is one of the strategies for controlling cognition. Figure 4.2 shows a comparative line graph of the percentage of the FCP and FCM students in rewinding pre-class videos.

The FCP group showed a fluctuating trend in the percentage of students rewinding. The trend starts off stably at 70% in Lesson 1 and Lesson 2 and then rises and falls alternatively until the last lesson. The highest rate was approximately 86% in Lesson 3, whereas the lowest rate was approximately 50% in Lesson 8. For the remaining lessons, the trend rate was around 70%. Apart from Lesson 3, which fluctuated slightly around 70%, the skill of rewinding was applied moderately. The rise of the peak at Lesson 3 indicates students' difficulties in understanding the topic. The lowest trend rate was because the students had a better understanding of the learning topic. The low percentage trend rate in Lesson 6 may be because this lesson was longer than the other videos. Most of the students chose to complete the pre-class learning within the expected time in Lesson 6.

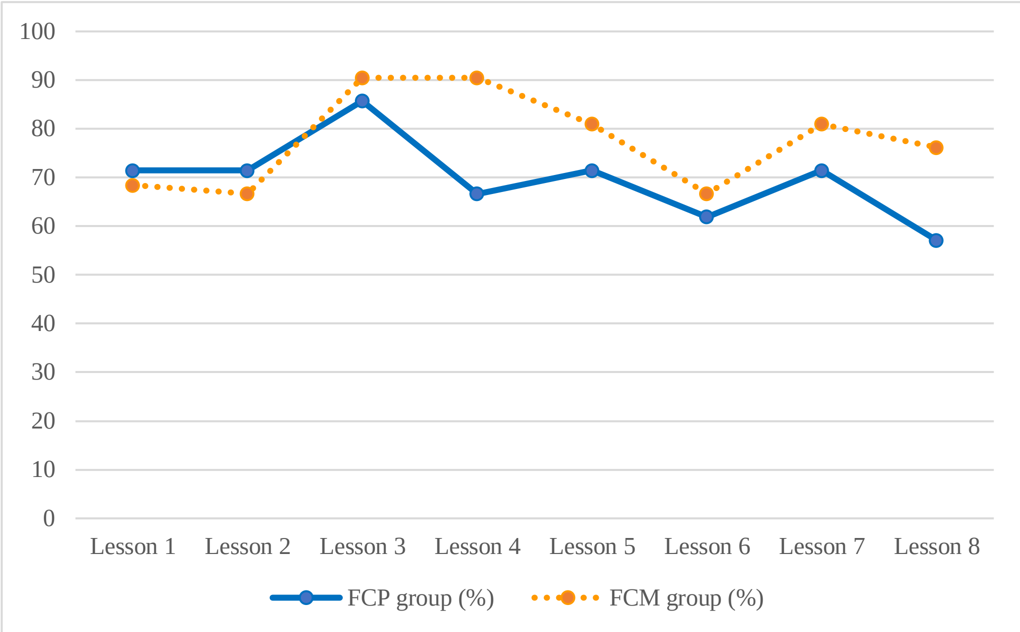
Similarly, a fluctuating trend in the percentage of students rewinding was discovered in the FCM group. The percentages of FCM students rewinding videos were approximately 70% in Lesson 1 and Lesson 2 and 90% in Lesson 3 and

Lesson 4. These were followed by falls in Lesson 5 and Lesson 6, a rise in Lesson 7 and then a slight drop, ending at 80%. Its lowest point was at 67% in Lesson 6. The rewinding segments included modeling and learning content. That is, the students rewatched the modeling video. The peaks occured when regulation of behavior including modeling of setting and monitoring timetables. The FCM group showed a higher percentage of rewinding, which suggests that segments of learning content and segments of self-regulated learning were rewound. The percentage dropped in Lesson 6 despite the complex learning content because the students watched the longest video within the pre-set time.

Overall, both groups showed similar fluctuating trends throughout the eight lessons. Starting off at similar percentage of students rewinding, the FCM group showed a relatively higher percentage of students rewinding afterwards and ends at a higher percentage of students rewinding at the end of the course, resulting in a higher average percentage of students rewinding.

Figure 4.2

Comparative Line Graph of the Percentages of the FCP Group and FCM Group Rewinding Pre-class Videos



Signs of cognitive regulation appeared during pre-class learning, with cognitive controlling as the most salient phase, in the notes, interview data and percentage of students rewinding. For nearly all of the signs of cognitive regulation, the FCM group showed a higher percentage of use than the FCP group.

4.2.3 How Do Prompts and Modeling Affect Regulation of Cognition during In-class Synchronous Online Learning?

In addition to pre-class asynchronous online learning, this study also looked into self-regulated learning in in-class synchronous online learning. A deeper understanding was gained by analysing notes and interview transcripts.

4.2.3.1 Content Analysis of Qualitative Notes of In-class Performance. In total, 78 sets of in-class notes (FCP: 28 and FCM: 50) were collected. Table 4.3 shows the frequency of cognitive planning reflected in notes with goal setting for Chinese speaking as the most important strategy used. Approximately one third of the FCP notes showed goal setting for Chinese speaking. None of the notes showed goal setting for self-regulated learning, activating prior Chinese knowledge or activating prior knowledge of self-regulated learning. For the FCM group, nearly two fifths of the students set goals for learning Chinese speaking. None of the notes showed goal setting for self-regulated learning, activating prior Chinese knowledge or activating prior knowledge of self-regulated learning. Comparing the cognitive planning displayed in in-class notes in both groups revealed that the FCM group had a slightly higher percentage in goal setting for Chinese speaking. Both groups showed no sign of setting goals for self-regulated learning, activating prior Chinese knowledge or prior knowledge of self-regulated learning for in-class sessions. Compared with controlling, both groups showed relatively lower percentages in displaying their comprehension in their notes.

Table 4.3

Descriptive Statistics of Cognitive Planning in In-class Notes

Cognitive planning	Frequency (%) FCP group	Frequency (%) FCM group
Setting goals for learning Chinese	32%	36%
Setting goals for learning SRL	0%	0%
Activating prior Chinese knowledge	0%	0%
Activating prior SRL knowledge	0%	0%

Table 4.4 shows cognitive controlling during in-class learning. Approximately two thirds of the students in the FCP group and half in the FCM group demonstrated cognitive control through listing main ideas. More advanced strategies were used less frequently by the FCP group; they included summarisation, graphic organisers, self-questioning and knowledge differentiation into various levels. Approximately half of the FCM notes showed listing, summarising ideas by paraphrasing and presenting ideas graphically. Some FCM students asked themselves questions about Chinese content and differentiation of knowledge into different levels. For reflection, approximately one tenth of the notes provided information on the topic learnt. However, approximately one

fourth of the FCM notes provided information on the topic learnt. The practice of reflection shown in the FCM notes was thus twice as frequent as in the FCP notes.

Table 4.4

Descriptive Statistics of Cognitive Controlling in In-class Notes

Cognitive control	Frequency (%) FCP group	Frequency (%) FCM group
Listing	64%	54%
Dividing knowledge into different levels (highlighting/underlining/ symbols)	11%	14%
Summarizing teacher's speech by rephrasing	25%	52%
Self-questioning on Chinese content	21%	26%
Organizing ideas using graphic organizers	29%	48%

Overall, listing was used frequently by both groups, occurring more in the FCP notes. The FCM group showed higher frequency in more advanced strategies such as graphic organisers, summarisation by paraphrasing words and self-questioning of the learning content. Regarding the similarities, cognitive controlling had the highest frequency as revealed in the notes, followed by cognitive planning, cognitive reflection and cognitive monitoring. For differences, the FCM group showed a higher percentage of all the phases than the FCP group except listing in cognitive controlling. Overall, the results of regulation of cognition in the in-class notes aligned with those of the pre-class notes. However, the percentage of all the phases for regulation of cognition was lower than that of the pre-class notes.

4.2.3.2 Qualitative Interview Data of In-class Performance. In addition to the in-class notes, the interview data provided insights into the regulation of cognition during in-class learning. The FCP (33.33%) and FCM (47.62%) groups demonstrated cognitive controlling through taking notes and regarded this strategy as the most useful one that they frequently used for in-class learning. A student described, “For example, something very important must be remembered. I must write it down.” They thought that notetaking was useful for memorising content easily because they could review the knowledge learnt in online classes. Another student said, “I took notes. I read it again after class. I could remember the knowledge more easily.”

When viewing notes and interview data about in-class learning as a whole, signs of regulation of cognition were observed during in-class learning, with cognitive controlling as the most important phase. For nearly all the signs of cognitive regulation, the FCM group showed a higher percentage of use than the

FCP group.

4.2.4 Regulation of Cognition Beyond the Virtual Flipped Classroom

All of the students were interviewed about their experiences in regular online classes after the course. Cognitive controlling through taking notes was chosen to be the most useful strategy for regular online classes by both the FCP (52.38%) and FCM (66.70%) groups. They described how to control their cognition – for example, "I found out key points and wrote them on my notes." Cognitive controlling through notetaking was important for regular online classes because notetaking allowed them to record and review information that could be missed because of the speed of the teacher's speech. A student said, "Teachers talk very fast. I might miss the information. I wrote it down so that I could read it slowly. Then, I could understand it." Additionally, cognitive controlling through notetaking was useful for regular online classes because it made learning convenient. This is illustrated by the excerpt below, "Maybe when studying, I needed not read the whole passage. I could directly read my notebook."

4.3 Regulation of Behaviour

This section reports the application of regulation of behaviour. Time management and decision to persist are included in the regulation of behaviour in Pintrich's (2000) model. It first describes the learning outcome in terms of self-regulation recorded by a questionnaire, the extended learning outcome reported in interviews and the process of learning during pre-class and in-class learning.

4.3.1 Effects of Prompts and Modeling on Behavioural Regulation

The learning outcomes of regulation of behaviour are indicated in the questionnaire data. Forty-two questionnaires (FCP: 21 and FCM: 21) were analysed. Regarding the difference within the FCP group, the Wilcoxon signed rank test showed a significant increase in the behavioural regulation of time after taking the course ($Z = -3.930$, $p < .001$). The median of the post-test of the FCP group (*Mdn* = 5.50) was higher than the median of the pre-test (*Mdn* = 4.50). ($Z = -4.020$, $p < .001$). There is a large effect size ($r = -0.606$). For the FCM group, this statistical test also showed a significant increase in the behavioural regulation of time after taking the course ($Z = -4.020$, $p < .001$). The median of the post-test of the FCM group (*Mdn* = 5.75) was higher than the median of the pre-test (*Mdn* = 4.50). A large effect size was observed ($r = -0.620$). When between group difference is studied, Quade's test showed a significant difference between the two groups in the post-test when the pre-test result was controlled ($F(1,40) = 6.421$, $p < .05$). It had a large effect size when rounded off to two decimal places (*partial eta square* = 0.138). The FCM group had a higher median in the post test (*Mdn* = 5.75) than the FCP group (*Mdn* = 5.50). Thus, the FCM group was rated significantly higher in behavioural regulation of time than the FCP group.

The data showed that prompts and modeling in videos can enhance regulation of behaviour for the FCP and FCM groups. This enhancement showed a large effect size for both groups. For the between-group variation, the FCM group was rated significantly higher than the FCP group with a large effect size.

4.3.2 How Do Prompts and Modeling Affect Regulation of Behaviour in Pre-class Phase?

The study also included qualitative pre-class notes and interviews displaying self-regulated learning during pre-class learning.

4.3.2.1 Content Analysis of Qualitative Notes of Pre-class Performance. The qualitative pre-class notes showed signs of regulation of behaviour. Table 4.5 shows regulation of behaviour reflected in 179 sets of pre-class notes (FCP: 70 and FCM: 109). Behavioural planning and monitoring showed the highest frequency for both groups. Approximately one third of the FCP students planned for the time of watching videos and notetaking. Approximately one fourth of them wrote ‘enough time’ to indicate time monitoring. Fewer than one tenth of them wrote their answers to prompt for behavioural controlling and reflection. Approximately two fifths of the FCM students planned for the time of watching videos and notetaking. Approximately two fifths of them monitored their time by ticking their checklist. However, none of them wrote how they controlled or reflected on their behaviour. The notes of both groups showed the signs of regulating and monitoring time for pre-class activities. The frequency of planning and monitoring time was higher in the FCM group compared with the FCP group, as extremely few FCP students wrote about behavioural controlling and reflection.

Table 4.5

Descriptive Statistics of Regulation of Behaviour in Pre-class Notes

	Frequency (%) FCP group	Frequency (%) FCM group
Behavioral planning	31%	39%
Behavioral monitoring	26%	38%
Behavioral controlling	4%	0%
Behavioral reflection	4%	0%

4.3.2.2 Qualitative Interview Data of Pre-class Performance. Apart from notes, qualitative interviews provided insights into the regulation of behaviour during pre-class learning. The FCP (76.19%) and FCM (90.48%) groups regarded planning the timetable and monitoring as the most useful strategy that they frequently used to regulate pre-class behaviour. The students described how they planned the timetable. For example, a student from the FCM group remarked, "I found a piece of paper and wrote down when I should do something." A student from the FCM group said, "I followed the video, the teacher pretended to be the child who drew the timetable." This excerpt shows that FCM students drew timetables with reference to the video. Additionally, both groups planned for the length of activities – for example, "I usually set half an hour to watch the video. I expected myself to take notes while the video was paused." In addition to monitoring the order of scheduled events, they also monitored the length of time – for example, "I put a timer next to me to see if I use more time than expected." They followed the timetable – for example, "I think I did follow the small timetable. As I had written it down, I must take action." In their perspective, planning and monitoring led to the effective use of time. This is illustrated by the following excerpt. "Even when I was tired, I would not procrastinate since I was monitoring the time." They also thought that the timetable provided a clear view of daily activities – for instance, "I completely understand the arrangements of activities in a day. My life became more organised. I am not lazy or messy anymore." Additionally, the FCP (72.43%) and FCM (85.71%) groups regarded behavioural controlling, especially persistence, as the most useful strategy that they frequently used – for instance, "I persisted because if I persist, I learn well.'

4.3.3 How Do Prompts and Modeling Affect Regulation of Behaviour in In-class Synchronous Online Learning?

In addition to the pre-class asynchronous online learning, the study collected information about self-regulated learning in in-class synchronous online learning.

4.3.3.1 Qualitative Interview Data of In-class Performance. The qualitative interviews provided insight into the regulation of behaviour during in-class learning. The in-class regulation of behaviour was similar to that in the pre-class. Based on interviews with 42 students (FCP: 21 and FCM: 21), most FCP (76.19%) and FCM (85.71%) students stated that the most useful strategy they frequently used for regulation of behaviour was planning and monitoring the timetable for the day they had in-class sessions. An FCP student said, "After having lunch, I prepared for the lesson or I revised the skills I learnt. I had the lesson. At about 8:30pm, I practised speaking." FCM students included the activities of the day, not simply the activities for the virtual flipped classroom. For instance, a student said, "In the morning, I exercised, had breakfast, watched videos, did the exercise, set goals, took notes, read the notes and relaxed." Both groups monitored the order of the scheduled events – for example, "I referred to the timetable and followed it." FCM students described the details of monitoring time – for instance, "I followed the timetable. When I complete an activity at home, … I ticked it." They believed that planning timetable was important, as they could know clearly what they needed to do, such as, "It made me know what I could do. I would not … get confused and distracted." Additionally, they believed that planning and monitoring time was crucial for the effective use of time. A student stated, "Setting the time to do things … is more efficient." Apart from planning and monitoring time, one fourth of the FCP (23.81%) and two fifths of the FCM (38.10%) students regarded maintaining persistence, mainly through self-talk, as one of the most useful strategies that they frequently used, although these percentages were lower than those of pre-class learning. A student said, "I told myself to persist for five more minutes."

4.3.3.2 Qualitative Analysis of Lesson Observation. All of the synchronous online in-class sessions were investigated. Figure 4.3 shows the average number of times that the FCP and the FCM students left their seats. To leave a seat means that a student stood up and walked away. For the FCP group, the frequency was steady at the beginning, reduced and then levelled off in the second half of the course. The frequency of leaving seats suggests the regulation of behaviour in persistence. For the FCM group, a decreasing trend was observed despite fluctuation. The decreasing trend started to occur from Lesson 2 to Lesson 3. Both groups show decreasing trends with a sharp decrease from Lesson 2 to Lesson 4.

The reduction in frequency was larger in the FCM group than in the FCP group.

Figure 4.3

Average Number of Times Students Left their Seats

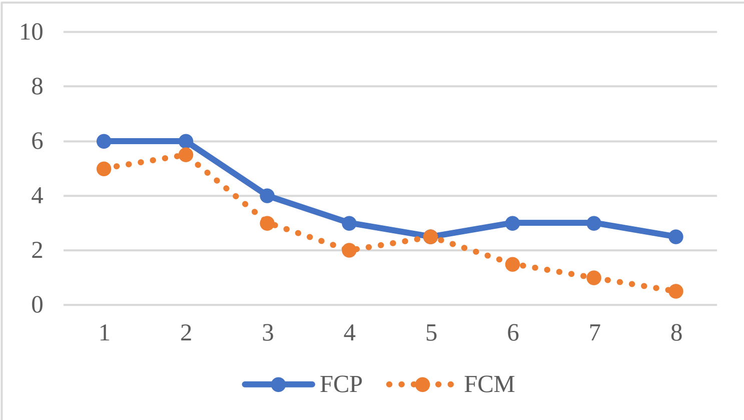


Figure 4.4 shows the average number of times the FCP and FCM students left the Zoom meeting. For the FCP group, the Zoom meeting was left once throughout the eight lessons. It was remarked that the student returned in the next observation interval, reporting an unstable network. For the FCM group, similar occurrences were recorded in Lessons 2, 3 and 6. The reasons were recorded in the remarks section – The students returned shortly, either within the same observation interval or in the next observation interval. When the students returned, they reported an unstable network. One of the students even wrote the cause, an unstable network, in the note submitted for the session. Apart from these incidents, both groups participated in all of the Zoom sessions.

Figure 4.4

Average Number of Times the Students Left Zoom

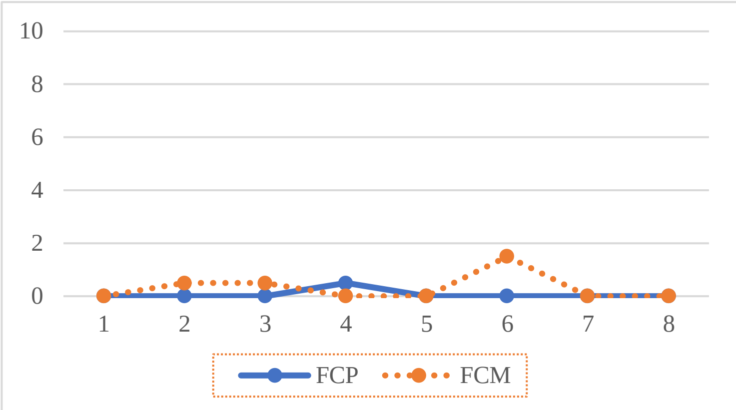


Figure 4.5 shows the average number of times the FCP and FCM groups requested that the teacher repeat questions. The frequency for the FCP group continually decreased from Lesson 1 to Lesson 4 and remained at nearly zero. The frequency of the FCM group fluctuated from Lesson 1 to Lesson 3 and remained low. Both groups showed a reduction from Lesson 2 to Lesson 3, and the frequency remained low thereafter. As the students persisted, they paid more attention and better heard the teacher's questions.

Figure 4.5

Average Number of Times Requesting the Teacher to Repeat Questions

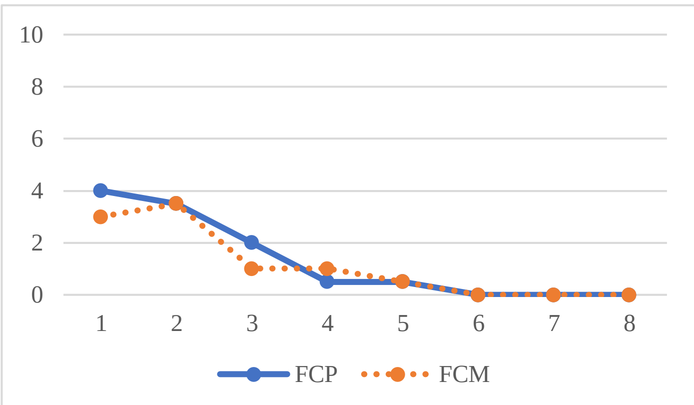
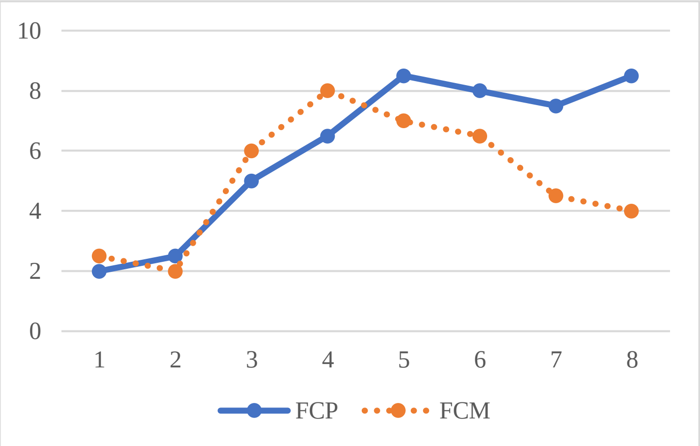


Figure 4.6 shows the average number of times the FCP and FCM students behaved well after misbehaving. For the FCP group, the frequency started at a very low point, increased and reached a peak at Lesson 5. It fluctuated minimally afterwards. For the FCM group, the frequency started at a very low point, increased remarkably from Lesson 2 to Lesson 3, and slightly increased from Lesson 4 to Lesson 5. A downward trend was observed in the second half of the course. Both groups showed an observable change in Lesson 3, and the frequency was high thereafter. Towards the end of the course, the FCP group remained at a higher frequency of returning to on-task behaviour, whereas the FCM group had a lower frequency. The contrasting trend is due to the reduced number of misbehaviours. As the learning context was controlled, the number of misbehaviours decreased. Thus, the frequency of behaving well after misbehaving decreased.

Figure 4.6

Average Number of Times Behaving Well after Misbehaviour



Overall, both groups showed decreasing trends in leaving seats and requesting the teacher to repeat questions. For behaving well after misbehaviour, the trend increased in the first half of the course for both groups. These imply that they had decided to persist to learn. The contrasting trend in behaving well after misbehaviour in the second half of the course suggests better control of learning context of the FCM group.

4.3.3.3 Content Analysis of Qualitative Notes of In-class Performance. Table 4.6 shows behavioural regulation during in-class sessions. Fewer than one tenth of the FCP notes showed planning and monitoring of time of in-class learning. Behavioural controlling and reflection were seldom on the FCP notes. For the FCM group, only one tenth of the notes showed planning and monitoring of time. Behavioural controlling and reflection were not found in the FCM notes. Comparison of the data showed that in the notes, behavioural regulation occurred infrequently. The FCM notes showed slightly higher percentages in behavioural planning and monitoring. The FCP notes show an exceptional occurrence of behavioral controlling and reflection as the students wrote their thoughts.

Table 4.6

Descriptive Statistics of Regulation of Behaviour in In-class Notes

Cognitive planning	Frequency (%) FCP group	Frequency (%) FCM group
Behavioral planning	7%	10%
Behavioral monitoring	7%	10%
Behavioral controlling	4%	0%
Behavioral reflection	4%	0%

Overall, both groups attempted to regulate behaviour for in-class learning. Behavioural planning and monitoring were salient strategies in interviews and notes. The FCM group gave detailed descriptions of their planning and monitoring of time. The decision to persist was better reflected in lesson observations then in interviews.

4.3.4 Regulation of Behaviour Beyond the Virtual Flipped Classroom

Planning and monitoring the timetable after online classes was reported as the most useful strategy that was frequently used for behavioural regulation by approximately half of the FCP students (52.38%) and the majority of the FCM students (90.48%). Similar to behavioural planning in the virtual flipped classroom, the FCM group described a more detailed timetable than the FCP group. For instance,

> "At 7:00, wake up, brush my teeth and eat breakfast. At 8:00, take lessons. At 1:00, eat lunch till 1:30 and rest till 2:00. At 2:00, I start to do school homework, then the homework of home (homework assigned by parents), then 15 minutes rest. At 2:15, piano practise and then learn Putonghua. Then rest, play or watch television."

Additionally, the FCM students described more clearly how they monitored their time in regular online classes than the FCP students. For example,

> "I set a timer. I can look at it. When there are five minutes left, and I still have a page to work on, I know I need to do faster. Finally, in contrast, I have a minute left. That means I worked really did faster."

Both groups believed that a planning timetable is crucial because they knew clearly about the arrangements of activities. As a student said, "I clearly know what I needed to do at different times. I became more familiar with the arrangements of the day."

Unlike pre-class learning, the percentage of students that chose persistence as the most useful strategy was lower in the in-class learning and post-course regular online classes: 23.81% for the FCP group and 38.10% for the FCM group. An example is "The lesson will end soon. I must persist." Additionally, FCP students used the adapted strategy, such as, “I wrote, ‘I must complete it. I must take notes. Then I wrote, ‘Try harder!’ ” Both groups believed that deciding to persist was crucial to successful learning. They said, “I persisted, so I learnt well.”

4.4 Regulation of Context

This section reports the regulation of context. It is divided into subsections about learning outcomes and the learning process. The quantitative questionnaire data provided insights into the immediate learning outcomes of self-regulation, and the qualitative interview data showed the extended learning outcomes of self-regulation.

4.4.1 To What Extent Do Prompts and Modeling Affect the Regulation of Context?

This section investigates the within- and between-group variation in the immediate learning outcomes of regulation of context. For the within-group difference, the Wilcoxon signed rank test showed a significant increase in the regulation of the learning context of the FCP group after the intervention ($Z = -3.528$, $p < .001$). The median of the post-test ($Mdn = 5.667$) was higher than the median of the pre-test ($Mdn = 4.667$). A large effect size was obtained ($r = -0.544$). Additionally, a significant increase was observed in the regulation of the learning context of the FCM group (*Z* = -3.930, *p* < .001). The median of the post-test (*Mdn* = 6.333) was higher than the median of the pre-test (*Mdn* = 4.667). A large effect size was obtained (r = -0.606).

Concerning difference between groups, Quade's test shows a significant difference between the post-test results of the FCP group and the FCM group when controlling for the pre-test result (*F*(1, 40) = 17.185, *p* < .001). A large effect size was obtained (*partial eta square* = 0.301). The FCM group rated regulation of the learning context significantly higher, as the median of the post-test of the FCM group (*Mdn* = 6.333) was higher than that of the FCP group (*Mdn* = 5.667).

The data showed that both prompts and modeling enhanced students' regulation of context for the FCP and FCM groups. This enhancement showed a large effect size for both groups. The FCM group was rated significantly higher rating than the FCP group, with a large effect size.

4.4.2 How Do Prompts and Modeling Affect Regulation of Context in Pre-class Learning?

Next, the process of learning regulation of the context is reported. For pre-class learning, qualitative interview data and content analysis of notes were investigated.

4.4.2.1 Qualitative Interview Data of Pre-class Performance. Monitoring and controlling of context were regarded as the most useful strategies that the students used frequently for pre-class learning, as expressed by the majority of the FCP students (80.95%) and FCM students (95.24%). The students monitored and controlled their study context. A student described how she monitored neatness, "My desk was always messy while I was doing my task because I saw this, I played with this. When I saw that, I played with that." They took note of what distracted them while watching videos and how the distractions affected them as they watched videos. They mentioned the usefulness of controlling neatness of their desks: "Put toys into a box. I was less distracted. It made me focused but it would not take a long time to do so (meaning packing toys)." They realised that controlling context was useful for maintaining their concentration.

Both groups also monitored and controlled noise. Regarding monitoring, a student said, "I noticed if there was any noise and if there was anyone disturbing me." The FCP group only controlled noise by themselves – for instance, "I moved to a quieter place, a place where no one disturbed me, like my room." Apart from controlling context by oneself, the FCM group showed an adaptation – controlling noise by requesting cooperation from others. As they noted the noise made by other family members, they requested their cooperation. This is illustrated by the following excerpt, “My dad was watching television. I told him to switch it off.” Overall, the students were aware of the disturbance caused by noise and its effect. Then, they controlled the context so that they could focus on their learning tasks. They thought that controlling noise was useful because they were focused in a quiet place; as a student said, “The context was quieter. I concentrated better.”

4.4.2.2 Content Analysis of Qualitative Notes of Pre-class Performance. Fewer than one twentieth of the FCP students wrote about planning, monitoring, controlling and reflecting on the context. The FCM students did not write down their thoughts about planning, monitoring, controlling or reflecting the context. That is, both groups showed extremely low frequency of writing about regulation of context. This may be due to the nature of notes for jotting down information on learning only.

4.4.3 How Do Prompts and Modeling Affect Regulation of Context in In-class Synchronous Online Learning?

This section examines the process of learning during the in-class phase. Data on lesson observation, interview and notes are presented.

4.4.3.1 Qualitative Lesson Observation Data of In-class Performance. Data from lesson observation showed how students changed in regulating the context during the eight lessons. This section reports the changes in the frequency of family members walking by, talking to family members, looking around, hearing background noise when unmuted, taking the initiative to make siblings walk away, wearing earphones or headphones and playing with things. The indicators provided insight into whether students could successfully control the context.

Figure 4.7 shows the average numbers of times the FCP and FCM students' family members walked by. For the FCP group, the number slightly fluctuated from Lesson 1 to Lesson 4 and remained relatively high on average. There was a sharp decrease between Lesson 4 and Lesson 5, a slight rise in Lesson 6, and a slight drop in Lesson 7, and then it remained the same. That is, the number decreased sharply and remained at approximately five in the second half of the course. For the FCM group, the number slightly fluctuated but remained at approximately 12 from Lesson 1 to Lesson 4. A sharp decrease was noted between Lesson 4 and Lesson 5 and a further decrease was observed afterward. Remarks in observation form showed that both groups had similar disturbances, such as siblings standing or sitting next to the students, siblings walking back and forth, and family members getting things nearby and walking past to other rooms.

Figure 4.7

Average Number of Times Family Members Walked By

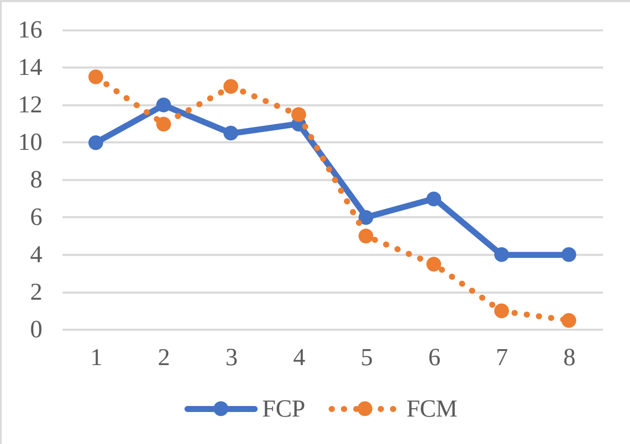


Figure 4.8 shows the average number of times background noise was heard when the FCP and FCM students unmuted their microphone to answer questions or to have speaking practice. For the FCP group, the number slightly fluctuated from Lesson 1 to Lesson 4. A slight decrease can be seen from Lesson 4 to Lesson 5 and slightly fluctuates, and then the number levelled off. For the FCM group, the number fluctuated from Lesson 1 to Lesson 4. The frequency dropped from Lesson 4 to Lesson 7, with the highest drop between Lesson 4 and Lesson 5. Remarks in observation form showed that both groups were affected by music, television and talking of family members. There are additional remarks for the FCM group included unknown repeated rhythmic noise such as a chopping sound and the sound of machines. Thus, both groups were exposed to background noise during learning, but a decreasing trend was observed particularly for the FCM

group, which attained a lower number of occurrences in the second half of the course compared to the FCP group.

Figure 4.8

Average Number of Times of Hearing the Background Noise when Unmuted

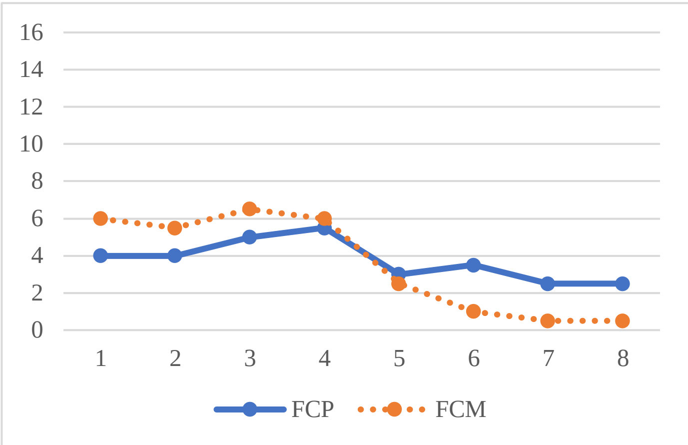
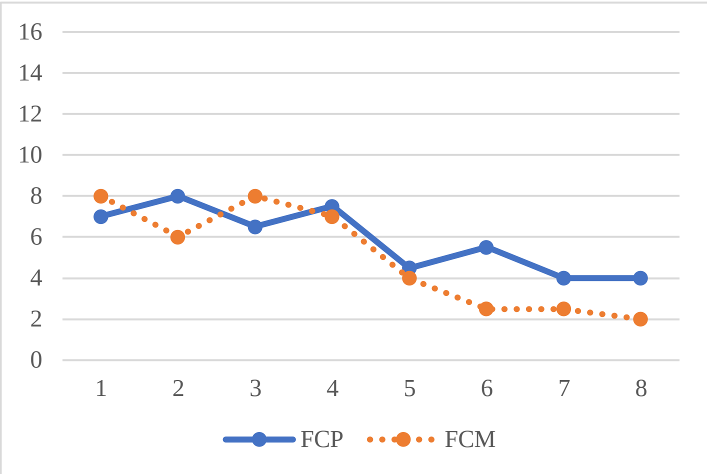


Figure 4.9 shows the average number of times the FCP and FCM students were looking around. The data fluctuated, staying relatively high in the first half of the course and relatively low in the second half of the course. There is an example of a particular scene when the student's grandfather got close to the shelf near him, and the student turned his head and looked at him. For the FCM group, the sharpest decrease occurred between Lesson 4 and Lesson 5. Despite the fluctuations, a decreasing trend was observed. The patterns of the two groups in looking around were similar to the patterns of people walking by. In combination with the written remarks on the observation forms, it can be concluded that most

of the students looked around because of the distraction of the context in the first half of the courses. However, the students controlled themselves better in the second half.

Figure 4.9

Average Number of Times of Looking Around



Incidences of talking to others also showed that the context affected students' level of concentration. Figure 4.10 shows the frequency with which the FCP students talked to their family members. For the FCP group, a relatively high frequency of students talked, as revealed by their mouth movements and facial expression from Lesson 1 to Lesson 4. A sharp decrease occurred between Lesson 4 and Lesson 5 and a slight decrease occurred from Lesson 6 to Lesson 7. The frequency ended at a moderate level. For the FCM group, an even higher frequency of mouth movement and facial expression was noted at the beginning. After decreasing sharply from Lesson 4 to Lesson 5, it further dropped slightly until reaching a very low level at the end. The patterns of the two groups were quite similar. The prominent changes in both groups occurred when they learned to regulate the context. The change was more crucial for the FCM group, which started with a slightly higher number and ended with a lower number of occurrences.

Figure 4.10

Average Number of Times Talking to Their Family Members

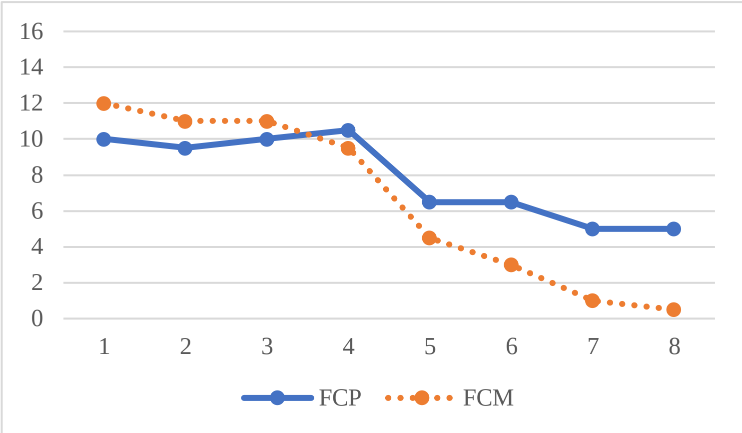


Figure 4.11 displays the average number of times the FCP and FCM students make their siblings go away. Only extremely few FCP students made their siblings go away since Lesson 5. Comparatively, more FCM students make their siblings go away in Lesson 5 and Lesson 6. Remarks of observation included requesting their siblings to walk away by gesticulating, pushing them away and closing open doors. In the last two lessons, the FCM students did not need to make their siblings go away because they were not disturbed. Overall, more FCM students than FCP students actively initiated means to prevent disturbance from family members.

Figure 4.11

Average Number of Times Making Siblings Go Away

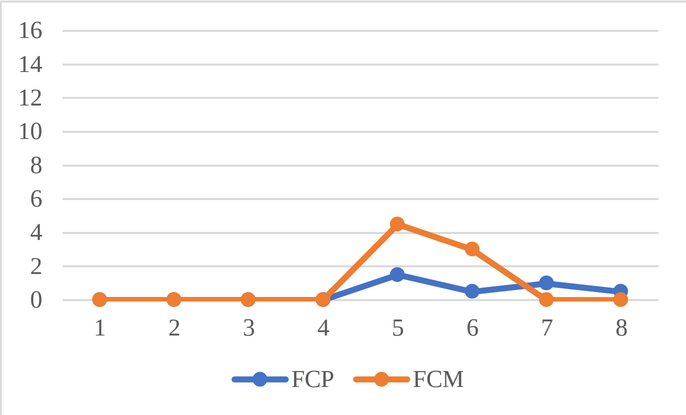


Figure 4.12 illustrates the average number of FCP and FCM students wearing earphones or headphones during a Zoom lesson. Very few FCP students wore earphones from Lesson 1 to Lesson 6 with very slight fluctuating numbers. No student wore earphones in Lesson 7 and Lesson 8. Very few FCM students wore earphones or headphones from Lesson 1 to Lesson 6, and the number was steady. No one wore earphones or headphones in the last two lessons. The trends are very similar, with a low number in the first six lessons and decreased to zero in the last two lessons. This observation suggests that they no longer need to regulate it using earphones or headphones in the last two lessons.

Figure 4.12

Average Number of Wearing Earphones or Headphones

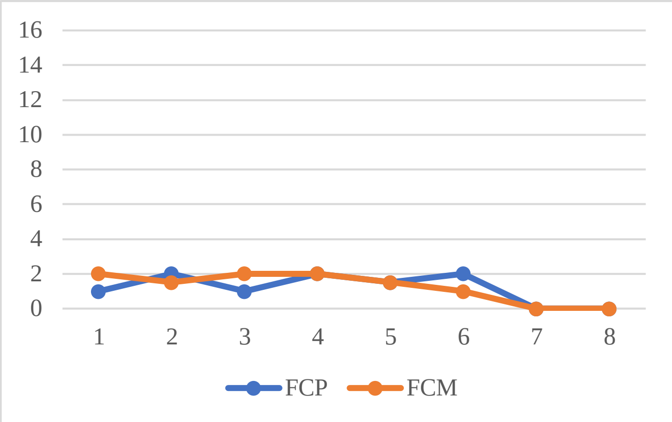
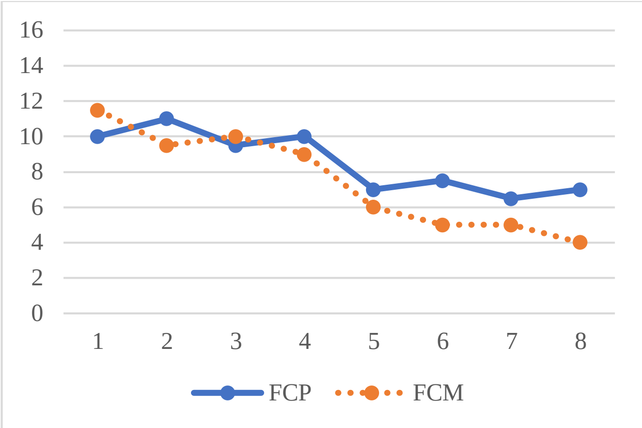


Figure 4.13 shows the average number of times the FCP and FCM students played with things. The trend of the FCP group started at a high level and continued at this level until Lesson 5, when it dropped substantially. Afterwards, it remained quite stable at a moderate level. The average frequency of the FCM group remained high from Lesson 1 to 4. A decrease occurred from Lesson 4 to Lesson 5, and the frequency slightly decreased thereafter. Both groups maintained a high level in the first half of the course with a distinct drop from Lesson 4 to Lesson 5. In the second half, the trends were slightly different: the trend of the FCP group remained quite steady, but the trend of the FCM group decreased slightly. Hence, there was a larger decrease in the frequency of misbehaviour in the FCM group.

Figure 4.13

Average Number of Times of Playing with Things



Conclusively, the lesson observation data for regulation of context showed a decreasing trend for both groups from the beginning to the end of the course. The FCM group showed a sharper decrease, reaching a lower point at the end. The sharper decrease suggests that the students regulated context more successfully.

4.4.3.2 Qualitative Interview Data of In-class Performance. Monitoring and controlling were regarded as the most useful strategies that students frequently used to regulate context during in-class learning, as expressed by 71.43% of the FCP and 95.24% of the FCM students in the interviews. An example of monitoring noise is as follows, “I told my mum not to use the vacuum cleaner at the time of my lessons, or to wait for a while because it sounded noisy.” Similar to pre-class performance, the FCM group also controlled noise by requesting others to cooperate. An FCP student said, “I went to a place without much noise.” A FCM student expressed, “I told my sister to play music after the lesson." Additionally, the students explained the importance of monitoring and controlling noise for pre-class, as illustrated by this excerpt, "When I was in a noisy context, I could not hear my teacher. I missed some notes and could not focus." They thought that monitoring and controlling context were useful because learning is affected by the noise level of context. Additionally, controlling noise can ensure a quick response from students to the teacher, as mentioned by a student, "I made myself more focused. When the teacher told me to answer a question, I could respond." Apart from noise, the two groups also monitored and controlled neatness of their desks. A student said, "When I saw my toy, I wanted to play with it." The following excerpt is an example of controlling neatness, "I removed my toys." They believed that monitoring and controlling toys could help focus during in-class learning – for example, "Put away the things… I would not play with things and would not be distracted."

4.4.3.3 Content Analysis of Qualitative Notes of In-class Performance. Fewer than one twentieth of the FCP notes signalled planning, monitoring, controlling and reflection of learning context. None of the FCM notes showed regulation of learning context. That is, the occurrence of signs of contextual planning, monitoring, controlling and reflection was extremely low for both groups. This may be due to the use of notes only for jotting down learning information.

The lesson observation and interview data together indicated signs of regulation of context during in-class learning, with contextual monitoring and controlling as crucial. The FCM group regulated context better than the FCP group during in-class learning and displayed wider adaptation of contextual regulation during in-class learning.

4.4.4 Regulation of Context Beyond the Virtual Flipped Classroom

This section explores the regulation of context during regular online classes. The FCP (80.95%) and FCM (90.48%) groups regarded monitoring and controlling as the most useful strategies that they frequently used. They described how they monitored and controlled noise during the COVID-19 pandemic. A student commented: “My home was quite noisy in the morning. My dad worked from home. My brother and I had online classes. There were two children in the living room and one adult in the room.” The following excerpts illustrate how they controlled the context using a preventive method. For instance, a student said, “I found a quiet corner. I would not be disturbed by things.” As some students and their siblings had online classes simultaneously during the COVID-19 pandemic, they decided to go to their rooms. “My brother was in the living room while I stayed in my room. Then, I was not disturbed by him.” The FCM students also applied the adapted strategy of requesting others to cooperate for regular online classes – for instance, “I told my family members to keep quiet for a while, or talk loudly after class.” Apart from noise, they also monitored and controlled neatness of their desks during the pre-class and in-class learning – for example, “I put my storybooks on the bookshelf.” They also believed that monitoring and controlling context could help them focus on their learning; for example, “Not seeing them (toys), I would forget them. Then, I would not think about playing.”

Both groups showed other variations in the use of self-regulation strategies. They shifted the sequence of contextual control to the beginning; for example, “I chose a place that was quiet and fewer people walked passed.” The FCM group also adapted contextual controlling for neatness of desk; for instance, “I placed my computer properly. It was neat. I felt relaxed to have lessons and take notes.” They set up a learning environment conducive to learning. Additionally, the FCM group combined the strategy of rewarding in controlling motivation to motivate themselves to control the context. For instance, “I was very lazy. If I packed my desk, I would reward myself with an ice-cream. I was satisfied after rewarding myself.”

4.5 Regulation of Motivation

This section reports the results concerning the application of regulation of motivation. It describes learning outcome concerning self-regulation and data about the process of learning.

4.5.1 To What Extent Do Prompts and Modeling Affect Regulation of Motivation?

Motivational regulation has two scales: intrinsic value and self-efficacy. The differences in intrinsic value within and between group are reported first. The Wilcoxon signed rank test showed a significant rise in the intrinsic value of the FCP group ($Z = -2.511$, $p < .05$) and a medium to large effect size ($r = -0.387$). The median of the post-test of the FCP group ($Mdn = 4.86$) was higher than the median of the pre-test ($Mdn = 4.43$). Moreover, this test showed a significant increase in the intrinsic value of the FCM group ($Z = -3.140$, $p < .01$) and a medium to large effect size ($r = -0.485$). The median of the post-test of the FCM group ($Mdn = 5.00$) was higher than the median of the pre-test ($Mdn = 4.43$). When between group difference is considered, Quade's test showed no significance in intrinsic value in the post-test between the two groups after controlling the pre-test result ($F(1, 40) = 0.020$, $p > 0.5$).

Motivational regulation was also reflected in self-efficacy. The Wilcoxon signed rank test showed that the self-efficacy of the FCP group significantly increased (Z = -2.908, $p < .01$), showing a medium to large effect size (r = -0.449). The median of the post-test of the FCP group (*Mdn* = 5.50) was higher than the median of the pre-test (*Mdn* = 5.00). Moreover, this test showed that the self-efficacy of the FCM group significantly increased (Z = -4.017, $p < .001$), with a large effect size (r = -0.620). The median of the post-test of the FCM group (*Mdn* = 5.88) was higher than the median of the pre-test (*Mdn* = 5.13). Quade's test showed a significant difference in motivational regulation reflected in self-efficacy between the two groups ($F(1, 40) = 14.042$, $p < .01$) and a large effect size (*partial eta square* = 0.260). The median of the post-test of the FCM group (*Mdn* = 5.00) was higher than that of the FCP group (Mdn = 4.86). That is, the FCM group rated self-efficacy significantly higher than the FCP group.

Both prompts and modeling significantly enhanced motivational regulation in terms of intrinsic value with a medium to large effect size. Although no significant difference was found between the two groups, the median of the FCM group was higher than that of the FCP group. Additionally, both prompts and modeling can significantly enhance motivational regulation in terms of self-efficacy. The effect size of the FCP group was medium to large, whereas the effect size of the FCM group was large. The FCM group was significantly higher than the FCP group in motivational regulation in terms of self-efficacy.

4.5.2 How Do Prompts and Modeling Affect Regulation of Motivation in Pre-class Learning?

4.5.2.1 Qualitative Interview Data of Pre-class Performance. Controlling was regarded as the most useful strategy frequently used to regulate motivation during pre-class learning, as mentioned by most FCP (61.90%) and FCM students (76.19%) students. They described how they motivated themselves through rewards such as candies and stickers. Both groups also rewarded themselves with other tangible rewards; for example, "After I had done the exercise, I rested and ate dessert or biscuits." The FCM students also adapted the strategy to have leisure activities. For example, "After watching the video, I could let myself play computer games or watch YouTube."

The students also described how they controlled motivation through self-talk. The following excerpts illustrate reminding of positive consequences:

> "I told myself, 'After watching the video, I can learn a lot.' "
>
> "I told myself, 'I am sure I can watch the full video.' "
>
> "I told myself, 'After watching the video and taking notes, I can eat something and play.' "

Both groups believed that motivational controlling through rewards and self-talk could motivate them – for example, “I was more motivated” – and make them feel positive, such as, “I felt happier, and I was eager to continue.”

4.5.2.2 Content Analysis of Qualitative Notes of Pre-class Performance. Notes were also analysed for the regulation of motivation, yet the regulation of motivation was rarely captured in the notes for the two groups. Fewer than one twentieth of the FCP notes showed motivational planning, monitoring and reflection. Approximately one tenth of the students’ notes showed motivational controlling. The FCM notes showed no motivational planning, monitoring or reflection. However, two tenths of them controlled their motivation by including stickers on notes.

4.5.3 How Do Prompts and Modeling Affect Regulation of Motivation in In-class Synchronous Online Learning?

Besides pre-class asynchronous online learning, the regulation of motivation was also shown in in-class synchronous online learning. Data included lesson observation, interviews and notes.

4.5.3.1 Qualitative Lesson Observation Data of In-class Performance. Lesson observation can provide information on the level of motivation in terms of confidence. Figure 4.14 shows the average number of times the FCP and FCM students used a confirmed tone in practice. A confirmed tone describes a student's tone in speaking practice as assertive, without hesitation or long pause. The trend of the FCP group fluctuated from Lesson 1 to Lesson 3, where it reached the lowest point. An upward trend was observed with a peak in Lesson 7. For the FCM group, stability at the start led to a slight drop from Lesson 2 to Lesson 3. An increasing trend occurred until a peak was reached in the last two lessons. Both groups had similar trends in a confirmed tone in practice, but the magnitude of increase of the FCM group was larger than that of the FCP group.

Figure 4.14

Average Number of Times Students Used a Confirmed Tone in Practice

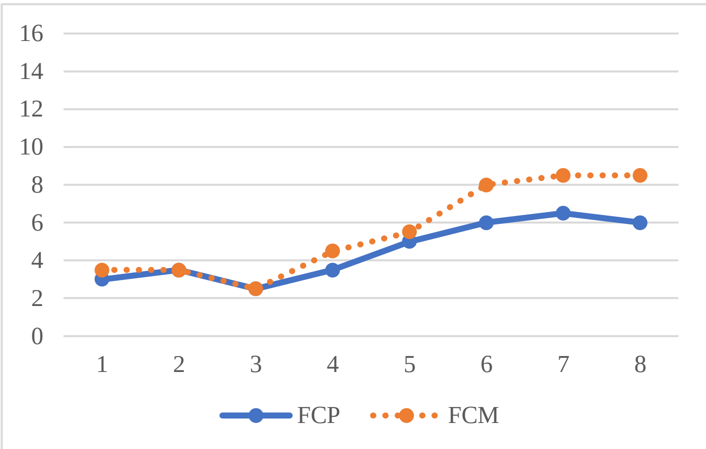


Figure 4.15 shows the average number of times the FCP and FCM students used a confirmed tone when answering a question. When confirmed tone is used, a student voice sounds assertive and can answer a question without hesitating. For the FCP group, an upward trend was observed with points varying occasionally

from the linear trend. A fluctuating increasing trend was also noted for the FCM group. Comparing trends at the beginning and the end, the FCM group showed a greater increase than the FCP group.

Figure 4.15

Average Number of Times Students Used a Confirmed Tone in Answering a Question

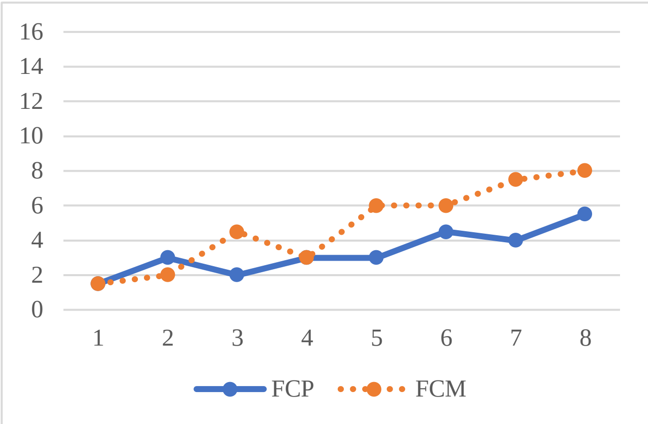
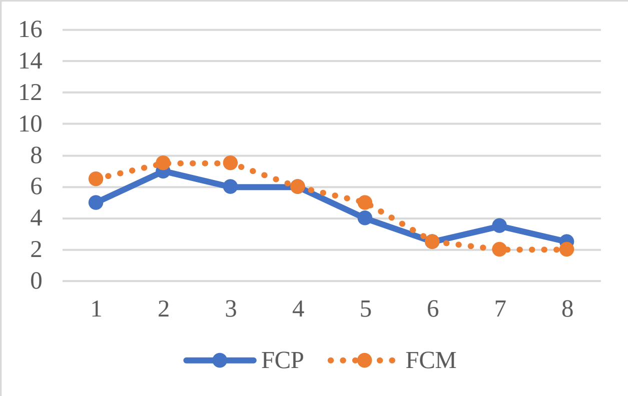


Figure 4.16 shows the average number of times the FCP and FCM students turned off their cameras. Turning off the camera may imply off-task behaviour due to a lack of motivation. The average frequency of the FCP group remained relatively high from Lesson 1 to Lesson 4 and decreased to a relatively lower level afterwards. The average frequency of the FCM group was relatively steady in the first half of the course, decreased after Lesson 3 and remained at a relatively low level in the last three lessons. Overall, both groups showed decreasing trends in turning off their cameras. Additionally, both groups attained low levels at the end of the course.

Figure 4.16

Average Number of Times Students Turned off Their Cameras



For the lesson observation data, the groups showed similar decreasing trends in turning off their cameras. The trend suggests an increased level of concentration as the students became more motivated. Both groups showed increasing trends in the use of a confirmed tone in answering questions and in speaking practice. The FCM group showed a larger increase. This may imply that both groups increased their self-efficacy, with the FCM group showing greater improvement.

4.5.3.2 Qualitative Interview Data of In-class Performance. Motivational controlling was the most useful strategy frequently used, as reported by approximately half of the FCP group (52.38%) and the majority of the FCM group (71.43%). Similar to the pre-class performance, the students rewarded themselves with tangible things and desirable activities. They also emphasised the use of rewards for attending the whole lesson during the synchronous online classes. For instance, “After the Zoom lesson, I would eat a candy. I wanted to eat a candy, so I focused “ They also controlled motivation by self-talk. For instance, “I would say something encouraging, ‘Add oil.’ I must not give up.” Similar to pre-class learning, they thought that motivational controlling was useful because they felt positive. For example, “Having a reward after the lesson made me happier”. It also motivated them to learn as illustrated by the following quote: “After the Zoom class, I engaged myself in something I wanted. Then I felt motivated. As a result, I learnt faster.” The students also showed a link between motivation and their learning outcomes: higher motivation made learning more efficient.

4.5.3.3 Content Analysis of Qualitative Notes of In-class Performance. In-class notes were analysed for regulation of motivation. Fewer than one twentieth of the FCP notes showed planning, monitoring and reflection for motivation. One tenth of the FCP notes showed controlling. None of the FCM notes showed planning, monitoring or reflection for motivation. The low occurrence of motivational regulation in the notes might have been due to the use of notes for jotting down learning content. Moreover, approximately one fourth of FCM notes showed controlling. Although the notes of both groups showed extremely low occurrences of motivational planning, monitoring and reflection, the FCM notes showed more applications of motivational controlling.

4.5.4 Regulation of Motivation Beyond the Virtual Flipped Classroom

Similar to pre-class and in-class learning, the most useful strategy for motivational regulation was motivational controlling, as indicated by 52.38% of FCP and 66.67% of FCM students. Both groups described application of rewards in the regular online classes. For example, "I could eat a candy in recess." This student rewarded herself with a candy for attending a regular online lesson. The students also applied self-talk successfully, "I said to myself, 'After online classes, I can play.' " Motivational controlling also made them feel positive and motivated for online classes: "I had snacks to make myself satisfied." Another student remarked on motivation, "I would be motivated."

4.6 To What Extent do Prompts and Modeling Affect the Ability of Giving a Chinese Speech?

The first research question aimed to determine the learning outcome from giving a Chinese speech. A pre-test and a post-test were administered to 42 students (FCP: 21 and FCM: 21). Table 3.5 presents the performance of the students in giving a Chinese speech using the rubric tool, which was shown to be highly reliable except in the scale of expression in the pre-test. The Cronbach's alphas for goal achievement were 0.845 and 0.971 in the pre-test and post-test, respectively, and those for expression were 0.569 in the pre-test and 0.830 in the post-test. The unexpected low value of expression in the pre-test is due to the non-verbal communication. Students either showed it to some extent or did not show any non-verbal communication at the beginning, thus making contrasting scores within the scale.

4.6.1 Overall Performance in Giving a Chinese Speech

For the within-group variation, the Wilcoxon signed rank test of the total score showed a significant increase in the FCP group ($Z = -4.019$, $p < .001$). The median of the post-test (*Mdn* = 85.00) was higher than that of the pre-test (*Mdn* = 77.00) with a large effect size ($r = -0.620$). Moreover, the statistical test of the total score showed a significant increase in the FCM group ($Z = -4.019$, $p < .001$). The median of the post-test (*Mdn* = 93.00) was higher than that of the pre-test (*Mdn* = 76.00). The effect size was large ($r = -0.620$). For the between-group difference, Quade's test showed a significant difference in the total score in the post-tests between the two groups when the pre-test was controlled ($F(1, 40) = 10.042$, $p < .01$), which resulted in a large effect size (*partial eta square* = 0.201).

4.6.2 Different Dimensions of Performance

Quantitative analysis was used to answer the research question regarding the effect of intervention on learning outcomes in giving a Chinese speech. The Shapiro–Wilks test of normality showed that data were distributed abnormally ($p < .05$), and non-parametric tests analysed the between- and within-group differences of the three scales and the total score. The Wilcoxon signed rank test was used to determine the within-group changes, whereas Quade's test was conducted to determine the between-group difference when controlling the pre-test.

4.6.2.1 Goal Achievement. To achieve the goal of presenting a message clearly, students used stress and pausing. For the within-group changes, the Wilcoxon signed rank test showed a significant increase in achieving clear presentation of the message through stress and pausing in the FCP group ($Z = -4.075$, $p < .001$) with a large effect size ($r = -0.629$). The median of the post-test of the FCP group (*Mdn* = 26.00) was higher than that of the pre-test (*Mdn* = 24.00). Additionally, the statistical test showed a significant increase in goal achievement through stress and pausing in the FCM group ($Z = -4.031$, $p < .001$) and a large effect size ($r = -0.622$). The median of the post-test of the FCM group (*Mdn* = 30) was higher than that of the pre-test (*Mdn* = 24).

For the between-group effect, Quade's test showed a significant difference in goal achievement through stress and pausing in the post-test when the pre-test was under control ($F(1,40) = 10.535$, $p < .01$) with a large effect size (*partial eta square* = 0.208). The median of goal achievement through stress and pausing of the FCM group (*Mdn* = 30) was higher than that of the FCP group (*Mdn* = 26).

The FCM group had a significantly higher score in goal achievement through stress and pausing than the FCP group.

4.6.2.2 Expression. Wilcoxon signed rank test showed a significant increase in expression in the FCP group ($Z = -4.017$, $p < 0.001$). The median of the post-test of the FCP group ($Mdn = 50.50$) was higher than that of the pre-test ($Mdn = 44.00$) with a large effect size ($r = -0.620$). Additionally, the Wilcoxon signed rank test showed a significant increase in expression in the FCM group ($Z = -4.020$, $p < 0.001$). The median of the post-test of the FCM group ($Mdn = 55.00$) was higher than that of the pre-test ($Mdn = 44.00$) with a large effect size. ($r = -0.620$). According to the group variation, Quade's test showed a significant difference in expression in the post-test between the two groups when the pre-test result was under control ($F(1, 40) = 7.125$, $p < .05$). The median of the post-test of the FCM group ($Mdn = 55.00$) was higher than that of the FCP group ($Mdn = 50.50$). That is, the FCM students performed significantly better than the FCP students in expression in the post-test.

4.6.2.3 Pronunciation. The Wilcoxon signed rank test showed no significant difference in pronunciation in the FCP group after the intervention ($Z = -1.890$, $p > 0.5$). The median remained unchanged between the pre-test and post-test ($Mdn = 9.00$). However, the test showed a significant increase in pronunciation of the

FCM group after the intervention ($Z = -3.127$, $p < 0.01$). The median of the post-test of the FCM group (*Mdn* = 9.00) was higher than that of the pre-test of the FCM group (*Mdn* = 8.00) with a medium to a large size effect ($r = -0.483$). Quade's test showed a significant difference in pronunciation in the post-test between the two groups when controlling the pre-test result ($F(1, 40) = 5.992$, $p < 0.05$) with a medium effect size (*partial eta square* = 0.130). The medians of the two groups were the same (*Mdn* = 9.00).

Conclusively, both groups improved in overall performance in giving a Chinese speech. However, the FCM group improved considerably more. For the individual categories, the FCP group improved in expression and goal achievement of giving a clear Chinese speech through stress and pausing. The FCM group improved in pronunciation, expression and the use of stress and pausing to achieve the goal of giving a clear Chinese speech. For individual categories, the FCM group improved considerably more than the FCP group.

4.7 Perceptions of Learning Self-regulated Learning Using Prompts and Modeling

This section focuses on the perceptions of the three parties – students, parents and the teacher. Their perceptions of enhancing self-regulation in the virtual flipped classroom are reported first.

4.7.1 Perceptions of Enhancing Self-regulation in Virtual Flipped Classroom

4.7.1.1 Perception of students. After taking the course, the students' valued learning self-regulation in the virtual flipped classroom. First, they believed that learning self-regulated learning was very useful. For example, "It can really help me", "If I do not learn self-regulated learning, I will be distracted and if I am distracted, I cannot learn well.", "It makes me reflect and understand what I am not doing well. Then, I can improve." Second, they believed that self-regulated learning could be applied to learning other subjects. For example, "It can be used in all kinds of learning, not only speech. It is a very good learning mode." Some of them believed that learning self-regulated learning may help them regulate their daily lives or their work in the future. For example, one student remarked: "Maybe when I start to work in the future, and I discover that the environment is noisy, I can apply the strategies I have learned."

Apart from the importance of self-regulated learning, they pointed out the specific need for learning self-regulation in the virtual flipped classroom compared with their prior experience. Firstly, the students did not know much about self-regulated learning, as one student mentioned: "I did not know what self-regulated learning was before the course" and "Even if you know it, you may not know how to apply it." Second, they recognised the importance of self-regulated learning skills in the virtual flipped classroom, as one student said: “As you watch the video, you also need learning strategies.” Third, they believed that self-regulation was impossible without the teacher’s support. A student said, “If I had not learnt it in this course, it would be very difficult.” This suggests that they might not have learned this skill if they were simply exposed to the virtual flipped classroom without any support in self-regulated learning. Another student stated that the application of the course content was related to the teacher’s support: “The teacher taught me in this course, so I could apply it.” Although support was necessary, they also believed that having a chance to apply self-regulated learning was crucial, as one student stated: “If you do not try it, you can hardly do it.” They believed that it was necessary to learn self-regulation in the virtual flipped classroom where they could learn and practice. For instance, “We learnt self-regulation when we watched the videos in the course. I could apply it in Zoom and I could remind myself how to regulate.” Thus, they had chances to learn and apply self-regulated learning in this course using the virtual flipped classroom mode.

The students’ positive opinions about the course were reflected in the questionnaire. Table 4.7 presents the descriptive data of the course evaluation items concerning students’ course satisfaction and preferences regarding the virtual flipped classroom. The Shapiro–Wilks test of normality showed that the data were not distributed normally ($p < .05$). A non-parametric Mann-Whitney U test was conducted to check the between-group difference. The test showed no significant difference in the items ($p > 0.05$). On a 7-point Likert scale, the medians of the groups were the same ($Mdn = 6.00$), which suggests that both groups liked to learn in the virtual flipped classroom mode. The third item concerning the teaching method of self-regulated learning. A higher median was found in the FCM group for using modeling to learn self-regulation ($Mdn = 7.00$), and a lower median was found in the FCP group for using prompts to learn self-regulation ($Mdn = 6.00$). Although a significant difference was not found, the FCM students generally rated slightly higher on all three items, as reflected by the descriptive data. Their perceptions of prompts and modeling are discussed in Sections 4.7.2 and 4.7.3, respectively.

Table 4.7

Descriptive Data of Course Evaluation Items

	Group	Median	SD
course satisfaction	FCP	6.00	0.700
	FCM	7.00	0.602
Preference of virtual flipped classroom	FCP	6.00	0.854
	FCM	6.00	0.680
Usefulness of prompts or modeling	FCP	6.00	0.669
	FCM	7.00	0.598

4.7.1.2 Perceptions of Parents. Forty-two parents (FCP: 21 and FCM: 21) were interviewed. Parents believed that learning self-regulation in the course was crucial for their children's studies. A parent said, "It is a systematic way of learning. I believe it can help students." Another parent described clearly why she thinks self-regulated learning is good for learning: "I think that having a clear purpose is really very good. This method helped him concentrate and understand key points." Self-regulated strategies learnt in the course can be applied to learning other subjects. A parent described in details, "The strategies learnt in this course are really useful. Setting timetables and controlling the context made her focused. Actually, the strategies taught in this course are really effective. I think not only learning speech, taking notes and setting timetables can be applied to other subjects and forming good habits. If students can persistently use these strategies, it will be helpful and effective."

Regarding the importance of self-regulated learning, the parents believed that self-regulated learning can have lasting impacts on the students. "I think that self-regulated learning is important for their lifelong learning." Another parent said, "They learnt to set goals, which is good for studying or working. It has lifelong benefits." She also suggested that self-regulated learning strategies can be applied at work. "The parents believed that home-based learning requires self-regulation. "Now, children take lessons at home, They have more leisure time. If they are able to set goals and timetables, and also know what to learn, learning is effective.' She suggested that students need to learn time management during the online learning of the COVID-19 pandemic. The parents added that students lacked time management skills before the course, which led to the need self-regulation. "At primary level, they may be unaware of how to spend their time (meaning making good use of time)."

Additionally, the parents believed that self-regulation learning was particularly important for the virtual flipped classroom. Firstly, they believed that pre-class learning in the virtual flipped classroom requires self-regulation skills. Secondly, students had minimal knowledge about self-regulation learning. A parent said, “My child was unaware of self-regulated learning before the course. I believe the video taught them to reflect, which is a very good habit.” Another parent affirmed, “My children absolutely do not know self-regulated learning before.” Thirdly, students could not perform self-regulation properly if they had not learnt it. A parent stated the need for self-regulated learning in the virtual flipped classroom: “When they watched videos before learning self-regulation, they were unaware of the time they needed to reflect.”Another parent mentioned the need for self-regulated learning support: “Learning through videos without support, the child might just sat and daydreamed.” This suggests that pre-class videos without support of self-regulated learning might result in off-task behaviour because of a lack of self-regulation skills. Another parent said, “I think it is good that the video paused and asked them to reflect on themselves.” This suggests that the support enabled them know when to exercise a particular skill.

More importantly, the parents thought that it was essential to embed learning of self-regulation learning in the virtual flipped classroom. First, they noted that self-regulation skills were not part of the curriculum. One parent commented: “To schools, self-regulation is an extra learning. I think teaching them when learning other topics, like speech, is very useful.” She regarded embedding self-regulation learning as an approach for teaching out-of-syllabus topics. Another parent also supported embedding learning of self-regulation, “Embedding it in this course is good. If it was drawn out to teach in a separate lesson, I think it would take too long to teach it.” He implied that embedding self-regulation learning in this course was better than conducting a separate training. Apart from supporting the need for embedding self-regulated learning in the course, the parent supported the gradual integration of self-regulation learning in videos: “Children had not learnt self-regulated learning strategies before. The teacher added these methods in videos. Children could learn how to use the whole set of strategies on their own learning. With these methods included in every video, they slowly learned how to use them and applied them to their learning. I think it is necessary.”

4.7.1.3 Perceptions of the Teacher. The teacher believed that the self-regulation strategies acquired in this course facilitated students’ learning: “This course provides strategies for regulating different areas. I think all the strategies taught can facilitate students’ learning.” The self-regulation strategies acquired in this course are useful for learning other subjects, as she remarked, “After learning self-regulation strategies in this course, students can probably apply them to learning English, Maths, General Studies, Science and others.” She also believed that self-regulated learning strategies can be useful for lifelong learning: “They will probably need to self-study in the future. The strategies learnt in this course are really helpful for them." The strategies learnt in this course are crucial to the changes in learning conditions that arose due to the COVID-19 pandemic. She said, "There may be class suspension for outbreak of upper respiratory infection. Online classes may be held in these cases. The strategies learnt in this course equipped students to learn in online classes."

The teacher believed that learning self-regulation is crucial for learning in the virtual flipped classroom mode. She said, "In the past, students did not make much improvement even when the virtual flipped classroom was used. This was probably because they did not have the skills to regulate their learning in the virtual flipped classroom." Additionally, she suggested that the virtual flipped classroom requires self-regulated learning and that students lack such knowledge and skills. She further explained why the virtual flipped classroom requires learning self-regulation skills, "For the pre-class learning, the students were learning at home on their own." She suggested that pre-class learning usually occurs without a teacher's or parent's monitoring, and therefore, self-regulation knowledge and skills are needed. She believed that support for learning self-regulation was needed: "In my past experience of the virtual flipped classroom, the students could not learn self-regulation without any support." "When they did not know how to self-regulate, they might just play the video. The core content was introduced in videos. If they were not self-regulated, they missed the core content introduced. In this case, they cannot benefit from the virtual flipped classroom." She thus strongly supported teaching self-regulation for the virtual flipped classroom mode.

Additionally, she believed that it is effective to embed training in self-regulated learning in the course for three reasons. She said, "The formal curriculum leaves very little room for teaching other topics not included in the formal curriculum, I mean self-regulated learning. Embedding it in this course is good since the curriculum and schedule of extracurricular programmes are comparatively more flexible." She also supported the design of gradual teaching self-regulated learning as she said, "If an introductory training was held, but not embedding it in each lesson, students may not be able to learn and apply such a complex concept."

4.7.2 Perceptions of Prompts

4.7.2.1 Perception of Students on Prompts. The students generally thought that prompts could help them apply self-regulation. They thought that prompts regularly reminded them to apply self-regulation; as a student said, "The questions reminded me to apply self-regulation." Another student said, "The questions made me understand the environment and what I need to do."

The students liked multiple choice questions as prompts and preferred them to open-ended questions. First, multiple choice questions can provide guidance for beginners, whereas open-ended questions are too broad. “If it is too broad, I will not know where to start with. You gave me choices, and then I can choose from the three choices. That’s easier.” Therefore, students will not be discouraged from learning self-regulation even if they cannot create their own ideas. Second, they considered it easier to answer multiple choice questions than to type or write on a screen. One student said,

> “I think pausing and choosing ABC is better. Because typing and writing on the screen are not so comfortable. Sometimes your fingers may scratch the ‘Mon’ (meaning the screen). Those using the computer are much poorer; they need to type the words.”

He implied that some students may encounter difficulties entering answers using tablets and computers, making multiple choice questions a better approach for prompting.

However, the students noted that the prompts were not very concrete, and they hoped to see how the teacher demonstrated planning of timetables. For example, “I hope that the teacher can demonstrate how to draw the timetable. If I could see her timetable, I could know the proportion of rest and work and the order."

4.7.2.2 Perceptions of Parents on Prompts. Parents of the FCP group commented positively on teaching self-regulation through prompts. Firstly, they thought that providing prompts allowed their children to interact with the system. A parent said, "I think, to some extent, it is an interaction. Although she did not interact with people, she interacted with the system. The system showed questions. Then she answered them. I think interacting with the system can also stimulate her to think." Another parent mentioned the advantage of supplementing face-to-face communication, "That's (meaning interacting with the system) the same as face-to-face; the teacher talks to her directly."

Secondly, they believed that prompts could guide them to learn self-regulation. A parent cited an example: "The questions themselves are directions, like I should set a target. And questions let her know how to focus on her task. I think these questions are very useful." Another parent said, "Some students may get lost. Actually, questions for regulation in the middle can lead students to the path that the teacher wants them to take."

Thirdly, they believed that prompts functioned as reminders. "While they were daydreaming, you have reminders: Actually, can you find key points? They can remind them." Another parent said, "The videos remind her a lot. She really can think about, “How to plan my time?” “When I have lessons, should I take notes?” She can really pause and think about them herself. I think they are very helpful. Not only very good, but really very helpful.” They implied that prompts can remind students to self-regulate their learning.

Fourthly , they liked multiple choice questions. They believed that students would be resistant to open-ended questions. A parent said, “They will resist open-ended questions. They think they are very difficult.” She suggested that multiple choice questions would not discourage the students if they did not come up with ideas. Another parent said, “If the questions are open-ended, they are not using mobile phones, they may not be able to write. Typing Chinese characters is even more difficult. They have not practiced typing. So I think MC is more suitable at this stage.” They believed that students would not face technical difficulties when answering multiple choice questions.

4.7.2.3 Perceptions of the Teacher on Prompts. The teacher supported the use of prompts in learning. She said, “Prompts help them learn self-regulated learning.” Prompts are beneficial because the options and questions provide guidance for learning self-regulation. She said, “The options were like teachers telling them the methods of regulating their own learning. That is to say, the options gave them the ideas of what they could do at different stages.” She added, "If the students were aware of the order of the prompts, they could actually learn the thinking pathway for self-regulated learning, planning questions leading to monitoring questions which then lead to controlling questions, and so on. They could also notice the areas that they learnt to regulate." She implied that students became used to the sequence of self-regulation, especially the flow of thought in guiding themselves to self-regulate.

She also believed that prompts are unique in helping students learn when and what to ask themselves, "Students can learn what questions they can ask to self-regulate their learning and when they should ask themselves." Apart from helping them to learn, she believed that prompts can function as reminders as she expressed, "Prompts are good. They remind students to regulate themselves." She believed that options could particularly help beginners, as she said, "Self-regulated learning might be new to them. If there were no options, they might not have any ideas. In that case, they might not try self-regulated learning." She also thought that multiple choice questions which can avoid technical problems are suitable for children because they had not learnt typing yet. However, she pointed out that prompts are weak in making the concept concrete as she said, "Prompts are less concrete and detailed than modeling … they might not know the details of how to use them."

4.7.3 Perceptions of Modeling

4.7.3.1 Perceptions of Students on Modeling. Students in the FCM group perceived modeling as a positive means of learning self-regulation due to several reasons. First, they believed that the teacher's modeling could help them understand self-regulation thoroughly. The teacher's modeling clearly showed the application of self-regulation through actions. A student remarked: "With the teacher's modeling, I clearly know how to practice self-regulation". In particular, they believed that demonstrating how to create a timetable was very useful. A student remarked, "Demonstration helps me understand how to create a good timetable, and I can refer to it to learn how to allocate the time." Another student said, "I always wanted to use the timetable, but I did not know the format. After watching the videos, I knew how to create a timetable." These remarks suggest that the teacher's modeling can show students the timetable format as well as the time allocation for activities. Additionally, the student believed that they could know the teacher's thoughts, as she thought aloud while demonstrating in videos. In the modeling videos, the teacher asked herself about Chinese learning content. One student commented, "She said it out loud, made me self-question myself more often and find the answer through self-questioning." This shows that the student learnt this learning strategy for cognitive controlling through the teacher's model of thinking aloud.

The students also had positive opinions on roleplaying by the teacher. They perceived teacher-in-role as highly interesting, which made the learning of self-regulation enjoyable. One student commented: “It is quite funny to see the teacher roleplaying a child, so I could remember it. As I remembered the strategies, I could apply them to my learning.” The student further explained the effect of such enjoyable learning – facilitating remembrance and the application of self-regulated learning strategies. The teacher’s roleplay helped the students relate and enhanced their understanding. Another student expressed, “The teacher took on our role. It made me understand more easily.”

4.7.3.2 Perceptions of Parents on Modeling. Parents of the FCM group were highly positive about teaching self-regulated learning through modeling. First, they believed that modeling could help the students know clearly how to regulate. One parent remarked, “If you just tell her, she may think that it is very abstract. When she does it, she may wonder, “What should I do?” Actually, this learning method is slightly abstract. If she watches the videos, the scenes will come up to her mind. She has a clear idea and knows how to do it.” Another parent described the concrete images in videos, saying: “They can actually see the whole process, how to set a timetable, how to take notes.” The parents believed that viewing the video could facilitate memorisation, as a parent commented, “The teacher demonstrated it once and for children, it is more memorable.”

Like the students, the parents also valued teacher-in-role. The parents believed that teacher-in-role was effective because teachers had a strong influence on students. A parent commented, “The teacher acted it out, which is really good. The teacher is a special actor; they really can remember and follow her.” The parents stressed that teachers had a stronger effect than parents: “He will believe her (the teacher) and try to understand. If it was me, he won’t listen to me.” Additionally, teacher-in-role can make students have a feeling of echoing. A parent described such effect using a metaphor: “Actually, the teacher’s roleplaying is like a mirror… If the teacher does not use the students’ angle, only her angle, the student may not be able to feel the same.” The parents also believed that teacher-in-role could narrow the distance between the teacher and students, thereby enhancing acceptance by the students. For example, one parent remarked, “They can feel that the teacher is not one who stand seriously and teach them. Instead, she is like a peer. Her tone is softened, like a child’s tone. There are no walls between them. I think they can accept the teaching more easily.” Additionally, the parents believed that teacher-in-role was highly interesting and attractive for students. A parent remarked, “As the main character is the teacher, the teacher roleplayed the child, and they think that it is very interesting." Another parent expressed, "I remember she told me that she saw the teacher wearing the jacket and thought it was very funny."

The parents believed that the teacher thinking aloud to model how to reflect was crucial, as it could help students understand the teacher's thought. For example, one parent remarked, "If the teacher did not verbally say her thinking process, I think the children, at their age, would not be able to guess her thought. She says it out loud, and the children can easily understand." The parents explained the need to model reflection: "Sometimes, she does not notice that she experiences the process of thinking. After listening to the teacher's reflection, she can think about how she should do reflection." The parent noted that reflection was related to thought and should be visualised for students to see through thinking aloud in modeling.

4.7.3.3 Perceptions of the Teacher on Modeling. The teacher believed that students could know what to do very clearly through her modeling. The teacher commented, "They could see the whole process of self-regulated learning. They could see what I did clearly. The concept of self-regulated learning became easier for them." The teacher also believed that students could know her thought through thinking aloud, as she stated, "My thoughts became so concrete to them. They could listen to how I verbally questioned myself to give further examples. They could listen to how I encouraged myself verbally through self-talk.” The teacher believed that modeling both action and thinking helped students understand self-regulated learning completely, yielding better learning results: “With actions and concrete thoughts, they could get a complete picture of self-regulated learning. They could know how it worked in real situations of learning.”

The teacher’s viewpoint on having a teacher as the main character roleplaying a child was positive. The teacher commented, “Children usually think that teachers are experts in particular areas. I think this makes them be willing to follow me to try self-regulated learning. If their schoolmates acted it out, this might be less persuasive to them.” The teacher emphasised a teacher’s influence on students: the teacher’s knowledgeable image can enhance the students’ willingness to learn. Additionally, the teacher remarked, ‘This time, I roleplayed a child learning in pre-class learning. I think they probably felt similar.” The teacher also believed that roleplaying could arouse students’ interest, as she commented, “I think they would find it interesting. They would remember the skills. They could then put them into practice more easily.”

The teachers, students and parents all believed that learning self-regulation was necessary for the virtual flipped classroom. They attributed the necessity of learning self-regulation to various reasons, such as the importance of self-regulation, the need for self-regulation in the virtual flipped classroom and students' lack of self-regulation skills. Additionally, they were all positive towards prompts and modeling. They positively described prompts not only as a means to remind students to self-regulate but also as a means to guide the students on how to self-regulate. They acknowledged that the teacher's demonstration could reduce the abstractness of self-regulation and that the teacher roleplaying a student successfully aroused the students' interest and created a feeling of echoing.

Chapter 4 presented the findings of the study based on the research questions. The following section discusses the findings and presents a better understanding of self-regulatory training via prompts and modeling as well as transfer of strategies.

Chapter 5 Discussion

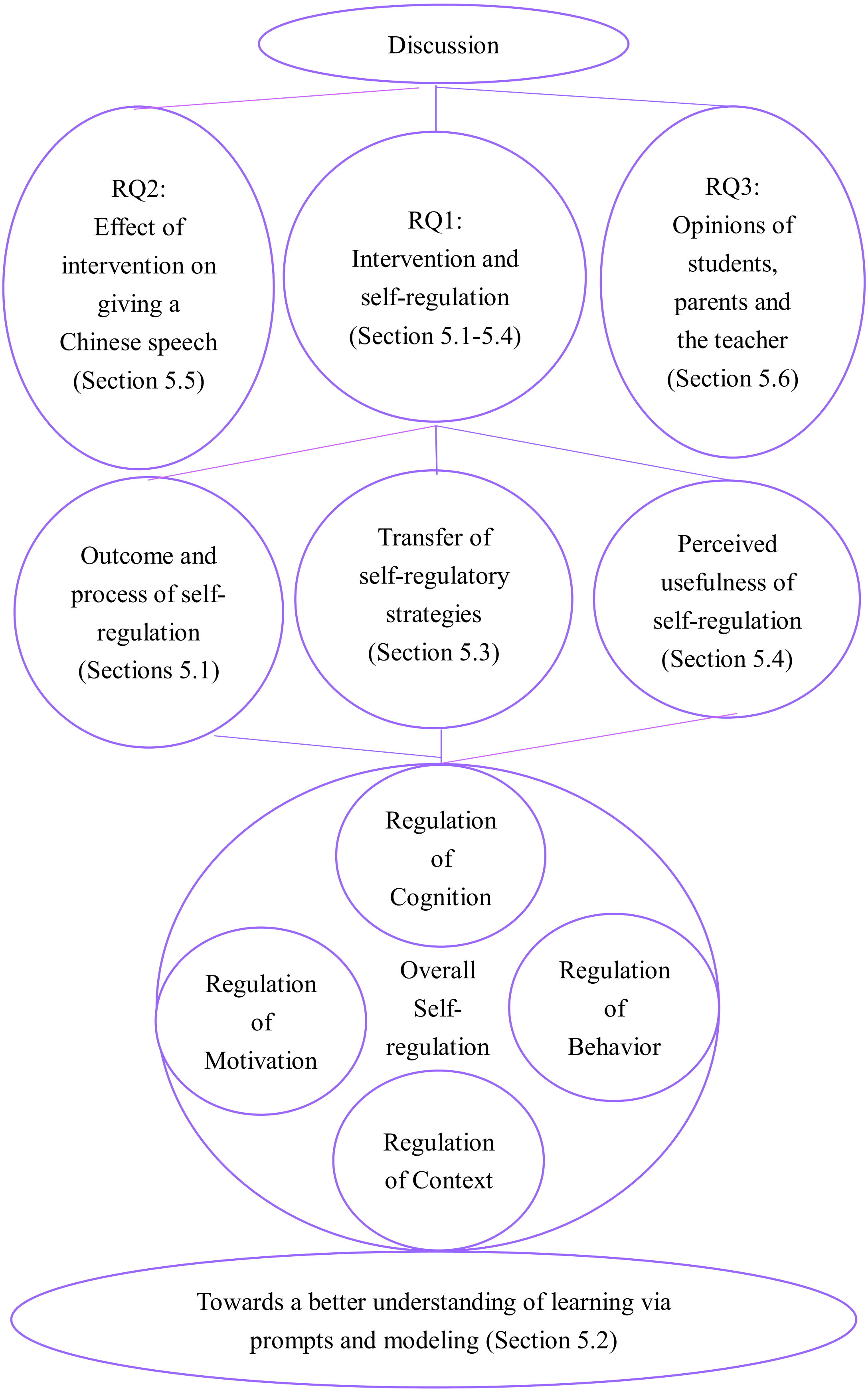
This chapter highlights the contributions of this study. The study contributes to research by determining a more effective approach (modeling or prompts) for self-regulated learning in primary school and justifying why modeling is better. More importantly, the study exhaustively examined self-regulated learning and provided detailed information on the subject.

Furthermore, the study adopted an action research design that includes the stages of planning, taking action, observation and reflection (Costello, 2011). Students and parents reflected on facing difficulties in learning from the lack of self-regulation because of the sudden change in learning modes during the critical period of the COVID-19 pandemic. The teacher reflected on how students were not self-regulated even when she attempted a few lessons in the virtual flipped classroom. After identifying the problem, I incorporated prompts and demonstrations in the pre-class videos for the two groups. I observed all of the course lessons and collected relevant data through pre- and post-speaking tests, pre- and post-questionnaires, notes, lesson observations and interviews with the students, parents and teacher.

Figure 5.1 shows the organisation of this chapter. Sections 5.1 to 5.4 centre on the research question about self-regulation: To what extent and how do prompts and modeling affect self-regulation? Section 5.1 focuses on the outcome and process of self-regulation. Section 5.2 discusses the transfer of self-regulatory strategies and is further divided into two sub-sections. Section 5.3.1 explores the transfer of strategies from the pre-class stage to the in-class stage. Section 5.3.2 centres on the transfer of self-regulatory strategies from the virtual flipped classroom to regular online classes. Section 5.4 concerns the perceived usefulness of self-regulatory phases. Sections 5.1 to 5.4 are further subdivided into five parts: regulation of cognition, behaviour, context, motivation and overall self-regulation. The first section (Section 5.5) addresses one of the research questions: To what extent do prompts and modeling affect learning outcomes in an extracurricular programme using the virtual flipped classroom? Section 5.6 is related to the following research question: What is the perception of students, parents and the teacher on learning self-regulated learning through prompts and modeling in an extracurricular programme using the virtual flipped classroom? This section is further subdivided into three major parts: perceptions of the need for teaching self-regulation in the virtual flipped classroom and perceptions of prompts and modeling for facilitating self-regulation. Section 5.6 consists of two parts: Section 5.6.1 proposes a new framework for understanding learning via prompts and Section 5.6.2 provides a better understanding of the adaptation of self-regulatory strategies for learning via modeling.

Figure 5.1

Overview of the Discussion Chapter



5.1 Outcome and Process of Self-regulation

This study also examined the outcome and process of self-regulation. This section discusses the effects of training on overall self-regulation and centres on the four aspects of self-regulation in Pintrich's (2000) model: regulation of cognition, behaviour, context and motivation. It thus provides a deeper and broader understanding of students' self-regulation application.

5.1.1 Overall Self-regulation

The data showed that prompts and modeling can enhance students' self-regulation. When the self-regulation in these four aspects improves, overall self-regulation improves because behavioural, contextual, motivational and cognitional aspects are regulated during learning (Pintrich, 2000). In this study, questionnaire data showed an increase in the regulation of different aspects of self-regulation and overall self-regulation for students learning via prompts and modeling.

Modeling was more effective in facilitating overall self-regulation than prompts. If the extent of improvement is greater in the different aspects, the extent of improvement in overall self-regulation will probably be greater. With the different aspects and overall self-regulation computed separately, the students learning via modeling showed greater improvement in the aspects than those learning through prompts. Additionally, the questionnaire data showed that modeling increased overall self-regulation more than prompts.

5.1.2 Regulation of Cognition

According to Pintrich (2000), regulation of cognition involves setting goals and activating prior knowledge for cognitive planning, monitoring understanding of content, controlling learning using learning strategies and reflecting on goal achievement. As self-regulation can be viewed as a static aptitude and dynamic process (Winne, 2010), this section focuses on the outcome and process of regulation of cognition.

5.1.2.1 To What Extent Do Prompts and Modeling Affect Regulation of Cognition? Prompts are effective for enhancing regulation of cognition because prompts can scaffold students to self-regulate in an online learning context (Azevedo, 2004). In this study, the students received prompts as reminders for regulation of cognition and suggestions, such as to rewind videos. As indicated in the student interviews, the students initially lacked sufficient ideas about how to self-regulate, but the options provided cues for them. The effectiveness of the prompts demonstrated in this study is consistent with the literature (Ferreira et al., 2015; Lai & Hwang, 2016; Sonnenberg & Bannert, 2019).

Similarly, modeling can effectively improve regulation of cognition. As modeling crystallises abstract thoughts, students can understand the abstract thinking during regulation of cognition. Modeling by thinking aloud aids the demonstration of thoughts in the mind (Hartman, 2001). In this study, the teacher thought aloud to let the students know what the teacher was thinking about during cognitive reflection. The findings regarding the effectiveness of modeling are consistent with prior studies using modeling to enhance regulation of cognition (Clearly & Zimmerman, 2004; Raaijmakers, 2018). According to Clearly and Zimmerman (2004), the teacher model thought aloud when she used strategies for regulation of cognition. Similarly, the teacher modelled thought aloud when selecting a task in the study of Raaijmakers (2018).

Furthermore, modeling was more effective than prompts in enhancing the regulation of cognition. Generally, the regulation of cognition involves the understanding of hidden thoughts (Pintrich, 2000). When the hidden thought during the regulation of cognition becomes more crystallised, learners can understand the regulation of cognition more easily. Particularly, the questionnaire data indicated that students learning through modeling improved more than those learning through prompts. In contrast, although prompts provided students with ideas to regulate their cognition, they were limited in displaying hidden thoughts.

This finding is consistent with that of Bannert and Reimann (2012) where modeling is more effective than prompts. The difference is in the timing of testing prompts and modeling. Bannert and Reimann (2012) tested prompts in one experiment before testing modeling in another, and the authors compared the effects of prompts and modeling in the two experiments. However, this study tested prompts and modeling in a single experiment, making a better comparison because of the same learning content and length of intervention.

5.1.2.2 How Do Students Implement the Regulation of Cognition in Pre-class Stage? This study also investigated how students applied the regulative strategies in the different stages of learning. In the pre-class learning, the students set goals for learning Chinese speech and self-regulation. They also activated their existing knowledge, monitored their understanding and controlled their learning using strategies such as listing and summarisation. The students also reflected on what they had learnt.

When students were prompted, they learnt how to practice self-questioning to self-regulate. Self-questioning is an important technique to prompt self-regulation (Hartman, 2001). The data in the notes showed that some students recorded the prompting questions and answers. Meanwhile, the students expressed that they followed the prompts to ask themselves questions in the interviews. That is, the students engaged in self-questioning mentally or in writing through notes when prompted.

The process data also clarified how students learnt through video modeling. It has been shown that students learnt through replaying the learning content and the modeling segment of the videos. In traditional modeling, viewing the modeling segment again may depend on whether the model demonstration would be repeated again. In video modeling, students can initiate watching the modeling segment themselves. This study is consistent with prior studies that showed that students replay videos when learning with video-based modeling (Chen & Yakubova, 2019).

Furthermore, the students' notes indicated that modeling can lead to more frequent use of strategies, such as self-questioning on the learning content, synthesising the content and organising information using thinking tools. These strategies require higher-order thinking as they involve analysis, evaluation and synthesis of knowledge (Bloom, 1956). Higher-order thinking involves a complex thinking process that can be demonstrated through externalising thoughts (Bandura, 1986; Hartman, 2001; Zimmerman & Clearly, 2004). Such a complex thinking process was displayed when the teacher verbalised her thoughts and acted out how she applied thinking tools. Visualisation can foster the execution of strategies because viewing the events demonstrated may help the students rehearse the actions before producing the actions (Bandura, 1986). After viewing the teacher's demonstration, the students could rehearse the actions of drawing thinking tools and the thinking process more easily. Rehearsing the strategies requiring higher-order thinking leads to better execution of such strategies in application.

In summary, prompts and modeling are effective in enhancing the regulation of cognition, where modeling is the more effective training method. The process data showed that students using prompts learnt to self-question, whereas students using modeling replayed the video modeling segment. Moreover, students learning through modeling tended to apply learning strategies requiring higher-order thinking.

5.1.3 Regulation of Behaviour

Regulation of behaviour involves managing time and effort such as scheduling and monitoring time, controlling effort by deciding to persist and reflecting on the result of deciding to persist (Pintrich, 2000). This section first considers the regulation of behaviour measured in terms of time management and then discusses how the students regulated their behaviour when learning online.

5.1.3.1 To What Extent Do Prompts and Modeling Affect Behavioural Regulation? First, prompts can effectively increase regulation of behaviour. As shown in the students' notes and interview data, the students learning with prompts planned the time for pre-class activities by drawing timetables. The questionnaire data also showed that the regulation of behaviour for students learning with prompts improved. This study is consistent with previous research (Chorng et al., 2019; Lai & Hwang, 2016; Wong et al., 2021) supporting the positive effect of prompts on behavioural time planning. However, other researchers such as Moos and Bonde (2016) reported that participants in their study did not manage their time. A possible reason is that prompts for regulation of behaviour were also provided in the current study, whereas the studies showing negative results only provided prompts for regulation of cognition. This suggests that prompts for the regulation of behaviour might be necessary for the development of regulating behaviour.

Modeling can also successfully enhance regulation of behaviour. When self-regulatory strategies are presented through dynamic visual images, learning of regulation becomes easier because the visual images aid visualisation of actions and reduce challenges in understanding (Lin & Li, 2018). The timetables that were drawn in notes by the students were similar to the format demonstrated by the model. Furthermore, the interview data showed that the students followed the model in regulating their behaviours (e.g., drawing the timetable). Additionally, questionnaire data showed that the regulation of behaviour increased for students learning with modeling. Hence, the image visualisation and the effect of the model facilitated the students in learning how to regulate behaviour. Learning regulation of behaviour improves regulation of behaviour.

Furthermore, modeling was better than prompts in enhancing regulation of behaviour. If the concept of regulation of behaviour is more explicit, the outcome of regulation will be much better, as explicitness affects the encoding of information and understanding. In addition, better encoding and understanding may enhance students' self-efficacy in self-regulation. Self-regulatory efficacy may affect the execution of self-regulation (Bandura, 2012). In this study, the students learning through modeling could observe the model's action, whereas the students learning through prompts had to depend on textual information. Visual images are better than text to enhance students' learning (Mayer, 2014). With visual images, students can understand how to regulate behaviour more easily. During the interviews, the students learning with prompts expressed their desire to see how to draw a timetable, uncertainty in planning and less confidence in managing time. Therefore, the students learning with modeling were more efficacious in the regulation of behaviour compared to students learning via prompts.

5.1.3.2 How Do Students Regulate their Behaviours in the Pre-class Stage? The interview data showed that both groups (prompts and modeling) planned and monitored time while receiving intervention, with a higher frequency for modeling. Controlling is one of the most useful strategies for regulating behaviour, and both groups described how they controlled their behaviours through self-talk. However, regulation of behaviour was rarely shown in the notes of both groups, perhaps because of the limitation of notes for recording learning activities.

Concerning learning through prompts, the notes and interview data also showed that students followed not only question prompts but also additional instructions embedded in the prompts. Additional instructions were provided as prompts to complement the questions in the video for students to learn regulation of behaviour. These instructions were to balance the information provided between the two groups. For example, a prompt was added to remind the students to rearrange events for the pre-class learning on a timetable, and the timetables with these events were illustrated in notes collected from the students. Empirical studies including direct instructions for students on what they should do for self-regulation have also shown a positive influence on self-regulation (Schumacher & Ifentaler, 2021).

The timetables drawn by the students in the modeling group indicated the process of observational learning. Observational learning involves paying attention to events demonstrated and the production of these events (Bandura, 1986). The notes showed that students drew a timetable in the same format as the timetable shown in the modeling. This implies that the students paid attention to the work produced by the model in addition to the action of the model. Thus, this study is consistent with previous research showing that students could learn from the work demonstrated by the model (Raaijmakers, 2018; Van Gog et al., 2020).

5.1.4 Regulation of Context

Another significant aspect of self-regulation is context. According to Pintrich's (2000) model, regulation of context involves thinking about the current context, monitoring the level of concentration under the current context, adjusting the context for concentration and reflecting on the changes made. In this section, the outcome is presented first, and the process of regulation of context next.

5.1.4.1 To What Extent Do Prompts and Modeling Affect Regulation of Context? Prompts have positive effects on the regulation of context, as they raise students' awareness of context, which is crucial for the regulation of context

(Pintrich, 2000). During the interviews, students reflected that they thought about the regulation of context when they were prompted. The questionnaire data showed that the students were aware of the context through prompts, leading to the regulation of context. In contrast, Van Alten et al. (2020a) did not provide students with prompts about regulating context, and their study showed no improvement in the students' ability to regulate context. This shows that prompts on regulating context are necessary for increasing students' awareness of regulating context.

Furthermore, beginners without prior knowledge on regulation can regulate context through prompts because specific suggestions on how to regulate context were provided for the students to follow. Additionally, suggestions such as removing toys, switching off the television and going to a quieter place were also provided as prompts for the students. The interview data showed students' positive feedback on these suggestions, as they described them as helpful for providing directions on regulation, especially when they had no ideas. Thus, this study agrees with Wong et al. (2021) that suggestions can direct regulation.

Similarly, modeling is helpful for enhancing regulation of context. When the scenario demonstrated in the video is similar to the students' personal learning context, the students can learn the regulation of context more easily. The similarity between the model and the learner contributes to successful modeling (Bandura, 1986) because a similar scenario can create the feeling of echoing, which encourages students to emulate the action demonstrated by the model in personal situations. During the interviews, a parent highlighted the feeling of echoing created by the scenario demonstrated and the positive effect on enhancing students' willingness to regulate context.

Moreover, the interview data showed that modeling is a better way to enhance regulation of context than prompts. Modeling and prompts are effective for students to regulate context; however, only modeling can create the feeling of echoing. The feeling of echoing increases students' willingness to regulate context; hence, it significantly enhances the outcome of regulation of context .

5.1.4.2 How Do Students Regulate Context with Prompts and Modeling?

Students learning through prompts could successfully describe activities related to regulation of context during the interviews. For example, they monitored noise and controlled the environment by going to a quieter place or switching off the television. They also monitored and removed distracting objects from their desks. Furthermore, the interview data showed that students learning through prompts responded to the suggestions provided in different ways. The students either completely relied on or were inspired by the suggestions. They could simply choose a suggestion and think further about the suggestion provided. They could also brainstorm other possibilities either before or after reading the suggestions. The students acted to regulate context after choosing an option.

When the students who learnt through modeling watched the demonstration of events related to regulation of context, they engaged in complex processing. The students processed the events demonstrated by recalling a similar past experience, finding a link between the experience and the modelled events, thinking about the source of the problem in the learning context, adapting the model for personal needs based on the problem and applying the adapted strategy for regulating context. The findings agree with theory, as Bandura (1986) mentioned that learners modify events demonstrated by the model before producing the modified events. More importantly, the findings of this study provide further details on learners' personal recount of how they modify the events demonstrated.

5.1.5 Regulation of Motivation

5.1.5.1 To What Extent Do Prompts and Modeling Affect Regulation of Motivation? When the students noted that they were less motivated, they used rewards and self-talk to control their motivation. Rewards for mastery of activities can increase perceived efficacy and interest (Bandura, 1997). The students attempted to control motivation through rewards. They rewarded their competence in pre-class learning, and they rewarded competence in reaching their personal standard – learning attentively. Rewarding oneself for a successful accomplishment and the desire to learn attentively can increase students' interest (Pintrich & Schunk, 2002). In the present study, students likely became more confident in accomplishing future tasks by rewarding their successful accomplishments. By rewarding attentive study in an independent learning environment, the students became more interested in accepting challenging independent learning tasks and learning self-regulation in the course.

The questionnaire data showed that prompts and modeling can positively affect the regulation of motivation. For the prompt group, when there was sufficient guidance through questions and suggestions, the students were more likely to be successful in regulating motivation because they were adequately scaffolded to attempt the regulation task. Scaffolding is necessary for self-regulation in online learning (Azevedo, 2004). For the modeling group, when the concept of motivational controlling was presented through visual and verbal means, the students could understand the purpose of rewarding in relation to their self-regulation. The idea of rewarding oneself purposefully is rather abstract; however, visual and verbal means help students to understand purposeful rewarding more easily. As mentioned, visualisation and verbalisation can make an abstract concept concrete (Hartman, 2001; Zimmerman & Clearly, 2004).

For both groups, when rewarding resulted in a successful experience of self-regulation, the students became more effective in self-regulation. An increment was observed in self-efficacy for students learning via prompts and modeling as reflected by the questionnaire. Additionally, students became more interested in learning self-regulation after realising that learning self-regulation could help them regulate their learning. This conclusion is supported by the questionnaire data, which showed an increase in the intrinsic value of learning the content included in the course.

Modeling is a slightly better means for enhancing the regulation of motivation compared with prompts. This can be explained by self-efficacy in self-regulation. Positive consequences gained by oneself in an enactive experience and positive consequences of the model from a vicarious experience can increase students' self-efficacy (Bandura, 1997). The self-efficacy of the prompt group was mainly influenced by an enactive mastery experience, whereas that of the modeling group was influenced by a vicarious mastery experience in addition to an enactive mastery experience. With both vicarious and enactive mastery experiences, the self-efficacy in self-regulation of the modeling group may be higher than that of the prompting group. As supported by evidence from the questionnaire, the self-efficacy and intrinsic value of the modeling group were higher than those of the prompt group. Additionally, self-efficacy in self-regulation affects willingness to self-regulate (Bandura, 2012). The higher the willingness to regulate, the higher the probability of using strategies to regulate motivation. As self-efficacy in self-regulation was higher, the modeling group had a higher willingness to regulate. The modeling group likely adopted more strategies for regulation of motivation, thereby resulting in enhanced regulation of motivation.

5.1.5.2 How Do Prompts and Modeling Affect Regulation of Motivation in the Pre-class Stage? As reflected by the interviews, both groups controlled their motivation through different forms of reward. The students reminded themselves of rewards through self-talk and stickers in notes. Both groups expressed an arrangement of the activities they liked as rewards upon successful accomplishment, which is an adaptation of applying rewards. As explained earlier, the two groups performed adaptation in different ways. Upon reading the suggestions provided in the options, the prompt group brainstormed other possibilities of regulating themselves. Upon watching the demonstrated scenes, the modeling group matched the demonstrated scenes with their daily experience.

Then, the modeling group adapted the strategies based on their daily experience.

5.1.6 Summary of Major Factors Contributing to the Differences in the Effectiveness of Prompts and Modeling

This section summarizes the discussion of prompts and modeling in Section 5.1. The major difference between the two approaches is the modality. The modality for learning via prompts is words and sound whereas the modality for learning via modeling includes images in addition to words and sound. By seeing the images, learners can form mental pictures of how to regulate themselves. This may help them to apply the strategies demonstrated. According to Bandura (1986), visualizing the events demonstrated can help students to rehearse the actions before production of the actions. With images, observational learning can occur. Observation and emulation may help learners to internalise the action more easily (Schunk & Zimmerman, 2007). In addition, modeling can help crystalise the abstract concept of self-regulation to a greater extent. Verbalization of teacher's thought and visualisation of teacher's action make the abstract concept of self-regulation more explicit. The more explicit the concept is, the better the encoding of information about self-regulation. Better encoding further leads to a better understanding, making students more efficacious in self-regulation. Being more efficacious in self-regulation results in higher willingness in applying self-regulatory strategies. Self-regulatory efficacy is linked to willingness of self-regulation (Bandura, 2012) .

5.2 Toward a Better Understanding of Learning via Prompts and Modeling

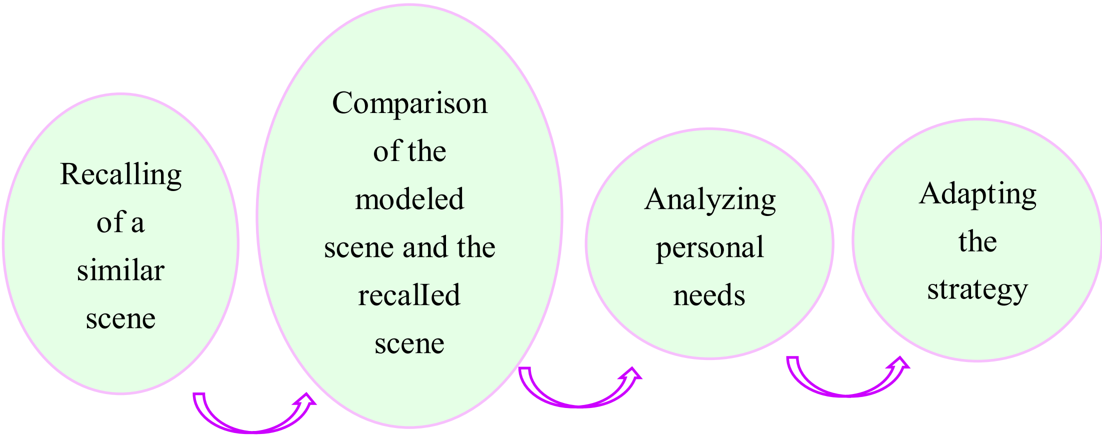
An in-depth exploration of the process of learning self-regulation has been largely neglected in the literature. My contribution is that the data obtained in this study provide a detailed account of how students self-regulate, which yields a better understanding of the process of learning through prompts and modeling. The first part of this subsection summarises the process of adapting strategies learnt through modeling, and the second part discusses the process of learning via prompts.

5.2.1 The Process of Adaptation of Strategies Learnt Through Modeling

Regarding modeling, the findings of this study can be explained by Bandura's (1986) observational learning. Based on the empirical interview data discussed in Section 5.2.5.2, Figure 5.2 contributes to a better understanding of adaptation of strategies in modeling for local primary students. When a teacher demonstrated a scene similar to the students' reality, the students recalled a similar real scene. The students compared the two scenes and analysed their personal needs, noting that family members' leisure activities caused the disturbance. Then they adapted the strategy from turning off the television themselves to requesting family members to cooperate. Through adaptation, the students made the strategy more suitable for their own situations.

Figure 5.2

Process of Adapting Strategies Learnt through Modeling



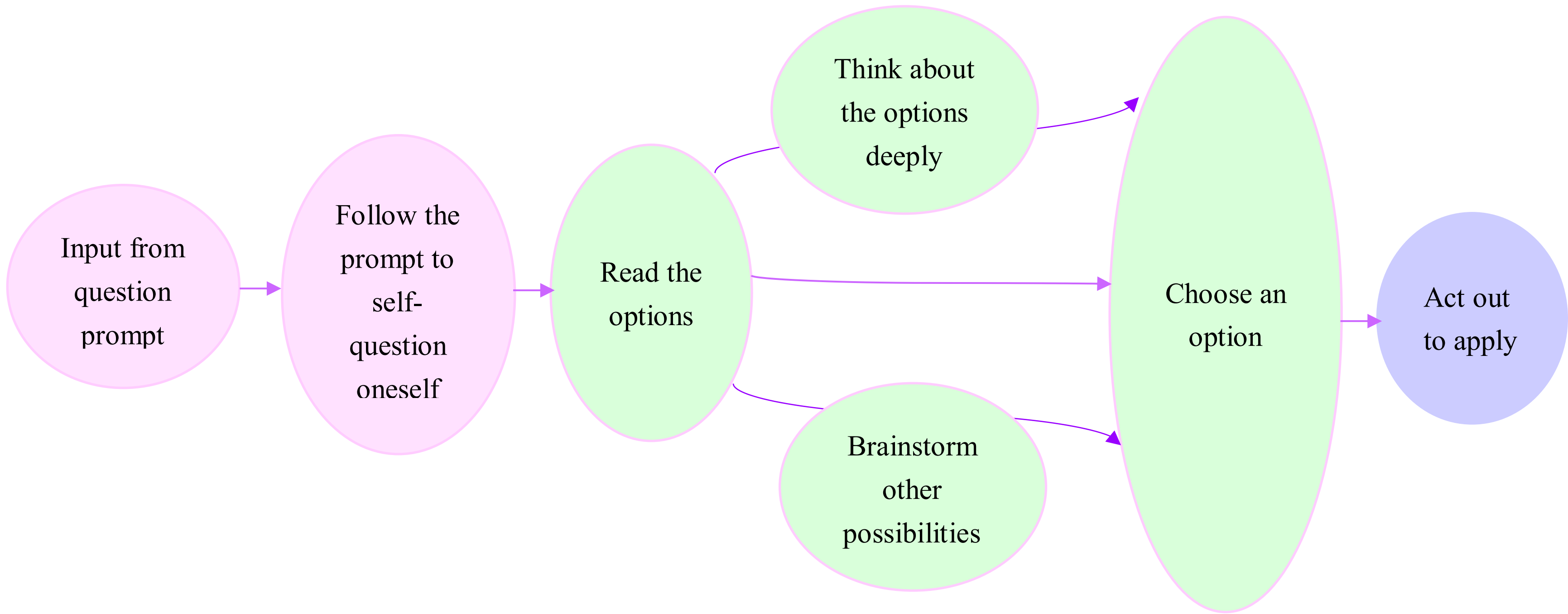
5.2.2 Process of Learning via Prompts

Figure 5.3 illustrates the process by which the students learnt through prompts. The framework is based on their description during interviews. Upon receiving a question prompt as an input, the students followed the prompt to self-question themselves. Successful learning via prompts depends on whether students comply with the prompts (Bannert & Reimann, 2012). The present study highlights that complying with prompts to self-question oneself is also a necessary step for learning with prompts. This step helped the students to develop a habit of self-questioning themselves. One main challenge in using prompts involves helping students act on the prompts. The results of this study suggest that through providing options, students can become more willing and able to use them.

This study provides further insights into why options are effective, as shown in the framework. After self-questioning, the students read the options. This step led to three different pathways (see t Figure 5.3). The students chose an option immediately, thought about the options before choosing one or brainstormed other possibilities before making their choice. The students then acted to regulate their learning. The framework provides a detailed account of the process of self-regulated learning and provides insights into why students could adapt during the pre-class stage – they brainstormed other possibilities or thought about the options deeply. Compared with previous studies (e.g., Van Alten, 2020b) that explain the use of self-regulatory strategies for students, the present study shows that it is possible for students to explore the reasons for using self-regulatory strategies. As supported by the interview data, the students could explain why they thought certain self-regulatory strategies were useful for them.

Figure 5.3

Framework Showing the Process of Learning with Prompts in Virtual Flipped Classroom



5.3 Transfer of Self-regulatory Strategies

This study also examined the transfer of self-regulatory strategies within the virtual flipped classroom and the transfer from the virtual flipped classroom to regular online classes. To the best of my knowledge, no study has addressed the transfer of self-regulatory strategies.

5.3.1 Transfer of Strategies within the Virtual Flipped Classroom

The virtual flipped classroom consists of two main stages – the pre-class asynchronous stage and in-class synchronous stage. Interviews, lesson observations and notes showed that the strategies learnt through prompts and modeling can be transferred from the pre-class asynchronous stage to the in-class synchronous stage.

5.3.1.1 Transfer of Strategies for Regulation of Cognition to the In-class Stage. Strategies for regulating cognition can be transferred from the pre-class stage to the in-class stage of the virtual flipped classroom. As supported by the in-class notes, the students set goals and controlled their learning by listing, rephrasing ideas and other learning strategies. However, the regulation of cognition in synchronous online learning differed from that of the pre-class stage. First, the topic for the pre-class learning and in-class learning was the same, which decreased the likelihood of students taking notes. Some students reckoned that taking notes during the in-class stage might be unnecessary, as they had already jotted down key information during the pre-class learning. For both groups (prompts and modeling), the number of in-class notes collected was lower than the number of the pre-class notes.

Second, the characteristics of the various learning modes affected the transfer of strategies for regulating cognition. Pre-class learning is in the asynchronous mode, but in-class learning is in the synchronous mode (O'Flaherty & Phillips, 2019). The asynchronous mode allows students to learn at their own pace through watching videos (Ozturk & Cakiroglu, 2021). However, the synchronous online mode is less flexible because in-class sessions are led by teachers, and all the students had lessons at the same time. The interview data showed that some students found it challenging to keep up with the speed of the class if they took notes.

5.3.1.2 Transfer of Strategies for Regulation of Behaviour to the In-class Stage. There are signs of transfer of strategies for behavioural regulation to the in-class stage. As illustrated by data from the interviews and lesson observations, the decision to persist in learning was transferred. This can be explained by backward-reaching high road transfer. According to Salomon and Perkins (1988), backward-reaching high road transfer means that the students noticed the problem in the new situation, abstracted the features from the new situation and searched for relevant past experiences. In this study, the students observed that they had to learn in the new synchronous online learning mode. They found the new synchronous online learning mode less flexible than the asynchronous pre-class learning. As reflected in interviews, a student noted that the teacher and other students could see him on the screen. He abstracted the feature of the new situation of synchronous online learning – he was learning Chinese speech at home. This feature might trigger his recall of pre-class learning experience. He could then apply the strategy of deciding to persist in the synchronous online learning stage.

5.3.1.3 Transfer of Strategies for Regulation of Context to the In-class Stage. Strategies for regulating context can be successfully transferred from the pre-class stage to the in-class stage, as indicated by the interview and lesson observation data. Students can monitor noise and the neatness of their desks during in-class learning, and they controlled noise by switching off electrical appliances. Adapted strategies like requesting family members to cooperate were also transferred.

Transfer of strategies for regulating context is due to the similarity in physical context between the pre-class and in-class stages. When the context for transfer and the original context are more similar, transfer is more likely (Bruning et al., 2011). In this study, the pre-class and in-class stage happened at the same physical space – students' homes. Such similarity facilitates the retrieval of relevant pre-class experience, that is, the experience of applying strategies for regulating context. Easier retrieval of relevant experience allows students to transfer strategies more easily.

5.3.1.4 Transfer of Strategies for Regulation of Motivation to the In-class Stage. Strategies for regulating motivation can be transferred to the in-class stage. Data from the interviews and notes showed that students can control motivation during in-class learning (e.g., by using stickers). The observation data showed that the use of a confirmed tone to answer questions and in speaking practice increased.

Forward-reaching high road transfer was reflected by students learning through prompts. According to Salomon and Perkins (1988), forward-reaching high road transfer involves students abstracting what they have learnt and applying it in another context. A student successfully described the thinking pathway, stating that she could learn from the pre-class and use that knowledge to regulate motivation during in-class learning. For instance, she realised that she had to question herself on self-efficacy. She knew that she would be more motivated if she was confident. Her motivation was lower when she was not confident, and during those times, she further asked herself how she could motivate herself. This example demonstrates how the student abstracted the thinking pathway for future learning. When she learnt in a varied context, she applied the abstracted thinking pathway. This example shows that not only strategies learnt from prompts but also the implicit thinking pathway shown in prompts can be transferred to the synchronous learning mode.

5.3.2 Transferring Self-regulatory Strategies to Regular Online Classes

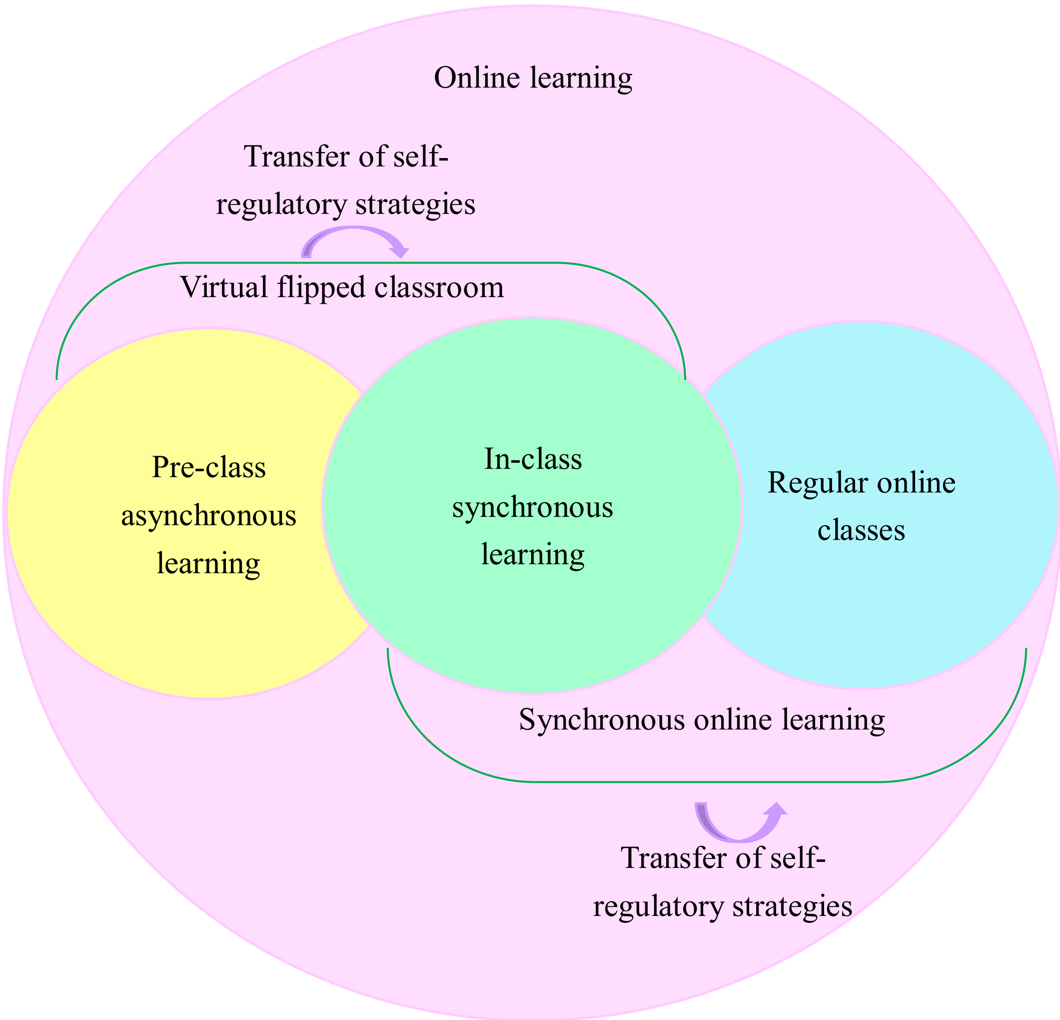
After implementing the virtual flipped classroom, classes were suspended during the COVID-19 pandemic; thus, online learning became the regular schooling model. Therefore, this study explored not only students' self-regulation in the virtual flipped classroom but also the transfer of self-regulatory strategies to regular online classes. Regular online classes differ from the virtual flipped classroom in the learning modes, with synchronous online learning for the former. Additionally, the virtual flipped classroom in this study focused on giving a Chinese speech, whereas regular online classes cover a wide range of subjects.

The results demonstrated the successful transfer of self-regulatory strategies from the virtual flipped classroom to regular online classes. During the interviews, students described the successful application of the strategies learnt in the previous virtual flipped classroom to regulate the four aspects of the regular online classes. For regulating cognition, students controlled their learning by taking notes. For regulating context, they also managed noise and neatness. The students also regulated their behaviour through planning and monitoring their timetables as well as by deciding to persist. They regulated motivation through rewards and self-talk.

Figure 5.4 illustrates the summary of this section and, more importantly, Figure 5.4 is the contribution of the study. It shows the transfer between the pre-class stage and the in-class stage of the virtual flipped classroom and of regular online classes. Self-regulatory strategies were learnt through prompts and modeling in pre-class asynchronous learning. The change from asynchronous pre-class online learning to synchronous in-class online learning mode led to transfer of self-regulatory learning because of the similarity: students learning online at home. Successfully applying learning strategies in synchronous online learning prepared the students to transfer their learning to the regular online classes as both in-class stage and regular online classes are synchronous online learning modes. The findings of this study showed that the in-class synchronous stage of the virtual flipped classroom acts as a bridge guiding students to apply strategies learnt in the pre-class stage to regular online classes. This is one of the novel contributions of this study.

Figure 5.4

Transfer between the Virtual Flipped Classroom and Regular Online Classes



5.4 Perceived Usefulness of Strategies in the Virtual Flipped Classroom and Regular Online Classes

This study also examined the perceived usefulness of strategies that fill the literature gap, as insufficient studies have addressed students' perceptions of self-regulation strategies. The more useful the students perceive the strategies to be, the more willing and likely they are to apply and transfer the strategies.

5.4.1 Most Useful Strategies for Regulating Cognition

Controlling through taking notes is the most useful strategy for regulating cognition in the virtual flipped classroom and regular online classes. Both groups explained the usefulness of notes. First, they could refer to their notes for revision. This aligns with the literature that found that notes allow learners to store knowledge externally to review later (Carter & Martre, 1975). Second, the students thought that note-taking increased topic comprehension. Increased comprehension may be because working memory is actively involved during notetaking (Bui et al., 2013). This study showed that aside from finding key ideas, the students synthesised the information into a mind map and paraphrased information. Hence, their working memory was actively involved in learning.

However, the perceived need to take notes in the virtual flipped classroom may affect the perceived usefulness of note-taking. The data showed that the percentage of students who took notes during in-class learning was lower than the percentage of those who took notes during pre-class learning. This is most likely because of the lower amount of content delivered during in-class learning than in pre-class learning. In-class learning focused on active learning, whereas pre-class video was lecture-based, as it covered the introduction of the topic (Strayer, 2007). Therefore, the benefits of taking notes depend on the course content and instructional activities.

5.4.2 Most Useful Strategies for Regulating Behaviour

For pre-class learning, both groups (prompts and modeling) regarded behavioural planning, monitoring and controlling as the most useful strategies. Both groups reckoned that time planning and monitoring contributed to the efficient completion of daily tasks. Planning the time helped them know the daily arrangements clearly. Monitoring the time helped them know if time was available or if they needed to speed up. Both groups also controlled their behaviours by persisting to learn.

The difference between asynchronous and synchronous learning modes affected the perceived usefulness of persisting. In synchronous learning, the teacher provides immediate support to students (Mogonea, 2014). In asynchronous online learning, students learn independently at home (without the teacher monitoring them) (Akcayir & Akcayir, 2018). Previous studies have shown that students have a stronger need to exercise control in a flexible learning environment (Lin & Gao, 2020), and this fact has been confirmed in this study. The percentage of students that perceived the usefulness of the frequently used persisting strategy was higher in pre-class asynchronous online learning than in in-class synchronous online learning or regular online classes.

Concerning time planning and monitoring for regular online classes, the percentage of students that learnt through modeling was much higher than the percentage that learnt through prompts. Vicarious and enactive mastery experience affects the perceived usefulness of time planning and monitoring. With vicarious mastery experience, students who learnt through modeling had higher self-efficacy, which further increased their enactive mastery experience. In contrast, students that learnt via prompts were a little uncertain on how to create a timetable. Without any vicarious mastery experience, they depended on their enactive experience. However, when some of the students narrated their experience in following the timetable, they encountered some difficulties. The negative consequences of the enactive experience decreased the students' expectations and confidence in following timetables in the future, and the likelihood of the students using the strategies in post-course online learning decreased. Low self-efficacy and outcome expectation in performing a particular task might lead to the student avoiding the task (Pintrich & Schunk, 2002). Therefore, perceived usefulness only remained high in regular online classes for students who learnt through modeling.

5.4.3 Most Useful Strategies for Regulating Context

Both groups regarded contextual monitoring and controlling as the most useful strategies for regulating context. Contextual monitoring and controlling helped the students concentrate on learning. There were different sources of distraction. Apart from a noisy context, people nearby may also distract students, and students may be directed to a distractor involuntarily (Schweppe & Rummer, 2014). Distractors may impede learning, as more resources need to be allocated to process them (Minamoto et al., 2015). Students can reduce distraction through contextual controlling. Therefore, monitoring and controlling context is essential.

Additionally, the percentage of students who chose contextual monitoring and controlling remained high across the phases of pre-class learning, in-class learning and regular online learning because the students learnt in the same context – their homes – during these three phases. Learning in a context where other family members are present makes it easy for the family's daily activities to distract the students. The interview data showed ample examples of disturbances from family members' activities, such as cleaning the floor using a vacuum cleaner, cooking and watching television. Parents and students recalled the experience of having family members around due to the work-from-home situation and suspension of face-to-face schooling during the COVID-19 pandemic. Therefore, monitoring and controlling facilitate flipped classroom and regular online learning.

5.4.4 Most Useful Strategy for Regulating Motivation

Both groups regarded motivational controlling through rewards as the most useful strategy. The students rewarded themselves for behaving well in lessons and completing the pre-class stage, the in-class stage and regular online classes. Rewards associated with accomplishment or performance can increase efficacy (Pintrich & Schunk, 2002). The students also regarded their desired activities as rewards, as anticipated consequences can increase motivation (Bandura, 1986). However, the percentage of students who chose motivational controlling as the most useful strategy was lower in synchronous learning. This may be because the teacher was present during in-class learning. The in-class stage often includes activities that allow the students to interact with teachers and other classmates, thus engaging the students to learn (Akcayir & Akcayir, 2018). Students engaging in synchronous learning may have a decreased need for self-motivation.

5.4.5 Summary of the Usefulness of Strategies for Self-regulation

Controlling was identified as the most useful strategy for regulation when considering all four aspects of self-regulated learning. Controlling is crucial because it involves taking actions to effect changes in response to the current condition (Pintrich, 2000, 2004). Taking the regulation of context as an example, students may have to learn amidst distractions if they do not control the context. Monitoring was the second most useful strategy, especially for regulating behaviour and context. Monitoring and controlling are often used together in practice (Pintrich, 2000). Students can take appropriate action only when they are aware of their learning problems. For instance, they must notice distractions in the context and understand what kinds of distractions they are before they can take appropriate action to remove them. Planning was the third most useful strategy and was applied together with monitoring and controlling for regulating behaviour. Based on planning, students can monitor time, as the planning of time often involves considering the length of activities shown in schedules (Pintrich, 2000). Planning was found to be the most useful strategy for regulating behaviour, as it provides directions for each learning stage.

Overall, students were generally positive about self-regulatory strategies and were able to realise the usefulness of these strategies. The next section discusses the perceptions of students, their parents and the teacher regarding how to enhance self-regulated learning.

5.5 Effect of Intervention on Learning Outcomes: Performance in Giving a Chinese Speech

Relatively few studies of self-regulated learning have focused on Chinese speaking, especially giving a Chinese speech. One of the objectives of this study was to identify the effects of prompts and modeling on students' performance in giving a Chinese speech. The learning outcomes were examined through pre- and post-speaking tests. The results showed that learning self-regulation through both prompts and modeling had a positive effect on learning outcomes and that modeling had a greater effect than prompts.

First, learning self-regulation via prompts positively affected performance in giving a Chinese speech. When prompts effectively enhance self-regulation, students' learning outcomes can be improved, as self-regulation is positively linked to learning outcome (Zimmerman & Schunk, 2011). In this study, the questionnaire data showed increased overall self-regulation and the speaking test showed an increase in the ability to give a Chinese speech. Thus, this study confirmed the effectiveness of prompts on the learning outcome reported in other studies in online learning (e.g. Daumiller & Dresel, 2019; Kauffman, Zhao & Yang, 2011; Müller & Senfert, 2018; Schnauber & Bodemer, 2017; Sonnerberg & Bannert, 2015) and the flipped classroom mode (Lai & Hwang, 2016; Moos &

Bonde, 2016). Lai and Hwang (2016) and Moos and Bonde (2016) studied the traditional flipped classroom, and this study further suggests that the effectiveness of prompts on learning outcomes is also valid for the virtual flipped classroom with online synchronous sessions.

Similarly, using modeling to learn self-regulation leads to positive learning outcomes. Both questionnaire data and speaking tests showed an increase in students' ability to give a Chinese speech. Thus, modeling enhanced students learning of self-regulation and, consequently, improved learning outcomes. Thus, this study supports the effectiveness of modeling in improving learning outcomes in previous studies (Gierlach & Washburn, 2018; Raaijmakers et al., 2018; Rodriguez-Malaga & Rodriguez, 2021; Wijnia & Baars, 2021).

Third, modeling is more effective than prompts in enhancing performance in giving Chinese speech. This might be attributable to the fact that greater self-regulation can produce better learning outcomes. The questionnaire showed that modeling greatly increases self-regulation compared to prompts. Additionally, speaking ability largely improved for students learning via modeling. This suggests that modeling is more effective in enhancing self-regulation, which improves learning outcomes.

Moreover, the effectiveness of modeling may be due to the virtual flipped classroom with no control group. However, the virtual flipped classroom was implemented in this extracurricular programme before this study, and the teacher indicated that no obvious improvement was noted before even if the virtual flipped classroom was used. This suggests that the self-regulation improved because of the intervention of self-regulation training rather than the virtual flipped classroom. Particularly, the pre-class learning requires self-regulatory strategies (Lai & Hwang, 2016; Li et al., 2019). If the students lack self-regulation, learning in the virtual flipped classroom may be difficult; hence, the effectiveness of learning speaking in the virtual flipped classroom is reduced.

In conclusion, prompts and modeling can enhance self-regulation and thus improve learning outcomes. Modeling greatly enhances self-regulation, which results in improved learning outcomes.

5.6 Perceptions of Students, Parents, and the Teacher

In this section, opinions among students, parents, and the teacher about learning self-regulation in the virtual flipped classroom, prompts and modeling are discussed. Generally, all parties believed that there was a need to facilitate self-regulated learning in the virtual flipped classroom. Moreover, all parties supported the use of prompts and modeling for training self-regulation.

5.6.1 Opinions on Learning Self-regulated Learning in Virtual Flipped Classroom

Overall, students, parents, and the teacher showed a positive attitude towards learning self-regulation strategies in this course. Three key themes emerged from the data: the essentiality of learning self-regulation, the prominence of learning self-regulation in the virtual flipped classroom, and the adequate integration of self-regulation in the virtual flipped classroom.

First, all parties believed that self-regulation could improve students' learning. This is in line with the literature indicating that self-regulated learning is paramount for academic achievement (Zimmerman, 2011). They also believed that self-regulated learning was not subject-specific, but could be applied to other subjects and was useful for lifelong learning. This belief is consistent with the findings of existing studies that self-regulated learning is useful for studying different subjects such as mathematics (Lai & Hwang, 2016) and psychology (Moos & Bonde, 2016). The parents and teacher believed that self-regulated learning was necessary for learning in the event of class suspension. The students also believed that self-regulatory strategies were useful for their daily lives and at work. Taking strategies learnt in the course as examples, students could manage their time adequately for daily activities; they could monitor and control the context to concentrate on their task at work; and they could monitor and motivate themselves to complete daily tasks. Such strategies are important for regulating oneself at work (Mattern & Bauer, 2014) and for psychological well-being in daily life (Robinson et al., 2017).

More importantly, the parties believed that it was paramount to learn self-regulation in the virtual flipped classroom. First, the virtual flipped classroom requires self-regulation but the students lacked knowledge and strategies for self-regulation before the course. The importance of learning self-regulation was further illustrated by the teacher's past experience of using the virtual flipped classroom without self-regulation training: self-regulation did not improve. Second, as self-regulation is excluded from the formal curriculum of regular schooling, embedding self-regulation in the extra-curricular programme is a way to help students become self-regulated learners. The teacher explained that the extracurricular programme had a more flexible curriculum than a formal curriculum.

Additionally, the parents and teacher believed that the four aspects of self-regulation were adequately integrated for successfully learning the complex concepts involved. The teacher noted that the level of difficulty and the proportion of new knowledge learnt in each lesson were scaffolded for primary students, meaning a complex model could be introduced and practised smoothly and gradually. Scaffolding is effective for learning (Vygotsky, 1978; Azevedo, 2004). With a thoughtful pedagogical design based on the concept of scaffolding, the students did not feel overwhelmed when all four aspects were integrated in the last three lessons. This was confirmed by the high rating of course satisfaction by both groups, who believed that the course was adequately balanced for learning Chinese speaking and self-regulation.

5.6.2 Opinions on Prompts

Generally, the level of satisfaction with prompts was linked to the perceived usefulness of the prompts. As shown in the questionnaire data, the students generally believed that learning via prompts was beneficial to learning self-regulation. Previous studies have reported varied findings on satisfaction with prompts. While some studies reported positive comments (Colthorpe et al., 2018), others reported negative comments (Bannert & Reiman, 2012; Van Alten, 2020a). The contrasting finding can be explained by whether the usefulness of prompts was realised by the students (Bannert & Reiman, 2012). However, the students in the present study recognised that prompts were beneficial to pre-class learning and online learning contexts. This is consistent with the study of Colthorpe et al. (2018), in which participants recognised the usefulness of prompts and were satisfied with learning via prompts.

Aside from students, the parents and teacher were positive towards the use of prompts for facilitating learning. All three parties believed that prompts could serve as reminders for self-regulated learning and guide students to practise self-regulation skills. When students could not generate ideas for self-regulation, they could refer to the suggestions provided. The need for providing suggestions is consistent with the study of Schnaubert and Bodemer (2017), which provided options for students' judgement of monitoring. Aside from easing monitoring, the present study demonstrates that multiple-choice options are beneficial to the entire regulation process. However, students learning through prompts expressed their anticipation of watching the teacher's demonstration. They would like to visualise the process of self-regulation, which is a strength of modeling.

5.6.3 Opinions on Modeling

Overall, students, parents, and the teacher were positive towards learning via modeling. All three parties expressed the usefulness of modeling in facilitating self-regulation. The self-regulation process was illustrated visually to make the abstract concept of self-regulation concrete. Students' responses included detailed examples: they could see actions and concrete examples of self-regulation strategies (e.g., timetables) created by the model. When visualising the use of strategies and examples, the students made positive comments on the model by verbalising cognitive thoughts, which facilitated their understanding. Parents cited the example of verbalising reflection, and the teacher cited additional examples such as summarising ideas in her own words, self-questioning, and self-talk for encouragement. Verbalising ideas in the mind when modeling is beneficial to learners (Hartman, 1998). Thus, all three parties affirmed that modeling provided visual and verbal means for clear representation of self-regulated learning.

Furthermore, all three parties appreciated the teacher roleplaying as a student. All parties believed that the teacher-in-role had several advantages. First, when the events were demonstrated by the teacher, the students were more likely to accept the events. As highlighted by parents, teachers have a strong influence on children, and children heed teachers' instructions more than they do others' instructions. The teacher also mentioned that children may regard teachers as knowledgeable experts, making the teacher's presentation more persuasive to them. The opinions of parents and the teacher confirmed the link between model competence and persuasiveness in the literature – the higher the competence of the model, the more likely students will follow the model (Bandura, 1986; Hoogerheide, et al, 2016).

Moreover, when the model takes the role of a student, students can resonate with the events demonstrated. This is because of the similarity created between the model and the child, which is another characteristic of effective modeling (Bandura, 1986; Marcus & Wilder, 2009). As discussed above, the actor was placed in situations similar to that of students, thereby easing the recognition of similar personal experience. A teacher-in-role can help to bring about an awareness of such similarity, which is typically a benefit of the peer model (Schunk, 1985). That is, by adopting role-playing, the model also had the advantage of peer models.

Aside from exploiting both the teacher and peer models, the teacher-in-role has an extra benefit. All parties believed that the teacher-in-role made learning more enjoyable. As explained by parents, when the teacher played the role of a child, the distance between the teacher and students was shortened. Parents also recounted that their children happily talked about the teacher's modeling with them.

Overall, all parties were positive towards learning self-regulation through modeling. More importantly, the present study demonstrates an extension of prior studies – the teacher roleplaying as a child can enhance similarity between the model and students, making modeling more persuasive.

To conclude, Chapter 5 discussed the findings and answered the research questions regarding differences in the learning outcome of performance in giving a Chinese speech, enhancement, and the process of self-regulation as well as the opinions of the three parties. In particular, this chapter broadened the understanding of prompts and modeling for learning self-regulation in the virtual flipped classroom; the chapter also explored the transfer of strategies between the virtual flipped classroom and regular online classes. The next chapter summarises the findings and presents implications.

Chapter 6 Conclusion

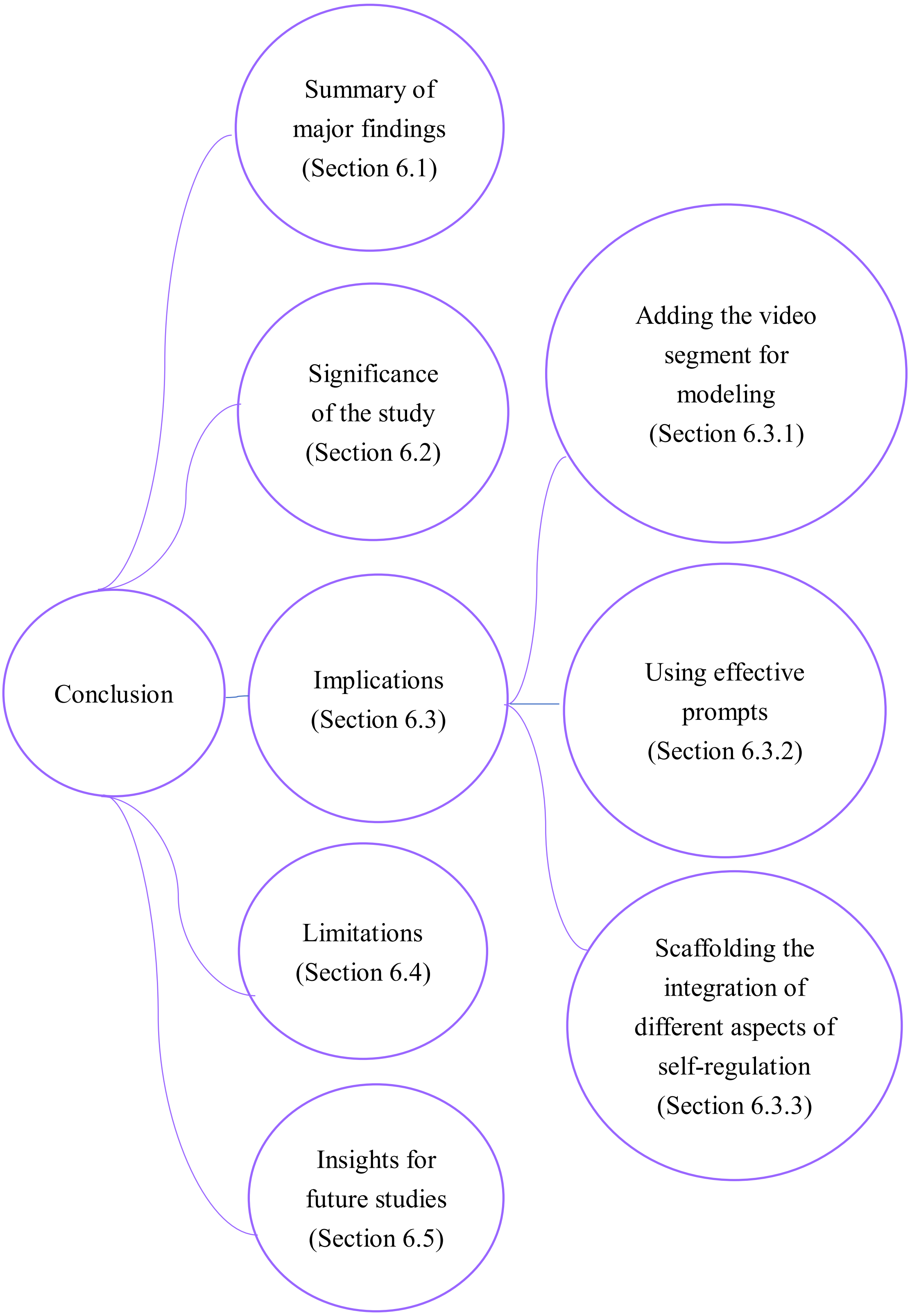
Owing to the outbreak of the COVID-19 pandemic, traditional learning suddenly transitioned into online learning. This mode of learning is difficult for students learning from home as it requires self-regulation. Hence, it was crucial to find means of enhancing students' self-regulation. This study aimed to provide self-regulation training to primary school students through prompts and modeling. More importantly, the study examined the processes and outcomes of self-regulation in consideration of regulation of cognition, behaviour, context, and motivation. A further objective was to obtain the opinions of students, their parents, and the teacher. The results showed that self-regulated learning could be taught, and upper primary students of the target school could benefit from self-regulation training.

This chapter first summarises the major findings (Section 6.1) of the study. The significance of the study (Section 6.2) is then described. Subsequently, the chapter highlights the implications for designing pre-class learning videos, including addition of the video segment for modeling (Section 6.3.1), using effective prompts (Section 6.3.2), and scaffolding the integration of different aspects of self-regulation (Section 6.3.3). The limitations of the study are also noted (Section 6.4). Finally, the scope for future studies (Section 6.5) is stated.

Figure 6.1 illustrates the outline of the chapter.

Figure 6.1

Overview of the Concluding Chapter



6.1 Major Findings

In response to the research question about the ability of giving a Chinese speech, the learning outcome differed between students learning through prompts and those learning through modeling. Students learning via modeling outperformed students learning via prompts in Chinese speaking.

The major question concerned the effects of prompts and modeling on students' self-regulation and the process of self-regulation. Both prompts and modeling were effective in enhancing all four aspects of self-regulation: cognition, motivation, behaviour, and context. Modeling was more effective than prompts in all four aspects, especially in regulation of context. Regarding the process of self-regulation, students could successfully apply strategies learnt through prompts and modeling for regulating all four aspects in the pre-class and in-class stages as well as during regular online classes. Compared with prompts, modeling led to an increased usage of self-regulatory strategies for all four aspects.

Moreover, two other important findings deepen the understanding of how local primary students apply self-regulation. Table 6.1 is a matrix that summarises the most useful self-regulatory strategies for learning in the virtual flipped classroom and regular online classes. This study extends the previous work on self-regulation because it shows the perspective of primary students who are beginners in self-regulated learning. More importantly, it includes the adapted forms of three strategies by local primary students. One of the adapted forms is to put encouraging self-talk in writing. Using the written word allows students to refer to the encouragement more often and for a longer period of time, which helps sustain the effects of the self-talk. Another adaptation is self-talk of future rewards. Such anticipation keeps students positive and energetic. As an example of contextual regulation, upon finding the source of disturbance, students request family members who cause the disturbance to cooperate with them. When the family members know that their activities disturb the students, they stop such activities and avoid them in the future.

Table 6.1

The Most Useful Strategies for Learning for Local Primary Students Who Are Beginners in Self-regulated Learning

Aspects	Most useful strategies
Cognitive regulation	✓ Controlling through listing and advanced strategies such as graphic organisers, self-questioning, and summarisation
Behavioural regulation	✓ Planning a timetable for the day in the pre-class or in-class stages of the virtual flipped classroom ✓ Planning a timetable for pre-class learning tasks ✓ Monitoring whether one can follow the timetable ✓ Encouraging oneself to persist to learn in the pre-class or in-class stages of the virtual flipped classroom through self-talk in verbal form or written form* on small cards
Contextual regulation	✓ Monitoring contextual disturbance, which is mainly noise and untidiness affecting pre-class and in-class learning ✓ Removing disturbance (noise and untidiness) by regulating oneself ✓ Removing disturbance (noise) by regulating others*
Motivational regulation	✓ Rewarding oneself with stickers ✓ Self-talk in anticipation of rewards for activities* upon learning in the pre-class or in-class stages of the virtual flipped classroom

* Adapted forms of strategies

This study also extends previous work by exploring the possibility of transferring strategies of regulating all four aspects from the pre-class stage to the in-class stage in the virtual flipped classroom. The study concludes that strategies for regulating all four aspects can be transferred from the virtual flipped classroom to regular online classes, with the synchronous online in-class stage serving as the bridge for a successful transfer.

RQ3 aimed to understand the perceptions of students, their parents and the teacher on learning self-regulation using prompts and modeling in the virtual flipped classroom. In response to RQ3, students, their parents, and the teacher generally expressed a positive view of the virtual flipped classroom and online learning. All parties believed that it was necessary to learn self-regulation in the virtual flipped classroom. In particular, the questions and options as prompts were considered beneficial for learning. More importantly, modeling through the teacher's roleplaying of a child learner was an effective means to enhance self-regulation as it exploited the advantages of both traditional teacher modeling and peer modeling.

6.2 Significance of the Present Study

This study contributes to filling several research gaps by exploring how to enhance self-regulation in the virtual flipped classroom. First, this study presents a schematic illustration of the pathway by which students use prompts to learn self-regulation (Figure 5.3). Although previous studies have been conducted on the use of prompts for enhancing self-regulation in the traditional flipped classroom, only a few studies have been conducted on the virtual flipped classroom. Furthermore, the existing studies on the traditional and virtual flipped classrooms have not explored the cognitive pathway relating to the use of questions and options in learning self-regulation during pre-class learning. Second, this study provides a better understanding of how students adapt strategies when they learn through modeling at the pre-class stage (as shown in Figure 5.4). The adaptation of strategies is understudied in the research on improving self-regulation in the flipped classroom. Third, this study shows that strategies of self-regulation learnt in pre-class learning can be transferred to in-class learning in the virtual flipped classroom. Through applying self-regulatory strategies in synchronous in-class learning, self-regulatory strategies can be further applied to synchronous regular online classes (as shown in Figure 5.2). Existing studies have not addressed the issue of transfer in enhancing self-regulation in and beyond the virtual flipped classroom.

6.3 Implications

6.3.1 Implications for Designing Pre-class Learning Videos

Aside from filling in the research gaps and contributing to the field of the virtual flipped classroom and self-regulation, this study is of high practical significance. The study provides a successful case of implementing self-regulation training for upper-primary students, which serves as an example for other schools. When considering the provision of self-regulation training, the school can embed training in extra-curricular programmes. In this way, the school need not worry about reducing the time allotted to the formal curriculum because of such training. Moreover, this study highlights the importance of designing and facilitating pre-class learning for optimising learning in the virtual flipped classroom. This sub-section highlights three implications for designing pre-class learning videos.

6.3.1.1 Scaffolding Self-regulated Learning in Pre-class Videos. First, scaffolding is crucial for the training of self-regulated learning in the virtual flipped classroom. As self-regulated learning is a complicated, abstract concept, it is fundamental to determine how to integrate it into training for primary students. This study demonstrated a successful application of Vygotsky's concept, which involves teaching new knowledge slightly higher than the current level, for progressing the development of self-regulated learning (Vygotsky, 1978). For each video, new elements that are slightly higher than the current level can be added. For example, after students learnt the four steps with simple strategies for cognition, they could learn more complex strategies for cognition. These scaffolds can gradually cover the four aspects and the four steps. Pintrich's (2000) model of self-regulated learning, which is divided into four aspects, is helpful for introducing different aspects of self-regulated learning one-by-one in order of planning, monitoring, controlling, and reflection. In this way, students can integrate the regulative strategies gradually and progressively.

6.3.1.2 How to Design Video-based Modeling. The most important finding of this study is that video-based modeling is effective for training self-regulation. One critical question is how best to design an effective video-based modeling. This study highlights several aspects of pedagogical designs that teachers should consider. First, using the teacher as a model, especially when the teacher roleplays as a student, is attractive and positively rated by students and parents. As discussed above, the teacher model exploits the advantages of the traditional teacher model and the peer model. Students tend to believe that their teacher is vastly knowledgeable about self-regulated learning, making them more willing to learn from the teacher. Meanwhile, the teacher playing the role of a child draws a similarity between the model and the students. Consequently, the students feel a sense of kinship with the model, which helps to keep them motivated to learn self-regulation. Additionally, video-based modeling makes the process and elements of self-regulated learning (e.g., timetables) concrete and visible for students. Thinking aloud is highly recommended for demonstrating cognitive processes, such as reflection, because thinking aloud can reduce the abstractness of self-regulation. More importantly, a systematic demonstration of the whole process should be shown to the students to help them see the relationships amongst all four phases and how they can progress smoothly through the phases. This study shows that modeling is more effective than prompts because modeling can make the abstract concept of self-regulated learning concrete and explicit.

6.3.1.3 Using Effective Prompts – Questions for Reminders of Use and Options for Learning Possible Self-regulation Methods. Although modeling is effective for learning self-regulation, it may be time-consuming for the teacher to make videos that demonstrate self-regulation. For teachers with such concerns, prompts for fostering self-regulated learning can be an alternative. The successful use of prompts and the positive opinions regarding them suggest that teachers may consider using them to facilitate self-regulated learning. This study also presents a guideline for using prompts by introducing new information in addition to using it as reminders. Teachers can use questions as prompts so that students can learn to self-question themselves and develop a clear flow of decision-making. As discussed in Section 5.3.4, students learnt to ask themselves to monitor whether the learning context could help them concentrate. If it did not help them concentrate, they learnt to ask themselves how they could control the learning context.

Multiple-choice questions are helpful for guiding students to self-regulate. Participants highlighted that the value of providing options was that it helped them know the possible methods for self-regulated learning. Therefore, teachers are recommended to provide options together with questions. For instance, when students realise that they do not know how to control the learning context, they can refer to the options, such as turning off the television, removing toys, and going to a quiet place. These options also stimulate the students to think of other possible ways to solve their own problems.

6.3.2 Implications for Integrating Self-regulation Training into the Mainstream Curriculum

The successful integration of self-regulation training in this study provides guidelines and suggestions on how to integrate self-regulation training in the mainstream curriculum. Concerning the time for integration, subject panel heads may consider scheduling self-regulation training and subject knowledge simultaneously. This study shows that teaching of self-regulation and subject knowledge can be included in a regular lesson in the virtual flipped classroom. Particularly, subject panel heads may consider adding the training in the pre-class phase of the virtual flipped classroom. In this way, the original length of a lesson which is the in-class phase of the virtual flipped classroom will not be affected. Concerning the methods for integration, teachers may consider letting students learn self-regulation via prompts and modeling while watching the pre-class videos. The findings of this study show that both methods are effective in enhancing self-regulation with modeling as a more effective means. Teachers may choose one of the approaches based on their time and technical support for preparation. Teachers may refer to the suggestions provided for designing pre-class learning videos in Section 6.3.1. Furthermore, teachers may consider progressively additive integration of different aspects based on the concept of scaffolding as discussed in Section 6.3.1.1. This helps students to learn new strategies and to consolidate the strategies learnt. In addition, this also helps students to integrate the application of strategies for different aspects as a whole instead of applying strategies for regulation of individual aspects separately.

6.4 Limitations

This study has several limitations as discussed below.

First, it would have been better to set a control group in the same mode of virtual flipped classroom but without self-regulation training. Setting a control group would have helped to better ascertain whether the learning outcome was due to the intervention.

Second, if parents had allowed the online lessons to be recorded, the online lesson observation could have been better captured. Having considered parents' concerns around privacy in recording online lessons, an attempt was made to maintain the objectivity of the observations through an additional observer.

Third, this study adopted action research, thereby focusing on solving the problem in my school. The students in my school were mainly from upper class families. Thus, they had enough electronic devices to participate in this study. The results might not be generalizable to students from different backgrounds or other types of schools. Concerning class levels, this study focused on Hong Kong primary school, in particular, upper primary students. If the project was carried out with students of other social economic status, other class levels or other schools, the results might be different. To compensate for such limitations, the methodology chapter provided a rich description of the context to enable interested teachers to better compare the study with their own context.

Fourth, the by-product of the study, transfer of strategies to regular online classes, is supported by data from interviews only. The transfer of strategies to regular online classes would have been better supported if questionnaires were administered. Although transfer to regular online classes was not the main focus of the study, it is worthwhile to be addressed in future studies.

Another limitation of the study includes my role as a teacher in the target school. Thus, there might have been a bias in the students' ability. To enhance objectivity in the analysis, a pre-speaking test and pre-questionnaire were administered. Moreover, a colleague taught the course, and another teacher assessed the students' speaking performance.

6.5 Insights for Future Studies

This study suggests new insights for future studies on self-regulation, intervention for enhancing self-regulation, and the virtual flipped classroom. Future studies may be conducted in a similar way with different background of learners and schools. For instance, scholars may conduct a study of prompts and modeling for enhancing self-regulation in the virtual flipped classroom at the secondary and tertiary level to see how the results are different due to varied class levels and learners' age. This may provide insights about the relationship between developmental issues and learning of self-regulation. In addition, scholars may conduct a comparative analysis of the effects of intervention among different primary schools. This may help explore how social economic status affects learning of self-regulation in the virtual flipped classroom. Apart from background of learners and schools, scholars may further enrich the study. If scholars want to carry out an experimental study, they may add a control group. This helps to confirm the effect of the intervention. If scholars want to focus on transfer beyond the virtual flipped classroom, they may collect the data for transfer beyond the virtual flipped classroom using questionnaire data to supplement interview data. This may help to provide stronger support for confirming transfer to regular online classes.

More interestingly, future studies can also be conducted based on the findings and interpretation of this study. First, the findings of this study suggest the schematic pathway for using prompts. Scholars can explore how to make use of different thinking pathways for using prompts to facilitate students to learn self-regulation. Scholars who would like to focus on the study of prompts may further explore the difference in making use of prompts with different thinking pathways. Second, the findings of this study suggest the process of how students adapt strategies learnt through modeling. Future studies may compare the process of adaptation between beginners and advanced learners learning self-regulation through modeling. Third, this study shows successful integration of self-regulation training in an extracurricular program and provides implications for integration into the mainstream curriculum. Future studies may emphasize on integration of self-regulation training into mainstream curriculum to confirm the possibility of integrating self-regulation training into the mainstream curriculum, to understand the challenges of integrating self-regulation training into the mainstream curriculum and to find out the ways for solving the challenges of integrating self-regulation training into the mainstream curriculum. Furthermore, this study shows that modeling is better than prompts in facilitating self-regulation. Future studies may consider how to integrate both methods in a meaningful way. It would be interesting to compare the difference between learning self-regulation via modeling before prompts and learning self-regulation via prompts before modeling.

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Appendix A

Parental Consent Form

香港浸會大學

學生參與者家長同意書

演講課程及翻轉課室行動研究

親愛的家長:

現誠意邀請 貴子女參與本研究計劃。研究旨在探討如何在翻轉課室中提升學;生的自主學習能力。教育心理學權威齊莫曼特聘教授指出自主學習是學術成就差異的重要來源。[1] 課程共有八堂，每節課堂包括觀看影片(Edpuzzle)及網上視像課堂(ZOOM)通過參與課程計劃開始和結束時各進行一項演說能力評估 (呈交個人演說的錄影課業) (註: 1. ZOOM 課堂不會被錄影。2. 個人演說的錄影課業只作研究用途， 貴子女的面容及姓名絕不公開，並會於分析後銷毀。 3. 為保障學童私隱，家長不得對 ZOOM 進行錄影)。此外， 貴子女會在計劃開始和結束時填寫約十五分鐘問卷，以量度 貴子女自主學習能力變化。 貴子女和家長亦可能會被邀請參與約十五分鐘的訪問。訪問目的是收集 貴子女和家長對課程的個人看法，過程會被錄音(所有錄音只作研究用途，並會於分析後銷毀)。資深演講學界評審*及教育博士候選人將深入了解 貴子女演講學習的進度及其自主學習能力的進程，務求令 貴子女在演講課程中建構及實踐最有效的個性化自主學習的能力，陶造他們成為勇於持續變革的未來社會棟樑，為迎向 21 世紀終生學習挑戰，奠定穩健的基石。

此項研究的參與純屬自願; 如閣下拒絕讓 貴子女參加，並不會影響其分數。所有收集的資料會保密，僅作研究之用。如 貴子女決定參加， 貴子女可以隨時退出而不會被懲罰或失去利益。如閣下在完成收集資料前退出， 貴子女的資料亦會被銷毀。大部分的資料會被綜合，可能會於學術期刊報告。個別研究結果不會向他人外泄 (除非我已詢問閣下，並得閣下的批准)。個人的回應可能會以匿名方式於學術期刊報告。如有任何疑問，閣下可以聯絡研究員，馮思琦，17439191@life.hkbu.edu.hk，電話:62487322。如閣下認為 貴子女被對待的方式與表中的描述不同，可聯絡研究倫理委員會(hkbu_rec@hkbu.edu.hk)或研究院(香港九龍塘香港浸會大學)。

1. Zimmerman, B. J., & Schunk, D. H. (2011). *Handbook of self-regulation of learning and performance.* New York, NY: Routledge.

*資深演講學界評審資歷:

亞太雙語節(兩岸四地國際學校)評審

民政事務處及香港獅子會－全港青年學藝比賽評審

同意

我已閱讀及明白研究的資料(包括同意書及第三頁的附件)，我已收到此表的副本，並同意參與這項研究。

學生姓名 ____________________

學生簽署 ____________________ 日期 ____________________

家長或監護人姓名 ____________________

家長或監護人簽署 ____________________ 日期 ____________________

項目團隊成員簽署 ____________________ 日期 ____________________

(馮思琦)

附件 – **演講課程 (參與 ZOOM** 視像課堂**)** 安全指引

為使 ZOOM 網上視像課堂能更有效及安全地進行，每組演講課堂均有指定的輸入「會議 ID」及「會議密碼」。家長必須依照以下守則進行 ZOOM 的課堂活動，並採取下列保安措施，確保會議安全和順利進行，多謝合作!

1. 敬請家長小心保護 ZOOM 帳戶資料(切勿隨意分享或公開「會議 ID」及「會議密碼」)。
2. 敬請使用最新版本的 ZOOM 軟件和保安(防毒)軟件，並經常更新操作系統(包括桌面電腦及流動裝置)。
3. 敬請確保使用的電腦或電子產品已裝置鏡頭和擴音器。為保障參與者，上課時必須把鏡頭保持在開啟狀態，否則老師可拒絕同學參與課堂。

Appendix B

Examples of Training for Regulation of Context Embedded in the Pre-class Video in Lesson 6

Figures 7.1 to 7.4 show the screenshots of prompts in Edpuzzle for training regulation of context in Lesson 6. For each phase, there are a question and options.

Figure 7.1

Screenshot of Prompts in Edpuzzle for Contextual Planning

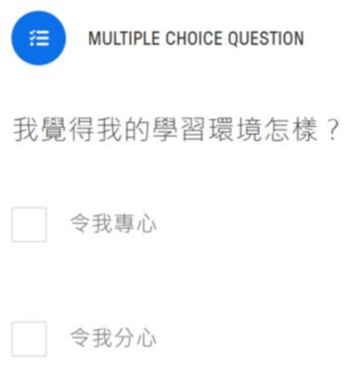


Figure 7.2

Screenshot of Prompts in Edpuzzle for Contextual Monitoring

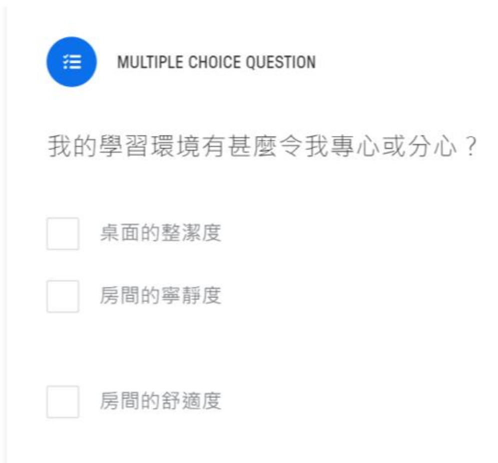


Figure 7.3

Screenshot of Prompts in Edpuzzle for Contextual Controlling

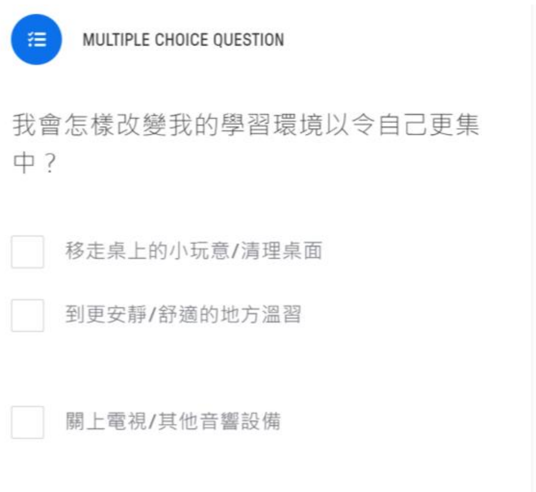
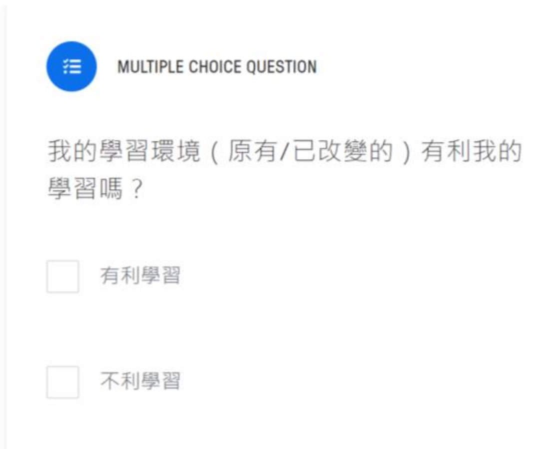


Figure 7.4

Screenshot of Prompts in Edpuzzle for Contextual Reflection



Figures 7.5 to 7.8 show the screenshots for training the modeling group regulation of context in Lesson 6. In Figure 7.5, the model thought aloud that she thought the context could make her focused. In Figure 7.6, the model noticed that she was playing with the toys. In Figure 7.7, the model removed the toys by putting the toys into a box. In Figure 7.8, the model thought aloud that the

changed context was benefical to her learning.

Figure 7.5

Screenshot for the Modeling Group for Contextual Planning

Figure 7.6

Screenshot for the Modeling Group for Contextual Monitoring

Figure 7.7

Screenshot for the Modeling Group for Contextual Controlling

Figure 7.8

Screenshot for the Modeling Group for Contextual Reflection

Appendix C

Interview Questions

Part A: Interview Questions for Students

Category 1: About self-regulated learning

Category 1a: Regulation of context

1. In pre-class learning, which frequently used strategy do you think is the most useful for regulating context? Why?
2. In in-class learning, which frequently used strategy do you think is the most useful for regulating context? Why?
3. During regular online classes, which frequently used strategy do you think is the most useful for regulating context? Why?

Category 1b: Regulation of motivation

1. In pre-class learning, which frequently used strategy do you think is the most useful for regulating motivation? Why?
2. In in-class learning, which frequently used strategy do you think is the most useful for regulating motivation? Why?
3. During regular online classes, which frequently used strategy do you think is the most useful for regulating motivation? Why?

Category 1c: Regulation of behavior

1. In pre-class learning, which frequently used strategy do you think is the most useful for regulating behavior? Why?
2. In in-class learning, which frequently used strategy do you think is the most useful for regulating behavior? Why?
3. During regular online classes, which frequently used strategy do you think is the most useful for regulating behavior? Why?

Category 1d: Regulation of cognition

1. In pre-class learning, which frequently used strategy do you think is the most useful for regulating cognition? Why?
2. In in-class learning, which frequently used strategy do you think is the most useful for regulating cognition? Why?
3. During regular online classes, which frequently used strategy do you think is the most useful for regulating cognition? Why?

Category 2: Opinions on learning self-regulated learning in the virtual flipped classroom (the flipped classroom used in this course), prompts and modeling

1. What do you think about learning self-regulated learning in the flipped classroom used in this course? Why?

2. What do you think about using prompts in videos to learn self-regulated learning?

   Why? (For the FCP group)

3. What do you think about using modeling to learn self-regulated learning?

   Why?

   (For the FCM group)

4. In videos, the teacher took on the role of a child to learn. What do you think about it? Why? (For the FCM group)

Part B: Interview Questions for Parents

Category 1: Opinions on learning self-regulated learning in the virtual flipped classroom, prompts and modeling

1. What do you think about learning self-regulated learning in the flipped classroom used in this course? Why?

2. What do you think about using prompts in videos to learn self-regulated learning? Why? (For the FCP group)

3. What do you think about using modeling to learn self-regulated learning? Why? (For the FCM group)

4. In videos, the teacher took on the role of a child to learn. What do you think about it? Why? (For the FCM group)

Part C: Interview Questions for the Teacher

Category 1: Opinions on learning self-regulated learning in the virtual flipped classroom, prompts and modeling

1. What do you think about learning self-regulated learning in the flipped classroom used in this course? Why?
2. What do you think about using prompts in videos to learn self-regulated learning? Why?
3. What do you think about using modeling to learn self-regulated learning? Why?
4. In videos, you took on the role of a child to learn. What do you think about it? Why?
5. How does the course different from your past experience in holding the extra-curricular program?

Appendix D

Questionnaire Items for Self-regulation

The questionnaire is adapted from Motivated Strategies for Learning Questionnaire (Pintrich & DeGroot 1990; Pintrich et al., 1993). The Chinese version is based on Rao and Sachs (1999, 2000) and Sachs et al. (2002).

Overall Self-regulation

25 I ask myself questions to make sure I know the content about public speaking that I have been learning.

26 It is hard for me to decide what the main ideas are when I learn public speaking.

27 When I face difficulties when watching the learning video (e.g. feel very tired), I give up.

32 I practise public speaking even when I don’t have to.

33 Even when the pre-class learning video is not interesting, I keep working until I finish.

38 I find that when the teacher is talking in the learning video I think of other things and don’t really listen to what is being said.

40 When I watch the pre-class learning video, I stop once in a while and go over

what I have learnt.

43 I work hard to get good results in public speaking competitions even if I do not like public speaking.

Use of Cognitive Strategies

28 When I learn public speaking, I put important ideas into my own words.

30 When I prepare for public speaking competitions, I try to remember as many facts as I can.

31 When learning public speaking, I copy my notes over to help me remember materials.

34 When I prepare for public speaking competitions, I practise saying the important facts over and over to myself.

35 Before I learn public speaking, I plan what I will need to do to learn.

39 When I learn a public speaking script, I try to make all the public speaking strategies learnt fit together.

41 When I review notes taken, I say the words over and over to myself to help me remember.

42 I list the key points of public speaking strategies to help me study.

Motivation Scale – Intrinsic Value

1 I prefer learning tasks that is challenging so I can learn new things.

4 It is important for me to learn what is being taught in the course.

5 I like what I am learning in the course.

7 I think I will be able to use what I learn in the course in another subject.

15 I think that what I am learning in the course is useful for me.

17 I think that what we are learning in the course is interesting.

21 Understanding what I learn in the course is important to me.

Motivation Scale – Self-efficacy

6 I am certain that I can understand the ideas taught in the public speaking class.

8 I expect to do very well in the public speaking class.

9 Compared with others in the public speaking class, I think I am a good student.

11 I am sure I can do an excellent job in the public speaking class (for distance learning at home and online lessons)..

13 I think I will get good results in competitions.

16 My study skills are excellent compared with others in the public speaking class.

18 Compared with other students in the public speaking class I think I know a great deal about public speaking..

19 I know that I will be able to reach the assessment requirements of public speaking competitions.

Time

43 I make good use of my study time for learning public speaking.

52 I find it hard to stick to a study schedule. (REVERSED)

77 I often find that I don't spend very much time on learning public speaking because of other activities. (REVERSED)

80 I rarely find time to review my notes and watch pre-class learning video before an exam.(REVERSED)

Study Environment

35 I usually study in a place where I can concentrate on my watching the pre-class learning video.

65 I have a regular place set aside for studying.

70 I make sure I keep up with the pre-class learning video and assignment.

CURRICULUM VITAE

Academic qualifications of the thesis author, FUNG Sze Ki, Marianna:

- ✓ Being awarded Evelyn Yee-fun Man Scholarship in recognition of outstanding academic performance (2009)
- ✓ Received the degree of Bachelor of Education (Honours) (Languages) (2009)
- ✓ Received the degree of Master of Arts in Language Studies (2011)

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