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A microanalysis study of EFL teacher self-regulation in COVID-19 emergency remote teaching

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Abstract: Teacher self-regulation is under-studied yet important especially for teachers of English as a foreign language (EFL) who need to conduct remote teaching over the internet due to COVID-19, known as emergency remote teaching (ERT). In light of the teacher development and self-regulation model that consists of the three phases of forethought, performance and self-reflection, this qualitative study applies the microanalysis method to explore how one novice-level and two master-level Chinese university EFL teachers self-regulated their ERT teaching. After synthetical term frequency analysis using jiebaR, we summarised a total of 14 teacher self-regulation strategies corresponding to the three phases and categorised them into ERT goals (three strategies), motivation for ERT (three strategies), self-control in ERT (three strategies), self-observation in ERT (one strategy), self-judgment from the ERT class (two strategies) and self-reaction from the ERT class (one strategy). We ended by proposing a tentative EFL teacher self-regulation model for ERT context. Implications are provided.

Keywords: EFL teacher; emergency remote teaching; microanalysis; self-regulation; teacher self-regulation

1 Introduction

Due to the COVID-19 pandemic's impact on education (World Bank, 2020), many teachers of English as a foreign language (EFL) moved from classroom-based teaching to temporary remote teaching conducted via internet in what was known as emergency remote teaching (ERT) (Adedoyin & Soykan, 2020). ERT is different from classroom teaching, and for it, teachers need to apply thoughts, feelings and actions that are planned and adapted to their goal attainment in a different way, which is conceptualised as self-regulation (Zimmerman, 2005). Self-regulation, or referred as self-regulated learning (SRL) in the academic setting, receives attention on teaching

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recently, referred to as teacher self-regulation (e.g., Heydarnejad et al., 2022; Huang, 2022; Pazhoman & Sarkhosh, 2019). Despite the attention on teacher self-regulation, there is a dearth of research linking self-regulation to EFL teaching, especially in an ERT setting. We argue that teacher development and teacher self-regulation are closely associated (Evans, 2008) and that instruction and self-regulation are also interrelated (Kaplan, 2008; Larsen-Freeman & Anderson, 2011). Therefore, it is pivotal to investigate EFL teacher self-regulation in a specific context, such as ERT, and the present study provides a tentative attempt to explore how EFL teachers self-regulate themselves at different teaching phases in ERT classes.

2 Literature review

2.1 Self-regulation: definition and model

Grounded in the social cognitive theory of human behaviour (Bandura, 1986), self-regulation is defined as the degree to which people are cognitively, motivationally and behaviourally active participants in the social context (Zimmerman, 1986). Social cognition emphasises the "regulation" in self-regulation, in particular how to set goals and to achieve them via regulated action and strategies (Baumeister et al., 2005; Byrnes, 1998; Garcia, 1996). Regulation is a highly resource-consuming concept—the regulation of (meta)cognition, motivation or affect, context and behaviour require resources, and the more resources provided, the more possible it will be to succeed (Franken, 1994; Muraven et al., 1998). For example, regulation of motivation needs many cognitive resources, suggesting that using more motivation regulation would possibly lead to less regulation of cognition or behaviour (Wang et al., 2021). Moreover, from a social perspective, Zimmerman and Schunk (2011) argued that self-regulation should not be viewed only as an "individualized form of learning because it also includes self-initiated forms of social learning, such as seeking help from peers, coaches, and teachers" (p. 1). In this way, they suggested that self-regulation, in a sense, is often viewed as a strategic construct.

The emergence of and increasing focus on self-regulation in the academic domain has resulted in SRL (Dent & Koenka, 2016; Zimmerman & Schunk, 2011). Various SRL models have been proposed, and according to Panadero (2017), one of the well-established ones is that of Zimmerman and Moylan (2009), which consists of three interdependent phases, namely forethought (preceding efforts to learn or perform), performance (during learning or performance) and self-reflection (after learning or performance). In each phase, various motivational beliefs and strategies are incorporated to engage in self-regulation (Zimmerman, 2005; Zimmerman & Moylan, 2009). The forethought phase includes strategic planning and goal-setting as well as self-

motivational beliefs such as self-efficacy, task interest, task values and goal orientation. The performance phase includes self-control (which consist of various strategies, such as help-seeking, environmental structuring and self-instruction) and self-observation (which includes strategies such as self-monitoring and self-recording). The self-reflection phase includes self-judgment and self-reflection, which consist of strategies such as self-evaluation and self-satisfaction (Zimmerman & Moylan, 2009, p. 300). Although this model was proposed for visual SRL, it can be adapted for teacher self-regulation (Huang, 2022), since teachers need various strategies for different developmental stages, and instruction also consists of different phases that resonate with the three SRL phases, as discussed next.

2.2 EFL teacher self-regulation

Theoretically, self-regulation is important for EFL teaching in light of both teacher development and teaching methodologies. In this study, the self-regulated behaviours and strategies that EFL teachers apply in teaching activities are operationalised as EFL teacher self-regulation.

From a macro-perspective, EFL teacher development involves different stages that require teachers to self-regulate. Teacher development is defined as an either subjective or objective multidimensional developmental process constituting professional, personal and societal development (Fuller, 1969; Rao, 2009). As suggested in Berliner (1988) and Fuller and Bown (1975), there are five stages of skill development for teachers, according to their age, experience and expertise in pedagogy, which are novice teacher, advanced beginner, competent teacher, proficient teacher and expert teacher. Moreover, Huberman (1989) proposed that teachers' ability to cope with and explore professional problems in teaching and learning is extremely important in terms of their development. More comprehensively, and in consideration of the Chinese context, Zhu (2011) suggested that there should be five teacher development levels staged in terms of their knowledge and skills; these stages are the novice, the advanced novice, effective, expert and master levels (p. 118). In different developmental stages, teachers should be instilled with both internal driving forces (e.g., motivation and affect) and external incentives (e.g., management and training) so that they will develop from being a novice to a master teacher (Evans, 2008; Zhu, 2011). In this sense, self-regulation, including both motivation and strategic behaviours in teaching, is essential for teachers to develop. From a micro-perspective, conventional EFL teaching consists of lesson planning, presenting, teaching, practice, production after class and reflection on teaching, which are important steps in many teaching methodologies, such as present, practice and product (PPP), task-based language teaching (TBLT), communicative language teaching (CLT) and so on (Ellis, 2012; Larsen-Freeman &

Anderson, 2011). These teaching procedures resonate with the self-regulation phases of forethought, performance and self-reflection (Zimmerman & Moylan, 2009).

In the 1980s, research embarked on teacher self-regulation, coping strategies and metacognition in general education (Zhu, 2011), but this work paid more attention to teaching behaviours that are observed rather than teachers' personal factors, such as affect, self-efficacy and the like (Evans, 2008; Rao, 2009; Zhang, 2010). Later, while teacher self-regulation was investigated in a wider range of subjects, such as science and chemistry (Aktamış & Acar, 2010; Sumantri et al., 2018; Uzuntiryaki-Kondakci et al., 2017), only a handful of studies were conducted to investigate teacher self-regulation in the EFL teaching context. Pazhoman and Sarkhosh (2019), using questionnaires as instruments and multiple regression as their analytical method, examined the relations between EFL teachers' reflective practices and self-regulation; their results revealed a positive relation between the two constructs, but no significant relation was found between teachers' self-regulation and teaching experiences. More recently, Huang (2022) investigated the relations between EFL teachers' self-assessment and self-regulation and found a positive correlation between them. They also found that both self-assessment and self-regulation developed EFL teachers' mastery (Huang, 2022). Heydarnejad et al. (2022) also used questionnaires as instruments to investigate self-regulation on university EFL teachers' emotions and teaching styles. Their findings revealed self-regulation to positively predict pleasant emotions but negatively predict unpleasant ones; moreover, self-regulation was found to have positive effects on student-centred teaching styles and negative effects on those centred on teachers (Heydarnejad et al., 2022).

Previous studies on EFL teacher self-regulation suggested the importance of self-regulation for teachers' practices, the close relations between self-assessment and self-regulation and self-regulation's effects on teachers' emotions and teaching styles. Despite these findings, more empirical research on teacher self-regulation is needed. Moreover, the current situation worldwide has led to teaching being no longer solely classroom-based; indeed, due not only the COVID-19 pandemic but also to the post-COVID influence, an alternative teaching mode—ERT—has become the norm in many regions (Adedoyin & Soykan, 2020). Therefore, it is necessary to investigate the extent to which EFL teachers self-regulate when they are required to conduct teaching via the internet.

2.3 Conceptual model and research questions

ERT is defined as an interim change of teaching and learning delivery to an online mode in the face of significant changes, such as the pandemic environment (Buchanan, 1999). ERT serves as an alternative teaching and learning method to counter massive

challenges, such as the COVID-19 pandemic (Bozkurt & Sharma, 2020). However, when a course is forced to shift from classroom-based teaching and learning to an ERT mode, it is very possible that the teacher will not be well-prepared for that, which could potentially exert negative influences on teaching and learning over the internet.

Based on Zimmerman and Moylan's (2009) model, we propose a teacher self-regulation model (Figure 1). Based on the literature regarding teacher development and self-regulation, the primary similarity between Zimmerman and Moylan's (2009) model and the one we propose is the self-regulatory feedback loop that constitutes the three cyclical, interdependent phases of forethought, performance and self-reflection. The major difference between the models is that the processes in each phase of the proposed model (Figure 1) were developed with a focus on teachers' motivational beliefs and strategy uses before, during and after ERT classes. Specifically, in the forethought phase, teachers approach and analyse ERT class teaching (Winne & Hadwin, 1998), establish ERT goals and plan how to accomplish them (Panadero & Alonso-Tapia, 2014; Zimmerman, 2005) and are activated by motivational beliefs of self-efficacy (judgment of competence to perform a task), task values (belief in the importance, utility and relevance of the task) and goal orientation (purpose of performing the task) to initiate changes in ERT (Schunk & Pajares, 2009; Wigfield & Eccles, 2000). In the performance phase, self-control and self-observation are assumed to take place (Zimmerman & Campillo, 2003). Various strategies to regulate behaviours and the environment are postulated for these two processes (Zimmerman, 2011), such as time and environment management to regulate the immediate context (Pintrich et al.,

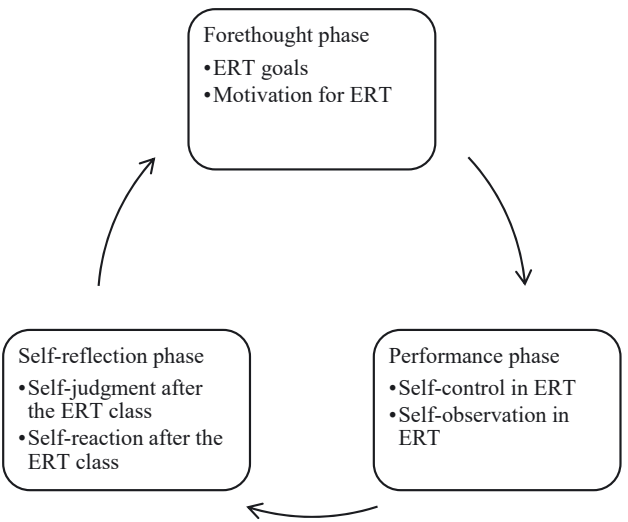

Figure 1: Proposed teacher self-regulation model for ERT.

1987) and help-seeking and metacognitive monitoring strategies to regulate learning behaviour (Zimmerman, 2005). In the self-reflection phase, teachers self-evaluate performance (self-evaluation) (Zimmerman & Moylan, 2009) and react to the evaluation and their success or failure (self-reaction) (Zimmerman, 2011; Zimmerman & Kitsantas, 1999). Strategies used in this phase influence how teachers approach the next task or ERT class (Zimmerman, 2013). As such, a cyclical feedback loop is formed, reiterating the three phases' interdependence and including motivational beliefs and self-regulation strategies (Pintrich & Schunk, 1996).

Based on the proposed conceptual model, this study investigates how Chinese EFL teachers self-regulated their teaching in the ERT context during COVID-19, and its ultimate goal is to propose a tentative teacher self-regulation model for ERT. The following two research questions are proposed:

RQ1: How do EFL teachers self-regulate their teaching in the forethought, performance and self-reflection phases of an ERT class?

RQ2: To what extent do EFL teachers use self-regulation strategies differently in the three phases of an ERT class?

3 Methodology

3.1 Context and participants

We conducted the research at a comprehensive university in the northeast of China that provides general English courses, which were conducted in the ERT mode during the pandemic. At that time, the ERT classes were conducted in virtual classrooms via Tencent Meeting (see https://meeting.tencent.com). They followed the syllabus developed by the instructor and confirmed by the university faculty office and included teaching reading, speaking, listening and writing skills.

Using purposive sampling (Mackey & Gass, 2005), we invited three EFL teachers working at the university to participate (Table 1). Each teacher used the same textbook, followed the same teaching schedule and taught first-year university non-English-major students the mandatory general English course. Since the COVID-19 outbreak in 2020, these teachers were required to conduct ERT, according to both the university policy and the local government's remote teaching requirements. According to the five teacher development stages proposed in Zhu (2011) and based on the three participants' backgrounds in terms of their age, self-reported expertise in pedagogy and teaching experience, we ascertained that one teacher was at the novice level (Teacher A) and two teachers were at the master level (Teachers B and C).

Table 1: Participant information.

Teacher number	Level	Gender	Age	Teaching experience	Self-reported pedagogy expertise
Teacher A	Novice	Male	31	2 years	Beginner
Teacher B	Master	Female	45	20 years	Proficient
Teacher C	Master	Female	53	28 years	Proficient

3.2 Research design: microanalysis approach

This study aimed to explore how EFL teachers self-regulate teaching in an ERT environment, and as an exploratory study, we wished to find out different teacher self-regulation strategies in ERT; thus, a microanalysis research design was applied. As a context-specific method, microanalysis is employed to investigate the teacher self-regulation strategies used in this study. Microanalysis refers to a highly specific or fine-grained form of measurement that targets behaviours as they occur in real-life situations across authentic contexts (Cleary, 2011). It has been employed in various studies across different disciplines to directly observe overt micro-level behaviours during authentic interactions, through which researchers have been able to illustrate the specific transient behaviours in action (Gordon & Feldman, 2008). Although microanalysis is frequently used to evaluate overt behaviours, it is also used to study highly specific cognition while a person is engaged in a task such as teaching and is also applied in self-regulation research (Cleary, 2011). Microanalysis in research on self-regulation in the academic context, often known as SRL micro-analysis, refers to an approach developed to evaluate individuals' regulatory beliefs and reactions as they participate in highly specific tasks, such as learning and, in our research, teaching (Cleary & Zimmerman, 2001; Kitsantas & Zimmerman, 2002).

SRL microanalysis specifically focuses on self-regulatory beliefs and processes, such as self-efficacy, goal-setting and emotions, and utilizes structured assessment probes that are designed to evaluate the cyclical phases of self-regulation at strategic moments in a specific activity (Cleary, 2011). Therefore, SRL microanalysis aims to target the multiple cyclical stages in the execution of a task and is often designed to assess self-regulation in terms of the three phases of forethought, performance and self-reflection (Cleary & Zimmerman, 2004). Specifically, at the core of microanalysis is a set of direct, clear and simple microanalytical interview questions that target the specific self-regulation strategies outlined in the three phases (Cleary, 2011), namely the processes of self-regulation at strategic moments in ERT (Cleary & Zimmerman, 2004). Cleary (2011) proposed that the microanalytical method could be a highly effective approach for tracking and examining changes in self-regulation in the

academic context, especially when a task with a clear beginning, middle and end can be identified. Therefore, given the context and research purpose, we argue that microanalysis is an appropriate approach to examine teacher self-regulation in the three phases (the before, during and after dimensions) of an ERT class.

3.3 Instrument

SRL microanalysis consists of the following five fundamental steps: (1) individualised administration; (2) examination of multiple SRL processes; (3) asking contextually specifific microanalytical questions; (4) linking phase-specifific regulatory processes to the before, during and after dimensions of an event; and (5) verbatim recording and coding of participants' responses (Cleary, 2011, pp. 335–339). Following these steps, we designed a teacher self-regulation microanalytical interview guide (TSRM interview guide) (Table 2).

First, given that each interview was conducted individually, to be free from social influences and biases, we used a semi-structured interview process in which introductory questions were designed beforehand but follow-up, confirmation and specifying questions were also asked based on the actual interview situation (Mackey & Gass, 2005). Second, as suggested in Cleary (2011), Zimmerman and Moylan (2009)'s model serves as the primary source and origin of SRL microanalysis, as all questions used in microanalytical interviews are developed to assess the specific sub-processes across and within each of these three phases. Since SRL microanalysis involves targeting processes framed within Zimmerman and Moylan (2009)'s cyclical feedback loop, our interview guide was divided into three phases corresponding to the three phases of forethought (before class), performance (during class) and self-reflection (after class). Third, all interview questions were designed in a simplistic, direct and straightforward fashion, as suggested previously, to prevent teachers' anxiety and any ambiguity in their responses (Cleary, 2011; Cleary & Zimmerman, 2004); also, the questions were directly linked to the target task of interest—that is, teachers' use of strategy for instruction in the three phases of ERT class teaching. Fourth, a key point for SRL microanalysis is to identify and clearly define the before, during and after phases of ERT teaching (Cleary, 2011). Following Cleary and Zimmerman (2001)'s and Kitsantas and Zimmerman (2002)'s microanalysis studies and procedures for developing interview questions, we identified the forethought phase as the time before an ERT class and included four questions to target teachers' motivational beliefs, goal-setting and strategic planning. We identified the performance phase as the in-class break times, during which the teachers could immediately provide us with their feelings and thoughts, including answers to five questions investigating their self-control and self-observation in this phase. According to Cleary's (2011) suggestion regarding

Table 2: TSRM interview guide.

Forethought phase	
ERT goals	Do you have goals for the class, including pedagogical goals or personal goals?
	How will you accomplish your goals in the class?
Motivation for ERT	Do you feel motivated to begin teaching English in the class?
	Do you have any other ways to prepare before the class that motivate you to teach?
Performance phase	
Self-control in ERT	In this part of the class, did any problems related to teaching or computer occur?
	How did you cope with them?
	How do you think you focused on the class? Did you lose control because of the problems?
Self-observation in ERT	Did you notice your lesson progression, such as time and interaction with students?
	Did you do any other things to make your class continue in an effective way?
Self-reflection phase	
Self-judgment from the ERT class	Did you unsuccessfully cope with any problems in this class?
	How do you rate your class, such as from 1 to 10?
	Do you think this reflection could help your next class?
	Did you feel satisfied with your teaching in this class?
Self-reaction from the ERT class	Do you believe you were motivated to teach? In what ways?
	Do you believe you performed well in coping with the problems regarding teaching and students' learning?
	Do you believe you attained your goals set before the class?

individuals' need to reflect on their behaviours, which might take time, we administered self-reflection questions after the teaching sessions were completed, including seven questions to assess the teachers' self-judgement and self-reaction strategies. Last, to ensure the reliability of the interview data coding, we followed Cleary and Zimmerman's (2001) coding procedures, which are discussed in Section 3.5.

3.4 Data collection procedures

We conducted the research late in the university's first semester, before the final examinations; during this time, one temporary COVID-19 crisis had taken place, so the three teachers were required to teach using an ERT model, with the students participating in the class remotely. According to Cleary (2011) and Cleary and Zimmerman (2001), microanalytical research needs to be conducted before a task, during a task and after the task completion, so we randomly chose one class for each teacher

and informed the respective teacher beforehand; we conducted the TSRM interviews before, during and after the ERT classes. So as not to influence teaching and to use the time to conduct interviews effectively, all questions were sent to the teachers one day before the classes. As shown in Table 3, we asked the forethought phase interview questions about half an hour before the beginning of each class, and we left 10 minutes before the actual class beginning time. The teachers logged into the ERT virtual classroom (Tencent Meeting Room) and closed both the video and audio functions during the interviews. However, for the interviews in performance phase, we only had time to conduct the interviews; to capture the online transient information provided by the teachers (Teng & Zhang, 2021), we conducted two short interviews during the two breaks in the classes. As for the interviews in self-reflection phase, we conducted the interviews on the same day as the classes and at the convenience of the teachers. The interviews in this phase lasted from 1 to 1.5 hours.

The interviews were transcribed verbatim and manually checked and member-checked by the corresponding teacher (Mackey & Gass, 2005). The researcher and one other EFL teacher (not one of the three participants), who holds a PhD in applied linguistics and has taught English at tertiary level for 10 years, coded the transcripts according to Cleary and Zimmerman's (2001) coding procedures. First, we designed an Excel sheet with three columns displaying teacher number/level, phase and six general strategies to represent the processes in the three phases (ERT goals, motivation for ERT, self-control in ERT, self-observation in ERT, self-judgment from the ERT class and self-reaction from the ERT class) and the specific strategies mentioned in the transcripts. Second, the two raters independently read and coded the transcripts. Third, in each participant's responses to each interview question, the raters identified the specific strategies that the participant used and confirmed whether the specific strategies should be categorised into the six general strategies. Fourth, the two raters communicated with each other, based on the inter-rater agreement results shown by the data analysis, and reached their decisions. A sample sheet for coding is in Appendix A.

Table 3: TSRM interview summary.

Teacher number	Class start time	Forethought phase	Performance phase	Self-reflection phase
Teacher A	8:00 a.m.	7:20–7:50 a.m.	8:45–8:50 a.m. 9:20–9:30 a.m.	11:40 a.m.–12:40 p.m.
Teacher B	8:00 a.m.	7:20–7:50 a.m.	8:45–8:50 a.m. 9:20–9:30 a.m.	12:10–13:10 p.m.
Teacher C	1:30 p.m.	12:50–1:20 p.m.	2:15–2:20 p.m. 2:50–3:00 p.m.	5:10–6:40 p.m.

3.5 Data analytical procedures

First, we used Kappa coefficients to evaluate inter-rater agreement, with 0.80 as the benchmark *a priori, given the small scale of data* (Cleary, 2011). Second, given that the transcripts were all in Chinese, they were subjected to word segmentation by jiebaR, which is able to segment Chinese words. We applied three steps to segment the transcripts. In Step 1, we used jiebaR mixed model word segmentation. In Step 2, we filtered stop words, or words that did not contain content meaning and interference with segmentation (Van Rijsbergen, 1975), following a combination of the stop word lists of Baidu, the Harbin Institute of Technology and Sichuan University (Yu et al., 2013). In Step 3, we used the inverse document frequency (IDF) method to generate the word frequency in the transcript of responses to each question. IDF is effective for calculating the frequency of a certain word, and it pays particular attention to specific keywords and filtered ambiguous common words, such as *jiushi* (the Chinese equivalent to 'that is') and *ranhou* (equivalent to 'and') in cases that were not detected and filtered in Step 2 (Lan et al., 2022). JiebaR generates word frequency based on the following formula:

$$fre_i = f_i \div (1 + f_i),$$

where f_i is the word frequency of the word i in a transcript of the response to one question and fre_i is the term frequency accordingly, which ranges from 0.00 to 1.00—the higher the term frequency is, the more frequent the word i is (Zheng & Lu, 2005). After finishing the three steps, we followed the open, axial and selective coding process to summarise the strategies that each teacher applied at specific behaviour moments (Charmaz, 2014).

4 Results

4.1 Inter-rater agreement results

Table 4 shows the kappa coefficients calculated across all three self-regulation phases. In general, a very high level of inter-rater agreement was found, ranging from 0.799 to 0.956, suggesting substantial consistency between two raters' coding results.

Table 4: Inter-rater agreement.

Phase	General strategy	Reliability
Forethought	ERT goal	0.956
	Motivation	0.927
Performance	Self-control in ERT	0.921
	Self-observation in ERT	0.955
Self-reflection	Self-judgment from the ERT class	0.901
	Self-reaction from the ERT class	0.832

4.2 Teacher self-regulation strategy uses

After open, axial and selective coding, framed within the proposed model, we summarise the teacher self-regulation strategies across the three phases (Table 5). A sample of the open coding is in Appendix B, along with the term frequency for each word or phrase, all translated into English.

Table 5: A summary of teacher self-regulation strategy in ERT.

Phase	General strategy	Teacher self-regulation strategy
Forethought	ERT goal	Stick to the classroom-based teaching goals.
		Manage time to accomplish the goals.
		It is important to set specific goals in the lesson plan.
	Motivation	Self-talk before the ERT class for motivation.
		Talk to peers beforehand about the class.
		Enter the classroom early to talk to students.
Performance	Self-control	Use technical methods, such as smart phone apps, to monitor students' responses.
		Pay attention to the questions and words typed in the chat box.
		Use conventional, instructional methods to monitor students.
	Self-observation	Use apps such as timers to manage time.
		Use instructional methods, such as lesson plans, to monitor progression.
Self-reflection	Self-judgment	Rehearse before each class.
		Watch the screen-recording after each class.
	Self-reaction	Update technical methods.

In the forethought phase, all three teachers suggested that they had set up the same pedagogical teaching goals as those in classroom-based teaching. Teacher C suggested that specific teaching goals were also important for ERT to finish the class on time. As for self-motivation, Teacher A mentioned that he had applied a self-talk strategy—talking to himself a few minutes before the class. For example, he told himself to calm down and be confident in his teaching. Also, to feel more motivated, he persuaded himself that he was familiar with all his students and that they treated him as both a teacher and a friend. Teacher B suggested that talking to peers before class was an effective way to feel motivated. For example, she sent messages to another teacher who taught another subject to the class, and they would communicate briefly

on notable topics, such as any interesting questions raised by the students in a previous class. Teacher B said she would use these topics in the class to cheer up the students, since online teaching and learning could be exhausting. Teacher C, however, suggested that she did not need to feel motivated, since teaching was a routine job for her. Teacher A highlighted that it was necessary to enter the Tencent Meeting early and greet the students so that both the teacher and the students would be motivated, which was something not evident in the responses of either Teacher B or Teacher C.

In the performance phase, Teacher A suggested innovative, high-tech methods in terms of self-control and self-observation strategies. He used an iPhone application to remind him of the time, used an application link to check attendance and adopted interesting methods, such as the Word Shake web-based application (https://wordshake.com), to involve students more in class; he also asked interesting questions in the chat box to monitor students' responses. In contrast, Teachers B and C used conventional strategies, such as nominating students to respond to questions, sending out pop quizzes, managing the class time and planning teaching time strictly. Teacher C suggested the strategy of asking students to check in pairs, thereby allowing the teacher to monitor their progression. Moreover, due to age issues and well-being, Teachers B and C each mentioned the importance of having eyewear to protect their eyes.

In the self-reflection phase, Teacher A suggested that although it was not possible to change the Tencent Meeting function, he was able to use various technical tools, including computer programs and Mac and iPhone applications, which could in combination make ERT more effective. In addition, it was important to maintain good progression, or talking speed, in ERT, which was also mentioned in Teacher C's responses. Teacher B said that familiarity with Tencent Meeting was essential, so rehearsing beforehand and watching her own ERT screen recordings after classes were vital for her to make progress in ERT; this was also highlighted in Teacher C's responses.

5 Discussion

This microanalytical study explores Chinese EFL teachers' self-regulation strategies in an ERT environment, and by using jiebaR to analyse the interview data, we identified 14 strategies used in the three phases, according to the three teachers' responses.

5.1 Teacher self-regulation strategies in forethought phase

First, the ERT goals were consistent with the original pedagogical goals in classroom-based teaching; however, Teacher C highlighted the importance of setting specific goals, which signified her master-level professionalism as a teacher (Berliner, 1988; Fuller, 1969; Zhu, 2011). Nevertheless, because only one ERT class was investigated for each teacher, we were not able to explore further examples of teachers' ERT goal-setting in terms of distant and short-term goals and the differences between them (Pintrich & Schunk, 1996). That said, this finding is interesting, given that self-regulation is highly domain-specific, but it seems that goal-setting does not vary to a large extent between the two teaching environments of ERT and the classroom (Zimmerman, 2005). In addition, goal-setting seemed to interact with the self-control strategy of time management, as suggested in Teacher B's responses. This finding is consistent with what has previously been suggested, namely that the three phases of forethought, performance and self-reflection are interrelated (Zimmerman & Moylan, 2009).

Second, it was surprising to find that only the novice-level teacher applied self-talk and talking to students as strategies to motivate himself; on the other hand, the two master-level teachers did not regard motivational strategies as essential and only referred to talking to peers as a method to seek motivational support (Zimmerman, 2005). Nevertheless, although Teacher C mentioned that she had not applied a self-motivational strategy before the class, she used quite a few interesting, effective teaching techniques, based on her responses in the performance phase—for example, she asked students to check in pairs so that she could monitor them, she kept track of her teaching progression by referring to her lesson plan in her notebook, and she watched her own recordings after the classes to reflect on her ERT. Therefore, the teachers might have already applied strategies to motivate themselves for classes or to teach them; only, these strategies were unconsciously interrelated with those in the performance phase. This further supports previous findings that self-regulation and teaching styles are positively correlated (Heydarnejad et al., 2022) and that teachers' self-regulation is closely related to their reflective practices (Pazhoman & Sarkhosh, 2019).

5.2 Teacher self-regulation strategies in performance phase

First, there was a stark contrast between the novice-level teacher and the master-level teachers regarding their self-control strategies; the former applied a technical method to monitor teaching and learning, whereas the latter two teachers used more conventional and instructional methods to do so. This finding is important in two ways. First, it reinforces previous research suggesting that teacher self-regulation is insignificantly related to teaching experiences (Pazhoman & Sarkhosh, 2019); second, it

highlights the importance of providing relevant training for teachers of different levels. As Rao (2009) argued, teacher development concerns societal development, and it is important to incorporate teachers at different professional levels with adequate training (Evans, 2008; Zhu, 2011). Moreover, novice- and master-level teachers have their respective strengths, such as using more advanced, high-tech methods and sticking to classic, effective teaching approaches (Huberman, 1989), so we argue that using both technical and instructional methods is essential, and integrating them can promote ERT teaching and facilitate EFL teachers of different levels (Zhu, 2011).

Second, similar to self-control strategies, those for self-observation were different between the two levels of teachers, mainly in terms of the use of technical methods. Nevertheless, all three teachers suggested a self-regulation strategy by monitoring students' questions typed in the chat box. This finding is important for two reasons. First, it has long been argued that self-regulation is a limited resource (Muraven et al., 1998), and we found that the successful application of self-regulation required adequate resources; the regulation of monitoring and attention requires teachers to provide extra attention or resources in their class monitoring process (Franken, 1994). Therefore, we assert that the two master-level teachers used fewer motivational strategies to assign more resources to regulate monitoring in the ERT class, since the regulation of motivation is rather resource-consuming (Wang et al., 2021). Second, Tencent Meeting is a virtual classroom, in which the regulation of the environment is different from that in an actual classroom (Zimmerman, 2011) in terms of the way students raise questions. Therefore, given that all teachers raised issues regarding questions in the chat box, it is necessary for teachers to use multiple methods to support their teaching, as Teacher A suggested.

5.3 Teacher self-regulation strategies in self-reflection phase

In terms of teachers' self-judgment, both master-level teachers suggested the use of rehearsal and watching recordings. This result signifies these master-level teachers' professionalism (Evans, 2008) and indicates that self-regulation has effects on teachers' behaviours (Huang, 2022). Nevertheless, the novice-level teacher did not frequently mention rehearsal nor suggest that he had watched his screen-recording after the class. Therefore, we argue that the novice-level teacher may have been unaware of the essential role of self-judgment, in particular the strategy of rehearsal and recording watching, thereby highlighting the necessity of relevant training for teacher development at different stages (Evans, 2008; Zhu, 2011). As for the self-reaction strategy, updating technical methods is important for ERT, although this was only brought up by the novice-level teacher, and this finding reiterates the importance of training in a similar vein (Huberman, 1989). We argue that teachers of different developmental

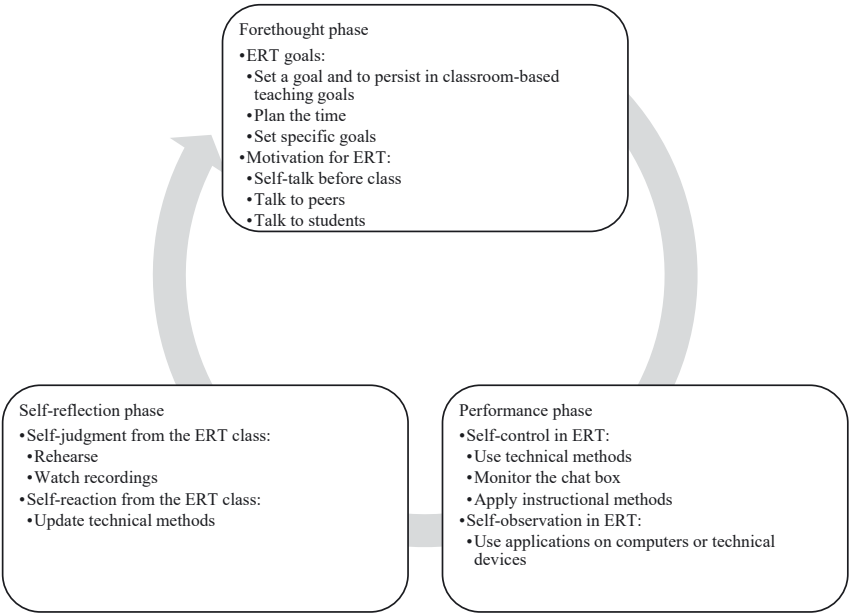

Figure 2: A tentative teacher self-regulation model for ERT.

stages need general training and also training that is much more relevant to their needs and changes in the societal environment, as suggested previously in both general education (Zhu, 2011) and in EFL education (Ellis, 2012). Therefore, necessary, adequate, punctual and well-designed training for teachers is essential.

Finally, we have revised the proposed teacher self-regulation model (Figure 1), incorporated the strategies and proposed a tentative teacher self-regulation model for ERT (Figure 2).

6 Conclusion

This study investigated Chinese EFL teacher self-regulation in an ERT context. Using the microanalysis method, we provided 14 strategies grounded with data from interviews with three university EFL teachers, one of whom was novice-level and the other two were master-level teachers. Some strategies were shared by the three teachers, while others were presented by one or two teachers, which further illustrates that teacher development, teaching and self-regulation are potentially interrelated (Ellis, 2012; Larsen-Freeman & Anderson, 2011; Uzuntiryaki-Kondakci et al.,

2017; Zimmerman & Moylan, 2009). Finally, we proposed a tentative teacher self-regulation model for ERT.

Our study has the following limitations, along with the corresponding future directions. First, our research employed cross-sectional data from three teachers that were not sufficiently in-depth and might preclude attempts to examine changes in teacher self-regulation over time. Therefore, in the future, longitudinal research is needed to find whether teachers' use of strategies has changed and to what extent it has done so. Second, although our study provided details regarding teacher self-regulation in ERT, the results should be considered with care, in particular when generalising them to other contexts. Hence, this tentative teacher self-regulation model for ERT should be validated by quantitative or mixed-methods research. Third, it is strongly suggested for future research to include more interview questions related to teaching methodologies, which would be useful for examining the relation between self-regulation and teaching in greater detail.

Appendix A

A sample of sheet for coding.

Teacher number/level	Phase/overall strategy	Strategies in transcript
Teacher A/novice	Forethought/ERT goals	Pedagogically, the goals for ERT were the same as those in classroom teaching. Personally, encouraging students to show up in front of their cameras was my second goal, which was hard to accomplish.
	Forethought/motivation for ERT	I would normally talk to myself a few minutes before the class. I entered the Tencent Meeting classroom beforehand to greet the students.
	Performance/self-control in ERT	We needed to monitor students' attendance by using an application link. We needed to use an interesting way for students to type in the chat box so that I could monitor their progress.
	Performance/self-observation in ERT	I used the alarm clock on my iPhone to monitor my time management. I assigned students as my assistants to monitor time.
	Self-reflection/self-judgment from the ERT class	Similar to video-chatting on the internet, the key issue was to send a clear message in the ERT.
	Self-reflection/self-reaction from the ERT class	Technical issues were beyond control, but we could use other types of assistance—I used computer, Mac and iPhone apps to keep track of my class.

(continued)

Teacher number/level	Phase/overall strategy	Strategies in transcript
Teacher B/master	Forethought/ERT goals	The pedagogical goal for ERT was the same as that in classroom-based teaching. The personal goal was to supervise students consistently and constantly. Attention should be paid to keeping in good physical condition.
	Forethought/motivation for ERT	It was recommended to speak to peers who also taught ERT. We needed to practice beforehand to encourage using the tools.
	Performance/self-control in ERT	It was important to monitor students' progression in class by nominating students, sending out pop quizzes or assigning risks to the ERT tasks. A close look at the questions raised by students in the chat box was important.
	Performance/self-observation in ERT	A timer or a close look at the clock on the screen was used to manage class time. We needed to pay attention to the time assigned for students to think.
	Self-reflection/self-judgment from the ERT class	ERT was not easy at the beginning, but the most important thing was to familiarise ourselves with the tools, particularly rehearsing and watching screen recordings.
	Self-reflection/self-reaction from the ERT class	Teachers are mostly not internet influencers, so we needed to focus more on teaching and students. Rehearsing beforehand and watching screen-recordings after ERT were extremely important.
Teacher C/master	Forethought/ERT goals	I set the pedagogical goal to finish the class on time. I set specific goals for each teaching step.
	Forethought/motivation for ERT	Motivation is no longer a bonus or a problem for a teacher of my age. I motivated myself by considering that it is time-saving to do ERT.
	Performance/self-control in ERT	I had eyewear to protect my eyes and to see the questions in the chat box clearly. I asked students to check in pairs so I could monitor them.
	Performance/self-observation in ERT	Technically, I taught the class strictly to my lesson plan and checked the progression written in my notebook.
	Self-reflection/self-judgment from the ERT class	Rehearsing the operation of Tencent Meeting was extremely important, especially at the beginning of the ERT.
	Self-reflection/self-reaction from the ERT class	I paid attention to my progression, whether it was slow or fast, by watching the recording later.

Appendix B

Frequently-mentioned words (from transcript of the interview with Teacher B, who was at master level).

	Forethought phase	Frequency of frequently mentioned words/terms (separated by semi-colon)
ERT goals	Do you have goals for the class, be they pedagogical goals or personal goals?	'Same goal' 0.87; 'emergency' 0.78; 'technical expertise' 0.71; 'uncertain about progression' 0.66; 'supervising students' 0.64
	How will you accomplish the goals?	'Practice' 0.88; 'eyeglasses' 0.79; 'physical condition' 0.74
Motivation for ERT	Do you feel motivated to begin teaching English in the class?	'Not very' 0.77; 'temporary' 0.74; 'not an internet influencer type' 0.56
	Do you have any other ways to prepare before this class to motivate you to teach?	'Talk with peers' 0.78; 'practice beforehand' 0.75; 'my daughter's help' 0.45
Performance phase		
Self-control in ERT	In this part of the class, did any problems occur, be they related to teaching, computer or anything else?	'Responding to questions' 88; 'chat box' 0.87; 'late-comers' 0.84; 'difficult to monitor' 0.78; 'no face shows up' 0.62; 'old problems' 0.61
	How did you cope with them?	'Nominating students' 0.96; 'sending out quizzes' 0.89; 'assigning risks' 0.84[a]
	How do you think you focused on the class? Did you lose control due to the problems?	'Pretty well' 0.92; 'eyes hurt' 0.89; 'wore eyeglasses' 0.88; 'took necessary breaks' 0.85
Self-observation in ERT	Did you notice your lesson progression, such as time, interaction with students?	'Lesson plan' 0.95; 'strict time online' 0.89; 'chat box' 0.88
	Did you do any other things to help your class continue in an effective way?	'Played video audio' 0.78; 'thinking time' 0.70
Self-reflection phase		
Self-judgment from the ERT class	Did you unsuccessfully cope with any problems?	'Now yes' 0.79; 'Tencent Meeting' 0.78
	How do you rate your class from 1 to 10?	'Chat box' 0.88; 'camera' 0.78; 'internet influencer' 0.68; 'good' 0.66
	Do you think this reflection could help your next class?	'No idea' 0.78; 'beyond control' 0.71
	Did you feel satisfied with your teaching in this class?	'Technology issue' 0.69
Self-reaction from the ERT class	Did you believe you were motivated to teach? In what ways?	'Like students' 0.87; 'convenient' 0.65
		'Need to improve' 0.78; 'learn techniques' 0.82

(continued)

	Forethought phase	Frequency of frequently mentioned words/terms (separated by semi-colon)
	Did you believe you performed well in coping with the problems regarding teaching and students' learning?	
	Did you believe you attained your goals set before the class?	'Much yes' 0.85; 'the same' 0.77; 'uncertain' 0.88

[a]Due to the time limit in the performance phase, the interview transcript from this was shorter in this phase than it was for the other two phases. Hence, the term frequency was relatively larger.

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