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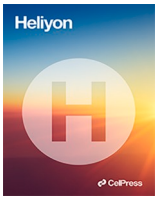

Research article

Effects of pedagogical intervention on Chinese EFL learners' use of motivational regulation strategies and oral English proficiency improvement

Ruyu Yan [a,b], Bing Liu [a,*], Lawrence Jun Zhang [b]

[a] College of Foreign Languages, Taiyuan University of Technology, Taiyuan, China
[b] Faculty of Education and Social Work, University of Auckland, Auckland, New Zealand

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ABSTRACT

This study investigated the role of motivational regulation strategies (MRSs) in English as a foreign language (EFL) pedagogy, with a focus on Chinese university students. While prior research has explored MRSs, their specific impact on the oral proficiency of Chinese EFL learners remains under-examined. This mixed-methods research offers empirical insights, advocating for the integration of MRSs into EFL instruction to bolster students' oral proficiency. The study is bifurcated, with the first phase dedicated to cataloging MRSs' usage among Chinese university students and crafting the Speaking Strategies for Motivational Regulation Questionnaire (SSMRQ). This initial phase engaged 171 EFL students from a northern Chinese "211 project" university, employing convenience sampling. Factor analysis of participant responses culminated in a 15-item SSMRQ, spanning five dimensions: Environment Structuring (ES), Mastery Self-Talk (MST), Self-Consequating (SC), Self-Oriented Performance Self-Talk (SPST), and Externally-Oriented Performance Self-Talk (EPST). The second phase assessed the efficacy of MRSs-oriented instruction on student application of MRSs and oral English proficiency. This quasi-experimental study involved 22 consenting second-year English majors from the participating university. Data collection instruments encompassed the SSMRQ, oral English proficiency tasks, reflective journals, and semi-structured interviews. The instructional intervention spanned four weekly 30-min sessions, targeting the five MRSs' dimensions and offering feedback on oral performance. Assessments were conducted pre- and post-intervention using the SSMRQ, oral tasks, and reflective journals. Six participants, selected based on their oral English performance, were interviewed in-depth. Results suggest that the instructional intervention had a significant effect on the students' use of MRSs and their oral English proficiency. The study offers pedagogical insights into EFL speaking instruction in the higher education context, underscoring the importance of personalized teaching strategies tailored to individual learner needs. Collectively, this research introduces the SSMRQ and elucidates the pedagogical merits of MRSs-based instruction on oral English proficiency, establishing an empirical base for subsequent inquiry and pedagogical advancement in language education.

* Corresponding author. College of Foreign Languages, Taiyuan University of Technology, Taiyuan City, Shanxi Province, China.
E-mail address: liubing@tyut.edu.cn (B. Liu).

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1. Introduction

Oral English proficiency remains a pivotal area for improvement among Chinese EFL learners across the spectrum of English language skills. During the primary education stage, it is evident that there is a lack of oral English learning environments and qualified educators in many regions, thereby restricting students' opportunities from both in-class and extracurricular practice. This shortage continues into the tertiary education level, where institutions need to offer dedicated courses for oral English proficiency and effective assessment mechanisms to evaluate students' oral English abilities. Learners often encounter significant challenges in developing diverse learning skills within such environments, particularly in oral English. Research conducted on a corpus of Chinese learners' spoken English has revealed that the features of word chunk utilization, discourse structure, and conversation management strategies in college students' spoken English differ significantly from that of native speakers; the forms and strategies of interactive expressions are relatively homogeneous, and the use of recurrent word chunks for implementing discourse functions is seriously lacking [1,2].

As China has been increasingly integrated into the global community, international economic, trade, and cultural exchanges have become integral to the national development. Consequently, the demand for proficient foreign language talent has escalated significantly. Given the status of English as a global lingua franca, it is imperative to leverage this language to articulate China's narrative and amplify its voice, thereby enhancing the nation's international communicative capacity. In this context, the value of oral English proficiency is significant for China's current economic and cultural endeavors, highlighting the importance of strengthening oral English instruction. As the primary institution for nurturing elite English communicative talents, universities are responsible for improving oral English pedagogy. Nonetheless, the prevailing conditions of oral English instruction within Chinese universities are far from satisfactory, with students frequently demonstrating inadequate oral English skills [3].

Motivational regulation strategies (MRSs), integral to the Self-Regulated Learning (SRL) model [4], pertain to the systematic processes individuals engage in to manage their learning motivation and strive to maintain or enhance their competency levels through strategic utilization of knowledge and skills [5]. Extensive empirical research has highlighted the pervasive impact of MRSs on students' choices, efforts, cognitive engagement, and academic performance across diverse domains, such as psychology, mathematics, and native language literacy [6–9]. Prior studies have demonstrated that MRSs significantly influence students' ability to overcome obstacles and sustain or intensify their learning volition [10,11]. In this context, MRSs can moderate the utilization of other learning strategies, including cognitive and metacognitive approaches, which are intricately linked to learners' performance in second-language acquisition [12]. Nonetheless, the application of MRSs in a second-language context has received limited attention [13,14]. Learners often face significant challenges in second language acquisition, particularly in developing skills such as spoken English proficiency. In specific learning environments, a lack of input or output opportunities can exacerbate the difficulty of language learning, thereby requiring increased efforts from learners [15]. Given these challenges, Chinese EFL learners must utilize cognitive and metacognitive strategies to attain learning goals and regulate negative emotions to maintain learning momentum. Therefore, a further examination of the role of MRSs in L2 speaking is imperative, necessitating additional empirical research to comprehend how these strategies influence students' proficiency in spoken English.

In light of these considerations, it is imperative to examine the MRSs employed by Chinese university EFL learners during the oral English learning process. Enhancing their awareness and adeptness in utilizing various strategies can lead to more proactive and efficacious oral English acquisition. Therefore, through pedagogical intervention, this study adopted a mixed-methods approach to explore the role of motivational regulation strategies in influencing the oral English output of Chinese university EFL learners based on the development and validation of an investigative tool, the Speaking Strategies for Motivational Regulation Questionnaire (SSMRQ), to provide innovative ideas and enhance the effectiveness of teaching and learning for teaching English as a foreign language in Chinese universities.

2. Literature review

2.1. Effects of motivational regulation strategies on academic performance

MRSs can be defined as various actions or strategies that students use to maintain or increase effort or persistence in a given academic task [8]. Researchers have widely recognized that MRSs can profoundly influence students' academic choices, effort, cognitive engagement, and overall performance across various disciplines [6–9]. Zimmerman [16] elaborated on the advantages of high motivation and its positive effects on students' self-regulated learning, which can be concluded as the following four aspects: firstly, high motivation enhances students' engagement with learning processes and outcomes. Students with higher self-feedback activity will likely obtain more learning effectiveness. Moreover, motivated students tend to opt for challenging tasks, like voluntarily practicing a foreign language. Additionally, heightened motivation drives increased effort, exemplified by striving for top grades. Furthermore, it fosters persistence, particularly in mastering intricate skills.

Recognizing the crucial role of motivational regulation, some scholars have delved into studying students' utilization of these strategies, yielding fruitful outcomes. Their work collectively illustrates the contribution of MRSs to students' academic learning and accomplishments. Wolters [7] investigated different MRSs among university students, finding that those employing intrinsic forms of regulation tended to utilize cognitive strategies more extensively. He observed that only performance self-talk, an extrinsic motivational strategy, significantly predicted students' course scores. Subsequently, Wolters (1999) expanded his research to adolescents and proposed a taxonomy of MRSs and their substantial impact on classroom performance.

Other researchers have explored various MRSs, such as volitional control and interest enhancement, or expanded the categories of these strategies across different learning environments. McCann and Garcia [17] identified volitional control as a significant predictor

of specific learning strategies but not course grades. Sansone et al. [18] focused on interest enhancement strategies among university students, noting their positive influence on persistence. Schwinger and his co-researchers (2009) adapted Wolter's questionnaire for German contexts, revealing an indirect relationship between MRSs and academic performance, mediated by students' learning effort and associated with better exam scores.

Despite a growing body of research demonstrating the effects of MRSs on academic performance, the results of different empirical studies are inconsistent or inconclusive. Wolters [8] found a significant effect of MRSs on classroom performance in general learning contexts. Conversely, Pintrich and De Groot (1990) reported that intrinsic MRSs, such as interest enhancement, did not directly influence academic performance. However, Schwinger and Stiensmeier Pelster [19] found that mastery self-talk strategies and short-term goal setting indirectly affected test scores in German classrooms. A study by Seker [20] found that Turkish students' internal motivational strategies were positively associated with academic performance, while external motivational strategies were negatively associated with academic performance. Zimmerman and Martinez-Pons' (1986) study showed that unlike other cognitive strategies (e.g., rehearsal and memory, organization and transformation), MRSs could not differentiate between high and low-level learners. Although these findings suggest a close association between motivational regulation and students' willingness to invest effort in academic tasks, research in this area is still in its early stages. There needs to be more consistency regarding the relationship between motivational regulation, other learning strategies, and academic performance.

2.2. Motivational regulation strategies in EFL

Motivation is of vital significance in second language acquisition (SLA); as Dornyei [21] presented, it serves as the primary impetus for initiating second language (L2) learning and the driving force to sustain the often lengthy and tedious process. All other factors in SLA presuppose some degree of motivation. Without sufficient motivation, even individuals with exceptional abilities cannot achieve long-term goals, and neither an appropriate curriculum nor excellent teaching alone can ensure student success. Conversely, high motivation can compensate for significant deficiencies in language aptitude and learning conditions. The study of MRSs in L2 learning is a recent research area that builds on learning motivation research and aims to offer methodological support for L2 teaching practices [22,23].

In the context of EFL, there has been an increasing interest in examining the effects of MRSs on students' performance. Zhong's [24] study indicates that actively employing MRSs can enhance EFL learners' academic performance. Li [25] examined the relationship between the MRSs and EFL learners' achievement and found that the utilization of MRSs can predict academic scores. However, their predictive power varies among distinct strategies; the low correlation coefficient between MRSs and English achievement suggests that, while they can predict performance, their predictive power is limited. Other researchers also investigated the use of MRSs among learners with different levels of English and reported that high-level English students are more proficient in using MRSs to sustain and promote motivation compared to low-level students [26,27].

In addition, EFL researchers not only studied the effect of MRSs on general English performance but also examined the effect of MRSs on specific English skills (e.g., writing, speaking) proficiency. For instance, Teng and Zhang [28] revealed a direct effect of MRSs on EFL students' writing quality, albeit with a small effect size. In an empirical study by Teng and her co-researchers [29], high writing proficiency students reported greater use of mastery and performance self-talk, interest enhancement, and emotional control than low writing proficiency students; it also revealed that the high writing-proficiency group exhibited greater maturity and flexibility in MRSs, such as interest enhancement and mastery self-talk; while the low writing-proficiency group, in contrast, demonstrated limited understanding and utilization of these strategies. Uztosun [30] found that only the regulation of affect significantly predicts EFL speaking competence. Despite variations in findings, these studies in the context of EFL collectively suggest that MRSs can impact learners' willingness to sustain or increase learning effort while indicating that MRSs, either entirely or partially, predict students' academic performance.

However, given that the research on the subject is in its nascent stages, the application of MRSs within second-language contexts remains relatively understudied [13]. Previous research in foreign language settings has primarily focused on the conceptualization of SRL and general foreign language achievement (e.g., Ref. [20,31,32]). There is a lack of sufficient instruments to measure SRL in EFL settings, particularly concerning specific aspects of the target language ([33]). Given the intricate nature of language skills, further investigation is warranted to explore whether SRL influences the development of specific language abilities such as reading, writing, listening, and speaking [34,35].

Upon conducting a review and analysis of relevant literature, it becomes clear that increased attention should be directed towards the application of MRSs in the context of second language acquisition; the research on the effects of MRSs on oral English proficiency still needs further investigation. Consequently, this study concentrates on the effects of the MRSs-based pedagogical intervention on the EFL learners' use of MRSs and their oral English proficiency. We hypothesized that the MRSs-based pedagogical intervention would enhance students' awareness and proficiency in employing various MRSs. This improvement is expected to lead to more effective self-regulation of the oral English learning process and an overall increase in the quality of oral English proficiency. This, in turn, can facilitate the achievement of positive and efficacious oral English instruction. In sum, the present study was directed at addressing two research questions.

1). Does the MRSs-based pedagogical intervention impact the intervention class participants' use of MRSs? If so, how do the participants change their use of MRSs?
2). Do the participants in the intervention class exhibit any improvement in their oral English proficiency after the MRSs-based pedagogical intervention?

3. Methodology

The current study is composed of two phases. The preliminary phase sought to validate the quantitative instrument utilized in the main study and to assess the prevailing use of MRSs among EFL students. Drawing from Wolters' [36] model of MRSs, Teng and Zhang's classification of MRSs within the context of second language writing, and the scale items design of the Motivated Strategies for Learning Questionnaire (MSLQ) by Pintrich [32], this phase focused on developing and validating the SSMRQ. This instrument was created to evaluate EFL learners' self-reported use of MRSs in their oral English output. The pilot version, consisting of six dimensions and 34 items, was administered to 171 EFL students. The data collected were subjected to factor analysis, leading to the final version of the SSMRQ, which includes five dimensions and 15 items.

The second phase, the core of this empirical inquiry, aimed to ascertain the impact of MRSs-based instructional intervention on the students' self-reported use of MRSs and their proficiency in oral English output. A quasi-experimental design was implemented within an EFL class comprising 22 students. The MRSs-based instructional approach consisted of four weekly sessions, each lasting approximately 30 min. The first session introduced the five dimensions of MRSs, which were identified in the preliminary phase as crucial for EFL students' oral English output. The subsequent sessions provided feedback on students' self-reported MRSs use, addressed challenges or experiences during oral English tasks, and offered guidance on how to refine their MRSs application and enhance their oral proficiency.

At this stage, quantitative data were gathered from both pre- and post-test questionnaires, as well as from six oral English output assessments. Qualitative data were collected through reflective journals and semi-structured interviews. Participants were prompted to keep reflective journals subsequent to each oral English task during the three post-intervention tests. Based on the performance trends in the six oral English output tests, six students from the intervention group were selected for a 20–30 min semi-structured interview to provide detailed insights into the effects of the instructional intervention on their oral English proficiency. Table 1 illustrates the overview of this whole study design.

3.1. Participants

This study recruited a total of 193 English-major students on a voluntary basis from a "211 Project" university in Northern China in two phases. Table 2 shows detailed information on the participants in each stage. All participants in this study were informed that all data collected would be used for research study purposes only and that the research participants' personal information would be kept strictly confidential and would not be disclosed to third parties.

In Phase One, a convenience sample of 171 English major students from a selected university in Northern China participated voluntarily in developing and revising the SSMRQ and assessing its validity and reliability. Convenience sampling was chosen due to its efficiency in collecting quantitative data despite criticisms of potential population representation issues [37]. However, this concern may have been mitigated in our study because Chinese university students with the same major typically share similar educational backgrounds and ages. Given that non-English majors typically lack dedicated spoken English courses and rarely practice spoken English, except for participation in competitions or tests like IELTS and TOEFL, we opted to involve only English majors in the pilot questionnaire. The participants in this questionnaire comprised English majors from freshmen to senior students, with 3.53 % (n = 6) males and 96.49 % (n = 165) females.

In Phase Two, a group of 22 English-major students was recruited from the university as the intervention class. These students were second-year English majors with a certain level of linguistic knowledge and English language abilities, particularly in oral English. This selection aimed to facilitate the practical teaching intervention and ensure its smooth implementation. Before the pedagogical intervention, all participants completed the formal version of SSMPQ and three oral English tasks to assess their reported use of MRSs and oral English proficiency, serving as the pre-test data. Subsequently, the entire class undertook three additional oral English tasks, recorded three reflective journals after each task, and completed the questionnaire.

During Phase Two, six students from the intervention class were invited to participate in semi-structured interviews. Interview selection criteria were determined based on significant characteristics derived from pre-test and post-test questionnaires and changes in oral English proficiency trends. Six intervention group members engaged in the semi-structured interviews following these criteria and their voluntary agreement.

3.2. Instruments

3.2.1. SSMRQ

The pilot version of SSMRQ was designed based on Wolters' [36] model of MRSs and Teng and Zhang's [28] dimensional classification of MRSs in second language writing, drawing on Pintrich, P. R. et al.'s (1990) Motivated Strategies for Learning Questionnaire (MSLQ) scale items. The authors briefed participants on the purpose of the study and informed them of their right to withdraw from the study at any time during or after data collection. Participants were also informed that all personal information and data from the completed questionnaires would not be disclosed to third parties and would only be used for academic research.

The pilot version integrated four overlapping dimensions from Wolters' and Teng and Zhang's classifications with two additional unique classifications. The final pilot questionnaire encompassed six dimensions: interest enhancement, performance self-talk, mastery self-talk, emotional control, environment structuring, and self-consequating, comprising 34 items. This instrument utilizes a 5-point Likert scale, anchored by 1 (Not at all true of me) to 5 (Very true of me), and includes two reverse-scored items. The authors translated the questionnaire from English to Chinese to facilitate participant comprehension and ensure data accuracy. We hosted it on the

Table 1
An overview of the research design.

Phase		Research Objectives	Instruments	Participants
Phase One		Develop and validate the instrument	Speaking Strategies for Motivational Regulation Questionnaire (SSMRQ)	English majors (n = 171)
Main Study	Phase Two	Implement the MRSs-based pedagogical intervention and examine its effectiveness	Pre- and post-questionnaires (SSMRQ, formal version) Oral English tasks (pre- and post-tests, six in all) MRSs-based pedagogical intervention (four sessions) Reflective journals (three times in post-tests)	Intervention class (n = 22)
			Semi-structured interviews	Six selected students (Intervention class)

Table 2
An overview of participant information.

Phases		Objectives	Total *N*	Major	Gender	Age *M*
					N Female (%)	
Phase One		Instrument development and validation	171	English	165 (96.49 %)	19.99
Main Study	Phase Two	Implementation of the MRSs-based pedagogical intervention	22	English	19 (86.36 %)	19.09
		Investigation of MRSs use and oral English proficiency				
		Case study	6		5 (83.33 %)	19.12

online platform www.WJX.cn and shared the link with English majors. After excluding invalid questionnaires, we collected 171 valid questionnaires. On average, participants completed the questionnaire in approximately 5 min.

The authors conducted a factor analysis on the 171 answered pilot questionnaires, deleted the items with a common score below 0.4 and those with serious deviations in the correspondence between the analyzed items and the factors, and re-adjusted the formal questionnaire to include five dimensions: environment structuring (ES), mastery self-talk (MST), self-consequating (SC), self-oriented performance self-talk (SPST), and externally-oriented performance self-talk (EPST), with a total of 15 items. The overall reliability coefficient of the formal questionnaire is $\alpha = 0.868$, and the reliability coefficients of each dimension are shown in Table 3. The potential structure of the questionnaire was examined by exploratory factor analysis, and the results showed that the KMO value = 0.839, Bartlett's spherical test value = 1007.151 ($df = 151$, $p = 0.000$), and Bartlett's spherical test chi-square distribution reached a significant level, indicating that the questionnaire items have common factors and are suitable for factor analysis. The SSMRQ's internal consistency and stability suggest high reliability and validity.

3.2.2. Pedagogical intervention

The MRSs-based pedagogical intervention comprised four well-designed sessions, which were conducted through WeChat, necessitated by the shift to online courses due to the COVID-19 pandemic. To ensure the efficacy of the practical teaching instruction, we sought collaboration with the teacher responsible for General English instruction in the intervention class. With her approval and active support, the authors smoothly implemented the pedagogical intervention within the intervention class.

The pedagogical intervention unfolded in two distinct phases. The inaugural session was dedicated to acquainting the members of the intervention class with the essence of the five MRSs and elucidating their practical application in the process of oral English output. To optimize the teaching process, the authors crafted a syllabus in advance, disseminating it to the students via a dedicated WeChat group. This pre-emptive measure allowed the students to preview and internalize the core content of the pedagogical intervention prior to the session. Additionally, the authors prepared and shared introductory and instructional videos via the same platform, affording all participants in the intervention group the flexibility to access and revisit the teaching materials at their convenience.

After the introductory session, the three instructional sessions were tailored to provide targeted feedback on students' oral English output and reflective journal entries. The authors conducted a systematic analysis of the challenges encountered by students and their use of MRSs throughout the oral English output process. Drawing from these observations, we provided personalized recommendations to guide students in refining their employment of diverse MRSs and enhancing their oral English proficiency. This iterative process of feedback and guidance was instrumental in fostering a dynamic learning environment conducive to continually improving students' oral English proficiency.

Table 3
Results of EFA and reliabilities of the SSMRQ.

Dimensions	Sample Items	Items	Factor Loading					α
			1	2	3	4	5	
ES	'I will choose a suitable environment for my oral English learning so that I can concentrate on my practice.'	ES 1	0.792					0.797
		ES 2	0.769					
		ES 3	0.743					
		ES 4	0.675					
		ES 5	0.668					
		ES 6	0.609					
MST	'I will tell myself that I need to study hard to improve my oral English.'	MST 1		0.854				0.835
		MST 2		0.811				
		MST 3		0.743				
SC	'After learning spoken English for a while, if I get better, I will reward myself.'	SC 1			0.857			0.759
		SC 2			0.835			
SPST	'In the process of oral English learning, once I relax, I will warn myself that my performance will decline.'	SPST 1				0.843		0.730
		SPST 2				0.813		
EPST	'I hope my oral English performance can be praised by teachers, classmates and relatives and friends.'	EPST 1					0.837	0.804
		EPST 2					0.711	

3.2.3. Oral English tasks

The authors collaborated with the teacher of the intervention class to select oral English tasks according to course contents. This approach allowed students to practice their oral English skills while studying the course material. Before and after the pedagogical intervention, the teachers assigned three oral English output assignments. Students were tasked with recording at least 2 min of oral English for three assignments submitted via the class WeChat group.

Using the online audio-to-text tool, the authors transcribed the intervention class students' audio recordings and cross-checked the text against the original recordings. Upon confirming transcription accuracy, the main author enlisted a second-year postgraduate student as a co-assessor to evaluate the quality of the intervention class' oral English output. Ratings were based on four dimensions: complexity, accuracy, fluency, and overall rating, following the IELTS speaking test marking criteria. This approach aimed to mitigate potential bias resulting from the authors' subjectivity. The content of the students' oral English output underwent independent rating by the two assessors (out of 100). A Pearson correlation coefficient test indicated a high correlation coefficient between the independent ratings ($r = 0.88$, $p = 0.00$). Any discrepancies in scores were resolved through discussion, and the mean of the two assessors' scores constituted the final score for the participants' oral English output.

3.2.4. Reflective journals

Following the pedagogical intervention, participants were tasked with completing three reflective audio logs in which they detailed their use of MRSs and any challenges they faced before, during, and after the oral English output processes. Reflective journals can be considered oral diaries, a valuable tool for assessing students' self-regulated learning, and an effective approach to gauge and guide self-regulation toward a desired outcome [38]. Numerous researchers have indicated that diaries can promote self-monitoring, a key component of effective self-regulated learning (e.g., Ref. [39]). In this study, participants documented their reflective journals immediately after each oral English task in the three post-tests. Consequently, reflective journals serve as a means to measure a series of consecutive states. This sequential measurement facilitates the capture of change, particularly in the short term. Similar to diaries, reflective journals can also identify subtle improvements in learning, which is essential for comprehending individual learning processes. Since journal entries were made in response to real learning scenarios, their ecological validity is expected to be high [38].

The quality of reflective journals is contingent upon several factors: the precision of the self-reported contents [40], the degree of participants' compliance [38], and the robustness of students' motivation [41]. Therefore, to ensure the validity of reflective journals, both the authors and the assisting teacher provided clear explanations to the intervention group students regarding the purpose of the reflective log, the completion method, and the task process prior to the assignment.

In order to enable the intervention group members to talk more clearly and fluently about their reflections on the completion of the oral English tasks, the reflective journals were recorded in Chinese by the intervention group members. These recordings were either made as a follow-up to the completion of the oral English tasks or as separate recordings lasting 1–2 min each.

3.2.5. Semi-structured interviews

Although we gathered considerable data from the intervention group's reflective journals, the semi-structured interviews enabled us to delve deeper into their use of MRSs in oral English output. The face-to-face interaction between the interviewer and participants fostered emotional communication and promoted expression. The interviews were designed to ensure data integrity, uncover hidden connotations within the quantitative data, and complement any gaps in the data collected. As Creswell [42] outlined, purposive sampling guided the recruitment process.

Based on the intervention class members' six oral English output scores, the authors selected six interviewees from different oral English output scoring trends, which are representative and special. In this selection process, we conducted purposive sampling that can afford opportunities to "learn the most", given the research question at hand [43,44]. Among them, two interviewees showed an increasing trend in their oral English scores, which is representative of the changes in oral English scores of most of the intervention class members; another two interviewees showed a flat trend in their oral English scores; another one interviewee showed a decreasing and then increasing trend in her oral English scores; the last one showed an increasing and then decreasing trend in his oral English scores; the latter three trends of oral English output are different from the overall trend of the intervention class and are special. We believe that it is worthwhile to explore the reasons for them.

The authors designed four questions to conduct the semi-structured interviews with the research participants, as outlined below.

1) Before watching this video, had you ever used the MRSs presented in the video in your oral learning process? Can you give me an example?
2) Did you learn anything after watching the video, or do you have any thoughts to share with me?
3) After watching the video, do you think you have changed the frequency or scenarios in which you use MRSs? If so, can you give me some examples?
4) Do you think that the MRSs introduced in the video have helped you in your oral English output? Can you give me an example?

In addition to these four questions, the authors posed more specific and pertinent inquiries regarding each interviewee's oral

English proficiency ratings and the results of the pre- and post-questionnaire assessments. It aims to offer a more dependable and accurate depiction of students' use of MRSs in their oral English and elucidate the concealed data's underlying causes. The interviews with students from the intervention class were carried out after the formal post-questionnaire, and with the interviewees' consent, the authors meticulously took notes and recorded audio throughout the sessions.

3.3. Data collection and analysis

This study compiled both quantitative and qualitative data. Quantitative data were obtained via pre- and post-test questionnaires, as well as oral English proficiency scores, whereas qualitative data stemmed from participants' reflective journals and interviews. Utilizing multiple data sources facilitates "triangulation" of evidence, thereby enhancing the reliability of the findings [45,46]. The quantitative data were analyzed using SPSS 23.0 to generate descriptive statistics. A paired samples *t*-test was conducted to compare differences in students' utilization of MRSs, as indicated in the questionnaires administered before and after the intervention. Students' oral English output quality before and after the pedagogical intervention was evaluated through repeated measures ANOVA.

Qualitative data from reflective journals and interviews were transcribed and analyzed. During this process, the authors conducted thematic analysis to explore the participants' perception of MRSs-based teaching intervention and the practical situations of oral English output. Thematic analysis offers a structured approach to identifying, analyzing, and reporting recurrent patterns (termed themes) in the data [47,48]. Throughout this process, the researcher scrutinized the data for prevalent themes and concepts [49,50]. The authors coded and thematically analyzed the intervention class' reflective journals through Microsoft Excel according to the six steps presented by Braun and Clarke [47].

4. Results

4.1. Questionnaires

Paired samples t-tests were conducted on the mean scores of the pre-test and post-test questionnaires for members of the intervention class, and the results showed that there was a significant difference between the pre-test results and post-test results of the SSMRQ ($t = -3.87$, $df = 14$, $p < 0.01$): the pre-test results scores of the intervention class members were significantly lower than the post-test results scores.

It indicates that the students' frequency and awareness of the use of MRSs increased as a result of experiencing the pedagogical intervention and that the practical teaching instruction for the intervention class members had a significant effect (see Table 4).

The pre-test and post-test questionnaire data of the intervention class members were divided according to dimensions, after which a paired samples *t*-test was conducted based on the mean of the question items included in each dimension. The results showed that there was a significant difference between the pre-test and post-test data of the intervention class members in the mastery self-talk dimension ($t = -2.463$, $df = 65$, $p < 0.05$); the pre-test data of the remaining four dimensions were not significantly different, but the mean of each dimension in the pre-test was lower than that of each dimension in the post-test (see Tables 5 and 6).

Table 4
Comparison of pre- and post-tests of formal questionnaire (n = 15).

	Pre-test		Post-test		MD	t(14)
	M	SD	M	SD		
Average score of the items	3.43	0.321	3.62	0.319	−0.19	−3.87[a]

[a] $p < 0.01$.

Table 5
Descriptive statistics and results of paired samples t-tests of MRSs at the pre- and post-tests in the intervention group.

MRSs Dimensions	Tests	M	N	SD	*t*	Sig. (two-tailed)
MST	Pre-test	3.29	66	1.02	−2.46	0.016[a]
	Post-test	3.68	66	0.90		
SC	Pre-test	3.43	44	1.00	−1.39	0.172
	Post-test	3.77	44	1.03		
SPST	Pre-test	3.95	44	0.94	−0.71	0.480
	Post-test	4.09	44	0.80		
ES	Pre-test	3.29	132	0.99	−0.64	0.521
	Post-test	3.36	132	0.92		
EPST	Pre-test	3.55	44	0.93	−0.73	0.472
	Post-test	3.66	44	0.83		

[a] $p < 0.05$.

Table 6
Comparison of pre- and post-tests of mastery self-talk strategy(n = 66).

	Pre-test		Post-test		MD	t(65)
	M	SD	M	SD		
Average score of the items	3.29	1.02	3.68	0.90	−0.39	−2.46[a]

[a] $p < 0.05$.

It indicates that members of the intervention class became more aware of the use of mastery self-talk after the instructional intervention. The paired-sample *t*-test descriptive statistics table shows that the means for each dimension in the pre-test were lower than that in the post-test, which means that the students' frequency and awareness of using each dimension of MRSs increased after the practical teaching instruction. Although there were differences in the use of strategies in the four dimensions in the pre-test and post-test, the differences did not meet the statistical criteria for statistical significance, except the mastery self-talk dimension. However, this does not mean that the use of strategies in the remaining four dimensions before and after the intervention is not descriptive, and the actual changes cannot be explained based on quantitative data alone. Therefore, the authors collected two qualitative data, the reflective journals, and the semi-structured interviews, in order to understand the changes in the MRSs of the intervention class members during the whole study and to help the authors interpret the use of MRSs in each dimension during the actual oral English output of the intervention class members.

4.2. Intervention class' Oral English Output Scores

The results of a paired samples *t*-test showed that there was a significant difference in the oral English output scores of the intervention class students before and after the pedagogical intervention ($t = -4.98$, $df = 65$, $p < 0.01$): the mean of the three oral English output scores of the intervention class students before the pedagogical intervention was significantly lower than the mean of the three after the pedagogical intervention. It indicates that the MRSs-based pedagogical intervention had a significant effect on the quality of the oral English output of the intervention class members (see Table 7).

Upon conducting a paired-sample *t*-test to compare the mean scores of participants' oral English output before and after the instructional intervention, the authors proceeded with a repeated-measures ANOVA on the six sets of oral English output scores. This analysis aimed to delve deeper into the trends of students' oral English proficiency prior to and following the MRSs-based instructional intervention. The findings indicated that the MRSs-based instructional intervention significantly impacted the oral English output ability of the students in the intervention class, as evidenced by a statistically significant result ($F(5, 105) = 6.85$, $p < 0.05$). Repeated comparisons showed that the mean of the first oral English output scores after the instructional intervention was significantly higher than the third oral English output scores before the instructional intervention (MD = 2.32). However, there was no significant difference between the three oral English output scores before the instructional intervention and no significant difference between the three oral English output scores after the instructional intervention (see Table 8). Overall, the participants' oral English output scores improved gradually after the instructional intervention of the MRSs (see Fig. 1).

4.3. Reflective journals

Table 9 outlines the results of the thematic analysis of the participants' reflective journals after MRSs-based pedagogical intervention. We used Microsoft Excel to code and tag the transcribed content of 22 intervention class students' reflective journal entries to complete the six steps in the thematic analysis [51]. Empirical studies have demonstrated that Excel is functional enough to analyze qualitative data and is a cost-effective and reliable analytical tool (e.g., Ref. [52]). The results broadly reflect the participants' perceived difficulties in oral English output, reported use of MRSs, and this study's teaching implications.

As can be seen in Fig. 2, the relationship model among the three themes appears. It represents that the participants' perceived difficulties prompt the need for strategies to address them, and learners utilize various strategies to overcome their difficulties in oral English output. On the other hand, through the participants' reported barriers and use of MRSs, it can be summarized that teachers can integrate the study tasks with students' interests and life experiences to trigger their passion for improving their oral English proficiency. As demonstrated by the study of Uztosun, Skinner, and Cadorath [53], learning activities can be designed by taking into account each individual's views and perceptions, which will promote students' participation in the oral English tasks as students should be more willing to engage in the learning process when the activities are suited to their needs and desires. In summary, the model demonstrates that learners' difficulties in oral English production prompt them to use various MRSs. In turn, the effectiveness of these

Table 7
Comparison of oral English scores before and after pedagogical intervention(n = 66).

	Pre-tests		Post-tests		MD	t(14)
	M	SD	M	SD		
Average scores of oral English output	72.48	3.90	76.11	6.89	−3.62	−4.98[a]

[a] $p < 0.01$.

Table 8
Comparison of students' oral English output scores through time(n = 22).

	Pre1		Pre2		Pre3		Post1		Post2		Post3		*F* (5,105)	Repeated Contrasts
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD		
Average scores of oral English output	72.73	4.42	72.14	3.75	72.59	3.63	74.82	5.89	76.18	7.53	77.32	7.23	6.85[a]	Post1 > Pre3

[a] $p < 0.05$.

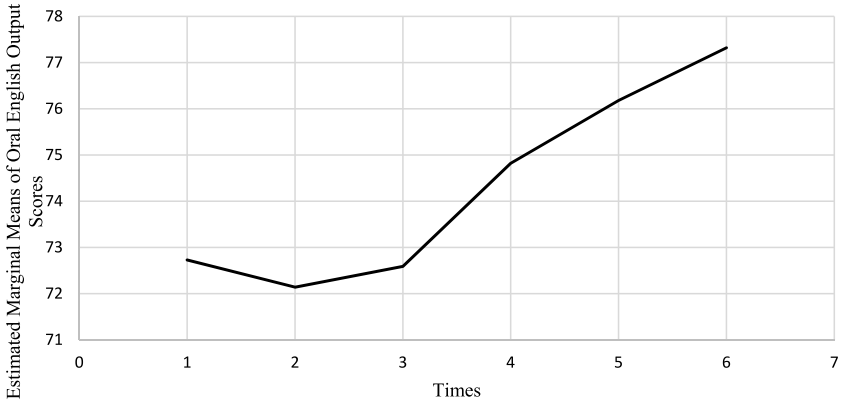

Fig. 1. Estimated marginal means of oral English output scores.

strategies in solving the difficulties reveals valuable pedagogical implications for teaching.

5. Discussion

5.1. The use of MRSs

The paired-sample *t*-test results from the pre and post-tests of the official questionnaire version, as detailed in section 4.1, indicated a significant increase in awareness and use of mastery self-talk strategies among intervention class members following the practical teaching intervention. However, no statistically significant differences were observed in the utilization of the other four dimensions. In order to provide a detailed description of the participants' use of MRSs in their oral English output after the pedagogical intervention, the authors transcribed and analyzed the reflective journals submitted by the intervention class members (see Table 9) and found that more than 70 % participants reported that they saw the oral English tasks as an opportunity to practice and exercise their oral English skills after the pedagogical intervention, rather than as tests and assignments. The mastery self-talk strategies emphasize the importance of developing a positive perception of the perceived importance of oral competence in the target language. Learners should find it valuable to develop their oral competence in the target language so that they are motivated to participate actively in the learning process ([33]).

The reported data clearly illustrates that participants utilizing mastery self-talk strategies experienced a cognitive shift towards more optimistic perceptions of their performance and task accomplishment in oral English. These findings align with Ames and Archer's research [54], which revealed that students who emphasized mastery in their learning exhibited more effective strategies and positive attitudes toward learning and attributed their success to effort.

While implementing self-consequating and environment structuring strategies was reported with slightly less frequency, both MRSs dimensions scored above the mean level on the response scale and illustrated an increasing trend after the MRSs-based pedagogical intervention. These findings align with prior research indicating that self-consequating and environment structuring strategies are employed less frequently compared to various other cognitive and metacognitive strategies examined; furthermore, early adolescents are inclined to employ self-consequating and environmental control techniques when faced with competing activities while attempting to complete homework assignments [8,55–57]. The self-consequating strategy reflected students' use of self-provided reinforcements (or punishments) for reaching specified goals necessary for the completion of the task [8].

This study's central focus of environment structuring strategies pertains to creating conducive environments for enhancing student concentration on oral English tasks and improving efficacy. Many participants actively sought environments conducive to focusing on the oral English output process, which contributed to higher oral English output proficiency and effectiveness. This outcome aligns with previous research findings. For instance, Ushioda's study [58] indicates that supportive learning environments bolster students' self-confidence and motivation, thereby reducing the likelihood of yielding their educational pursuits [59]. Furthermore, additional research has highlighted the vital importance of maintaining concentration and minimizing distractions for effective learning [60,61].

Table 9
Thematic analysis of reflective journals.

Theme	Definition	Sub-theme	Code	Examples
Difficulties in Oral English Output	This theme explores the objective and subjective factors reported by participants that affect their level of oral English production. Objective factors include environmental noise, limited opportunities for oral English practice, and lack of familiarity with tasks. Subjective factors relate to the participants' oral English proficiency, such as vocabulary, pronunciation, and logical expression skills.	Objective Factors	Noisy dormitory environment	"Noises from the next door could disturb me."
			Limited opportunities to speak English in daily life	"In addition to oral English classes, I hardly communicate in English."
			Unfamiliarity with task topics	"I still don't know enough about these topics, and I don't feel like I have anything to say."
			Insufficient understanding of the core question	"This assignment requires answering questions from a feminist and environmental critical perspective. But I do not have a deep understanding of these two topics, so it is very difficult to complete the task"
		Subjective Factors	Lack of oral English expression ability	"The main difficulty I encountered was that I did not know how to express myself fluently in English, and I was not able to organize words smoothly."
			Insufficient English vocabulary	"My difficulty is that my vocabulary is not enough and I can't find the right words to express my ideas."
			Inaccurate pronunciation	"I often worry that I will mispronounce or stutter."
			Oral English anxiety	"I often feel nervous in oral English output process."
			Need to improve logical expression ability	"I think the biggest difficulty for me is no longer just in oral English expression skills, but in logical expression ability, in whether I can express ideas logically or answer questions well."
Use of MRSs	This theme focuses on the specific use of various MRSs in the process of oral English output, as reported by participants. It delves into participants' understanding and application of different strategies after the MRSs-based teaching intervention.	MST	Emphasizing the improvement of oral English proficiency	"I pay great attention to the improvement of my oral English ability. I think oral English is an important part of English learning, so even if I don't want to practice oral English sometimes, I will tell myself that I must master this ability."
				"I think it is good to take part in some activities like English corner to improve my oral English proficiency."
		SPST	Concern about oral English scores	"I attach great importance to my grades, which makes me worry that my oral English task is not good enough."
			Repeated recording to achieve satisfactory results	"I tried to reduce my pronunciation errors and word mistakes so that I could record more fluently."
		ES	Find a quiet, study-conducive environment	"I chose to leave the dormitory and went outside to find a quiet place. I found a study room, where the study atmosphere was very strong, and I quickly entered the state of learning. I had to bravely go out of the comfort zone and study in a place with a strong learning atmosphere, so as to improve the learning efficiency as much as possible."
			Complete oral English tasks when in a good personal learning state	
		SC	Listen to the recording after completion	"In this oral English assignment, I used strategies of self-consequating. After answering the questions once, I rewarded myself by looking at my phone, taking a rest for a few minutes, and then I listened to the recording again to find out my problems and correct them."
			Check errors	
			Provide feedback	
			Reward	
		EPST	Concern about teacher's evaluation	"I always want to do a better assignment and give it to the teacher."
			Others' recognition for personal oral proficiency	"Given that I did make a fool of myself in front of others because of my lack of oral English, I have to improve it."
Pedagogical Implications	This theme focuses on the teaching insights gained from participants' feedback regarding oral task design and guiding students to complete oral tasks. It can help teachers understand students' actual situation when completing oral English tasks and convey practical teaching experiences to them.	Interest Integrated Tasks	Match task topics with personal interests	"I hope that in the future, I will focus more on combining the study tasks with my interests, not treating them as burdensome but finding points of interest and going deeper in the learning process."
		Connection between Tasks and Real Life	Associate personal life experiences, reading, or learning experiences to answer oral English tasks	"I have also combined this question with my own personal experience to give an example. This is helpful to complete this oral English task."
				"This assignment was closely related to real life, so I began describing it with my life experience. I found it very interesting to connect the learning task with real life to increase the learning process's fun."

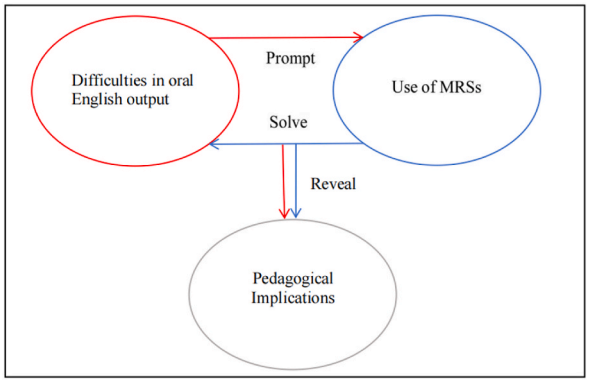

Fig. 2. Thematic model.

The slight disparity observed between the effectiveness of self-oriented performance self-talk and externally-oriented performance self-talk both before and after the intervention warrants examination. Upon amalgamating the findings from pre- and post-questionnaires with qualitative data analysis, the authors determined that participants generally emphasized their performance more. Specifically, mean scores for the self-oriented performance self-talk dimension increased from 3.95 to 4.09, while those for the externally-oriented performance self-talk dimension rose from 3.55 to 3.66. These scores surpassed those of the other four dimensions, signifying a pronounced emphasis on self-perception and achievement motivation. Moreover, nearly all interviewees expressed aspirations to excel in oral English output tasks and exhibit proficiency. Besides, the mean scores of self-oriented performance self-talk strategies are higher than those of externally-oriented performance self-talk strategies in both pre- and post-tests. It has been proposed that Chinese students place a greater emphasis on self-improvement and often set learning objectives [62]. Analysis of qualitative data suggests that focusing on self-oriented performance can assist students in concentrating on personal development and mitigating negative emotions associated with peer pressure. This, in turn, can foster the pursuit of learning goals. However, this does not imply that the importance of externally-oriented performance self-talk strategies should be overlooked. At the same time, it should be recognized that competitive settings can encourage performance goals [63]. Such findings underscore both self-talk strategies' enduring relevance and efficacy in fostering achievement-oriented mindsets among participants. Therefore, teachers should focus more on introducing self-oriented performance self-talk strategies supplemented by externally-oriented performance self-talk strategies in the classroom.

Overall, the above analysis of participants' reflective journals indicates that the MRSs-based pedagogical intervention positively affects EFL students' use of MRSs, and most of the intervention class students have developed a certain degree of cognitive maturity in selecting different MRSs in their oral English output process to enhance their oral English proficiency. The data collectively reveal that the MRSs-based pedagogical intervention successfully provides students with a comprehensive understanding of MRSs and increases their awareness of using the multi-dimensional MRSs during oral English learning.

5.2. Oral English proficiency

The results of the repeated measures of variance of the six oral English output scores of the intervention class indicate that the oral English output scores of the vast majority of the participants showed a significant trend of improvement after the instructional intervention on MRSs and that the oral English output scores of the participants gradually increased over time. This suggests that the pedagogical intervention about MRSs had a positive effect on the oral English proficiency of the intervention class members.

Quantitative data presented an overall upward trend; however, upon closer examination of individual participant scores, deviations from this pattern were observed. Therefore, the authors selected each two students (six in total) from three different performance trends as semi-structured interview participants according to the scores of the six oral English assignments of the intervention class members and analyzed their reflective journal recordings. The three trends are improvement, flatness, and fluctuation, among which the overall trend of the six oral English task scores of the two interviewees with an improvement trend is consistent with the situation presented in Fig. 1 Estimated Marginal Means of Oral English Output Scores. The students whose scores showed a flat and fluctuating trend for six times of oral English output were selected as the participants for semi-structured interviews because they did not conform to the overall score change trend of most members of the intervention class.

From insights gleaned from semi-structured interviews and reflective journals, it emerged that individuals exhibiting an increasing trend in their oral English output scores had all assimilated and employed at least one motivational regulation strategy after the instructional intervention. Notably, diverse participants opted for different strategies tailored to their learning contexts, with the mastery self-talk strategy being the most frequently used, succeeded by environment structuring and self-consequating strategies. This trend corroborates findings from paired samples t-tests conducted on pre- and post-questionnaires. Prior research has underscored the impact of learning goals on student engagement, focusing on mastery fostering diligent study habits and conducive learning processes, while performance-oriented goals often lead to rote memorization and superficial understanding [64]. Therefore, it is unsurprising that mastery self-talk emerged as the most frequently utilized strategy among students exhibiting enhanced oral English proficiency.

The adoption of MRSs, particularly mastery self-talk, facilitated a shift in perspective for interviewees, enabling them to view each task as an opportunity for growth, courageously venture beyond their comfort zones, and appreciate the value of reflection, all of which contributed to the enhancement of their oral English output quality.

For example, as one of the interviewees who showed an increasing trend in oral English output scores, Student A reported her intrinsic interest in obtaining more skills and knowledge about oral English during the semi-structured interview, and in her reflective journals, she described how the use of self-consequating and environment structuring strategies produced a virtuous circle in the progress of oral English output.

> " … in this process, I applied the mastery self-talk strategy, and I implied to myself that if I could go on with this question, I would improve my oral English ability, and then I would be able to gain more oral English knowledge and skills. Although it was also a difficult learning task, completing it would mean overcoming some of my mental or skill difficulties, suggesting that it would enable me to gain more." (Student A, Interview)

> "I learned how to use the strategies of self-consequating and environment structuring in the instructional videos and used both of these strategies during the completion of the oral English task. I would give myself small rewards in time after completing the oral English task to stimulate myself to complete the task better, which boosted my confidence and interest; in addition, I would look for a suitable study room to complete the oral English task." (Student A, Reflective Journal)

It is evident that Student B, another interviewee, had not only developed a certain level of mastery self-talk strategies in oral English tasks for improving her oral English proficiency and extra knowledge but could also use environment structuring strategies to help herself concentrate on tasks so that she can complete more satisfied oral English output.

> " … at the same time, when I first started to prepare for this assignment, … I even thought of putting it aside for a while and then finishing it. But then I felt that I should rise to the occasion when I encountered difficulties and I should find a way to solve them, … so I encouraged myself to do my best to finish it. … I also gained a lot from consulting the materials. Not only did I gain a deeper understanding of feminism and ecocriticism, but I also improved my ability to access materials. I told myself to appreciate challenging learning tasks because I can gain a lot in the process of completing them." (Student B, Reflective Journal)

> " … but I found that the more nervous I was, the worse I was at recording, so I started to try to reassure myself that I should not be so nervous and that the big deal was to practice a few more times, just as a practice of oral English. With this kind of thinking, I finally succeeded in completing this assignment."; " … secondly, I actually intended to complete this assignment in my dormitory at first, but I found that I couldn't concentrate at all in the dormitory, causing me to forget again just when I had a little thought. So, I left the dormitory and found a study room to finish the oral English assignment. The study room was a completely different environment from the dormitory, and the atmosphere was very helpful. I was able to complete the assignment very quickly." (Student B, Interview)

The two students who displayed a flat trend in their oral English output scores during the assessment articulated, through semi-structured interviews, the challenges they faced in executing oral English tasks and the objectives they aimed to achieve. Although a minor advancement was noted in both participants' oral English output scores after six assessments, this change did not attain statistical significance. The semi-structured interviews revealed that following the MRSs-based pedagogical intervention, the two interviewees exhibited greater consciousness in utilizing diverse MRSs. Based on the insights gathered from the interviews, the authors analyzed the factors contributing to the insignificant improvement in oral English output scores. While their awareness of MRSs utilization increased, the actual implementation of these strategies was ineffective due to three primary reasons: firstly, the quality of oral English output did not undergo significant enhancement due to the interviewees' inadequate fundamental knowledge and relatively weak proficiency in oral English; secondly, despite repeated attempts to employ MRSs following the pedagogical intervention, they failed to achieve significant progress in oral English output owing to their limited capabilities and emotional management issues; thirdly, the participants' utilization of MRSs was primarily at a cognitive level, and their practical application during oral English output required further reinforcement. These three reasons are pointed out in the two students' interview contents:

> "I hope that I will pay more attention to the combination of study tasks and personal interests in the future, not taking them as a burden, but to find points of interest in the learning process and continue to go deeper and further … Also, I like to watch some TV dramas and films after class. It can help me learn authentic oral expression and pronunciation while relaxing without delaying my studies or affecting my entertainment. As English is a tool subject, I should focus on developing my expression, writing, and listening ability. After that, I need to speak and practice more to improve my spoken English and learn more about it. In addition, I should take part in some competitions as much as possible to overcome my nervousness … Besides, I need to create some language environment for myself and find a suitable learning atmosphere." (Student C, Interview)

> "I can't understand this text completely or am a bit impatient. I think it is too long to read, and when I organize the language, there are a lot of grammatical errors. I think this results from a failure in emotional control; I lack basic knowledge and need to do more oral tasks to improve my oral English expression and logical thinking skills." (Student D, Interview)

Upon conducting interviews with these two participants, the authors determined that despite their cognizance of strategies such as mastery self-talk and environment structuring post-pedagogical intervention, their oral English proficiency did not undergo substantial enhancement due to their relatively inadequate oral English proficiency, challenges in employing the strategies mentioned above, and inadequate utilization thereof. Notably, though the improvement in their oral English proficiency was unsatisfactory, both participants

explicitly acknowledged their deficits in oral English proficiency and the areas requiring focus in their learning journey. These observations suggest that the onus of applying and integrating the targeted strategies, complementary knowledge or skills, and self-regulatory mechanisms is progressively transitioning from educators to learners [65]. Consequently, these two students reported a more optimistic approach to their learning process as they sought to leverage various resources to enhance their oral English proficiency.

Furthermore, the authors observed a distinct pattern in individual participants' six oral English output scores, exhibiting a variable trend that initially decreased, subsequently increased, and then again decreased. This pattern is in stark contrast to the two trends as mentioned above, and the authors maintain that these trends are distinctively different and possess the significance of being described independently. Through semi-structured interviews conducted with the two participants, the authors gained insight into the reason behind one participant's downward-then-upward trend in oral English output ratings. Specifically, it was attributed to the sequence in which each oral English task was tackled prior to the instructional intervention, wherein answers were initially written down, subsequently read aloud, and finally recorded as delivered.

> " … because before the intervention, I would always just write down everything I wanted to speak and then read it to the script. But after watching the instructional videos, I only write down some of the main points that I need to say and then go through my answers to those points." (Student E, Interview)

According to the participant's narrative, her decision to pre-write all responses aimed to ensure the superiority of her oral presentation and achieve a more favorable grade. Nevertheless, following the intervention, her mindset underwent a significant shift, wherein she perceived each spoken English assignment as a venue for honing her oral proficiency rather than merely an examination. Therefore, while the caliber of her spoken English output may not have matched her previous standards, she attained notable progress in her courage and fluency in English expression.

Another participant's oral English proficiency after the pedagogical intervention showed an upward and then downward trend, and we learned from the interview that this was related to the difficulty of the oral English task.

> " … there are six questions in the last assignment, which is a slight increase compared to the previous ones, so it was a big challenge for me to allocate time wisely and complete each question in a coherent way. In terms of time, there will also be a proper enhancement, so in my oral English practice afterward, I think it is still important to make a rough draft and write out my thoughts roughly so that I can get twice the result with half the effort when recording the oral English assignments, and I will continue to work on this next time." (Student F, Interview)

Overall, the teaching intervention grounded in MRSs garnered positive feedback from the participants. They actively implemented techniques such as mastery self-talk and environmental structuring to augment their proficiency in spoken English, resulting in broadly satisfactory outcomes. Additionally, the educational intervention facilitated the students' comprehension and utilization of MRSs, thereby enhancing the quality of their spoken English proficiency for the vast majority. Although specific individuals did not demonstrate marked improvements owing to personal limitations or the complexity of the tasks, it is evident from the interview transcripts and reflective journals that they upheld a constructive and proactive stance towards MRSs and language acquisition. The obtained findings underscore the efficacy of the MRSs-oriented pedagogical intervention in advancing students' comprehension and application of MRSs, ultimately contributing to the enhancement of spoken English quality for the majority of the participants.

6. Conclusion and implications

Based on a comprehensive analysis of both quantitative and qualitative data, this study demonstrates that the implementation of MRSs in pedagogical interventions serves as a valuable tool for enhancing Chinese university English learners' awareness and proficient application of these strategies in the context of oral English production. Moreover, the current research underscores the positive impact of MRSs-based pedagogical interventions on the oral English proficiency of EFL students.

The pilot questionnaire for the present study was constructed with six dimensions, integrating components from previous research. Following a thorough factor analysis of the preliminary data, it was established that five valid dimensions had emerged. The authors have rechristened these dimensions, drawing from the intrinsic meanings of the underlying questions: environment structuring, mastery self-talk, self-consequating, self-oriented performance self-talk, and externally-oriented performance self-talk. Notably, there was a significant rise in the awareness and application of the mastery self-talk dimension before and after the intervention. Although no statistically significant differences were noted in using the other four dimensions, the mean scores for these strategies in the post-intervention questionnaire exceeded those in the pre-intervention questionnaire. Qualitative data collected from reflective journals and semi-structured interviews indicated that the majority of participants in the intervention class reported choosing and implementing various MRSs based on their unique learning situations after the pedagogical intervention. Additionally, the qualitative data highlights the impact of EFL learners' linguistic proficiency on the efficacy of pedagogical interventions based on MRSs, a result that aligns with findings from prior studies (e.g., Ref. [66,67]).

A rigorous analysis of the participants' oral English output scores across six assessments has indicated that the scores obtained post-intervention were notably higher than those achieved pre-intervention. More than eighty percent of the participants recorded their utilization of the motivational regulation strategy in their reflective journals. Prior to the educational intervention, a substantial majority cited the challenging nature of the oral English tasks and the absence of regular daily practice as reasons for perceiving each task as a burden, leading to significant academic stress. However, following the MRSs-oriented pedagogical intervention, a significant number of participants exhibited a shift in approach, attempting to employ one or more MRSs techniques. Specifically, the

employment of the mastery self-talk strategy was prevalent. Participants adopting this strategy perceived each oral English task as an opportunity to hone their speaking skills rather than a burden, resulting in a reduction in stress and fear levels, ultimately augmenting their motivation to complete the tasks. Based on the reflective logs and semi-structured interviews, it was revealed that several participants utilized environment structuring and self-consequating methods to enhance their performance in oral English tasks. Implementing these strategies contributed positively to the quality of their oral English output. These findings align with the significant differences observed in the paired-sample t-tests conducted on the pre- and post-questionnaire data. Furthermore, the results of thematic analysis of reflective journals suggest that teachers should consider students' interests and experiences when designing oral English tasks, making the tasks more understandable and increasing learners' motivation to complete assignments. Consequently, the authors assert that this study offers valuable insights into the curriculum design of oral English instruction and provides empirical evidence of the positive impact of MRSs on oral English output.

Although the current study has made valuable contributions, it is constrained by a relatively modest sample size, necessitating a cautious interpretation of the results. While the sample size is deemed adequate for the intended target group, its implications for the broader applicability of the conclusions must be duly noted. Consequently, the conclusions drawn from this study should be considered preliminary, highlighting the importance of further research with more extensive and diverse samples to validate and expand upon these initial observations. Additionally, future research can incorporate a control group to accurately gauge the impact of the MRSs-based teaching intervention on EFL learners' spoken English proficiency while eliminating confounding variables such as knowledge accrual. Furthermore, given the intricate nature of the EFL learning process, additional research endeavors are warranted to explore the diversification of sampling techniques and participant classifications, encompassing students from various academic disciplines and cultures. This imperative underscores the significance of replicating the study to confirm the preliminary findings, thereby ensuring that MRSs-based educational interventions effectively cater to the diverse needs of EFL students.

Studies involving human subjects

This study was reviewed and approved by the College of Foreign Languages of Taiyuan University of Technology. All participants provided informed consent to participate in the study.

Inclusion of identifiable human data

No potentially identifiable human images or data is presented in this study.

Ethics statement

This study was reviewed and approved by the College of Foreign Languages of Taiyuan University of Technology. All participants provided informed consent to participate in the study. Informed consent was obtained from the participants for the publication of any data included in this article.

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Data availability statement

Data associated with the study have not been deposited into a publicly available repository and they are available from the corresponding author upon reasonable request.

CRediT authorship contribution statement

Ruyu Yan: Validation, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Bing Liu:** Writing – review & editing, Visualization, Validation, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Data curation, Conceptualization. **Lawrence Jun Zhang:** Writing – review & editing, Supervision, Methodology.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Ruyu Yan is a first year full-time PhD student at the Faculty of Education and Social Work, The University of Auckland, New Zealand. She holds a BA in English Studies and an MA in Foreign Languages and Applied Linguistics from Taiyuan University of Technology, China. Her research interests lie mainly in EFL learning, educational psychology and second language acquisition. Email: ryan093@aucklanduni.ac.nz

Bing Liu, PhD, is a professor of applied linguistics at the College of Foreign Languages, Taiyuan University of Technology, Taiyuan, China, where he has also served as the Dean. He has won research grants from the National Social Science Foundation of China. His research interests include applied linguistics, second language acquisition, and foreign language education. His research has appeared in journals on foreign languages, such as *System*, *Modern Foreign Languages*, *Foreign Languages in China*, and *Foreign Language Education*, among others. Email: liubing@tyut.edu.cn

Lawrence Jun Zhang, PhD, is Professor of Linguistics-in-Education and Associate Dean Faculty of Education and Social Work, University of Auckland, New Zealand. His major interests and publications are on the psychology of language learning and teaching, especially learner metacognition, L2 reading-writing development, emotions, and teacher assessment literacy. His publications have appeared in journals such as *Applied Linguistics* (Oxford), *Applied Linguistics Review* (de Gruyter), *Assessing Writing* (Elsevier), *British Journal of Educational Psychology* (Wiley), *Discourse Processes* (Routledge), *Journal of Second Language Writing* (Elsevier), *Journal of Psycholinguistic Research* (Springer), *Metacognition and Learning (Springer)*, *Modern Language Journal* (Wiley), *TESOL Quarterly* (Wiley), *Language Teaching Research* (Sage), *Perceptual and Motor Skills* (Sage), *RELC Journal* (Sage), *System* (Elsevier), *Frontiers in Psychology* (Frontiers Media), among others. He serves on editorial boards for *Applied Linguistics Review* (de Gruyter), *Australian Review of Applied Linguistics* (Benjamins), *Chinese Journal of Applied Linguistics* (de Gruyter), *Journal of Second Language Writing* (Elsevier), *Metacognition and Learning* (Springer), *Journal of Second Language Studies* (Benjamins), *Language Teaching for Young Learners* (Benjamins) and *RELC Journal* (Sage). He is Co-Editor-in-Chief for *System* (Elsevier). In 2016 he was honoured with the recognition by the TESOL International Association (USA) with the award of "50@50″, which acknowledged "50 Outstanding Leaders" around the globe in the profession of TESOL at TESOL's 50th anniversary celebration. In the Elsevier-Stanford Rankings, he has been listed in the top 2 % of Scientists in the World in the disciplinary areas of Linguistics/Applied Linguistics. Email: lj.zhang@auckland.ac.nz