

Effects of the Listening Strategy Self-Regulated Learning Model on Thai EFL Undergraduate Students' Listening Comprehension

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Abstract

This study investigated the effects of the Listening Strategy Self-Regulated Model on the utilization of listening strategies among EFL undergraduate students to comprehend academic lectures. The model, which integrates listening strategies with Zimmerman's (2000) cyclical model of self-regulation, was implemented with 21 Thai EFL undergraduate students at Khon Kaen University. Research tools included tests, questionnaires, and interviews, with data analyzed quantitatively and qualitatively. Results obtained from the questionnaire showed that participants effectively applied various listening strategies to enhance lecture comprehension, despite encountering difficulties, such as rapid speech, technical terms, and unclear passages. Test scores showed improvement in listening comprehension. Interviews revealed the use of diverse strategies across different lecture segments, including meta-cognitive planning, cognitive inferencing/guessing, practicing, and socio-affective cooperation. Recommendations include allowing more time for strategy application within self-regulated learning and encouraging personalized models for investigation of strategy usage.

Keywords: EFL listening comprehension, listening strategies, self-regulation, self-regulated learning model, academic listening

Introduction

Listening comprehension entails actively interpreting spoken information, constructing understanding, engaging in dialogue with the

speaker, and formulating responses (Rost, 2002). It is a crucial component in language acquisition, especially in EFL settings where learners rely on listening to grasp the target language (Berne, 2004). Proficiency in listening comprehension is fundamental to achieving fluency in EFL (Liu, 2009) and is indispensable across various academic disciplines (Coakley and Wolvin, 1997). Therefore, EFL students, including those in Thailand, must cultivate their listening comprehension abilities to excel in both language acquisition and academic subjects. Nonetheless, mastering these skills poses a challenge due to the intricacy of the process.

When dealing with spoken texts, it is crucial for EFL learners to effectively manage the process of their listening comprehension (Liu, 2009). This process consists of three primary methods: bottom-up, top-down, and interactive processing (Vandergrift, 2002, 2007). Bottom-up processing involves listeners focusing on linguistic elements to decode sounds, progressing from phonemes to complete texts (Anderson and Lynch, 1989). By concentrating on linguistic features, this method aids in understanding oral messages (Vandergrift, 2002; Siegel, 2011). Conversely, top-down processing is the use of background knowledge to predict the meaning of the spoken content (Vandergrift, 2002). Listeners draw upon their prior knowledge or schemata to anticipate the speaker's message. Scholars now emphasize the synergy between bottom-up and top-down processing to enhance listening comprehension by leveraging both linguistics and prior knowledge (Vandergrift, 2002). However, despite using interactive processing, comprehension may fail, especially in challenging academic contexts where students grapple with understanding complex lectures. Listening comprehension challenges often arise from individual students' difficulties (Vandergrift, 2007).

While attending academic lectures, EFL students often encounter diverse listening challenges related to three main factors: their own listening abilities, teachers' delivery of information, and the content of the lectures themselves. Concerning the first factor, EFL students commonly struggle due to limited vocabulary, pronunciation, and

grammatical knowledge gaps (Hamouda, 2013). Insufficient vocabulary knowledge can hinder their ability to discern sounds (Bennui, 2007). Additionally, the lack of understanding grammar obstructs their comprehension of sentence structures (Hamouda, 2013). For the second factor, teachers may contribute to listening problems through speech pace, lengthy speeches, and unfamiliar accents (Ishler, 2010). An unfamiliar accent, in particular, can alter English pronunciation, making it challenging for students to understand. For the third factor, the complexity of lecture content can pose obstacles for EFL students in interpreting the information presented (Moradi, 2012). To address these challenges, the use of various listening strategies is recommended to assist in navigating the complexities of the listening process (Vandergrift, 2007). This is particularly relevant in contexts like Thailand, where Thai EFL students must overcome listening difficulties to comprehend lectures delivered in English.

Listening strategies are mental processes which listeners use in order to understand oral input and handle listening problems (Oxford, 1990). Listeners usually rely on listening strategies when they must handle complex tasks, such as interpreting stress and discriminating between sounds in order to comprehend or maintain new information from the EFL oral input (Oxford, 1990). Many scholars insist that the application of effective listening strategies is essential for university students' academic accomplishment (Retief, 1995; Strauss, 2002). Thus, it is suggested that EFL learners of different proficiency levels utilize different strategies to comprehend EFL oral input (O'Malley and Chamot, 1990). Although students may employ various listening strategies, their listening skills are not developed enough to extract data from spoken lectures effectively (Retief, 1995; Khuwaleih, 1999; Strauss, 2002). This is because they are unable to use listening strategies appropriately, and regulate the learned strategies (Goh, 2008). Therefore, EFL learners must know how to manage appropriate listening strategies to enhance their listening comprehension (Cheng, 2011). They could be encouraged to use proper listening strategies in exercising their self-regulated learning. Processing self-regulated learning motivates

learners to carry out appropriate listening strategies, independently monitor their strategy usage, and effectively change their strategy usage when necessary (Cheng, 2011).

Thai university students face challenges in listening comprehension (Cubalit, 2016), indicating a need for effective listening strategies. Recent research has highlighted gaps in their ability to utilize these strategies, which then hinder their comprehension of EFL lectures (Bennui, 2007; Cubalit, 2016). Consequently, there has been a proposal to integrate self-regulated learning with listening strategy training. The present study aimed to examine the effects of the combined model of self-regulated learning and listening strategy training on students' comprehension of academic lectures. Specifically, it sought to address the following research questions:

1. How does the Listening Strategy Self-Regulated Learning Model promote the listening comprehension of EFL undergraduate students?
2. What are the effects of the Listening Strategy Self-Regulated Learning Model on the listening comprehension of EFL undergraduate students?
3. What are EFL undergraduate students' listening problems and what listening strategies do they use to deal with the problems?

Listening Comprehension

Listening comprehension encompasses all aspects of understanding spoken language (Rost, 2002). It involves actively receiving oral input, interpreting it, constructing meaning, engaging in meaning negotiation with the speaker, and responding to conveyed messages (Purdy, 1997; Rost, 2002). For EFL students, comprehension is fundamental to the development of speaking, writing, and reading skills (Rost, 2002; Vandergrift, 2007). Hence, mastering listening comprehension is important for EFL learner to excel in speaking, writing, and reading (Liu, 2009).

As globalization advances and English becomes more prevalent, universities increasingly prefer English as the primary teaching language (Kirst, Chaisiri, Chantarachikapong, and Wilang, 2023). Therefore, EFL students must prioritize their listening comprehension skills to successfully navigate academic texts and accomplish their listening objectives (Brown, 1987, 2000; Coakley and Wolvin, 1997). Even when mastering their listening comprehension, however, EFL students commonly face diverse listening challenges. These challenges include difficulty in identifying main points or key terms, coping with the rapid pace of lecture speech or various accents, and encountering unfamiliar vocabulary (Underwood, 1989). To tackle these challenges successfully, it is essential for EFL students to employ effective listening strategies.

Listening Strategies

Numerous studies have stressed the importance of employing listening strategies to acquire EFL content across diverse learner populations (Bennui, 2007; Moradi, 2012; Cubalit, 2016). Listening strategies involve cognitive processes that aid listeners in acquiring, comprehending, and retaining spoken material (Oxford, 1990). The use of these strategies is crucial for EFL listeners to interpret and comprehend orally-conveyed information. These strategies are commonly classified into three main categories: meta-cognitive, cognitive, and socio-affective (O'Malley and Chamot, 1990). Meta-cognitive strategies are "general skills through which learners manage, direct, regulate, and guide their learning through the three processes of planning, monitoring, and evaluating" (Wenden, 1998; 519). Cognitive strategies involve processing, comprehending, and storing input in the working memory or long-term memory for recovering later (O'Malley and Chamot, 1990). Cognitive strategies are problem-solving techniques; therefore, they are used to deal with listening tasks by considering how to encode, retain, and retrieve information from the spoken text (Rubin, 1981). Cognitive strategies are composed of different sub-techniques, such as inferencing, imagery,

and translating. Socio-affective strategies are techniques utilized by listeners to cooperate with others and to lessen anxiety (O'Malley and Chamot, 1990).

Self-Regulated Learning

Self-regulated learning, as outlined by Zimmerman and Schunk (2001), involves learners actively managing their educational endeavors with confidence (Pintrich, 2000), by setting goals, self-monitoring, and adjusting strategies for success (Nückles et al., 2009). This approach is characterized by employing active learning techniques for enhanced comprehension. Zimmerman's model, further explained by Li (2017), supports this through a structured process of planning, action, and reflection, aimed at improving study habits and overcoming academic challenges, thus providing a comprehensive framework for learning.

There are three phases in Zimmerman's model. The initial phase, forethought, precedes learning and involves setting goals and developing strategies (task analysis), alongside fostering self-motivation beliefs like self-efficacy (Zimmerman, 2002). The performance phase unfolds with learning that focuses on executing strategies (self-control) and monitoring personal experiences through self-observation (Zimmerman, 2000, 2002). The final phase, self-reflection, occurs post-learning, wherein learners evaluate their performance and outcomes (Zimmerman, 2000) through self-judgement against standards and self-reaction, reflecting on satisfaction, or adjusting responses based on performance (Zimmerman, 2002).

Combining Listening Strategies and Self-Regulated Learning

There have been few notable studies that combined listening comprehension with self-regulated learning in the EFL context. One is that of Abdolreza and Ghanbari (2021), which investigated the impact of self-regulated dynamic assessment techniques on the listening comprehension and self-regulation skills of 49 female Iranian EFL

learners aged 14 to 17. The experimental group, which received self-regulated dynamic assessment, exhibited higher post-test scores, underlying the significance of self-regulation in enhancing language learning and listening performances.

Another example was research conducted by Zhou and Thompson (2023) examining self-regulated listening practice among Chinese L1 students enrolled in English-medium instruction (EMI) courses. Data collection involved semi-structured interviews conducted at the beginning, halfway, and end of the course. Results revealed participants' recognition of the importance of self-regulated listening practice in EMI courses, with initial strong motivation among high-proficiency students diminishing over time. Some participants adapted their approach while others ceased practice because of perceived proficiency or slow progress.

In the same line, the present study investigated the impact of integrating self-regulated learning and listening strategies on academic lecture comprehension among Thai EFL undergraduate students. It focused on the effectiveness of the Listening Strategy Self-Regulated Learning Model, adapted from Zimmerman's cyclical phases, in improving students' comprehension. Additionally, it explored students' listening challenges and their strategies to overcome comprehension difficulties.

Methodology

Research Context and Participants

This research centered on Thai undergraduate students majoring in chemical engineering, who were required to take English for Engineering courses aimed at improving their specialized language and communication abilities. The course content encompassed various engineering topics and included practical tasks relevant to real-world situations. The primary objective of this research was to assess how the implementation of the Listening Strategy Self-Regulated Learning Model influenced students' utilization of listening strategies to enhance

comprehension during lectures. Conducted at Khon Kaen University's Faculty of Engineering, the study utilized a mixed methods approach involving 21 second-year students selected through convenience sampling. These students, identified as low-intermediate, based on their below-average scores in English-related chemical engineering subjects, encountered difficulties in comprehending English lecturers, and demonstrated limited proficiency in listening strategies and self-regulated learning.

Research Instruments

Quantitative data came from test scores and questionnaires, while qualitative insights were derived from open-ended questionnaire responses and in-depth interviews, focusing on participants' listening challenges and strategy use during lectures.

The test contained 10 multiple-choice questions with four answers. The questions covered all three parts of the lecture: the introduction, the main body, and the conclusion. Two questions pertained to the introduction, six focused on the main body, and two addressed the conclusion. The test aimed at evaluating participants' listening comprehension following the acquisition of strategies from the Listening Strategy Self-Regulated Learning Model. All participants completed five tests throughout the study: four post-unit tests and a final post-test. These tests were developed using methods suitable for Thai undergraduate students and avoiding negative phrasing and overly difficult terms unrelated to the study's focus on listening skills. Each post-unit test corresponded to a specific lecture delivered weekly, covering topics of *Entropy and Enthalpy for Real Gases* (Parts 1-3) and *Gas and Liquid Mixture*. Scores from these tests were compared to analyze the impact of the Listening Strategy Self-Regulated Learning Model on participants' listening comprehension, assessing their ability to understand academic lectures. The researchers designed the tests, which were validated by three experts in chemical engineering to ensure they measured listening competency effectively.

The questionnaire aimed to assess participants' use of listening strategies during academic lectures. Developed by integrating strategies from Vandergrift (1997), Ishler (2010), and Abdalhamid (2012), it featured 57 five-point Likert scale items categorizing strategies into meta-cognitive, cognitive, and socio-affective types. The questionnaire's validity was ensured through review by three applied linguistics experts.

In this study, participants were introduced to the Listening Strategy Self-Regulated Learning Model in weeks 2 and 5. Initially consisting of 25 listening strategies recommended by the physical chemistry lecturer, the model was organized into forethought, performance, and self-reflection phases corresponding to pre-listening, during-listening, and post-listening stages. Participants were instructed on all 25 strategies by researchers, who demonstrated their application during lectures. Following each lecture, participants underwent testing, completed questionnaire, and participated in interview, followed by a 30-minute reflection session to address listening challenges. In week 5, a revised model with 20 strategies was provided, removing less-utilized ones. The same assessment and reflection procedures were repeated after subsequent lectures.

Research Procedures

The study lasted eight weeks. In week 1, students were briefed on research objectives and procedures, after which they identified useful listening strategies from a list of 57. This led to the creation of the Listening Strategy Self-Regulated Learning Model, comprising 25 strategies categorized into meta-cognitive, cognitive and socio-affective types. These strategies were aligned with pre-listening, during-listening, and post-listening phases of self-regulated learning. Week 2 consisted of the introduction and guidance on the utilizing the model's strategies. The researchers also demonstrated the use of all 25 strategies, depicted in Figure 1.

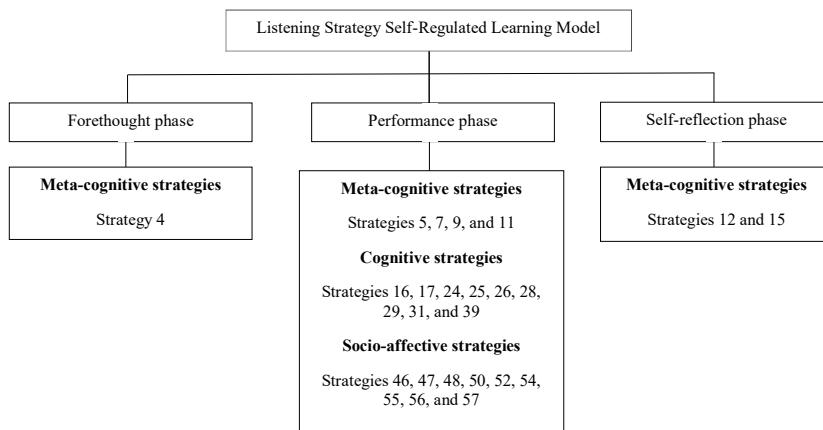


Figure 1 The Listening Strategy Self-Regulated Learning Model

In week 3, participants employed strategies from the model to understand a lecture called *Entropy and Enthalpy for Real Gases* (Part 1), which lasted about 80 minutes. Following the lecture, they completed a post-unit test and a questionnaire on listening strategies. Subsequently, selected participants underwent an interview, in which they reviewed their test and questionnaire to discuss their use of listening strategies throughout the lecture's introduction, main body, and conclusion. Their responses were recorded for later transcription. Additionally, a 30-minute session allowed all participants to discuss their listening challenges, while the researchers offered model-based strategies for improvement. In week 4, the process mirrored week 3, with participants applying listening strategies to a lecture entitled *Entropy and Enthalpy for Real Gases* (Part 2), which was also about 80 minutes long. This was followed by a post-unit test, a questionnaire, an interview session, and a discussion on listening challenges and strategies.

During week 5, participants underwent another session facilitated by the researchers, which included 20 listening strategies. Notably, strategies 26, 47, 54, 55 and 56, identified as less frequently used in the previous week (week 2), were excluded. Data on both highly- and less-frequently employed strategies were gathered through

questionnaires and interviews conducted in weeks 3 and 4. Weeks 6 and 7 followed the procedures of week 3, with participants attending lectures, completing post-unit tests, questionnaires, interviews, and reflecting on their listening challenges afterward. The lecture topics in weeks 6 and 7 covered *Entropy and Enthalpy for Real Gases* (Part 3) and *Gas and Liquid Mixture*, respectively. In week 8, participants underwent a post-test covering all four lectures to evaluate their listening achievement post-treatment. Subsequently, they completed a questionnaire, participated in an interview, and reflected on their listening challenges during their involvement in the study.

Data Analysis

Quantitative data analysis involved using X-bar and standard deviation (SD) to assess participants' utilization of listening strategies across meta-cognitive, cognitive, and socio-affective dimensions. Likert scale surveys were used to gauge the frequency of listening strategy usage, while percentage was employed to compare test scores across lecture sections. Qualitative data were transcribed for thematic analysis.

Results

Data from the Tests

Post-unit tests revealed that many participants scored high on the initial tests, showing strong performance across lecture components. However, scores declined noticeably on the third and fourth tests, with performance on the lecture parts significantly lower than in earlier tests. Questionnaire responses highlighted the frequent use of meta-cognitive, cognitive, and socio-affective strategies, with the most common strategies being 4: "Before listening, I prepare my mind to concentrate (planning)," 17: "I use my background knowledge to help me understand unfamiliar ideas in a text (association/elaboration)," and 52: "When I don't understand something, I try not to worry too much about it (monitoring emotions/lowering anxiety)," which align with the Listening Strategy

Self-Regulated Learning Model. Interviews revealed participants' utilization of listening strategies across lecture sections and their engagement in self-regulated learning, with a preference for meta-cognitive planning in the introduction, meta-cognitive monitoring, cognitive association, and conferencing in the main body, and socio-affective cooperation in the conclusion. Participants reported less inclination toward meta-cognitive evaluation, indicating limited engagement in the self-reflection phase of self-regulated learning.

The post-unit tests and the post-test were given to the participants in order to analyze the effects of EFL undergraduate students' use of listening strategies through the Listening Strategy Self-Regulated Learning Model to understand academic lectures. There were a total of four post-unit tests concerning each lecture in weeks 3, 4, 6, and 7. For week 8, they took the post-test which involved the four lectures. The participants' scores regarding the four post-unit tests (or Test 1 to Test 4) and the post-test are shown in Table 1.

Table 1 Scores of the post-unit tests and the post-test

Participants (P)	Test scores				
	Test 1	Test 2	Test 3	Test 4	Post-test
P1	10	7	7	7	6
P2	10	7	6	7	7
P3	10	6	7	6	7
P4	10	7	5	5	6
P5	8	10	4	5	8
P6	8	6	6	5	8
P7	8	5	3	3	4
P8	7	5	3	4	4
P9	7	6	4	5	3
P10	8	6	6	4	5
P11	9	6	4	5	3
P12	8	8	3	3	5
P13	10	10	7	8	6
P14	8	10	8	6	9

Table 1 Scores of the post-unit tests and the post-test (cont.)

Participants (P)	Test scores				
	Test 1	Test 2	Test 3	Test 4	Post-test
P15	10	7	6	6	7
P16	9	7	7	6	6
P17	8	10	7	8	6
P18	9	8	8	7	8
P19	8	10	7	8	6
P20	9	8	4	7	8
P21	8	7	5	8	6
Total points	182	156	117	123	128
Total %	86.66%	74.28%	55.71%	58.57%	60.95%

Moreover, the participants' scores in the introduction, main body, and conclusion of each lecture were also analyzed. Their performance in these three parts, related to the four post-unit tests including the post-test, are revealed as total scores in the form of percentages and presented in Table 2.

Table 2 Total scores in the introduction, main body, and conclusion

Tests	Total scores (%)		
	Introduction	Main body	Conclusion
1	90.47%	84.92%	88.09%
2	78.57%	74.6%	69.04%
3	52.38%	63.49%	35.71%
4	61.9%	59.52%	52.38%
Post-test	57.14%	65.87%	50.0%
Mean (%)	68.09%	69.68%	59.04%

Tables 1 and 2 summarize the results of Test 1 and Test 2 for the lecture, *Entropy and Enthalpy for Real Gases* (Part 1) and the lecture, *Entropy and Enthalpy for Real Gases* (Part 2), respectively. In Test 1, 19 participants achieved high scores (eight to ten points), with six scoring ten points, while only two participants received medium scores (five to

seven points), both achieving seven points. Performance was highest on the introduction (90.47 percent), followed by the conclusion (88.09 percent) and the main body (84.92 percent). These findings suggest that the model effectively enhanced participants' listening comprehension, as indicated by the high test scores. In Test 2, 13 participants attained medium scores, while eight achieved high scores, including five with a perfect score of ten points. Performance was highest on the introduction (78.57 percent), followed by the main body (74.6 percent), and the conclusion (69.04 percent). These results suggest that participants may have encountered difficulty comprehending the lecture, indicated by the lower performance.

In Test 3, focusing on the lecture, *Entropy and Enthalpy for Real Gases* (Part 3), only two participants achieved high scores of eight points, while seven received low scores (less than five points), with three scoring the lowest at three points. Performance was highest on the main body (63.49 percent), followed by the introduction (52.38 percent) and the conclusion (35.71 percent), indicating challenges across all lecture segments, particularly the conclusion. On Test 4, covering *Gas and Liquid Mixture*, four participants achieved eight points, four scored fewer than five points, and two got three points. Performance was highest on the introduction (61.9 percent) followed by the main body (59.52 percent), and the conclusion (52.38 percent). Overall, participants performed better on the introduction and conclusion compared to the previous test. The post-test results showed improvement, with five participants achieving high scores and four attaining low scores, with the body having the highest performance rate (65.87 percent), followed by the introduction (57.14 percent), and the conclusion (50 percent). Total percentages indicated improved listening comprehension on the post-test (60.95 percent), with the mean percentage on the main body being the highest (69.68 percent), although participants faced difficulty understanding the conclusion (59.04 percent). These findings suggest that the Listening Strategy Self-Regulated Learning Model aided participants by enhancing their comprehension of academic lectures.

Data from Questionnaires and Interviews

Regarding collecting data involving the frequency of listening strategy usage, questionnaire was applied after the participants completed each test. The frequently-used strategies that were provided in the Listening Strategy Self-Regulated Learning Model are presented in Table 3.

Table 3 Frequently-used strategies in the Listening Strategy Self-Regulated Learning Model

Item	Listening strategies	Week 3		Week 4		Week 6		Week 7		Week 8	
		\bar{X}	SD								
4	Before listening, I prepare my mind to concentrate.	3.85	0.96	3.85	0.79	3.95	0.67	4.23	0.77	4.23	0.7
5	While listening, I consciously keep in mind the information I need to listen for.	3.8	0.75	3.66	0.58	3.66	0.66	3.95	0.74	4.0	0.77
7	While listening, I am actively thinking about the important information.	4.0	0.55	3.95	0.67	3.76	0.7	3.66	0.91	3.8	0.6
9	While listening, I check the new information and link it with already known information.	3.57	0.75	3.57	0.75	4.0	0.77	3.76	0.7	3.67	0.58
11	While listening, I will check what part of the content I don't understand.	3.85	0.79	3.76	0.7	3.85	0.73	3.76	0.7	4.19	0.75
17	I use my background knowledge to help me understand unfamiliar ideas in a text.	3.9	0.7	3.85	0.91	4.14	1.01	3.95	0.86	3.9	0.62

Table 3 Frequently-used strategies in the Listening Strategy Self-Regulated Learning Model (cont.)

Item	Listening strategies	Week 3		Week 4		Week 6		Week 7		Week 8	
		\bar{X}	SD								
25	I use the context of a text to help me guess the meaning of words I do not know.	3.66	0.66	3.8	1.03	3.9	0.62	4.09	0.83	3.67	0.73
29	I focus on the key points of the lecture by underlining or capitalizing.	3.76	0.83	3.8	0.6	4.04	0.74	3.47	0.93	3.62	0.67
31	While listening, I write down some ideas and keywords.	3.71	0.9	3.9	1.04	3.8	0.75	3.9	0.83	3.9	0.7
39	I summarize information I have heard in my own words to help me remember it.	3.76	0.77	3.61	0.67	3.85	0.73	3.85	0.73	3.95	0.59
50	I encourage myself to concentrate on listening to English even when I can't hear clearly.	4.14	0.79	4.04	0.67	3.95	0.86	3.71	0.78	3.95	0.86
52	When I don't understand something, I try not to worry too much about it.	3.95	0.86	4.09	0.7	4.04	0.74	3.85	0.79	4.23	0.7
57	When I encounter unclear texts, I will discuss them with my classmates to clarify comprehension.	3.8	0.81	3.9	0.89	3.85	0.85	3.76	0.89	4.04	0.86

From Table 3, regarding listening strategies used in the lecture, *Entropy and Enthalpy for Real Gases* (Part 1), the questionnaires indicated that the participants' most frequently-utilized meta-cognitive strategy

was 7: "While listening, I am actively thinking about the important information (Monitoring)" ($\bar{X} = 4.0$, $SD = 0.55$). This was followed by 6: "While listening, I keep in mind the answers I am looking for (Monitoring)" ($\bar{X} = 3.95$, $SD = 0.8$). The most frequently-employed cognitive strategy was 17: "I use my background knowledge to help me understand unfamiliar ideas in a text" (Association/Elaboration) ($\bar{X} = 3.9$, $SD = 0.7$), followed by 44: "I use words from my language when I do not know an English word: (Translating/Transferring) ($\bar{X} = 3.8$, $SD = 0.87$). The two most frequently-used socio-affective strategies were 50: "I encourage myself to concentrate on listening English even when I can't hear clearly" (Encouragement) ($\bar{X} = 4.14$, $SD = 0.79$), and 52: "When I don't understand something, I try not to worry too much about it (Monitoring emotions/Lowering anxiety)" ($\bar{X} = 3.95$, $SD = 0.86$) respectively. This data indicated that the participants frequently used strategies 7, 17, 50, and 52 to help them comprehend the lecture. As for the interviews, ten participants who achieved high scores attended this section. They mentioned that the strategies used in the introduction were meta-cognitive planning, monitoring, and cognitive association/elaboration. For the main body, the preferred strategies were cognitive association/elaboration, inferencing/guessing, practicing, and socio-affective cooperation. For the conclusion, the participants mainly employed metacognitive evaluation, cognitive practicing, and socio-affective cooperation. Their utilization of listening strategies indicated that they used forethought (meta-cognitive planning), performance (e.g., meta-cognitive monitoring, cognitive association/elaboration, practicing, and socio-affective cooperation), and self-reflection (meta-cognitive evaluation) phases of self-regulated learning.

In the lecture, *Entropy and Enthalpy for Real Gases* (Part 2), the questionnaires indicated that the participants applied mainly meta-cognitive strategies 7 ($\bar{X} = 3.95$, $SD = 0.67$), 4: "Before listening, I prepare my mind to concentrate (Planning)" ($\bar{X} = 3.85$, $SD = 0.79$), and 8: "While listening, I try to keep up with the speed (Monitoring)" ($\bar{X} = 3.85$, $SD = 0.57$). The cognitive strategy with the highest rate was 31: "While listening, I write down some ideas and keywords (Practicing)"

($\bar{X} = 3.9$, $SD = 1.04$), and the second was strategy 17 ($\bar{X} = 3.85$, $SD = 0.91$). The most frequently-utilized socio-affective strategies were the following: 53: "If I feel stressful, I will take a deep breath to relax myself (Monitoring emotions/Lowering anxiety)" ($\bar{X} = 4.14$, $SD = 0.85$), 52 ($\bar{X} = 4.09$, $SD = 0.7$). The most frequently-used listening strategies were 4, 7, 17, 31, and 52. For the interviews, eight participants with high scores took part. For the introduction, the strategies mainly employed were meta-cognitive planning and monitoring. For the main body, the participants preferred to apply metacognitive monitoring and cognitive practicing. As for the conclusion, they used meta-cognitive evaluation, cognitive association/elaboration, summarizing/note-taking, socio-affective cooperation, and questioning/clarification.

Concerning the utilization of listening strategies in the lecture, *Entropy and Enthalpy for Real Gases* (Part 3), the questionnaires pointed out that the highly-used meta-cognitive strategy was 8 ($\bar{X} = 4.09$, $SD = 0.7$), followed by 9 "While listening, I check the new information and link it with already known information (Monitoring)" ($\bar{X} = 4.0$, $SD = 0.77$). The most frequently-applied cognitive strategy was 17 ($\bar{X} = 4.14$, $SD = 1.01$), followed by 29: "I focus on the key points of the scripts by underlining or capitalizing (Practicing)" ($\bar{X} = 4.04$, $SD = 0.74$). The two most frequently-employed socio-affective strategy was 52 ($\bar{X} = 4.04$, $SD = 0.74$) and 50 ($\bar{X} = 3.95$, $SD = 0.86$). The results showed that the participants preferred to utilize strategies 9, 17, 29, 50, and 52 in the model. For the interviews, two high scorers and seven low scorers participated in this section. Regarding the introduction, meta-cognitive planning was highly utilized by the participants. About the main body, the strategies employed were meta-cognitive monitoring, cognitive association/elaboration, imagery, inferencing/guessing, summarizing/note-taking, and socio-affective monitoring emotions/lowering anxiety (strategy 52). For the conclusion, cognitive and socio-affective strategies were used. The information revealed that the participants did not rely on strategies of meta-cognitive evaluation. This could imply that they preferred to perform the forethought and performance phases of self-regulated learning rather than the self-reflection phase.

In the lecture, *Gas and Liquid Mixture*, the questionnaires revealed that the most frequently-used meta-cognitive strategy was strategy 4 ($\bar{X} = 4.23$, $SD = 0.77$), followed by 5: "While listening, I consciously keep in mind the information I need to listen for (Monitoring)" ($\bar{X} = 3.95$, $SD = 0.74$). The usage of cognitive strategy 25: "I use the context of a text to help me guess the meaning of words I do not know (Inferencing/Guessing)" ($\bar{X} = 4.09$, $SD = 0.83$) was the highest and strategy 17 ($\bar{X} = 3.95$, $SD = 0.86$) was the second highest. The most frequently-applied socio-affective strategy was 52 ($\bar{X} = 3.85$, $SD = 0.79$), followed by both strategy 53 ($\bar{X} = 3.76$, $SD = 0.89$) and strategy 57: "When I encounter unclear texts, I will discuss with my classmates to clarify comprehension (Questioning/Clarification)" ($\bar{X} = 3.76$, $SD = 0.89$). This data revealed that the participants mainly employed strategies 4, 5, 17, 25, 52, and 57 to understand the lecture. For the interviews, four high scorers and four low scorers were selected. For the introduction, they used meta-cognitive planning and cognitive practicing. For the main body, they used meta-cognitive monitoring, cognitive association/elaboration, inferencing/guessing, and practicing. For the conclusion, they mainly employed cognitive strategies of association/ elaboration, imagery, practicing, and summarizing/note-taking. This data revealed that they did not prefer using meta-cognitive evaluation or socio-affective strategies in any part of the lecture. Thus, they did not prefer strategies in the self-reflection phase.

For the final week, the questionnaires asked the participants about their overall strategy use in all four lectures. The results showed that the participants applied meta-cognitive strategies concerning strategy 4 ($\bar{X} = 4.23$, $SD = 0.7$) the most, followed by strategy 11: "While listening, I will check what part of the content I don't understand (Monitoring)" ($\bar{X} = 4.19$, $SD = 0.75$). The most highly-utilized cognitive strategy was 39: "I summarize information that I have heard in my own words to help me remember it (Summarizing/Note-taking)" ($\bar{X} = 3.95$, $SD = 0.59$), followed by strategy 17 ($\bar{X} = 3.9$, $SD = 0.62$) and 31: "While listening, I write down some ideas and keywords (Practicing)"

($\bar{X} = 3.9$, $SD = 0.7$). The two most highly-employed socio-affective strategies were 52 ($\bar{X} = 4.23$, $SD = 0.7$) and 57 ($\bar{X} = 4.04$, $SD = 0.86$). This data indicated that the participants relied on strategies 4, 11, 17, 31, 39, 52, and 57. For interviewing, five high scorers and four low scorers in the post-test were asked to take part. For the introduction, they tended to employ meta-cognitive planning, cognitive association/elaboration, and practicing. For the main body, they preferred to apply meta-cognitive monitoring, cognitive association/elaboration, inferencing/guessing, and socio-affective cooperation. For the conclusion, they used mainly socio-affective cooperation. This data showed that the participants were mainly engaged in the forethought and performance phases of self-regulated learning since they did not apply meta-cognitive evaluation.

In summary, this section addresses the first two research questions. Regarding the first question, "How does the Listening Strategy Self-Regulated Learning Model promote listening comprehension of EFL undergraduate students?" the data indicated that the model effectively enhanced listening comprehension by providing students with useful strategies for different phase of lectures: pre-listening comprehension, during-listening, and post-listening. This positively impacted students' understanding of academic lectures, as evidenced by improved test scores. For the second question, "What are the effects of the Listening Strategy Self-Regulated Learning Model on the listening comprehension of EFL undergraduate students?" data from questionnaires and interviews demonstrated that students frequently employed strategies from the model to support their comprehension. Despite a preference for strategies in the forethought and performance phases, the model supports self-regulated learning across all phases of the lecture, leading to more effective understanding of lecture content.

Listening Problems and Self-regulated Problem Management

Data from the open-ended section of the questionnaires revealed significant issues encountered by participants during lectures. Additionally, participants were introduced to various strategies from

the Listening Strategy Self-Regulated Learning Model during a dedicated reflection session aimed at addressing weekly problems. In the lecture entitled, *Entropy and Enthalpy for Real Gases* (Part 1), the primary challenge was keeping up with the lecturer's speech rate. Participants addressed this by employing the following two socio-affective strategies, 54: "If I do not understand something in English, I ask the speaker to slow down," and 55: "If I do not understand something in English, I ask the speaker to say it again." Another major issue was difficulty understanding complex words or technical terms, which participants tackled using cognitive strategies 25: "I use the context of a text to help me guess the meaning of words I do not know," and 28: "I use tools to understand the script, such as an English dictionary, grammar book, or an encyclopedia." Finally, losing concentration during the lecture was a challenge overcome by utilizing meta-cognitive strategy 4: "Before listening, I prepare my mind to concentrate."

Regarding the lecture, *Entropy and Enthalpy for Real Gases* (Part 2), the primary issue was difficulty comprehending the text. Participants addressed this by employing meta-cognitive strategies, such as 9: "While listening, I check the new information and link it with already known information" and 11: "While listening, I will check what part of the content I don't understand." Another challenge involved unclear words, which participants managed using socio-affective strategies like 46: "I ask for help from other students when I don't understand something in English" and 50: "I encourage myself to concentrate on listening to English even when I can't hear clearly." Finally, coping with the lecturer's accent was addressed by employing the socio-affective strategy 57: "When I encounter unclear texts, I will discuss with my classmates to clarify comprehension."

Regarding the lecture, *Entropy and Enthalpy for Real Gases* (Part 3), participants encountered several challenges. The primary issue was difficulty understanding technical terms, which they addressed by using cognitive strategies 25 and 28, along with socio-affective strategy 52: "When I don't understand something, I try not to worry too much

about it." Another challenge was comprehending the delivered information, which participants tackled through meta-cognitive strategy 12: "After listening, I self-check my listening comprehension and try to correct my errors," and cognitive association/elaboration strategy 17: "I use my background knowledge to help me understand unfamiliar ideas in a text." Finally, keeping pace with the lecturer's speech rate posed a problem, which was addressed using socio-affective strategy 46: "I ask for help from other students when I don't understand something in English" and strategy 48: "I encourage myself through positive self-talk."

In the lecture, *Gas and Liquid Mixture*, the first major problem was figuring out the meanings of words/technical terms. The students employed cognitive strategy 25 and socio-affective strategy 52. The second problem concerned grasping the main points. The students used meta-cognitive strategy 5: "While listening, I consciously keep in mind the information I need to listen for" and strategy 7: "While listening, I am actively thinking about the important information." The last problem involved understanding the delivered information. The students employed cognitive strategy 15: "After listening, I notice the mistakes which I had made in listening to texts and use that information to help me do better," and strategy 16: "When I hear new ideas, I combine them with other similar ideas that I am familiar with."

Finally, participants discussed their listening challenges from the previous four lectures. Dealing with unfamiliar vocabulary was a major issue, addressed with meta-cognitive strategies 12 and 15, and cognitive strategy 28. Coping with the lecturer's speech rate was another challenge, often managed using socio-affective strategy 46. Handling personal anxiety during lectures was also common, with participants using socio-affective strategy 48 to overcome stress. Finally, unclear information posed a challenge, with participants relying on socio-affective strategy 57.

To summarize, this section addresses the third research question, "What are EFL undergraduate students' listening problems and the use of listening strategies to deal with the problems?" Data revealed that

students employed various strategies to address different listening challenges encountered during academic lectures. They frequently utilized strategies outlined in the Listening Strategy Self-Regulated Learning Model to manage these problems. For instance, they employed socio-affective strategies 54 and 55 to cope with fast speech rates, cognitive strategies 25 and 28 to tackle complex vocabulary, and meta-cognitive strategy 4 to combat loss of concentration during lectures.

Discussion and Conclusion

This study points out the importance of self-regulation in students' learning, especially through diverse listening strategies applied during academic lectures to improve comprehension. It expands upon the research of Zhou and Thompson (2023), by exploring how students employ self-regulated listening techniques that incorporate meta-cognitive, cognitive, and socio-affective strategies over an eight-week period. The study identifies various strategies utilized across different lecture phases, with a notable focus on forethought and performance. Additionally, it references the findings of Duy and Quan (2021) concerning EFL undergraduates in Vietnam, showing that a wide range of strategies was employed for enhancing listening comprehension.

The study demonstrates that employing the Listening Strategy Self-Regulated Learning Model could significantly improve students' lecture comprehension, as can be seen in satisfactory test results. This is congruent with the findings from Abdolreza and Ghanbari (2021), which showed that enhanced self-regulation skills led to increased use of meta-cognitive and socio-affective strategies among Iranian EFL students, benefiting both high and low achievers. Similarly, the research of Zahroh et al. (2023) indicated that students of varying proficiency levels improved their comprehension skills through strategies like planning and note-taking, pointing out the model's effectiveness across different learner groups.

This study shows that students used self-regulation and problem-solving skills effectively to address common EFL challenges like fast speech rates and complex vocabulary. It also underscores the need for more opportunities for EFL students to learn and engage with self-regulated learning strategies to overcome listening challenges. It highlights the effectiveness of the Listening Strategy Self-Regulated Learning Model in enhancing students' strategy usage and comprehension during lectures. The findings encourage educators to develop personalized training programs and adapt models to improve EFL students' academic listening skills, so that they can apply listening strategies across various lecture contexts.

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