Self-regulated listening of students at transition from high school to an English medium instruction (EMI) transnational university in China

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1. Introduction

The exponential growth of English medium instruction (EMI) is an increasingly prominent trend in higher education globally. In China, EMI programs have received substantial support from national policies since the turn of the century (Ministry of Education, 2001, 2007a, 2007b, 2007c; State Council, 2010), and are positioned as an important component of the internationalisation of Chinese higher education (Hu et al., 2014). The provision of EMI has thus expanded rapidly in universities in mainland China – by 2006, 132 out of 135 universities that Wu et al. (2010) surveyed had run EMI courses with an average of 44 EMI courses per each university. Despite the growth of EMI programs in China, many studies have revealed observable difficulties that students encounter in listening to English medium lectures (Beckett & Li, 2012; Hu et al., 2014; Hua, 2020), particularly during the transition year when students shift from first language (L1)-taught secondary schools to EMI university programs (Evans & Morrison, 2011, 2016).

To overcome such difficulties, it seems highly likely that students need to become more self-regulated and strategic in their learning

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when adapting to an EMI university environment (e.g., Ding & Stapleton, 2016, in Hong Kong; Evans & Morrison, 2011, 2016, in Hong Kong; Macaro et al., 2019, in Italy; Soruç & Griffiths, 2018, in Turkey). However, limited studies have examined the self-regulated learning of students in EMI programs in contexts such as mainland China, where students need to rapidly adapt to both a new medium of instruction, and also to a new educational context, where topic-based lessons are delivered by university teachers. The study fills this gap by exploring how first-year students self-regulate their listening, an important yet challenging aspect for Chinese students (Hu et al., 2014), at an EMI transnational university in mainland China. The study explores the self-regulatory listening strategies and processes reported by students while also taking into account listening proficiency (Goh & Hu, 2014; Vandergrift et al., 2006) and self-efficacy (Graham & Macaro, 2008) to explore the role of these factors in interacting with self-regulatory listening processes.

2. Background to the study

2.1. Listening in transition-year EMI university classes

Listening to EMI classes can be particularly challenging when students transit from an L1-instructed secondary school to an EMI university programme (Aizawa & Rose, 2020; Evans & Morrison, 2011, 2016). The transition challenges involve not only an abrupt shift in the instructional language to an unfamiliar L2, but also an increased depth and professionalism in subject knowledge (Macaro, 2018). Hence, students are often found to struggle in listening to the lengthy and spontaneous teacher talk[1] typical of university lectures (Evans & Morrison, 2011), and are unable to maintain concentration for an extended period of time (Hua, 2020). A large amount of new academic or specialist vocabulary has also been reported to overwhelm the students, making it easy for them to lose the thread of what the teacher delivered (Aizawa & Rose, 2020; Evans & Morrison, 2016). Under such circumstances, students can become highly anxious and often reduce their interactions with the teacher (Ding & Stapleton, 2016; Hua, 2020), leading to downgraded quality of classroom learning. Previous research into EMI university classes has observed that classroom talk is dominated by monologic teacher-centred lectures, with student-teacher interaction occurring infrequently (Macaro et al., 2019). Thus, the present study focuses on how students *listen to* what is delivered in university EMI classes, while acknowledging that classroom interaction is an important aspect to examine in its own right (see, for example, Sahan, 2020).

In response to these listening challenges, several studies have revealed a strong level of autonomy by students in their adoption of various strategies to overcome difficulties, though some disparities exist within the findings (e.g., Ding & Stapleton, 2016; Evans & Morrison, 2011; Macaro et al., 2019; Soruç & Griffiths, 2018). At EMI universities in Hong Kong, students were found to invest considerable effort into preview and preparation before class (Ding & Stapleton, 2016; Evans & Morrison, 2011). In contrast to these findings, however, Macaro et al. (2019) found that first-year students in Italy seldom prepared for lessons before their classes. More consistently, most studies recorded students' attempts to infer meaning of unknown words while listening in class (Macaro et al., 2019; Soruç & Griffiths, 2018), and to review materials and notes after class (Ding & Stapleton, 2016; Evans & Morrison, 2011; Macaro et al., 2019). In general, this literature suggests that learners engage in strategic and autonomous learning during their first learning experiences in an EMI university context. However, many of the studies, with the exception of Macaro et al. (2019), drew on a small sample size such as nine learners in Ding and Stapleton (2016), and 39 learners in Soruç and Griffiths (2018) and, thus, lacked the use of statistical tools to quantitatively investigate students' use of strategies. Hence, the current study intends to address this gap by adopting a mixed methods design with quantitative measures from a sample of students that is large enough for statistical analysis (n = 412) as well as a sizable qualitative sample of students (n = 35) to better understand the nuances of listening strategies in an EMI context.

2.2. Self-regulation in educational psychology

Self-regulated learning (SRL) has been a well-researched construct in educational psychology, which according to Zimmerman and Schunk's (2011) definition, refers to "the processes whereby learners personally activate and sustain cognitions, affects, and behaviours that are systematically oriented toward the attainment of personal goals" (p.1). Under the influence of social cognitive theory (Bandura, 1986), research on self-regulation has extensively focused on the learners' use of metacognitive and cognitive strategies (Brown et al., 1983) including investigations of their motivation and self-efficacy beliefs (Bandura & Schunk, 1981; Pintrich & De Groot, 1990; Zimmerman & Martinez-Pons, 1990). In line with this trend, Zimmerman (Zimmerman, 1989, 2000; Zimmerman & Moylan, 2009) conceptualised a three-phase SRL cyclical model of *forethought, performance (or volitional control)*, and *self-reflection*, foregrounding the importance of self-efficacy in mediating this set of associated self-regulatory processes. Indeed, a proliferous amount of literature has examined the role of self-efficacy in SRL (e.g., Pajares, 2008; Shunk & Dibenedetto, 2016; Zimmerman & Martinez-Pons, 1990) as a central notion of social cognitive theory (Bandura, 1986, 1997). According to Bandura (1986), self-efficacy refers to beliefs in one's capabilities of implementing courses of actions to achieve certain attainments.

Although originally placed in the *forethought* phase, research has shown efficacy beliefs of learners interact with their self-regulatory behaviours throughout all three phases outlined in Zimmerman's model. In the *forethought phase*, learners set learning goals, make plans and select strategies for the task. Highly efficacious students were reported to choose more specific strategies suitable for the tasks (Wigfield et al., 2011), and are prone to invest more effort (Pajares, 2008). Subsequently students enter the *performance*

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[1] In the present study, teacher-talk refers to the language produced by the teacher in a classroom setting, whether monologic or interactional.

phase (also referred to as *volitional control*), when they exert self-control to remain focused, adopt appropriate task strategies, and monitor or record their learning progress using techniques such as note-taking. Self-efficacy has been found to mediate multiple metacognitive processes during this phase, including time management (Bandura, 1997), help seeking (Zimmerman & Martinez-Pons, 1990), and self-monitoring (Bouffard-Bouchard et al., 1991; Shunk & Dibenedetto, 2016). Finally, students arrive at the *self-reflection* phase, when they evaluate their performance, make causal attributions of the results, and possibly adapt their learning for the next learning cycle. At this stage, highly efficacious students are more likely to attribute failures to controllable factors (Zimmerman, 2011), and to react to dissatisfaction through positive and adaptive efforts (Shunk & Dibenedetto, 2016).

2.3. Self-regulation in L2 listening

In the field of L2 research, Dörnyei (2005) first introduced self-regulation as an alternative concept to language learner strategies. Since then, many studies have focused on students' self-regulated learning of vocabulary (Mizumoto and Takeuchi, 2012; Tseng et al., 2006; Tseng and Schmitt, 2008; Ziegler, 2015) and writing (Lam, 2015; Rose & Harbon, 2013; Teng & Zhang, 2016, 2018). In contrast, research into the self-regulatory processes surrounding L2 listening has been rather limited (Mareschal, 2007; Yabukoshi, 2018; Zeng & Goh, 2018).

Existing research on self-regulated listening has integrated *metacognition* as an important component (e.g., Zeng & Goh, 2018) perhaps due to the "parallel and intertwining" relationship between metacognition and self-regulation (Fox & Riconscente, 2008). Based on evidence from confirmatory factor analysis (Teng & Zhang, 2016), Zhang and Zhang (2019) conceptualise self-regulation as an overarching construct, within which a metacognitive aspect is situated. This conceptualisation also echoes that of some researchers in educational psychology (e.g., Pintrich, 2000; Winne & Hadwin, 2008). Drawing on Wenden's (1991, 1998) framework of meta-cognitive knowledge and research on self-regulation (e.g., Boekaerts et al., 2000), Vandergrift et al. (2006) developed the meta-cognitive awareness listening questionnaire (MALQ) to measure learners' knowledge and perceived use of strategies in L2 listening. The MALQ has been used in studies which revealed a positive correlation between learners' metacognitive awareness and their L2 listening proficiency (e.g., Goh & Hu, 2014; Vandergrift et al., 2006).

In addition to metacognition, *deep processing strategies* is another construct closely associated with self-regulated learning and has been included in Oxford's (2011) Strategic Self-Regulation (S²R) Model of language learning. Unlike surface strategies which only entail minimum cognitive investment for completing a task (e.g., rote memorisation), deep strategies (e.g., elaboration) make meaningful associations between new and existing knowledge, hence resulting in long-term retention of information (Ehrman & Leaver, 2003). Oxford (2011) argues that "students who often use deep processing strategies are often intrinsically motivated for learning or personal growth, and they show task persistence, good performance, and ability to regulate their own learning" (p. 30). The adoption of deep processing strategies by language learners was found to be closely associated with their perceived self-efficacy (e.g., Mizumoto, 2012), and the same relationship has been reported elsewhere in learning other subjects as well (Fenollar et al., 2007; Greene & Miller, 1996; Phan, 2009).

The review of literature on self-regulation reveals three gaps of research. First, the construct of self-regulation has hitherto been mainly applied to vocabulary learning, whereas listening remains a neglected area. Second, although previous studies have indicated that students engage in self-regulatory learning processes through strategic behaviours and persistence in EMI settings (e.g., Ding & Stapleton, 2016; Evans & Morrison, 2011), no studies have drawn on an SRL framework to systematically investigate the issue. Third, L2 listeners' perceived self-efficacy and listening proficiency have been found to be closely related to their strategic behaviours in language learning (Goh & Hu, 2014; Graham & Macaro, 2008). However, it remains in question whether the two factors play a crucial role in learning in an EMI context.

In order to address these gaps in research, the present study aims to investigate the self-regulated listening of transition-year students at an EMI transnational university in China. Specifically, the study intends to answer the following research questions:

1. What strategies do students report in listening to EMI classes?
2. How do students self-regulate their learning in relation to listening in EMI classes?
3. How do students' *baseline English listening proficiency* and *self-efficacy in listening to EMI classes* interact with their self-regulated listening in EMI contexts?

3. Methodology

3.1. Settings and participants

Data were collected at an EMI transnational university located in southeast China. The university was chosen for two main reasons: first, as the earliest joint-venture between research-led universities in UK and China, the university has developed a mature EMI curriculum; second, a large student cohort of around 4000 is enrolled every year, covering wide demographic variations and hence making the results more generalisable. Upon arrival at the university, students are clustered into six broad majors, and participate in the Oxford Online Placement Test (OOPT). The results include a standardised score for the overall test and a listening section, both of which are matched with the CEFR level (see Oxford University Press, 2020). Students are streamed into three levels of EAP classes based on the overall test score, namely *Foundation*, *Standard*, and *High-level*. During the first semester, students are required to take a 7.5-credit EAP module as well as two to three major-specific EMI modules up to 10 credits (1 credit = 1 hour of class contact/week).

All students enrolled in the EMI modules of *communication*, *linguistics*, and *business* were invited to participate in the study. These

modules belonged to the broad majors of *Humanities and Social Science* (H&SS) and *Business*, which are among the disciplines where previous research suggests that students may encounter most language-related difficulties (Yang & Farley, 2019). After receiving an introduction to the study, a total of 495 students filled in a questionnaire that included a battery of measures (see section 3.2). The researcher then cleaned the data, deleting responses with a low completion rate, which eventually resulted in a valid sample of 412 students (see Table 1). All respondents had Mandarin Chinese as their first language and attended high schools with subject courses instructed in Chinese prior to the university. A large majority had no experience living or studying abroad (86.4%), with a small number having spent less than one month (9.0%) or less than six months (4.6%) abroad.

Following a maximum variation sampling strategy (Dörnyei, 2007), a sub-cohort of 35 participants were contacted for semi-structured interviews (see Table 2). Students were balanced across all three EMI modules. Most of the participants (n = 28) had no overseas experience and only seven had travelled abroad for less than one month. Although the sample included a larger cohort of female (n = 313) than male students (n = 99), previous research has shown that gender has no significant correlation with SRL strategies (Ting & Chao, 2013). Nonetheless, a gender imbalance in the sample is duly noted.

3.2. Instrumentation

Data collected for the study included the following:

- Students' OOPT listening scores as a measure of their *baseline English listening proficiency (BELP)*;
- A battery of three subscales of *metacognitive awareness of listening strategies*, *deep processing listening strategies*, and *self-efficacy in listening to EMI classes*;
- Semi-structured interviews to explore how students self-regulate their learning in relation to listening in EMI classes.

The subscale of *metacognitive awareness of listening strategies* was adapted from the Metacognitive Awareness Listening Questionnaire (MALQ) developed by Vandergrift et al. (2006). Students were asked to record, on a 6-point Likert scale (6 = totally agree; 1 = totally disagree), the degree that they used certain listening strategies in EMI classes. To check the robustness of the MALQ for the present study, an exploratory factor analysis (EFA) was conducted on the subscale, which revealed that multiple items of the factor 'person knowledge' had low communality values less than 0.30, and hence the factor was excluded from the subscale. The remaining 18 items yielded a four-factor solution largely resembling the MALQ (see Appendix A), including strategies of 'directed attention', 'plan-evaluation', 'problem solving', and 'mental translation'. Cronbach's α for the subscale was 0.84, suggesting a high reliability.

Adapted from the Motivated Strategies for Learning Questionnaire (MSLQ) validated by Pintrich et al. (1993), the subscale of *deep processing listening strategies* also adopted the afore-mentioned 6-point Likert scale. Three strategies, namely, 'elaboration', 'organisation' and 'critical thinking' were incorporated, referred to as 'deep processing strategies' as per Oxford's (2011, p. 29–30) definition. An EFA conducted on the subscale identified a same factor structure as the MSLQ (see Appendix B). The subscale had a high reliability, indicated by a Cronbach's α of 0.91.

The subscale of *self-efficacy in listening to EMI classes* was newly developed with the items synthesised from existing scales on self-efficacy in L2 listening (Graham & Macaro, 2008; Yabukoshi, 2018). A 100-point system was adopted following Bandura's (2006) guidance on designing a self-efficacy scale, ranging in 10-unit intervals (0 = cannot do at all; 100 = highly certainly can do). The 10-item subscale was validated with a principal component analysis (PCA), which yielded a one-factor solution that explained 76.3%

Table 1
Information of questionnaire participants (n = 412).

Variable	Group	n	Ratio
Gender	Female	313	76.0%
	Male	99	24.0%
Age	18	324	78.6%
	19	67	16.3%
	Other	21	5.1%
Major	Business	267	64.8%
	Humanities & Social Sciences	145	35.2%
EAP class level (based on OOPT overall score)	High-level	65	15.8%
	Standard	294	71.3%
	Foundation	53	12.9%
Baseline English listening proficiency (based on OOPT score for the listening section)	A1	7	1.7%
	A2	89	21.6%
	B1	176	42.8%
	B2	87	21.1%
	C1	50	12.1%
	C2	3	0.7%
Years of English learning	More than 9 years	268	65.1%
	6–9 years	113	27.4%
	Less than 6 years	31	7.5%

Table 2

Information of interview participants (n = 35).

Variable	Group	n
Gender	Female	25
	Male	10
Major	Business	12
	Humanities & Social Sciences	23
EAP class level (based on OOPT overall score)	High-level	8
	Standard	19
	Foundation	8
Baseline English listening proficiency (based on OOPT score for the listening section)	A1	1
	A2	8
	B1	15
	B2	5
	C1	5
	C2	1

of the total variance (see Appendix C). The subscale was considered highly reliable with a Cronbach's α of 0.97.

Finally, the semi-structured interviews were informed by Zimmerman's three-phase cyclical SRL framework (see Appendix D for the interview protocol). Students were asked, in open-ended questions, about their perceptions, feelings, and learning behaviours before, during, and after listening to EMI classes. Probes were provided to encourage further discussions when interesting themes were touched upon (Dörnyei, 2007).

3.3. Procedures and data analysis

The survey was administered in the second week of students' first term of university study to capture key constructs at the time of transition to their new learning environment. Students were invited to fill in a questionnaire consisting of a battery of instruments detailed in section 3.2, via the online platform 'Qualtrics' as soon as they finished EMI classes. The immediacy attempted to enhance the accuracy of memory recall in capturing students' reported strategy use (Cohen & Macaro, 2007). Semi-structured interviews were delivered in the following week on an individual basis. Each interview lasted for 30 to 60 minutes and was conducted entirely in Chinese. All interviews were audio recorded and were later transcribed by the first author to ensure that the meaning and tones aligned with that in the original language. Excerpts were translated into English by the same author and checked for accuracy by the second author when the data were presented.

Using SPSS 25.0, descriptive statistics were first generated from questionnaires to depict students' reported use of listening strategies in class (RQ1). Multiple regression was used to examine if and how students' *baseline English listening proficiency* and *self-efficacy* predicted their reported strategy use (RQ3). The qualitative data were analysed using NVivo, following the thematic content analysis procedures proposed by Kuckartz (2014). Main categories were developed deductively from the literature on self-regulated learning and sub-categories emerged from the dataset inductively. The sub-categories were iteratively amended throughout the coding process, after which they were systemised and summarised for further analysis. The categories and sub-categories were first presented and described (RQ2). After that the interplay between constructs were explored using the 'matrix coding' query function in NVivo (RQ3).

4. Findings

4.1. Listening strategies in EMI classes

Table 3 presents the descriptive statistics of students' perceived use of listening strategies in EMI classes two weeks into the first semester. The cohort, on average, reported a substantial use of strategies, indicated by multiple mean values above the 3.5 middle point. Among *metacognitive awareness of listening strategies*, *directed attention* (Mean = 4.44, SD = 0.78) and *problem solving* (Mean =

Table 3

Descriptive statistics of the reported use of listening strategies in EMI classes.

Strategy	n	Mean	SD	Min	Max
Metacognitive awareness of listening strategies					
Directed attention	401	4.44	0.78	1.75	6.00
Problem solving	401	4.28	0.66	2.17	6.00
Plan-evaluation	401	3.84	0.73	1.20	6.00
Mental translation	401	3.61	0.89	1.00	6.00
Deep processing strategies					
Elaboration	387	4.38	0.70	2.00	6.00
Critical thinking	387	4.00	0.79	1.00	6.00
Organisation	387	3.98	0.88	1.25	6.00

4.28, SD = 0.66) were most highly rated. This reflected an awareness of the students to maintain concentration while listening, and to infer the meaning of teacher talk when comprehension problems occurred. The use of *plan-evaluation* was reported to a lesser degree (Mean = 3.84, SD = 0.73), indicating that students were less likely to plan, monitor, or evaluate their listening in class. It should be noted, however, that an observable level of *mental translation* was also reported (Mean = 3.61, SD = 0.89), a strategy considered obstructive to becoming skilled listeners (Vandergrift et al., 2006). However, compared to other strategies, *mental translation* seemed to be the least reported strategy.

Among *deep processing strategies*, students reported to most heavily resort to the strategy of *elaboration* (Mean = 4.38, SD = 0.70). This alluded to a perceived attempt by students to associate new knowledge heard in class to prior knowledge through tactics such as paraphrasing and making analogies to known information. A certain degree of *critical thinking* (Mean = 4.00, SD = 0.79) and *organisation* (Mean = 3.98, SD = 0.88) was observed, but not as highly reported as *elaboration*. This suggested that students, to a certain extent, perceived themselves to select and establish connections among information as well as to critically evaluate information while listening. Fig. 1 presents the boxplot of the strategies reportedly used by the students.

4.2. Self-regulated learning in relation to listening in EMI classes

Interview data were analysed to explore the self-regulated learning that students employed before (*Forethought phase*), during (*Performance phase*), and after (*Self-reflection phase*) listening to EMI classes. Major themes are summarised in Table 4 with a count of how many participants referred to each theme. In accordance to recommendations by Selvi (2020), these frequency counts are intended to provide an overview of the prevalence of themes in the data, which are then illustrated qualitatively via representative excerpts. Excerpts are labelled for reference according to each participant's major and CEFR proficiency, as well as other key variables (such as self-efficacy ratings) when relevant to the discussion.

4.2.1. Forethought phase

The most heavily coded themes in the *forethought phase* related to previewing materials, vocabulary, and knowledge. Prior to EMI classes, *previewing slides or textbooks* was found the most commonly undertaken effort (n = 26). Students mainly commented on two processes during preview: *tackling unknown vocabulary* (n = 16) and *organising knowledge structures* (n = 16). In dealing with new vocabulary, several students preferred looking up and figuring out the exact meaning of specialist vocabulary during preview (n = 5), referring to them as the 'key knowledge points' (S18, H&SS/B1). Resolving key terminology beforehand, according to one student, 'makes it easier to focus and to follow the teacher tightly in class because I don't have to stop and look it up in the dictionary' (S2, H&SS/B2). In the face of non-specialist new words, although some students still resorted to dictionaries (n = 7), others were more tolerant with extrapolating meaning or simply 'letting it pass' if the words interfered little with understanding the general meaning (n = 6).

Organising knowledge structures was another heavily coded theme (n = 16). For some students, this process was top-down, where they prioritised headings and sub-headings over explanations and examples to grasp the main knowledge points (e.g., S18, H&SS/B1; S10, Business/B2). For others, during the preview stage, it involved bottom-up summarisation of details after careful reading: 'I would read through the textbook chapter and then organise the structure to clarify what the topics are within each sub-heading' (S28, H&SS/A2). Similar bottom-up organising processes were mirrored by other lower proficiency students (e.g., S29, H&SS/A1; S32, Business/A2), where detailed information such as examples were valued for 'making the content more understandable' (S24, H&SS/A2).
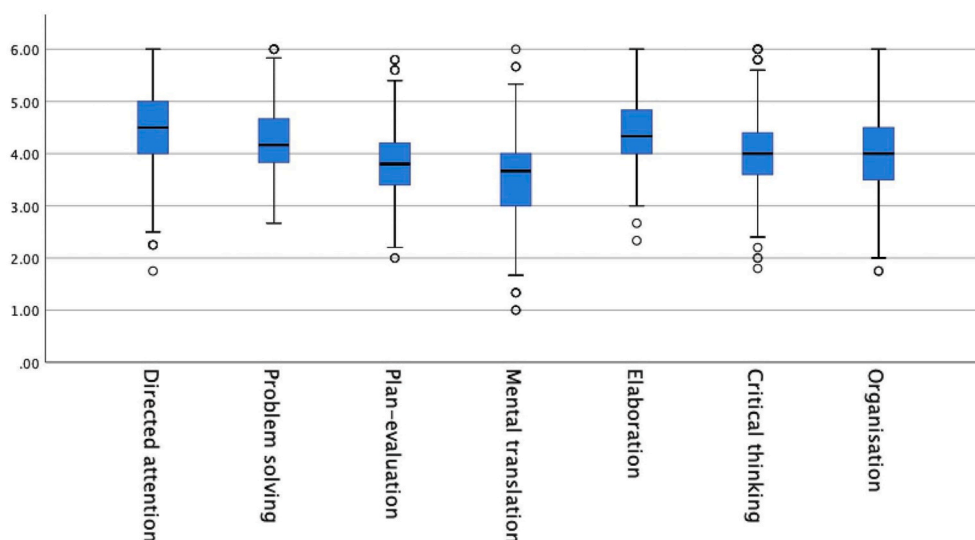

Fig. 1. Boxplots of the reported use of listening strategies in EMI classes.

Table 4
Categories and themes of semi-structured interviews (n = 35).

Categories	Themes	References
Forethought Phase		
Goal setting	Understanding the literal meaning of teacher talk	13
	Prioritising subject knowledge	5
Preview	Previewing slides or textbooks before classes	26
	Dealing with unfamiliar vocabulary	16
	Organising knowledge structures	16
Performance Phase		
Attention management	Trying to stay focused or resuming attention	12
	Selectively distributing attention	11
	Reducing note taking	11
Problem solving	Inferring meaning of words or sentences	14
Deep processing of content knowledge	Associating and anticipating teacher talk	12
	Thinking critically	4
Self-reflection Phase		
Review and remedy	Reviewing slides	14
	Reorganising and completing class notes	8
	Seeking help from others	9
Evaluation, attribution, and adaptation	Evaluating the degree of understanding	16
	Attributing listening problems to lack of proficiency	7
	Attributing listening problems to learning methods	2
	Willingness to adapt for future listening	20

Structuring knowledge during preview was considered important and conducive to associating knowledge taught in class, as one student described: 'It's like knowing where a branch is on a tree instead of just getting all the scattered leaves' (S24, H&SS/A2).

4.2.2. Performance phase

When listening to EMI classes, the *management of attention* became critical to the quality of learning. Though getting distracted was almost inevitable, many students reflected a strong will to *control and persist against attention loss* and to *re-direct focus* back to listening (n = 12). As a student commented: 'I told myself today to persist until the end even if I couldn't understand' (S28, H&SS/A2). To optimise the use of restrained attention capacity, some students *selectively distributed attention* to certain elements in class based on variations in teacher speech (n = 11), as shown by the excerpt below:

> Because I know I can't remain focused like a robot for a whole lesson, I need to allocate my attention to the truly important or difficult parts. When the teacher stresses, repeats or pauses, I feel this must be important. But when the teacher states a tedious opinion or gives similar examples, I might skip if I already get his point.
> (S20, H&SS/A1).

Reducing note taking was another strategy reported to ease the strain on limited attentional resources (n = 11). Students prioritised understanding the spontaneous teacher talk and tended to only note down key points (n = 11), illustrative examples (n = 4), challenging concepts (n = 3), or new vocabulary and expressions (n = 5). This minimalist approach for note taking, however, seemed to stem from trial and error, as a student reflected: 'At the beginning I took very detailed notes but my efficiency in class was not very high. So yesterday I just tried more general notes and I was more satisfied with my understanding' (S13, H&SS/B1).

Listening in EMI classes was frequently impeded by linguistic barriers. Many students commented on attempts to *infer meaning for words and sentences* (n = 14). For instance, some students extrapolated new words using prefixes and suffixes (S24, H&SS/A2; S22, Business/B1), while others speculated the meaning of sentences based on the overall gist of the passage (S34, Business/A2) or adjacent sentences (S16, H&SS/B1). These techniques were usually developed to cope with a continuous flow of teacher talk, but came with a risk of compromising accuracy of comprehension, as one student reported: 'I would guess new words with prefixes, suffixes, or the general passage meaning. Though it might not be that accurate, it does save me much time' (S34, Business/A2).

In spite of limitations of cognitive capacity in EMI classes, some students still managed to carry out *deep processing of content knowledge*. *Associating and anticipating* (n = 12) as well as *thinking critically* (n = 4) were two recurring themes, which were, nonetheless, usually conditioned on sufficient preview. Students reported to actively connect knowledge in class to what was previewed. They also predicted and organised teacher talk to aid understanding: 'When the teacher is talking, I would draw on the knowledge structure from preview and think which part he is covering now, and what he will teach next.' (S28, H&SS/A2). After activating their knowledge during preview, some students even reported a certain degree of *critical thinking*: 'I feel more engaged in class if I've previewed well. If the teacher talks about a point and gives an example, I will be able to follow him to give another example' (S13, H&SS/B1).

4.2.3. Self-reflection phase

The interview data showed that the majority of the students *reviewed* after class (n = 27). The most popular tools for review were the lecture slides (n = 14). Some students preferred *skimming slides* to refresh themselves of the general knowledge points (e.g., S35, Business/A2; S15, H&SS/B1). Others, however, *read the slides carefully*, aiming to detect and resolve information missed in class (e.g., S31, Business/B1; S34, Business/A2). Another common approach was to *reorganise and complete the notes* taken in class (n = 8). In doing

so, students seemed to compensate for what they should have, but due to restrained attention, could not have achieved in class: 'I just write down some notes in class then after class I can organise them in a logical way' (S18, H&SS/B1).

In addition to review, several students reported *seeking help from others* after class (n = 9). This included asking for help on missing information or parts of the lecture that they had difficulties understanding (e.g., S1, H&SS/C1; S32, Business/A2), and confirming with peers about homework requirements (S11, H&SS/B1). A few students also requested help from teachers on specific points that remained problematic after review (S29, H&SS/A1), or sought advice from senior students on effective listening methods in class (S1, H&SS/C1).

Still, a number of students *reflected upon the degree of understanding* (n = 16). When they were dissatisfied with the listening outcomes, many students attributed the problems to their *insufficient English proficiency* (n = 7), in particular, a small vocabulary size (S11, H&SS/B1; S25, H&SS/A2; S31, Business/B1). A couple of them, however, blamed their previous *vocabulary learning method*: 'I think I have these listening problems because I used to separate the pronunciation from spelling when learning words' (S12, H&SS/B1). Critical reflections on causes of listening problems also emerged, as one student commented: 'If there was a moment I didn't understand in class, after class I would think back to that moment on what caused the breakdown – was it that I wasn't focused enough or just a matter of my proficiency?' (S32, Business/A2).

In response to these problems, many students expressed a willingness to *adapt their learning* to achieve better understanding in class (n = 20). These adaptations included investing more time in preview (S3, H&SS/C1; S29, H&SS/A1), searching for relevant information in Chinese to 'digest' the subject knowledge (S13, H&SS/B1), strengthening the ability to guess word meaning (S29, H&SS/A1), enlarging vocabulary (S25, H&SS/A2; S35, Business/A2), and practicing listening in their spare time (S24, H&SS/A2; S26, H&SS/A2).

4.3. The interplay between self-regulated listening, baseline English listening proficiency, and self-efficacy

A series of simultaneous multiple regressions were conducted on the data to examine if students' *baseline English listening proficiency (BELP)* and *perceived self-efficacy in listening to EMI classes* predicted their reported use of various listening strategies in class. Assumptions were first examined prior to the tests, and descriptive statistics of the two predictor variables are outlined in Table 5 in addition to the outcome variables, namely the strategies presented in 4.1. Results of the multiple regression tests are presented in Table 6.

In general, the combination of students' *baseline English listening proficiency* and *self-efficacy* significantly predicted all types of strategies. For metacognitive awareness of listening strategies, the two predictors best explained *problem solving* for a total variance of 20.4% ($F_{[2, 391]} = 50.02$, $p < .001$), followed by *directed attention* ($R^2 = 0.109$, $F_{[2, 391]} = 23.90$, $p < .001$) and *plan-evaluation* ($R^2 = 0.103$, $F_{[2, 391]} = 22.43$, $p < .001$). The least predicted construct was *mental translation*, for which only 6.6% of the total variance was explained ($F_{[2, 391]} = 13.79$, $p < .001$). Concurrently, the two predictors together significantly explained 17.7% of the deep processing strategy *elaboration* ($F_{[2, 383]} = 41.23$, $p < .001$) and 15.9% of *critical thinking* ($F_{[2, 383]} = 36.12$, $p < .001$). The use of the *organisation* strategy, however, was predicted to a lesser degree ($R^2 = 0.117$, $F_{[2, 383]} = 25.49$, $p < .001$).

Table 6 further illustrates that the students' *baseline English listening proficiency* significantly predicted *mental translation* ($\beta = -.22$, $p < .001$), *plan-evaluation* ($\beta = -.11$, $p = .039$), *critical thinking* ($\beta = -.11$, $p = .041$) and *organisation* ($\beta = -.12$, $p = .034$). In particular, the *BELP* showed a stronger effect in predicting students' reported use of *mental translation*, as indicated by a larger absolute value of the standardised coefficient ($\beta = -.22$). Specifically, as students' *BELP* increased by one SD, their reported use of *mental translation* decreased by 0.22 SD. The *perceived self-efficacy in listening to EMI classes*, however, was found a significant predictor for the reported use of all types of strategies except for *mental translation* ($\beta = -.06$, $p = .289$).

The interview data revealed a more nuanced role of students' *baseline English listening proficiency* and *self-efficacy* in mediating their listening in class. *Mental translation* was most commonly mentioned by students with intermediate listening proficiency ranged between B1 to B2 (n = 6). Although low-proficiency listeners favoured translation, they often found it too strenuous due to perceptual difficulties such as segmenting speech: 'When the teacher talks fast, I can't even tell the words so it's hard to translate' (S35, Business/A2).

As the interview data revealed, the students' *perceived self-efficacy* seemed to influence several strategic processes in listening. First, in terms of *problem solving*, low-efficacy students tended to resort to dictionaries for fear of guessing the meaning wrongly, even if they might be more proficient: 'I'm not very confident, neither am I sure about what the teacher means. I always worry that I get it wrong' (S10, Business/B2, *self-efficacy 39*). Self-efficacy also seemed to play a role in *directing attention* in listening to EMI classes. Lack of efficacy was found to demotivate students and hamper their willingness for sustaining attention, as one student described: 'I'm always afraid that I can't keep up with the teacher. Actually, when one feels unconfident or not good enough, (s)he loses the drive to continue to listen' (S21, Business/B2, *self-efficacy 37*).

In contrast, high-efficacy students seemed more confident at extrapolating meaning based on clues from preview or context (S24, H&SS/A2, *self-efficacy 71*; S33, Business/B1, *self-efficacy 66*). Sufficient *preview* was considered an effective approach to enhance

Table 5

Descriptive statistics of baseline English listening proficiency (BELP) and self-efficacy in listening to EMI classes.

	n	Mean	SD	Min	Max
BELP	410	53.82	18.96	8.00	110.00
Self-efficacy	396	53.10	18.52	6.00	98.00

Table 6

Simultaneous multiple regression of baseline English listening proficiency (BELP) and self-efficacy on listening strategies.

Outcome variable	Predictor variable	B	SE B	β	t	Sig.	Model summary
Metacognitive awareness of listening strategies							
Directed attention	Constant	3.82	0.13		29.36	.000	$R^2 = 0.109$
	BELP	0.00	0.00	−.09	−1.59	.113	Adjusted $R^2 = 0.104$
	Self-efficacy	0.02	0.00	.36	6.70	.000	R = 0.330***
Problem solving	Constant	3.39	0.10		32.76	.000	$R^2 = 0.204$
	BELP	0.00	0.00	.04	0.86	.393	Adjusted $R^2 = 0.200$
	Self-efficacy	0.02	0.00	.43	8.43	.000	R = 0.451***
Plan-evaluation	Constant	3.32	0.12		27.22	.000	$R^2 = 0.103$
	BELP	0.00	0.00	−.11	−2.07	.039	Adjusted $R^2 = 0.098$
	Self-efficacy	0.01	0.00	.36	6.60	.000	R = 0.321***
Mental translation	Constant	4.31	0.15		28.56	.000	$R^2 = 0.066$
	BELP	−0.01	0.00	−.22	−4.07	.000	Adjusted $R^2 = 0.061$
	Self-efficacy	0.00	0.00	−.06	−1.06	.289	R = 0.257***
Deep processing strategies							
Elaboration	Constant	3.56	0.11		31.58	.000	$R^2 = 0.177$
	BELP	0.00	0.00	−.02	−0.40	.692	Adjusted $R^2 = 0.133$
	Self-efficacy	0.02	0.00	.43	8.19	.000	R = 0.421***
Critical thinking	Constant	3.25	0.13		25.11	.000	$R^2 = 0.159$
	BELP	−0.01	0.00	−.11	−2.05	.041	Adjusted $R^2 = 0.154$
	Self-efficacy	0.02	0.00	.44	8.24	.000	R = 0.398***
Organisation	Constant	3.30	0.15		22.38	.000	$R^2 = 0.117$
	BELP	−0.01	0.00	−.12	−2.13	.034	Adjusted $R^2 = 0.113$
	Self-efficacy	0.02	0.00	.38	7.02	.000	R = 0.343***

Note: *** p < .001.

students' self-efficacy, which would then contribute to a more in-depth processing of knowledge in class. As one student commented:

> If I realise that I have covered this point in preview, I won't worry that I can't understand at all. I'd be more confident, more efficient and I can compare what I read from preview with what the teacher is teaching to see if there are differences.
> (S14, H&SS/B1, *self-efficacy 70*).

Similar feelings were visible in other students' accounts (e.g., S24, H&SS/A2; S33, Business/B1), where they reflected that preview gave them a sense of control over what would be delivered in class, hence reducing their anxiety in listening and enhancing understanding.

5. Discussion

The study reveals that students engaged in a self-regulatory cycle of learning to cope with the transition to listening to EMI classes. Data showed that students' listening experience and use of strategies in class were closely associated with both their learning before and after class and thus should be viewed as a holistic process. This finding echoes previous studies, which reported that students managed to survive and thrive in EMI classes during their transition year via preparation before lessons (Ding & Stapleton, 2016), and industrious catch-up or review of knowledge after class (Evans & Morrison, 2011; Macaro et al., 2019). The study further shows that students not only invested effort into extra learning, but also evaluated the outcomes of this learning, reflected on the effectiveness of methods, and identified causes for listening problems. This critical reflection could presumably not only strengthen learners' meta-cognitive knowledge of themselves, the tasks, and the strategies, but also inform their learning behaviours for subsequent learning cycles.

Unlike Macaro et al.'s (2019) research in Italy, however, the present study finds that the majority of the students indeed carried out preview on textbooks and slides prior to the lessons. One of the explanations for the difference might be that the structure and content of lessons that EMI teachers in this study delivered highly cohered to the materials provided to the students for preview. Hence, after students structured the knowledge in preview materials, they might find it easier to organise and make connections among knowledge taught in class. In addition, the consistency between preview materials and content covered in class might have offered students relevant repertoire of knowledge to draw upon, which may explain why students considered sufficient preview conditional to the deep processing of information in class. This finding is in line with Soruç and Griffiths's (2018) study, where the authors also note that students needed to activate all relevant prior knowledge and experience to critically process the information in EMI classes.

The study also identifies *attention management* and *problem solving* as two important self-regulatory processes while listening to EMI classes. In terms of *attention management*, though Hua (2020) argues that students in EMI classes found it difficult to maintain con-centration, findings from our study suggest that students at least tried to counteract this problem by resorting to the strategy of *directed attention*. Additionally, in order to use limited attentional resources to achieve optimal learning, students were found to distribute their attention selectively and reduce note taking. This finding aligns with Soruç and Griffiths's (2018) study, where students were reported

to pay particular attention to stress and emphasis in teacher talk and to reduce note taking to prioritise understanding.

Problem solving was another highly rated strategy in the questionnaire data and a frequently recurring theme during interviews. As general academic vocabulary and field-specific terminology pose tremendous challenges in listening to EMI classes (Evans & Morrison, 2011), Macaro et al. (2019) argue that students need to deploy strategic effort to compensate for their lack of linguistic (especially vocabulary) knowledge. Similar to Macaro et al.'s study (2019), our study also finds *inferring the meaning of unknown words* a commonly reported strategy. However, as findings from the interviews suggest, the rapid and spontaneous teacher speech left some students no choice but to extrapolate word meaning while sacrificing the accuracy of such inferences due to the limited time resources available to them while listening. Hence, to enhance the effectiveness of this strategy, students need to deploy other relevant strategies such as comprehension monitoring to reduce chances of misunderstanding (Graham & Macaro, 2008; Vandergrift, 2003).

Finally, the study reports that students' *self-efficacy in listening to EMI classes* significantly predicted their metacognitive awareness of multiple listening strategies including *directed attention*, *problem solving* and *plan-evaluation*, echoing findings elsewhere (Rahimi & Abedi, 2014). Self-efficacy also emerged as a significant predictor of students' reported use of all three deep processing strategies. This finding supports the contention that highly efficacious learners are usually more cognitively engaged in learning and thinking (Fenollar et al., 2007; Phan, 2009), and are more likely to adopt deep learning approaches such as organising knowledge (Pintrich & De Groot, 1990) and thinking critically (Phan, 2009). In contrast, students' *baseline English listening proficiency* only appeared to be a strong predictor for their reported use of *mental translation*. On the one hand, this finding aligns with Vandergrift et al.'s (2006) argument that *mental translation* is typically used by less proficient listeners. On the other hand, the finding suggests that listening proficiency might play a minor role in strategic listening in EMI classrooms compared to that in EFL/ESL settings. In other words, even less proficient listeners might still employ strategic effort to survive and to compensate for their linguistic competence in an EMI context.

6. Conclusion and implications

The findings of the study have several implications for language support in EMI classes when students are taking English medium courses for the first time. First, the importance of preview in this context indicates that EMI teachers can facilitate listening comprehension by following a set text in their curriculum, or making their slides available to students before class (see Flowerdew & Miller, 1997). This would help students to better regulate their learning during the forethought phase. By building up their knowledge of the content before the lecture, effective preview activities may free up cognitive space for deeper processing of information while listening. While teaching to a textbook may detract from pedagogical flexibility, these materials can provide a curriculum with a transparent structure, and allow students to devote more of their attention to understanding the content while listening. Pre-reading activities can boost overall understanding of content in EMI contexts, so lecturers could encourage students to engage in these activities if their lecture resembles the content of the reading.

Second, the study points to the important role of self-efficacy in predicting strategy use. Previous EMI research has linked self-efficacy to EMI success, suggesting that self-efficacy raising tasks be included in preparatory language programs (see Thompson et al., 2019). By this same logic, self-efficacy raising tasks in preparatory courses may raise the confidence of students during EMI listening activities to pave the way for successful strategy use and SRL. If students feel more efficacious in their regulation of listening in EMI via a confidence that has been built up over numerous scaffolded listening activities, they may be able to direct their attention to other important aspects of listening.

Finally, our study has suggested that lower proficiency students can apply strategies in EMI contexts to counter difficulties in listening, but nonetheless may require more help to avoid reliance on mental translation—a strategy known to impede listening comprehension and learners' development as skilled listeners (Vandergrift et al., 2006). The interview data pointed to the importance of preview to free up space for other strategies such as verifying and monitoring. To facilitate this, extra structural support in the transitional stages of EMI programs could be provided to students of a lower proficiency. These could include classes or study groups whose aim is to preview content and key terminology before listening to a lecture.

All of these recommendations may be best achieved via the careful integration of language support programs to accompany students' first EMI courses during this crucial transition period of university. Previous researchers have long lobbied the benefits of team-teaching, which involves input from both language and content teachers in the same classroom (Doiz et al., 2019). Students' first EMI classes at university (taught by content specialists) could be accompanied by specific language classes (taught by language specialists), where both types of teachers work closely together to facilitate the SRL cycle. The language teachers could work with the students in the forethought and self-reflection phases, applying strategies to preview and review content, language, and terminology as well as engaging them in self-efficacy-building listening activities. The content teachers would then work with students in the performance phase of EMI listening, teaching with a sensitivity to scaffold their listening strategies through the provision of readings and slides, thereby freeing up opportunities for deeper processing strategies to engage more deeply with the content of the classes.

Author statement

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Appendix A. Exploratory factor analysis for the subscale 'metacognitive awareness of listening strategies'

Item	problem solving	mental translation	directed attention	plan-evaluation
When I guess the meaning of the word, I think back to what I have heard to see if my guess makes sense.	0.86			
I use the general idea of the lesson to help me guess the words I don't understand.	0.72			
I use the words I understand to guess the meaning of the words I don't understand.	0.64			
I use my experience and knowledge to help me understand.	0.50			
Before I listen to EMI classes, I think of similar topics I have listened to.	0.46			
As I listen to EMI classes, I compare what I understand with what I know about the topic.	0.37			
I translate in my head as I listen to EMI classes.		0.97		
I translate word by word as I listen to EMI classes.		0.53		
I translate key words as I listen.		0.50		
When my mind wanders in EMI classes, I recover my concentration right away.			0.83	
I try to get back on track when I lose concentration.			0.72	
I focus harder on what the teacher talks when I have trouble understanding.			0.68	
When I have difficulty understanding what I hear, I (don't) give up and stop listening.			0.64	
I have a goal in mind as I listen to EMI classes.				0.78
As I listen to EMI classes, I periodically ask myself if I am satisfied with my level of comprehension.				0.69
After listening, I think back to how I listened and what I might do differently next time.				0.57
Before I start to listen, I have a plan in my head for how I am going to listen.				0.44
As I listen to EMI classes, I quickly adjust my interpretation if I realise that it is not correct.				0.37
Eigenvalues	5.57	2.13	1.63	1.32
% of variance (cumulative)	30.96	42.81	51.85	59.18
Cronbach's α **Scale:** 0.836 **Factor:**	0.83	0.66	0.80	0.74

Appendix B. Exploratory factor analysis for the subscale 'deep processing listening strategies'

Item	elaboration	organisation	critical thinking
When I listen, I try to relate what the teacher says to what I already know.	0.79		
When I listen, I try to understand the concepts in this class by making connections with what I read before the class.	0.78		
When I listen, I pull together information from different sources to help me understand, e.g. pre-reading materials, slides, etc.	0.66		
When I listen, I try to relate ideas in this lesson to those in other lessons whenever possible.	0.59		
When I listen for this course, I write brief summaries of the main ideas of what teacher talks.	0.41		
I try to apply ideas I listened in the class in other class activities such as discussion in seminars.	0.35		
After the class, I go over my class notes and make an outline of important concepts.		0.82	
After the class, I go through my class notes and try to find the most important ideas.		0.69	
As I listen, I make simple charts, diagrams, or tables to help me organise what I hear in class.		0.69	
As I listen, I outline key points to help me organise my thoughts.		0.48	
Whenever I hear an assertion or conclusion in this class, I think about possible alternatives.			0.80
When a theory, interpretation, or conclusion is presented in class, I try to decide if there is good supporting evidence.			0.77
I treat what I hear in class as a starting point and try to develop my own ideas about it.			0.73
I often find myself questioning things I hear in this course to decide if I find them convincing.			0.70
I try to play around with ideas of my own related to what I hear from the teacher.			0.67
Eigenvalues	6.71	1.61	1.32
% of variance (cumulative)	44.74%	55.47%	64.29%
Cronbach's α **Scale:** 0.908 **Factor:**	0.84	0.84	0.84

Appendix C. Principal component analysis for the subscale 'self-efficacy in listening to EMI classes'

Item	
I believe I can understand teachers' talk in EMI classes better than other students.	0.91
I believe I can learn English effectively to improve my English listening skills.	0.91
I am good at listening to subject knowledge taught in English.	0.90
I am capable of using listening skills to enhance my understanding in EMI classes.	0.89
I believe I can understand the details of EMI lectures.	0.89
I believe I can use strategies to improve my listening skills for EMI classes.	0.89
I believe I can learn to improve my listening skills for EMI classes in my own way.	0.85
I believe I can learn to improve my English listening skills more creatively than others.	0.85
I believe I can understand the general idea of EMI lectures.	0.83
I believe I can work out the meaning of unknown words in teachers' talk in EMI classes.	0.80
Cronbach's α	0.97

Appendix D. Interview protocol for semi-structured interviews

Forethought phase

➢ [Goal setting] What listening expectations (goals), if any, did you set for yourself before listening to EMI classes?
➢ [Strategic planning] What plans, if any, did you make for achieving the expectations (goals)?

Performance phase [Self-observation & Self-control]

➢ How did you feel (emotionally and motivationally) when you listened to EMI classes?
➢ How did you feel about your attention while listening to the teachers?
➢ While listening to EMI classes, what issues (problems), if any, were you aware of in your listening processes?

Self-reflection phase

➢ [Self-judgement] How did you feel/think about your experience after listening to EMI classes?
➢ [Self-reaction] What would you like to do (change) for listening to EMI classes in the following weeks?

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