

## Reconceptualising Linguistic Adaptation in EMI Classrooms: Self-regulatory Language-discursive Strategies in Taiwanese EFL Contexts

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### ABSTRACT

*In Taiwan, the evolution of bilingual education is reconfiguring instructional practices under the 2030 Bilingual Policy. English Medium Instruction (EMI) has become prominent; however, learners are still challenged by the academic content and the linguistic complexities inherent in a second-language learning environment. This study revalidates an adapted self-regulated learning (SRL) scale through a linguistic lens, investigating how Taiwanese EMI learners negotiate language practices, discourse strategies, and affective responses to support their academic and language development. Factor analysis revealed five dimensions—Supportive Adaptation, Intrinsic Perseverance, Goal Setting and action Scheduling, Negative Affection, and Extrinsic Expectancy—with findings suggesting that learners' language proficiency and previous exposure to EMI contexts predict not just academic self-regulation but also the effective management of language-related challenges. Implications for EMI pedagogy include explicit training in self-regulatory and language-discursive strategies to foster learners' capacity to navigate and transform classroom discourse.*

*Keywords: SRL strategies; EMI; higher education; bilingual education; Chinese-speaking context*

### INTRODUCTION

Bilingual education is emerging across various educational levels in Taiwan due to the driving force of the 2030 Bilingual Policy in response to the globalisation of the labour market and in hopes of increasing national competitiveness (NDC, 2018). Thus, the CLIL (Content and Language Integrated Learning) approach and EMI (English Medium Instruction) have been promoted at Taiwan's secondary, primary, and tertiary levels to achieve this goal. Efforts to prepare qualified CLIL or EMI teachers have been made, including teacher training courses, workshops or training programmes, ranging from short- to long-term. However, bilingual education learners seem to be less prepared for the new approaches, no matter whether they are in CLIL classrooms where learning the target language is viewed as one equal aim or in EMI classes where improved proficiency of the target language is seen as an implicit bonus (Arnó-Macià & Mancho-Barés, 2015; Dafouz & Smit, 2016; Rose & Galloway, 2019). Academic and language support provided to bilingual learners seemingly cannot keep up with the prevailing EMI provision in Asian settings (Galloway & Ruegg, 2020). This may result in only international students taking EMI courses if support for all students is not ensured (Burgess et al., 2010).

Academic and language support for students in EMI courses can vary across different institutes. Most support is extrinsic, including writing support services in writing centres, compulsory EAP courses, or self-access learning centres (Bradford, 2013; Johnston et al., 2008; Lassegard, 2006), although there is usually criticism of the accessibility and availability of the support by learners (Galloway & Ruegg, 2020). Sometimes, support for students is nearly non-existent in some EMI contexts. The literature on helping EMI learners intrinsically adapt to EMI classes is relatively scarce. Yet, informing students to control, monitor and evaluate their learning in EMI lessons should become another form of support. Relying on external resources cannot guarantee the survival of EMI learning experiences; it also needs learners' self-regulated learning (SRL) skills. In other words, EMI learners learning English as a second/foreign language (ESL/EFL) should be equipped with a wide range of SRL skills, for example, setting goals for EMI learning, attending to and concentrating on EMI instruction, using effective strategies to retain information, establishing a productive study environment, using resources effectively, monitoring performance, effectively managing time, seeking assistance when needed, holding positive beliefs about self-capabilities, learning values, the factors affecting learning, and the anticipated learning outcomes for their learning, and continuously reflecting on them (Bai et al., 2020; Bai & Wang, 2023; Schunk & Ertmer, 2000). These self-regulation skills can help keep learners motivated and facilitate their content and English learning and course completion, as has been extensively evidenced in online learning environments (Bol & Garner, 2011; Chang et al., 2022; Jansen et al., 2020; Kanoksilapatham, 2023).

Although abundant evidence shows a strong link between SRL strategy use and English learning results, SRL is still relatively under-studied in some Asian ESL/EFL contexts, such as Taiwan, where improved English proficiency is regarded as one implicit educational aim of EMI courses/ programmes. Students face significant challenges in academic learning when they have to shift from L1 medium instruction to L2 (or the target) medium instruction (Aizawa & Rose, 2020; Hu & Gao, 2018). Thus, EMI students should be explicitly informed of SRL skills or capacities so they can become autonomous learners who can master language and content beyond the classroom (Hu & Gao, 2020) if external support or service is limited or not readily accessible. Thus, our study aimed to identify what SRL strategies are commonly deployed by EMI learners with different variables affecting them by revisiting an established SRL survey to make it better fit the EMI learning environment.

## LITERATURE REVIEW

### AN OVERVIEW OF SELF-REGULATED LEARNING (SRL)

SRL, which originated from social cognitive theory, is defined as 'the ways in which learners systematically activate and maintain their cognitions, motivations, behaviours and affects to achieve their goals' (Schunk & Greene, 2018, p. 1). It involves learners actively pursuing desired learning goals through planning, monitoring, controlling and reflecting on various aspects of their learning process. A wealth of research has demonstrated that SRL can successfully predict students' academic and learning outcomes across different educational levels and settings (Broadbent & Poon, 2015; Greene, 2018; Schneider & Preckel, 2017; Zimmerman, 2013). Although there are several models for describing students' SRL processes, and new models are still constantly being proposed (Yu, 2023), Zimmerman's (2000) three-stage cyclical framework, comprising forethought, performance (or volitional control), and self-reflection, is a typical example of

describing the process whereby students use a combination of critical cognitive, metacognitive, affective, motivational, behavioural, and strategic skills to approach tasks before, during, and after learning (Greene et al., 2019). However, most SRL skills are not innate to learners but need to be explicitly taught (or at least learners need to be made aware of them), practised and developed (Schunk & Greene, 2018; Zepeda et al., 2015). Teachers must engage with self-regulation and make it explicit to students to promote their self-regulatory capacities (Russell et al., 2022). In other words, if teachers can model, support or engage students using SRL strategies, student learning and performance can be enhanced (Schunk & Greene, 2018).

The educational setting in which SRL is used is often in online (or distance) learning environments, as the underlying principles of both are almost identical, with both emphasising the importance of self-monitoring, problem-solving, self-assessment and self-reflection for learning (Mou, 2023). Students in online learning are expected to self-regulate and have a positive attitude towards their learning (Wang et al., 2013). There is recent empirical evidence of the benefits of using SRL strategies. For example, in Mou's (2023) study, students with a clear time management strategy tended to perform better and show an upward trend in self-monitoring and self-evaluation of their learning. In a mobile learning environment where SRL skills are taught, students' language skills improve significantly (Kondo et al., 2012). A systematic review by Edisherashvili et al. (2022) looked at SRL in higher education distance learning contexts, with a particular focus on the interventions identified as supporting all domains of SRL (metacognitive, cognitive, motivational and emotional) in its three phases (preparation, performance, evaluation). They argued that many SRL support interventions have been shown to affect SRL positively and that a combination of different interventions is beneficial for supporting online learning in universities. Even the recent development of AI technology has been identified as a potential way to support learners' successful SRL (Molenaar, 2022). For example, an AI-based planner was designed to help students set learning goals, suggest actionable strategies, and provide personalised study recommendations based on information gathered from individual student profiles and past performance records (Somasundaram et al., 2020). Similarly, a study by Jin et al. (2023) found that AI applications designed to support SRL strategies can effectively support Zimmerman's 14 SRL strategies. However, they warned that it is crucial to consider pedagogical and psychological design elements such as learner identity, engagement and positioning to improve support for students' SRL in online settings.

#### LINGUISTIC ADAPTATION AND DISCOURSE IN EMI

As EFL countries strive to internationalise and become more globally competitive, higher education institutions increasingly focus on implementing English Medium of Instruction (EMI) programmes in non-language subjects (Kong & Wei, 2019). English as an academic lingua franca and instructional language to facilitate international scholarly communication is generally supported by policies in Asian countries (Ackerley et al., 2017; Galloway & Rose, 2015). In Taiwan, the government's push to globalise higher education, improve university graduates' competitiveness and the education quality of universities, and provide more opportunities for students to enhance their English proficiency, as has been done in other Asian contexts, led to its proposal of the 2030 Bilingual Policy and the rapid growth of EMI programmes in universities (Healey, 2008; Hu & Lei, 2014; Rose et al., 2020).

University students need to achieve a certain level of English proficiency to cope with the demands of studying academic subjects in the target language. However, there is still a gap between policy and actual practices in implementing EMI projects in Asian settings (Wächter & Maiworm, 2014). For instance, Japan is under pressure to expand its EMI programmes in response to internationalisation by encouraging the implementation of EMI programmes in universities (Galloway & Rose, 2015). However, several difficulties have been reported, including teachers facing significant challenges in teaching EMI, regardless of their English proficiency level, and all students suffering linguistic or academic difficulties in EMI programmes (Aizawa & Rose, 2020). Thus, sustained language and academic support throughout EMI programmes is urgently needed in Asian EFL contexts where preparatory-style EMI models are prevalent (Aizawa & Rose, 2020; Macaro, 2018).

Promoting the 2030 bilingual policy in Taiwan has led to a rapid increase in content and language-integrated courses in higher education. Therefore, support for EMI teachers' professional development and teaching effectiveness is abundant (e.g. Fenton-Smith et al., 2017; Kao et al., 2021; Tsou & Kao, 2017; Tsui, 2017). However, support is much less and rarely documented for learners. Although it is acknowledged that government-initiated EMI programmes usually provide more opportunities for students to improve their English language skills (Hu & Lei, 2014), EMI learners need additional opportunities and provisions as support for EMI students is mainly concerned with improving their English language proficiency and general academic English (Wingate, 2022). They may be less willing to spend their free time on optional extra-curricular or credited English courses, as they perceive them as being irrelevant to their content courses. Pressure to study EMI courses is mainly due to unfamiliarity with the learning strategies of approaching EMI lessons and learning content knowledge through an unfamiliar L2 in an EFL-EMI setting (Hua, 2019) rather than less exposure to English language courses. What's worse, supporting strategies such as translanguaging or the supportive role of the L1 in facilitating EMI learning are sometimes not recognised in Taiwan's official EMI guidelines or in other Chinese-speaking EMI contexts such as China (Zhang & Wei, 2021). Supporting EMI learners is the core of EMI course delivery (Chin & Li, 2021). Different learning strategies that help learners survive in EMI environments instead of language courses may be more desirable, accessible and sustainable for students.

#### DEPLOYING SRL STRATEGIES TO FACILITATE EMI LEARNING

Traditional studies of SRL focus on planning, monitoring, and evaluating learning processes (Schunk & Greene, 2018). However, in EMI classrooms, regulating learning is inseparable from language management. Scholars have noted that learners must simultaneously acquire academic content and develop proficiency in the target language through active negotiation of classroom discourse (Chin & Li, 2021). Thus, external support, such as EGP/ESP/EAP interventions offered by universities and internal support can be complementary, such as raising awareness of self-regulated learning skills or explicitly teaching them.

SRL strategies are beneficial for learners' English proficiency in EFL classrooms, with studies indicating a significant positive correlation between English vocabulary learning and SRL ability (Liang, 2016) and a relationship between learners' SRL ability and their frequent use of English learning strategies (Saito, 2020). Under the guidance of explicit instruction of SRL strategies, EFL learners can perform significantly better on L2 proficiency tests than their peers who do not receive SRL instruction (Chang, 2007; Deng, 2012). However, the use of SRL to

enhance learning satisfaction in EMI classrooms has been less addressed because EMI is usually not considered part of EFL classrooms, but in fact, improved English proficiency is expected in some Asian EFL EMI contexts.

EMI students are also expected to monitor and manage their understanding of both content and English as a cohesive construct in EMI. However, studies investigating the awareness of SRL strategies in EMI classrooms still need more representation (Tatiana & Valentina, 2017). Most SRL-EMI work has been conducted in China and Hong Kong, while it is almost non-existent in Taiwan despite the rapid development of EMI.

In China, Gay's (2022) study found that instructional interventions using online resources and vocabulary learning strategies improved students' vocabulary proficiency and EMI scores, especially for a student population with solid self-regulatory skills. This supports the feasibility and importance of the EMI programme. Also, in postgraduate EMI programmes, teaching students SRL skills appears to be a prerequisite for independent learning (Qin et al., 2023). In Hu and Gao's (2018) study, they compared differences in the SRL process of high and low achievers in a Hong Kong EMI secondary writing course, arguing that the latter should be encouraged to reflect on their learning process more frequently and that EMI teachers should help them adopt the SRL strategies that the former tend to use. Their later study (Hu & Gao, 2020) in the same context also found that high and low achievers used self-regulated mediating resources and appropriated their roles differently in different learning communities when interacting with content teachers, language teachers, classmates, family members, tutors and friends, suggesting the value of considering different contextual resources and interactions when teaching SRL strategies to low achievers in EMI classrooms.

Furthermore, SRL is particularly important for students transitioning from non-EMI (secondary school) to EMI (university) settings to be well-adjusted. Zhou and Rose's (2021) study showed that learners used SRL strategies closely related to their listening skills before and after an EMI course, highlighting the role of SRL during this transitional period. A recent large-scale longitudinal study by Zhou and Thompson (2023) supported the previous argument and suggested structural training of SRL strategies in language support programmes, as EMI learners tend to use SRL differently as the course progresses. However, contradictory evidence was reported by Xie and Curle (2022), who suggested that language learning motivation and perceived success in EMI courses do not predict actual success. They called for reconsideration of the use of different measures to assess learners' performance in EMI classrooms.

Similarly, in other non-Asian EFL EMI contexts, the values of SRL have been demonstrated to enhance student learning. For example, EMI learners in a Spanish university demonstrated frequent use of SRL strategies, higher motivation, and higher levels of self-confidence, time study management, and persistence than their counterparts (Menéndez et al., 2018). Similarly, in an Icelandic university, EMI students' awareness of SRL was positively related to their performance in an intensive academic writing course (Prinz & Arnbjörnsdóttir, 2021). Two studies conducted in Turkish higher education also showed that SRL skills and self-efficacy can predict EMI learners' academic performance in content and language (Soruç et al., 2022; Tomak & Seferoglu, 2021). Effective EMI learners are good self-regulators (Tatiana & Valentina, 2017). The above positive associations between SRL and EMI highlight the importance of considering learners' and teachers' understanding of SRL in Asian EFL EMI settings. Besides, the traditional SRL framework should be expanded to include language-oriented strategies. The revised SRL-EMI scale captures learners' cognitive planning, emotional regulation, and self-regulation of language use.

## RESEARCH METHODOLOGY

### THE RESEARCH CONTEXT

The research context is a national polytechnic university focusing on hospitality and tourism education. It is renowned for its sandwich curriculum, which requires all the students to complete a one-year industrial placement overseas or domestically in the third year and return to continue their studies in the final year. The 83 students in the current study came from the first and second years of the Department of Applied English and were expected to have their placement overseas. Thus, EMI courses (content courses about hospitality and tourism) are standard in the curriculum design to prepare them for overseas internships in addition to formal language training courses. However, like the EMI learners in other departments and universities, additional support in enhancing language or academic skills for EMI learners is relatively less provided than the support to EMI teachers. Besides, in Taiwan's higher education, the initiatives to offer EMI courses come from the demands of the educational authorities, school managers or teachers instead of from learners' needs. This leads to the situation that EMI teachers usually enjoy much more concrete resources and immediate support than learners do. On the contrary, EMI learners are encouraged to do online self-learning to increase their language level (TWAEA, 2021).

The two 18-week EMI courses delivered in the present research were 'Introduction to Hospitality', a required course for first-year students, and 'Diverse Cultures', an elective for sophomores. According to the MOE definition of EMI delivery at the Taiwan tertiary level, the lecturer should use 100% English for instructional purposes. Learners must use at least 70% in the EMI classroom. The EMI courses were lecture-based but also included group work. The lecturer, as both a language expert and content instructor, in the two courses was the same person who maintained the same teaching style and ensured that English was used throughout the two courses and assessments for 18 weeks. The lecturer, with more than 20 years of teaching experience and a TESOL background, is also a qualified EMI instructor accredited by different teacher training sectors worldwide.

### INSTRUMENT AND PARTICIPANTS

To realise how the EMI learners self-regulated their learning in EMI classrooms where the instructor or the university did not offer apparent additional linguistic and academic support, we adopted the SRL-O questionnaire developed by Broadbent et al. (2023) and adapted it to create the SRL-EMI. The survey was composed of two sections. The first one included five demographic questions, including each student's major area of study in senior or vocational high school, English ability, gender, self-assessment, and whether or not they were experienced in EMI or CLIL. The second consisted of 44 close-ended question items with a 7-point Likert scale across 10 measures and one open-ended question, asking the respondents to write any comments about the EMI courses. Although the original survey was used for an online learning environment, we believe it can also apply to EMI learning. Both learning environments require much from learners' autonomy to be well-adapted to complete the courses successfully. The survey was designed in an online bilingual version (English and Chinese) and administered in the last week of the spring semester of 2023.

The original SRL questionnaire was conducted by Broadbent et al. (2023) at an Australian university, where English is used as the L1 status. In our context, English is used as an L2 to learn content courses, and students are expected to achieve content and language goals in EMI learning, as well as the psychometric properties of the SRL, including internal consistency, reliability, and validity. Therefore, we ascertained the applicability of the adapted SRL questionnaire by inviting students who took the two above-mentioned EMI courses to take the survey. There were 83 subjects enrolled in the Applied English Department and assumed to have higher English proficiency to master EMI courses (at least at CEFR B2 level). Most came from vocational high schools with either an English language or hospitality major, and only a few came from regular senior high schools or overseas.

## ANALYSIS

The descriptive statistics were analysed using the SPSS 23.0 software, which was also used to perform the factor analysis, often regarded as the preferred technique for interpreting self-report questionnaires, to explore the latent variables and the structure of the collected dataset, to determine the factorial structure of the questionnaire, and to identify the grouping of items that constituted distinct constructs. To simplify the factor structure of these 44 items, exploratory factor analysis (EFA) was first performed. Principal component analysis (PCA) was selected for factor extraction, and Varimax with Kaiser Normalization was chosen as the rotational method.

Owing validity pertains to the appropriateness of the inferences drawn from a set of scores on a scale (Borsboom et al., 2004; Wang et al., 2022). To study the convergent and discriminate validity, the two subtypes of validity that makeup construct validity (Van de Vijver & Tanzer, 2004; Wang et al., 2022), the psychometric properties of the SRL-EMI scale, including internal consistency reliability and validity, were identified.

## RESULTS AND DISCUSSION

### DEMOGRAPHIC VARIABLES

Information on the participants is shown in Table 1. There were 63 females (75.9%) and 20 males (24.1%). Among them, 67.5% had majored in English-related fields, and 14.5% had majored in hospitality-related fields in senior/vocational high school. The remaining 16.9% had not majored in either English or hospitality. The subjects' English language skills were also examined. Of the 67.5% of participants, 18.1% had passed the English Certificate Examination at the Intermediate level, 39.8% at the High Intermediate level, 4.8% at the Advanced level, and 4.8% at the Superior level. However, 31.3% of the subjects did not take the English test. Overall, 65.1% of the participants had experience with EMI or CLIL, and 33.7% did not.

TABLE 1. Demographic variables of participants ( $N = 83$ )

Variables		N	%
Gender	Female	63	75.9
	Male	20	24.1
Major area in senior/vocational high school	English-related	56	67.5
	Hospitality-related	12	14.5
	Neither hospitality-related nor English-related	14	16.9

English ability	Intermediate	15	18.1
	High-Intermediate	33	39.8
	Advanced	4	4.8
	Superior	4	4.8
	untested	26	31.3
Experienced in EMI or CLIL	Yes	54	65.1
	No	28	33.7
Self-assessment of academic achievement	Very good	14	17.1
	Not bad	32	39.0
	Average	35	42.7
	Below average	1	1.2

## FACTOR ANALYSIS

### EXPLORATORY FACTOR ANALYSIS (EFA)

The item analysis was then carried out, and the items' statistics are presented in Table 2. The reliability of the SRL-EMI questionnaire is examined using Cronbach's alpha. Generally, a Cronbach's alpha value greater than .7 is considered acceptable. A high alpha level indicates that the test items are highly correlated (Lavrakas, 2008). The total scale of the SRL-EMI has a good reliability of .973. Internal consistency was excellent ( $\alpha \geq .90$ ) for the total SRL-EMI scale ( $\alpha = .973$ ) and for the Supportive adaptation ( $\alpha = .973$ ) and Intrinsic perseverance ( $\alpha = .966$ ) subscales. In addition, reliability was good ( $.90 > \alpha \geq .8$ ) for the Goal setting and action scheduling, Negative affection, and Extrinsic expectancy subscales, ranging from .816 to .884 (George & Mallery, 2003).

TABLE 2. The statistics for items and the reliability of the SRL-EMI scale

Dimension/item	Mean	S.D.	Corrected Item-Total Correlation	Cronbach's $\alpha$ if Item Deleted	Reliability
The total scale SRL (44 items)					.973
D1: Supportive adaptation (18 items)					.973
20. I break larger goals into smaller actionable goals.	4.84	1.24	0.739	.973	
23. I think about what learning strategies have worked for me in the past when doing similar assignments/types of study.	4.88	1.29	0.782	.972	
24. I spend time trying to interpret the task to ensure I understand accurately what I need to do.	4.96	1.27	0.761	.972	
25. I usually self-assess my performance once I finish.	4.59	1.28	0.718	.973	
26. I look over past feedback I have received and check that I have made improvements in my current learning.	4.89	1.32	0.836	.972	
27. I think about how I might improve my work by evaluating it against the marking criteria provided by the teacher.	4.95	1.32	0.842	.972	
29. I have access to a quiet and distraction-free place to study.	5.23	1.34	0.782	.972	
32. When my EMI study gets difficult, I remain committed to reaching my study goals.	5.10	1.31	0.855	.971	



33. When my mind begins to wander during a learning session for this EMI course, I make a special effort to keep concentrating.	4.88	1.34	0.823	.972
34. No matter how I am feeling, I persevere with my EMI study.	4.83	1.29	0.758	.973
36. I ask for help from those who have experienced EMI courses before when I am not sure what to do in my EMI class.	4.99	1.39	0.821	.972
37. I ask the teacher and/or my peers to clarify things in EMI courses.	5.13	1.39	0.86	.971
38. When I have difficulties with my EMI class, I seek assistance from others through different means.	5.00	1.43	0.834	.972
39. I connect with the teacher and other students when I need help in EMI courses.	5.08	1.38	0.857	.971
40. When studying EMI courses, I create my own examples of the content to make it more meaningful.	4.88	1.32	0.683	.973
41. When studying EMI, I organise my thoughts by making summaries of what I am learning.	4.93	1.30	0.824	.972
42. When studying EMI, I try and relate the content to what I already know.	5.13	1.32	0.912	.971
43. When learning the EMI content, I try to develop my own ideas about it.	4.94	1.39	0.844	.971
D2: Intrinsic perseverance (13 items)				.966
1. I am confident that I will be able to master the content and assignments in this EMI class.	4.86	1.07	0.833	.964
2. I am confident in my ability to successfully persist in this EMI class, even if I find the content difficult.	4.88	1.29	0.784	.964
3. I am confident I can put in the effort required to get a high grade in this EMI class.	5.00	1.30	0.842	.963
4. I am confident that I can accurately work out what the task is requiring me to do.	4.84	1.30	0.838	.963
5. I always find aspects of the content that arouse my curiosity.	4.81	1.34	0.846	.963
6. I love learning new things in this EMI class.	5.18	1.40	0.875	.962
7. I find studying for this EMI class enjoyable.	5.04	1.27	0.883	.962
8. I find it very satisfying when I learn new material in this EMI course.	5.23	1.32	0.889	.962
9. I get a sense of achievement when I learn new skills or information.	5.33	1.33	0.824	.963
12. I want to get a better grade than others in my EMI class.	5.06	1.48	0.767	.965
28. I am able to study for my EMI course without distraction.	5.00	1.31	0.795	.964
35. I try to help other students when they ask a question about EMI that I can answer.	5.02	1.32	0.813	.964
44. I try to improve my understanding by doing additional work beyond the core content (e.g. doing extra problem-solving activities or extra readings).	4.64	1.49	0.663	.968

D3: Goal setting & action scheduling (4 items)					.844
18. I set short-term (daily or weekly) goals.	4.30	1.27	0.737	.779	
19. I set realistic deadlines for learning.	4.77	1.47	0.656	.816	
21. I make a list of detailed actions that I need to complete.	4.71	1.33	0.645	.817	
22. I plan out my schedule each week so I have the appropriate amount of time available for EMI study.	4.41	1.27	0.692	.798	
D4: Negative affection (5 items)					.884
13. I feel so helpless that I cannot dedicate all my effort to my EMI studies.	3.76	1.60	0.626	.88	
14. I consider dropping out because I feel overwhelmed by my EMI studies.	2.83	1.68	0.821	.834	
15. While studying, I want to distract myself to lower my anxiety level.	3.92	1.70	0.474	.915	
16. I get so anxious that I don't even want to start studying EMI.	2.92	1.63	0.853	.827	
17. When I have to study EMI, I start to feel bad.	2.87	1.66	0.861	.825	
D5: Extrinsic expectancy (3 items)					.816
10. I want to do well in this EMI course so I can show off to my friends and family.	4.89	1.28	0.672	.743	
11. I want to do well because of others' actual or perceived expectations of me.	4.82	1.38	0.738	.672	
31. I work hard in my EMI study, even when there are more interesting things to do.	4.82	1.27	0.6	.813	
D6 (1 item)					
30. I know where I can study most efficiently for this EMI course.	4.60	1.37	.678	.969	

Factor analysis is used to reduce many intercorrelated variables to a few representative factors or constructs. Before conducting an exploratory factor analysis (EFA), the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity were used to assess the suitability of the data. It is widely recommended that KMO values of at least 0.70 are good enough to start factor analysis (Netemeyer et al., 2003). Table 3 shows that the KMO index was 0.873, indicating that the matrix was adequate for factor analysis and had sufficient items for each factor. Bartlett's sphericity test was also significant ( $p < 0.001$ ), indicating that the correlation matrix was different from an identity matrix, where variable correlations are assumed to be 0 (Tabachnick & Fidell, 2007) and that there are sufficient correlations between the variables. This means the respondent data we collected was suitable for subsequent data reduction.

TABLE 3. KMO and Bartlett's Test for the adequacy of the data set

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.873
Bartlett's Test of Sphericity	Approx. Chi-Square	4271.969
	df	946
	Sig.	.000

Principal component analysis (PCA) and orthogonal varimax rotation were then used to extract the factors. The eigenvalues, scree test and percentage of total variance explained were used to determine how many factors to retain. Table 4 below shows a cumulative percentage of variance of 77.26% and six components (factors) with an eigenvalue > 1. In Figure 1, the scree plot also showed agreement with a six-factor result. It should be noted, however, that according to Costello and Osborne (2005), constructs with fewer than three items are typically characterised as weak and unstable. Ultimately, five factors were retained, explaining 74.58% of the total variance, as the sixth factor consisted of only one Item.

TABLE 4. The factor loadings of the rotated component matrix

Item	Component, eigenvalue & % of explained variance					
	1	2	3	4	5	6
eigenvalue	23.12	4.37	2.49	1.56	1.27	1.18
%	52.54	9.93	5.66	3.55	2.90	2.68
Cumulative %	52.54	62.47	68.13	71.68	74.58	77.26
20.	.637					
23.	.719					
24.	.526					
25.	.508					
26.	.652					
27.	.773					
29.	.701					
32.	.642					
33.	.751					
34.	.553					
36.	.794					
37.	.816					
38.	.805					
39.	.833					
40.	.716					
41.	.705					
42.	.821					
43.	.728					
1.		.734				
2.		.693				
3.		.824				
4.		.832				
5.		.746				
6.		.738				
7.		.694				
8.		.727				
9.		.674				
12.		.614				
28.		.551				
35.		.562				
44.		.469				
18.			.794			
19.			.531			
21.			.581			
22.			.806			
13.				.779		
14.				.884		
15.				.568		
16.				.903		
17.				.915		
10.					.712	
11.					.786	
31.					.491	
30.						.684

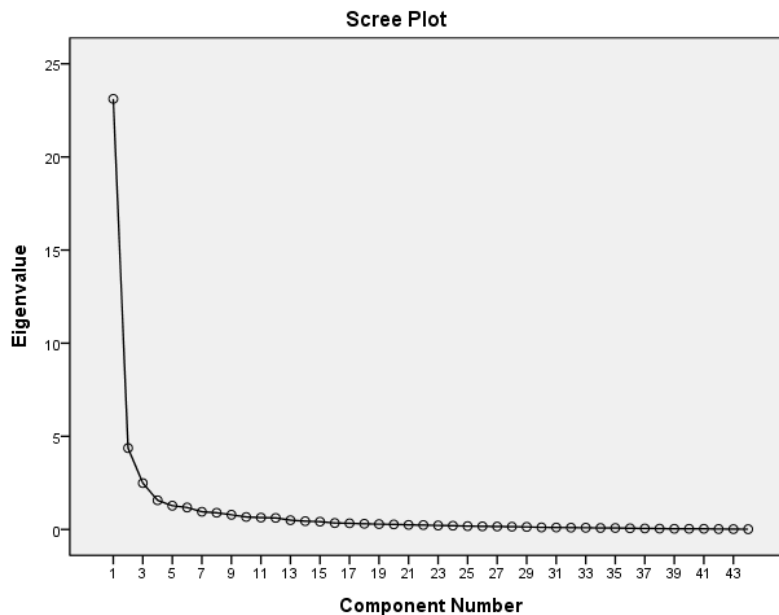


FIGURE 1. The Scree Plot

Compared to Broadbent et al.'s research, the Self-Regulation for Learning online questionnaire (SRL-O) contains ten constructs (dimensions). After conducting the EFA, the SRL-EMI retained five factors explaining most participants' responses. The first component, with an eigenvalue of 23.12, included 18 items, items 20, 23, 24, 25, 26, 27, 29 and items 32 to 43, with factor loadings ranging from 0.508 to 0.833, accounting for 52.54% of the total variance. These items, which covered the dimensions of 'planning and time management', 'metacognition', 'online effort regulation', 'online social support' and 'online task strategies' in the SRL-O questionnaire, were grouped into one dimension in the context of our research EMI. According to the items with higher factor loadings, such as item 42, 'When I study EMI, I organise my thoughts by making summaries of what I am learning', this construct was named 'Supportive Adaptation' (SA). As shown in Table 2, the mean scores and S.D. of these items on the SA dimension ranged from 4.59 to 5.23. The second component, with an eigenvalue of 4.37, accounted for 9.93% of the variance and included items 1 to 9, items 12, 28, 35, and item 44, which were mainly related to the dimensions of 'Online Academic Self-Efficacy' and 'Online Intrinsic Motivation' in SRL-O. Intrinsic Perseverance (IP) was designated as the second construct. The mean scores on the IP dimension ranged from 4.81 to 5.33, and item 4, 'I can accurately work out what the task requires of me', had the highest factor loading of .832. Items 18, 19, 21 and 22 comprised the third construct named 'Goal Setting & Action Scheduling' (GA), with an eigenvalue of 2.49 and explaining 5.66% of the variance. Their mean scores were 4.30, 4.77, 4.71 and 4.41, respectively. Items 13, 14, 15, 16 and 17 were grouped into the fourth construct with an eigenvalue of 1.56 and explaining 3.55% of the variance; it was labelled 'Negative Affection' (NA) and corresponded to the dimension 'Online Negative Achievement' in SRL-O. Item 17, 'When I have to study EMI, I start to feel bad', had a lower mean score of 2.83, but the highest factor loading was .915. The fifth construct was named 'Extrinsic expectancy' (EE) and included items 10, 11 and 31; the eigenvalue was 1.27, accounting for 2.90% of the variance. Item 11, 'I want to do well because of the actual or perceived expectations of others,' had the highest factor loading of .786.

We adapted the Self-Regulation for Learning Online Questionnaire (SRL-O) developed by Broadbent et al. for EMI courses to create the SRL-EMI questionnaire, which includes five constructs, Supportive Adaptation (SA), Intrinsic Perseverance (IP), Goal setting and action scheduling (GA), Negative Affection (NA), and Extrinsic Expectancy (EE). The intercorrelations between these constructs are shown in Table 5.

TABLE 5. The correlations between constructs of the SRL-EMI scale

Construct / Dimension	SA	IP	GA	NA	EE
Supportive adaptations (SA)	1				
Intrinsic perseverance (IP)	0.844	1			
Goal setting action scheduling (GA)	0.680	0.698	1		
Negative affections (NA)	-0.157	-0.258	0.205	1	
Extrinsic expectancy (EE)	0.726	0.754	0.697	-0.012	1

#### CONVERGENT VALIDITY AND DISCRIMINANT VALIDITY

To confirm whether the latent variables have good convergent and discriminant validity, these can be assessed using the composite reliability (CR), which indicates the overall reliability of a collection of heterogeneous but similar items with underlying characteristics, and the average variance extracted (AVE), which represents how accurately the construct is measured (Fornell & Larcker, 1981) as a basis for judgement. Discriminant validity can be assessed by comparing the value of the variance captured by the construct and the variance shared with other constructs (Alarcón et al., 2015).

As shown in Table 6, the composite reliability (CR) values for all five constructs were within the satisfactory range, ranging from 0.708 to 0.948, in line with the established threshold of 0.60 considered acceptable by Fornell and Larcker (1981). The average variance extracted (AVE) ranged from 0.455 to 0.673, exceeding the recommended threshold of 0.50, according to Hair et al. (2010). However, it is worth noting that Fornell and Larcker (1981) suggested that the AVE may be a more conservative estimate of the validity of the measurement model and that an AVE greater than 0.36 is minimally acceptable.

TABLE 6. The internal consistency and validity of the SRL-EMI scale

Dimension	N of items	Reliability ( $\alpha$ )	CR	AVE
The SRL-EMI scale	43	.969		
Supportive Adaptation (SA)	18	.973	0.948	0.506
Intrinsic Perseverance (IP)	13	.966	0.920	0.475
Goal setting and action scheduling (GA)	4	.844	0.778	0.475
Negative Affection (NA)	5	.884	0.909	0.673
Extrinsic Expectancy (EE)	3	.816	0.708	0.455

#### PARTICIPANTS' SRL-EMI SCALE RESPONSES

Whether the demographic variables of the participants affect the use of self-regulated learning (SRL) strategies in EMI courses was then examined. We examined the performance on the total score of the SRL-EMI scale and the scores on each subscale. Irrespective of the gender variable, majoring in upper secondary or vocational school, or experience in EMI or CLIL, there was no statistically significant difference on the total scale. It is worth noting that the variable, 'Major in

Senior or Vocational High School', showed a statistically significant difference on the subscale, 'Goal Setting & Action Scheduling' (GA) ( $p = .037 < .05$ ). The mean score of 'Hospitality related' was statistically lower than 'English related' and 'None of the hospitality and English related', with Cohen's  $d$  effect sizes of 0.721 (medium  $> .50$ ) and 0.953 (large  $> .80$ ), respectively (Wei et al., 2019). It can be assumed that the curriculum design for students with a background in hospitality and tourism focuses on developing practical skills and practical training that directly prepares them for specific industries, and with an English background, allows students to create a learning environment that not only provides practical skills, but also cultivates autonomy and adaptability to set their own learning goals and progress, and to preview and review themselves. In addition, the variable 'experience of EMI or CLIL' showed a statistically significant difference on the subscale 'Supportive adaptation' (SA) ( $p = .032 < .05$ ) with a medium Cohen's  $d$  effect size of 0.510. It may be that students who have experienced EMI or CLIL settings often develop strong study skills and time management habits. They know how to allocate time to language-related tasks and are more likely to approach teachers for help proactively, ask for additional support, and collaborate with peers who can provide language-related support. EMI-experienced students may have learned the importance of self-advocacy in their studies and made more use of Supportive Adaptation.

Regarding the variable, 'English proficiency', after conducting an ANOVA with a post hoc test, we found that the mean scores of the groups on the SRL-EMI and the other subscales were significantly different from each other, except for the subscale 'Goal setting & Action planning' (GA),  $F = .573$ ,  $p = .683$ . Compared to the advanced group, the 'untested' group had the lowest mean score, more than 50 points below the advanced group. According to the phenomena and our observations in the Taiwanese educational context, those students who did not take the English proficiency test often perceived their English proficiency as limited or showed a lack of enthusiasm for learning English. As expected, they were less likely to use the self-regulated learning strategy in their studies. It is worth noting that the Negative Affection (NA) subscale shows that students in the Superior group scored significantly lower than the other groups. 'Superior' represents the highest level of English proficiency. A lower average score means these students were less likely to experience anxiety, helplessness or dissatisfaction due to their participation in EMI courses. However, as the advanced students scored the highest on this negative affection subscale, we inferred that this outcome resulted from their intrinsic expectancy to improve their performance in the EMI classes and to progress to the superior level. Consequently, they were more likely to experience feelings of anxiety and distress.

Concerning the variable 'self-assessment of academic performance', it was also shown that the groups' mean scores differed significantly, not only on the total SRL-EMI scale but also on the other subscales, except for the subscale 'Negative Affection' (NA). Using multiple comparisons, there is a positive correlation between self-assessment of academic performance and scores on each subscale. For example, on the 'Intrinsic Perseverance (IP)' dimension, students with a 'very good' grade had significantly higher scores than the 'not bad' group, and the 'not bad' group also had significantly higher scores than the 'average' group. This means that students with high levels of 'intrinsic perseverance' had a strong intrinsic motivation to persevere, work hard and overcome obstacles and were more likely to excel academically because they were driven by their internal desire to learn and achieve. This motivation can lead to better study habits, greater engagement in learning, and a willingness to put in the effort required to succeed.

## CONCLUSION AND IMPLICATIONS

This study has reconceptualised the role of self-regulated learning within EMI classrooms by foregrounding linguistic adaptation and classroom discourse strategies. Integrating SRL constructs with a linguistic lens offers a new framework whereby EMI learners are seen as active agents who must manage content and language simultaneously. Proficient EMI learners benefit from robust discourse strategies that enable them to negotiate complex academic interactions. At the same time, those facing linguistic challenges require explicit instruction in general learning strategies and ineffective language management. Supportive adaptation is essential to embody learners' strategies for structuring discourse, such as creating personal glossaries or reflective summaries that decode academic language in EMI classes. Such linguistic strategies, alongside intrinsic perseverance and extrinsic motivational factors, enable learners to better manage the dual demands of language and content learning.

Hence, EMI teachers should incorporate explicit instruction in linguistic self-regulation—emphasising reflective discourse, translanguaging, and language scaffolding strategies—into their teaching practices. This integration should be addressed, and EMI teachers should be trained in professional development. Instructional interventions using SRL strategies are practical and need to be explicitly taught, practised and developed (Gay, 2022; Schunk & Greene, 2018; Zepeda et al., 2015). Teachers must self-regulate and make it explicit to students to foster self-regulatory skills (Russell et al., 2022). Teachers can model, support and engage students using SRL strategies to guide students in EMI classrooms (Schunk & Greene, 2018). Moreover, students with low EMI performance in language or content need extra care and attention from their teachers. Teachers can help these students design their individual SRL strategies to adapt their learning styles and attitudes according to their low scales in different dimensions. For example, students can be encouraged to set an extrinsic goal of how EMI can help them find a good opportunity for a job, internship, or further study, both at home and abroad. They can be advised on what help is available and how it is available if they need it. Most importantly, EMI learners should be continually supported to reflect on why EMI is essential. Supportive adjustments and intrinsic persistence are critical factors in increasing EMI learning satisfaction and achievement.

As our research may be one of the few studies investigating the use of self-regulated learning strategies in EMI classrooms in an Asian EFL context, several future studies can be conducted to complement it. For instance, our study did not attempt to compare the relationship between learners' academic performance and their use of SRL strategies. Although we recorded their overall academic performance, the survey was conducted anonymously, making it unlikely to individually compare students' content and language performance with SRL. It is therefore suggested that future studies investigate this relationship. Also, it is suggested that more qualitative measures can be included in EMI SRL research. For example, interviews with EMI learners, think-aloud activities or journaling can provide a deeper perspective on when, how and which SRL strategies learners use to improve their EMI learning experience.

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