Routledge Studies in English-Medium Instruction

ENGLISH MEDIUM INSTRUCTION IN SOUTH KOREA

FOCUSING ON LANGUAGE IN SCHOOL AND UNIVERSITY CLASSROOMS

Jiye Hong and Helen Basturkmen

English Medium Instruction in South Korea

Adding to the growing body of research on English Medium Instruction (EMI), this book focuses on the language support systems currently used by EMI mathematics and social science schoolteachers and university lecturers in South Korea.

While EMI is an instructional field, there is a gap in the knowledge of how teachers and lecturers integrate English language-specific practices within their curriculum. Drawing on findings from an observational and interview-based case study at secondary and tertiary levels in South Korea, the research outlines differing planned teaching practices and illustrates EMI classroom interaction, language-related episodes (LREs) in this interaction, and vocabulary materials developed by EMI teachers and lecturers. Hong and Basturkmen discuss how they assessed the students' learning from LREs in classroom interaction and the results from these findings, which illustrate practical advice and guidelines for integrating a focus on language into the discipline of teaching. The volume also offers several application tasks, including two reflection-on-practice projects, which the reader can try out by using the procedures developed in the case study.

This is the first major book-length examination of EMI in the South Korean context and presents a useful resource for EMI teachers, lecturers, and educators – in South Korea and globally – who are looking to develop their methodology for language, including practical suggestions about how to seamlessly incorporate the learning of disciplinary vocabulary and forms of expression using EMI.

Jiye Hong is an adjunct professor in the Graduate School of TESOL at Hankuk University of Foreign Studies, South Korea.

Helen Basturkmen is a professor in Applied Linguistics and Language Teaching at the University of Auckland, New Zealand.

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Contents

Acronyms

CBI	Content-Based Instruction
CLIL	Content and Language Integrated Learning
EAP	English for Academic Purposes
EFL	English as a Foreign Language
EMI	English-Medium Instruction
ESL	English as a Second Language
ESP	English for Specific Purposes
FFE	Form-Focused Episode
FoF	Focus on Form
HE	Higher Education
IELTS	International English Language Testing System
KMI	Korean-Medium Instruction
L	Lecturer
L1	First Language
L2	Second Language
LRE	Language-Related Episode
MA	Master of Arts
NNS	Non-native Speaker
NS	Native Speaker
PhD	Doctor of Philosophy
S	Student
SLA	Second Language Acquisition
T	Teacher
TOEFL	Test of English as a Foreign Language

Part I
Background

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1 Introduction

1.1 What is EMI?

The definition of English medium instruction (EMI) varies (Gundermann, 2014; Macaro, 2018). One prominent definition refers to EMI as "the use of the English language to teach academic subjects (other than English itself) in countries or jurisdictions where the first language of the majority of the population is not English" (Macaro, 2018, p. 19). However, other researchers have critiqued this definition for being too narrow and limiting the scope of EMI to contexts where most of the population has English as a second language (L2). Pecorari and Malmström (2018) suggest a wider definition of EMI that encompasses Anglophone countries. Although populations in such countries are predominantly English first language speakers, classrooms often include English as a second language (ESL) students (and teachers). Countries such as Australia and New Zealand, for example, have high numbers of international students from a range of first language backgrounds and a high proportion of domestic students from migrant backgrounds, although teachers and lecturers may not necessarily be aware of their students' linguistic backgrounds (Baker & Hüttner, 2017, 2019). Following Pecorari and Malmström (2018), this book adopts a wide definition of EMI and uses the term to refer to the instruction of disciplinary classes delivered in English regardless of whether most, many, or only some students in the class are using English as a second or foreign language.

EMI is not a language teaching approach. It generally does not have explicit language teaching objectives (Airey, 2016). It thus differs from language teaching approaches, such as content-based instruction (CBI), English for academic purposes (EAP), and content and language integrated learning (CLIL), which primarily or largely do have language teaching objectives. In EMI, the objective is for students to develop their disciplinary (content) knowledge, and this disciplinary content is taught by disciplinary teachers or lecturers, for example, accounting teachers or science lecturers. Nevertheless, it is recognized that EMI can provide conditions in which English will likely be acquired as students are exposed to English and have opportunities in EMI to practice the language in meaningful ways (Galloway, 2017b). In short, EMI, using English to teach disciplinary subjects such as economics, art, mathematics or science,

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can play an important role in enabling ESL students to acquire English naturally, especially the English they need for disciplinary study (Aizawa & Rose, 2020; Galloway, 2017b; Hong & Basturkmen, 2020; Park, 2018).

As shown in Table 1.1., EMI differs from language teaching approaches, such as CBI, EAP, and CLIL, in certain key dimensions. According to Brinton, Snow, and Wesche (2003), any approach that teaches disciplinary content in a second language (L2) can be termed CBI. However, Brown and Bradford (2014) argue that CBI should be used to refer to a language teaching approach where "content, texts, activities, and tasks drawn from subject-matter topics are used to provide learners with authentic language input and engage learners in authentic language use" (p. 332). For Brown and Bradford, disciplinary content in CBI is the "vehicle" or means for language learning (Brown & Bradford, 2014, p. 331). In EMI, disciplinary content is the objective of learning. Also, CBI teachers are usually language specialists, whereas EMI teachers or lecturers are almost always discipline specialists (Brown & Bradford, 2014; Macaro, 2018).

EMI and EAP are distinctive teaching contexts. EMI is the teaching of a discipline, such as science, through the medium of English. EAP instruction targets the English language knowledge and skills ESL learners need to be able to function in academic settings (Paltridge & Starfield, 2013) and clearly has language teaching objectives. However, unlike the teaching of general English, EAP instruction focuses on the academic English linguistic register and associated skills, such as academic writing. In this regard, researchers argue that EMI can complement each other and are synergistic (e.g., Galloway & Rose, 2022).

Table 1.1 EMI vs. language teaching approaches

Approach	*Language*	*Teaching objective(s)*	*Teachers*	*Teaching context*
EMI	English	Disciplinary/ subject content	Subject teachers (e.g., accounting teachers, science lecturers)	Teaching subjects or disciplines (e.g., accounting classes, science courses, art classes)
EAP	English	Academic English language & linguistic skills	English language teachers	Classes teaching academic English (e.g., academic writing class)
CBI	Any language	Language learning	Language teachers	Classes teaching English language
CLIL	Any language	Disciplinary/ subject content & language learning	Subject teachers or language teachers	Classes that integrate subject/ disciplinary content and language teaching

EMI and CLIL, too, differ. CLIL is an educational approach that aims to integrate language and content learning, and it is more content-driven than CBI or EAP (Richards & Pun, 2023). EMI and CLIL differ in regard to what is taught. CLIL teaching targets both language and content learning, although the focus of instruction can shift between language and content at any one time (Brown & Bradford, 2014). CLIL has been described as a "dual-focused educational approach" (Coyle, Hood, & Marsh, 2010, p. 6). While CLIL aims to integrate disciplinary content and language without prioritizing either one over the other, EMI targets the learning of disciplinary content (Lasagabaster & Doiz, 2021). Also, in CLIL, the language to be integrated is not necessarily English, whereas in EMI, as the name signals, the language used is English. As argued by Graddol (2006), students in EMI settings are expected to have a certain level of English proficiency in advance, while L2 proficiency may or may not be a prerequisite for students in CLIL setting.

1.2 EMI in South Korea

The start of EMI in higher education in South Korea can be traced back to government initiatives in the 1990s to increase the global competitiveness of South Korea's institutions of higher education (Byun et al., 2011; Chang, Kim, & Lee, 2013; Kim, 2017). However, it is from the early 2000s that EMI has become widely adopted in South Korea. An important impetus for this adoption has been the decline in domestic enrollments in higher education due to the decreasing size of the college-age population in South Korea, which has led to financial difficulties for the institutions (Chung, 2021). In 2021, many Korean higher education (HE) institutions outside the Seoul area were affected as the enrollment rate dropped to about 75% of all student places available (Chung, 2021). The school-age population of South Korea at all educational levels is expected to continue to decrease due to low birth rates (Kim, 2020). Institutions of HE became aware of the need to attract more international students for survival, and EMI appears to be the most effective means by which they attract such students.

Against this demographic and financial backdrop, the South Korean government launched the *Study Korea Project* in 2004 (Ministry of Education, 2006b) with the stated aim of attracting 50,000 international students to South Korea by 2010. It was further envisaged that the adoption of EMI in South Korea would reduce the number of domestic students going overseas for study (Byun et al., 2011). To implement this project, the Ministry of Education (MoE) introduced *The Strategic Plan of Internationalization of Korean Higher Education* (Ministry of Education, 2006a) in 2007. The plan sets out three objectives for the adoption of EMI:

(1) To prepare domestic students for their future careers in business or academia at the international level.
(2) To attract international scholars and students.
(3) To enhance domestic faculties' academic English skills for teaching and research as a means of internationalizing the academic environment.

Steps have been taken to encourage HE institutions to adopt EMI. For example, the government began offering major financial incentives in 2004, and the South Korean Council for University Education included the proportion of EMI courses as a criterion by which institutions were evaluated in terms of their levels of internationalization (Byun et al., 2011).

Following the initiatives described earlier, the adoption of EMI courses in South Korean HE institutions has risen dramatically over the past two decades. Presently, over 200 HE institutions in South Korea (universities, colleges, and community colleges) have adopted EMI either wholly or partly, and the proportion of EMI courses has risen from just over 2% in 2002 to almost 20% in 2019 (Choi, 2021). Certain areas have even higher levels of adoption, such as the Seoul metropolitan area (Nam & Kwak, 2019). The adoption of EMI has been particularly high in the disciplines of engineering and science (Lee & Hong, 2015). This is reflected in reports from science and technology-focused universities concerning the percentages of EMI courses they provide, for example, the Korea Advanced Institute of Science and Technology (100%), Ulsan National Institute of Science and Technology (100%), and Pohang University of Science and Technology (88%) (Nam & Kwak, 2019).

The adoption of EMI in the South Korean HE context has attracted some criticism. Research, for example, has reported that often lecturers and students view EMI negatively (Park, Kim, Lee, & Kim, 2022). However, despite reports of lecturers' and students' opposition to EMI, it is unlikely that South Korean HE institutions will revert from offering EMI courses, not least because both domestic and international university ranking systems consider the proportion of international students or lecturers as measures of universities' performance (Study in Korea, 2022) and because many institutions have made it a requirement that students take a certain number of EMI courses in order to graduate (Lee & Hong, 2015). Korean HE institutions often now include the ability to teach EMI courses as a criterion in the recruitment of new lecturers (Choi, 2015), and most institutions incentivize lecturers who teach EMI courses with financial rewards or extra points in faculty performance evaluation schemes (Choi, 2015; Han & Kim, 2020).

EMI has extended to secondary education in South Korea. In 2008, the South Korean President, Lee Myung-Bak, argued for the teaching of content subjects, particularly mathematics and science, through English in elementary and secondary schools. Currently, there is no official government EMI policy for schools. However, the MoE introduced the *Enforcement Decree of the Elementary and Secondary Education Act* (MoE, 2018). This decree allows all schools, regardless of the type or stage of education, to adopt EMI on the condition that the EMI curricula are based on the national curriculum and that the curricula are reviewed by the MoE before implementation.

At present, there is no official document regarding the number of schools that offer EMI in South Korea. However, earlier research identified 11 high schools, seven public and four private schools, that stated their adoption of EMI in their public-facing documents (Hong & Basturkmen, 2020). One

impetus for the adoption of EMI in high schools in Korea has been the adoption of foreign educational curricula, such as the Advanced Placement (AP) and International Baccalaureate (IB). Some schools have adopted EMI along with IB or AP to provide students with the English skills they need for admission to HE overseas. In their public-facing documents, such schools state that all disciplinary subjects except language subjects and Korean history are taught in English throughout all grades. See the example statement of this from one school's documents:

> Under the English Only Policy, all school members should use English in their classrooms as well as the entire school. . . . All subjects except Korean language and Korean history should be taught through English.
> (Seyoung High School, 2020)

Because competition for places in the EMI schools has been strong, the MoE imposed a restriction on the admissions process of these schools so that students can only be selected based on their middle school English grades and their performance in admission interviews conducted in English (Ministry of Education, 2009) and not on their overall performance in middle school.

To the best of our knowledge, there are no public elementary and middle schools that offer EMI in South Korea. Some private elementary schools, however, provide bilingual classes in which disciplinary subjects are taught in both Korean and English (Lee, 2010).

1.3 EMI in other geographical contexts

South Korea is one of a set of Asian countries in which EMI has been adopted. EMI courses have been identified across various Asian countries, including Japan, Malaysia, Singapore, South Korea, and Taiwan (Dearden, 2021; Neghina, 2017; Vu & Burns, 2014). The increase in adoption has led to a surge in the numbers of international academics and students in such contexts (Kim, 2017; Liyanage, 2018; Walkinshaw, Fenton-Smith, & Humphreys, 2017). For Southeast Asian countries, such as Brunei, Indonesia, Malaysia, Singapore, and Thailand, the Association of Southeast Asian Nations (ASEAN) has played a role in promoting EMI for both HE and secondary education sectors (Macaro, 2018). However, each nation has individual factors too that have driven or limited EMI. For example, since 2016, public universities in Indonesia have been required to provide bilingual programs using Bahasa Indonesian and English as the mediums of instruction (Dewi, 2017). In some countries, such as Malaysia or Singapore, EMI began as a legacy of American or British colonialism.

EMI has a long history in some Asian countries. EMI can be traced back to the middle of the nineteenth century in Hong Kong and Turkey, for example (Coşgun & Hasırcı, 2017; Macaro, 2018). The early implementation of EMI in Hong Kong was related to its colonial past under British rule (Evans, 2008;

Macaro, 2018). Over time, English became the dominant medium of instruction in this region, and the proportion of EMI schools increased unabated until the 1990s. However, soon after the end of British colonial rule in 1997, the Hong Kong administration mandated that schools switch the medium of instruction (MoI) from English to Chinese through the introduction of a 'mother tongue policy' (Lai, 2013; Lin & Morrison, 2010). After several revisions to the policy, in 2009, the administration allowed secondary schools but not primary schools to decide on the MoI (Education Bureau, 2009). However, EMI in secondary schools is still a controversial issue in Hong Kong. After joining the United Nations in 1952, the Turkish government first adopted EMI in 1955 by establishing five state EMI secondary schools (the *Anadolu Liseleri* schools). As the reputation of the state EMI schools became established, private schools began to offer EMI as well. The first public EMI university in Turkey, the Middle East Technical University, was established in 1956 (Karakas, 2019) with the aim of contributing to the development of the country and surrounding areas.

Many Asian countries, where English is a compulsory subject in the national education curriculum (China and the Philippines, for example) (Kirkpatrick, 2014), have recently experienced a rapid surge in international academics and students. This has led other Asian countries to notice the importance of internationalizing their HE, which has resulted in the spread of English as a medium of education in HE (Kim, 2017; Liyanage, 2018; Walkinshaw et al., 2017). EMI can be even found in the North Korean context. From 2012, some major universities in North Korea announced their plans to provide EMI courses and began to encourage their lecturers in the natural sciences to teach through English (Korea Institute for National Unification, 2015; National Institute for Unification Education, 2021; Yonhap News, 2015).

EMI is not of course limited to Asia. It has been described as a growing worldwide phenomenon (Dearden, 2021; Galloway & Ruegg, 2020). The European Region Action Scheme for the Mobility of University Students (ERASMUS), launched in 1987, made it easier for students to study abroad and accelerated student mobility between the nations. However, according to Macaro (2018), students mostly chose to study in countries that speak more global languages, such as France, Germany, Italy, and the UK. In the late 1990s and early 2000s, the Bologna Process allowed HE degree courses to be credited between European countries (Airey, Lauridsen, Rasanen, Salo, & Schwach, 2017) to internationalize the European HE. After the implementation of the Bologna Process, the number of EMI courses in the European HE institutions rapidly increased (Airey, 2016).

1.4 Aims and scope of the book

To the best of our knowledge, this is the first major book-length examination of any aspect of EMI in the South Korean context. The book reports research into research into the kinds of language support that EMI teachers in South

Korea provided for their students. To date, the literature on EMI in South Korea has been largely restricted to reviews of EMI (e.g., Lee & Lee, 2018) and reports of low motivation or teaching and learning difficulties (Bradford, Park, & Brown, 2022; Choi, 2021). Much of this research literature has been based on survey-type data, and the findings tend to paint a negative picture of EMI in South Korea. This research highlighted the perception that instruction in English, the second language of most students and teachers, presents intractable language difficulties for the students.

The present book has two main aims. Firstly, it reports a case study that investigated EMI classroom interaction in South Korean EMI high school and university settings. The research drew on a mix of data types and sources, including observations of EMI classes, interviews with EMI teachers, and analysis of documents and materials. The case study identified the practices the EMI teachers used to address or mitigate their students' language difficulties. Far from presenting a negative picture of EMI in South Korea, the book presents findings that show how the teachers successfully incorporate a focus on language within their teaching of disciplinary content. Secondly, the book provides suggestions for EMI teacher education that are based on findings from the study. The suggestions concern ways teachers can investigate their own practices for dealing with language concerns or extend their range of teaching strategies. The book provides two EMI teacher development projects, a classroom interaction analysis and a test design task to illustrate the suggestions.

The primary audience for this book is researchers, teachers, and teacher educators in the field of EMI. However, we hope the book will also be of interest to graduate students in applied linguists and education. EMI researchers may find the book's case study content, such as the details on the methodology and findings, useful. The case study report includes findings on the EMI teachers' strategies for dealing with language issues, which is a topic that has received limited research interest to date. The report on the teachers' strategies will be of interest, we hope, to EMI researchers, teachers, and teacher educators alike. For graduate students in applied linguistics and education, the book highlights the value that observation of teaching practices can play in building understanding of an educational context. EMI teacher educators will be able to draw on the ideas for teacher education in Chapter 7 in their work.

1.5 Organization of the book

The book is organized into three parts: Background, Case Study, and Future Perspectives. Part I, *Background*, includes three chapters. Chapter 1 introduces the topic of EMI and describes its current position in South Korea. Chapter 2 provides a review of EMI literature with specific reference to the topic of teaching and learning issues. Chapter 3 provides a detailed description of the case study. This includes details about the South Korean school and university case settings and EMI courses, demographic information about

the teachers, lecturers and students who participated in the study, the kinds of information that were collected, and the different forms of analysis used.

Part II, *Case Study*, comprises three chapters that report the case study findings. Chapter 4 presents each teacher's planned practices for incorporating a focus on language into their teaching. It reports findings from interview data and illustrates the kinds of materials, such as glossaries of technical terms, that the teachers devised. Chapter 5 presents the teachers' spontaneous practice. It reports findings from the analysis of classroom interaction and the incidence of language-related episodes (LREs) in it. The LREs arose when the teachers attended to language issues, for example to highlight vocabulary, correct their students' language expression, or respond to students' queries about language. Chapter 6 reports findings from tests of student learning from LREs and compares findings about learning in the school and university contexts.

Part III, *Looking forward*, comprises two chapters. Chapter 7 draws on content from the chapters in Part II to make suggestions for ways EMI teachers can integrate a focus on language into disciplinary teaching. It provides ideas for EMI professional development and suggests projects and tasks for use in teacher education. Chapter 8 concludes the book with a discussion of the future of EMI research in South Korea and teaching and learning topics for the EMI research agenda. Throughout the book, the term 'EMI teacher' will be used to refer to both content teachers and lecturers in EMI settings.

2 Teaching and learning in EMI

2.0 Introduction

In this chapter, the literature is examined with a focus on understanding how various issues impact teaching and learning in English medium instruction (EMI). The review encompasses studies that explore the perceptions of teachers and students regarding the effectiveness of EMI and the linguistic challenges faced by both teachers and students within this context. The subsequent sections of the chapter delve into the literature concerning how EMI teachers perceive their role, particularly in relation to the development of students' language skills. Additionally, the chapter reviews literature addressing the nature and role of language in EMI settings. It further explores studies that investigate how teachers address students' English language needs through incidental teaching practices in the classroom, providing insights into the broader effects of EMI on education. The goal is to offer a comprehensive understanding of the nuanced ways in which issues impact the teaching and learning experiences in an EMI environment.

2.1 Teachers' and students' perceptions of the effectiveness of EMI

A substantial body of EMI research has focused on the inquiry into teachers' or students' perceptions of the effectiveness of EMI, mostly in higher education, and it usually used interviews and/or questionnaires for collecting large-scale data (e.g., Sahan, Galloway, & McKinley, 2022). Research indicates that perceptions of EMI are diverse, influenced by factors such as the English proficiency of teachers and students, challenges faced in EMI, implementation approaches, and the broader internationalization goals of institutions and countries.

Among existing EMI studies, there are those that report students' positive perceptions of EMI which center around English proficiency development, access to global knowledge, and preparation for an increasingly interconnected world (e.g., Lee, 2022; Macaro & Akincioglu, 2018; Yeh, 2014). For instance, in Taiwan, Yeh (2014) looked into undergraduate students' learning

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experiences and attitudes towards EMI in six universities using a survey questionnaire. Findings indicated that students acknowledged EMI's benefits, such as enhanced English proficiency and improved employability, and generally reported satisfaction with their EMI experiences, despite some noting their limited English skills as a challenge.

Likewise, in their survey-based study, Macaro and Akincioglu (2018) explored the motivation behind Turkish university students' enrollment in EMI courses and their level of satisfaction with EMI. They reported that the primary motivation for choosing EMI was the students' belief that it would improve both their general and disciplinary English proficiency. Furthermore, they found a high level of student satisfaction with EMI, particularly in terms of enhanced English proficiency and the overall quality of education.

Reinforcing the positive perceptions, a study focused on the South Korean higher education context by Lee (2022) delved into the learning experiences of Korean ESL students in undergraduate EMI courses. The study revealed that students perceived EMI as not only beneficial but also effective for their English development. Lee's research concluded that the positive perceptions of EMI among students could be attributed to their frequent utilization of various learning strategies within the EMI context, suggesting that active engagement and adaptive learning approaches might contribute to favorable attitudes towards EMI in the academic context.

Additionally, in terms of teachers' perceptions, Hammou and Kesbi (2023) reported optimistic views among science teachers in Moroccan secondary schools regarding the use of EMI. Through interviews with 18 secondary EMI teachers in math, physics, and life and earth sciences, the research revealed positive attitudes toward EMI implementation in Moroccan education.

However, ambivalent perceptions of both teachers and students towards the effectiveness of EMI do exist. In China, Zhang and Pladevall-Ballester (2022) examined the change of undergraduate students' perceptions towards EMI over time or after the completion of EMI courses and differences of perceptions across disciplines, including International Trade, Film Production, and Project Management, using pre-post semester survey questionnaires. The researchers observed a shift in students' perceptions towards EMI, moving from positive to negative, suggesting that as students gained more exposure to EMI, their initial enthusiasm may wane. In addition, students in International Trade had a more favorable view of EMI compared to those in Film Production and Project Management. The researchers explained that the relevance of English proficiency to a student's field of study would have significantly influenced their perceptions towards EMI. In this regard, Zhang and Pladevall-Ballester underscored the importance of recognizing that students' perceptions of EMI might vary across disciplines, emphasizing the need for institutions and educators to employ distinct strategies tailored to each academic discipline during EMI implementation.

Moreover, some research has reported teachers' and students' negative or equivocal views of the effectiveness of EMI (e.g., Hellekjær, 2010; Hu, 2015;

Kim et al., 2017; Jiang, Zhang, & May, 2019), which stem from a combination of various factors. One factor that contributes to such negative perceptions towards EMI is the lack of consensus or proper preparation among stakeholders regarding the necessity and implementation of EMI. Researchers have claimed that a mismatch between expectations and reality, as well as insufficient support for language adaptation, can lead to dissatisfaction of EMI among both educators and students. As noted by Cho (2012b), the introduction of EMI in South Korea lacked consensus among stakeholders. This absence of agreement has sparked numerous inquiries into the effects of EMI on students' content acquisition, learning motivation, and English proficiency.

A majority of prior EMI studies in the South Korean context aimed to address these concerns by investigating perceptions of EMI, revealing negative feedback from both teachers and students. Research by Kim (2017) and Yu and Chung (2009) focused on the perceptions of undergraduate students in Korean universities where EMI courses were made compulsory for all students. These studies exposed a significant gap between students' expectations of EMI courses before enrollment and their actual experiences. The findings indicated students' concerns about the potential adverse impact of using a foreign language (English) on their comprehension of course content and academic performance. Additionally, Hwang's (2013) study on EMI teachers in a Korean university underscored skepticism among these educators regarding EMI's impact on students' content knowledge comprehension, despite acknowledging its inevitability in the internationalization of education.

Another factor for negative views towards EMI appeared to be due to the teachers' and students' lack of confidence in the use of English and insufficient support for teaching and learning in EMI, which can result in students' decreased academic performance and learning motivation as well as hindered teaching quality. For instance, a study by Hellekjær (2010) compared undergraduate students' lecture comprehension in EMI and the first language-medium instruction courses in Norwegian and German higher education institutions using a survey questionnaire. It found that nearly 57% of the students felt it challenging to understand the meaning of unfamiliar registers and comprehend lectures due to their insufficient English proficiency. Hellekjær (2010) pointed out a need for language support for students in EMI settings for the improvement of their English proficiency to understand EMI lectures and their successful learning of content knowledge.

In the Chinese context, Hu (2015) looked into the perceptions of EMI teachers in universities using questionnaires and interviews and found that the teachers had ambivalent views towards EMI. On one hand, the teachers in Hu (2015) thought EMI is necessary for the internationalization of education, but on the other hand, they had concerns regarding students' learning of content knowledge, effective communication with their students, and the quality of teaching. Hu (2015) suggested training programs for in-service EMI teachers to increase their confidence in using English for teaching.

Similarly, in their study within Chinese higher education, Jiang et al. (2019) explored the teaching practices and perspectives of EMI teachers. Employing a combination of classroom observations and interviews, the researchers discovered that teachers dedicated significant effort to deploy practical strategies, including code-switching, in order to assist students facing language difficulties. Despite their efforts, the teachers perceived teaching in EMI as burdensome and time-consuming, largely attributed to their lack of confidence in using English and concerns about students' academic performance. In light of these challenges, Jiang et al. recommended the implementation of language support initiatives, such as English for specific purposes (ESP) courses, to improve the overall learning experience for students in EMI settings.

Previous EMI studies have shown that the perception of EMI by both students and teachers is profoundly influenced by language-related difficulties. The way in which individuals view their experiences within EMI, whether positively or negatively, can significantly impact the overall effectiveness of the educational process. Consequently, addressing these linguistic challenges becomes paramount as it can lead to more favorable perceptions among both teachers and students, ultimately enhancing the quality of the educational experience. In the following section, we will delve into a comprehensive review of studies conducted across various educational contexts that examine the intricate nature of linguistic challenges in EMI settings.

2.2 Linguistic challenges for students and teachers in EMI

A substantial EMI research has raised numerous concerns surrounding linguistic challenges that affect both teachers and students engaged in EMI settings (Pun & Thomas, 2020; Sah, 2022b; Soruç, Altay, Curle, & Yuksel, 2021). Although, EMI, by its nature, does not prioritize English language learning, it is often anticipated or expected as an outcome (Pecorari & Malmström, 2018). Galloway (2017a) underscores that EMI provides English as a Second Language (ESL) students with increased exposure to a foreign language, facilitating natural acquisition within the context of their academic disciplines. This assertion aligns with the viewpoints of various researchers who contend that language proficiency plays a pivotal role in the development of disciplinary content knowledge (Ardasheva & Tretter, 2017; Basturkmen, 2021; Schleppegrell, 2020).

In this regard, irrespective of the medium of instruction, students need to grasp the distinctions in language usage across disciplines to effectively comprehend disciplinary content and engage in meaningful communication within their academic community (Basturkmen, 2021; Schleppegrell, 2020). As students progress through diverse academic disciplines, the expectation increases for them to comprehend and produce discipline-specific academic texts. This poses a heightened challenge for students in EMI settings who must navigate their field of study using a foreign language. Furthermore, while recognizing the divergence between the linguistic features of academic spoken

English and academic written English (Dang, Coxhead, & Webb, 2021), ESL students in EMI may encounter distinct linguistic challenges when reading textbooks compared to those faced during classroom interactions. Thus, it is imperative for content teachers to exert substantial effort in aiding students to overcome such challenges and fostering their development of disciplinary literacy, regardless of the medium of instruction (Moje, 2015; Van de Poel & Gasiorek, 2012).

The extensive body of literature on EMI has thoroughly documented diverse linguistic challenges faced by students across all four language skills. Sert (2008) compared EMI and Turkish-medium instruction in the Turkish higher education context to investigate if EMI was effective for undergraduate students' acquisition of language and disciplinary content. The study used survey questionnaires and interviews, involving 527 students and 87 teachers from three disciplines (Economics, Administrative Sciences, and International Relations). Sert discovered that although students believed EMI was more effective than existing English as a second language courses, students in EMI courses encountered difficulties in understanding and responding to teachers' questions effectively and engaging in communicative classroom tasks in English. Moreover, the study reported that the students felt unmotivated towards the use of English and uncertain about their ability to comprehend the lecture. Likewise, Shim (2012), in her survey-based research on Korean-speaking students in EMI universities in Korea, revealed challenges in following lectures, comprehending course content, and interacting with lecturers using English, which were not experienced in Korean-medium instruction (KMI) classes.

Dafouz, Camacho, and Urquia (2014) reported that EMI students exhibited a lower level of content understanding compared to non-EMI students. In China, undergraduate students expressed dissatisfaction with EMI, citing a "little chance to speak," leading the authors to attribute this to students' insufficient proficiency in basic academic English (Gu & Ren, 2017, p. 231). Master's students in Pakistan reported challenges in all four language skills, including hesitation to speak, difficulty in understanding lectures, confusion when reading academic texts, and stress associated with academic writing (Khan, 2013).

Recent research within the Hong Kong context, specifically focusing on science courses at EMI universities, has yielded findings that slightly differ from those reported in earlier studies. Pun and Jin (2021) conducted a survey involving 73 ESL students from two EMI universities, categorizing them based on gender, prior EMI experience, and exposure to English before higher education. The researchers aimed to discern the influence of these characteristics on students' linguistic challenges within the EMI context. Contrary to prevailing expectations, the findings of this study revealed that the majority of students faced minimal linguistic challenges. Importantly, the investigation unveiled a noteworthy trend – neither students' prior experience with EMI nor their exposure to English significantly contributed to the challenges encountered in adapting to different teaching styles within EMI courses. This

nuanced exploration brings attention to the variability in experiences among ESL students in the Hong Kong EMI setting. Factors such as gender, prior EMI exposure, and English language exposure before higher education did not emerge as predominant determinants of linguistic challenges. Consequently, this study challenges some of the conventional assumptions regarding the universality of linguistic challenges within the EMI landscape. It underscores the importance of context-specific investigations and highlights the dynamic nature of language experiences in diverse EMI settings. These findings emphasize the need for targeted approaches in understanding and addressing linguistic challenges among ESL students.

Another notable theme in relation to linguistic challenges for EMI students is the use of academic register and associated vocabulary. A study by Lin and Morrison (2010) in a Hong Kong university highlighted the negative impact of the shift from Chinese to English in secondary education on the size of English academic vocabulary possessed by tertiary students. Evans and Morrison's (2011) longitudinal study further emphasized challenges related to understanding and using academic vocabulary, along with listening and writing-related challenges. The insufficient academic vocabulary knowledge was identified as negatively impacting students' lecture comprehension, understanding of textbooks, and academic writing and presentations.

Some EMI research has also explored disciplinary variations in challenges faced by students. Exploring disciplinary differences in EMI challenges, Bolton, Botha, and Bacon-Shone (2017) surveyed undergraduate and postgraduate students across disciplines in a Singaporean university. Their findings indicated that students found productive skills of academic writing and speaking more challenging than receptive skills. Notably, students in engineering and science encountered more difficulties in all four language skills compared to those in business or humanities and social sciences.

In the Turkish higher education context, Kamaşak, Sahan, and Rose (2021) examined linguistic challenges among students in three disciplines (social science, engineering, and medicine) taking EMI courses. Writing, particularly organizing essays and using proper academic writing styles, emerged as the most challenging aspect, with social science students expressing greater difficulty in writing and reading than their counterparts in engineering. Additionally, students across disciplines faced speaking-related challenges in participating in discussions and peer interactions using English.

Expanding the focus beyond students, it is crucial to recognize that EMI teachers are also susceptible to grappling with linguistic difficulties that were not present in their classes conducted in the students' (or their) first language. This section embarks on a detailed exploration of the diverse linguistic challenges encountered by both students and educators across a spectrum of EMI contexts. Notably, existing research underscores that teachers, too, confront linguistic challenges during their EMI teaching endeavors, with a predominant emphasis on spoken English proficiency for lecturing and engaging with students (e.g., Briggs, Dearden, & Macaro, 2018; Pun & Thomas, 2020; Yip, Coyle, & Tsang, 2007).

Previous studies shed light on the linguistic hurdles faced by EMI teachers, particularly in terms of spoken English. For instance, in an observational study conducted in EMI Science classes in Hong Kong secondary schools, Yip et al. (2007) revealed that a significant number of teachers encountered difficulties in elucidating abstract disciplinary concepts and employing questioning techniques to encourage student participation. These challenges were attributed to teachers' insufficient proficiency in spoken English, highlighting a specific dimension of linguistic complexity in the EMI teaching.

Building upon this, a comprehensive study by Briggs et al. (2018) used semi-structured interviews and a survey involving 167 teachers from 29 countries to look into challenges encountered by educators in both secondary and tertiary education settings during EMI teaching. The findings illuminated various linguistic difficulties faced by EMI teachers, encompassing challenges related to the use of English academic vocabulary. These challenges included concerns over correct pronunciation and insufficient knowledge about academic vocabulary in English, as well as complexities in facilitating effective class interactions, such as providing alternative explanations or ensuring clarity in instructional delivery.

Beyond linguistic intricacies, another formidable challenge emerged for EMI teachers, closely tied to the use of English – increased workload. A survey-based study by Cho (2012b) among 41 EMI teachers in a Korean university uncovered that more than half expressed concerns about the extended time required for class preparation in English compared to Korean. Similarly, in Turkey, Başıbek et al. (2014) conducted a survey involving 63 EMI teachers in higher education settings, revealing a prevalent consensus that "EMI increases the workload for teachers." Notably, there was a disagreement with the statement asserting that "it is easier to organize a lesson, to prepare for it, and to prepare classroom materials in EMI" (p. 1822). This juxtaposition of challenges underscores the intricate dynamics faced by EMI educators, encompassing linguistic intricacies and pragmatic demands associated with an augmented workload. The ensuing sections delve into the nuanced dimensions of these challenges, offering a comprehensive understanding of their impact on both the teaching faculty and the educational milieu in diverse EMI contexts.

2.3 Learning outcomes in EMI

This section explores learning outcomes in EMI with a focus on students' content learning and language proficiency. Research on learning outcomes in EMI settings has been conducted by using perception-type data from survey questionnaires or interviews and students' academic scores. While many studies highlight the positive effects of EMI on students' academic achievements, there are also instances where EMI showed somewhat negative outcomes.

Barton and Neville-Barton (2003) conducted a study focusing on first-year undergraduate ESL students in mathematics at a New Zealand university. They utilized a comprehensive test to assess students' understanding of mathematical concepts, including texts, symbols, diagrams, and graphs. The study

revealed that ESL students in EMI lectures faced a significant 10% disadvantage in learning mathematics content compared to their English first language peers. This underscores the importance for ESL students not only to comprehend mathematical terms but also to become proficient in their conventional usage to excel in mathematics.

On a more positive note, recent research has confirmed the benefits of EMI on students' academic achievements. Del Campo et al. (2015) compared the academic performance of Spanish L1 undergraduate students in EMI and Spanish-medium instruction (SMI) economics courses at a Spanish university. Analyzing 15 EMI students and 15 SMI students, the study found that EMI students achieved higher academic results, highlighting the advantages of EMI. However, it is worth noting that this study had relatively small sample sizes. Similarly, Dafouz and Camacho-Miñano (2016) explored the influence of the language medium on content knowledge acquisition among first-year undergraduate ESL students in EMI and SMI accounting courses at a Spanish university. Analyzing the final grades of 383 students over four academic years, they found that EMI students performed equally well as SMI students, indicating that EMI did not hinder academic achievement and contributed to the development of disciplinary literacy in English.

Research from Turkey suggests that EMI doesn't necessarily hinder learning, and students' performance in their first language courses can positively influence their EMI academic achievements. A study by Zaif, Karapınar, and Yangın Eksi (2017) investigated the academic performance of undergraduate students in business studies at a Turkish university, comparing EMI and Turkish-medium instruction (TMI) courses. Their analysis of 386 students revealed no significant difference in midterm, final exam grades, or overall grades between EMI and TMI groups, suggesting that EMI did not impede learning. In a recent Turkish study by Curle, Yuksel, Soruç, and Altay (2020), fourth-year undergraduate students' academic achievements in TMI courses were examined to predict their success in EMI courses. They collected all exam scores of Turkish students in economics and found a significant connection: students' TMI academic success positively predicted their EMI academic achievement. This emphasizes the mediating role of students' first language in EMI learning. This study is significant because it explores the influence of academic performance in content lectures taught in the first language on subsequent success in an EMI setting, an aspect not extensively covered in existing literature.

In their study, An and Kim (2018) conducted a comprehensive examination of the impact of EMI on the academic achievements of undergraduate students in South Korean universities over a span of two years. Their research involved the analysis of GPA data from a randomly selected sample of 859 students representing various disciplines and universities in South Korea. The findings of their study revealed an overall modest increase in GPA by approximately 2%, suggesting a positive influence of EMI on academic performance. However, when considering students with high English proficiency,

no significant changes in terms of learning difficulty or GPA were observed. In contrast, among students with intermediate-level English proficiency, a higher enrollment rate in EMI courses correlated with an increase in learning difficulty and a decrease in GPA. Additionally, the researchers did not identify significant variations in the impact of EMI based on students' fields of study, implying that the effectiveness of EMI may not necessarily differ depending on the chosen academic discipline. Instead, the researchers proposed that students' levels of English proficiency and their participation in language support programs (including language courses, mentoring initiatives, and student counseling) were more closely associated with the effectiveness of EMI.

In addition, students' content learning outcome in EMI has also been examined in school settings. One longitudinal study by Yip et al. (2007) examined the influence of EMI on students' academic achievement in EMI in Chinese school settings. The researchers tracked the science achievement of students from 25 EMI and 75 Chinese-medium instruction (CMI) schools over three consecutive years and compared a science achievement test results between the settings. The study revealed a hindering effect of EMI on students' science learning, particularly in areas where students struggled with problems assessing their understanding of abstract disciplinary concepts and their ability to distinguish scientific terms from other general words.

EMI research also delves into its impact on students' language learning. EMI is often seen as a pathway for students to enhance their English proficiency while engaging in content-based instruction (Galloway, Kriukow, & Numajiri, 2017). Smith (2004) argues that the benefits of EMI outweigh the drawbacks. However, despite these expectations and arguments, there is a noticeable gap in research that empirically assesses students' language acquisition within the EMI context. Many existing studies rely on surveys, interviews, or official English proficiency tests to gather data.

For instance, in China, Lei and Hu (2014) used scores from the national college English test (CET), designed to evaluate the general English proficiency of college students in non-language disciplines. They aimed to investigate EMI students' English language progress. By comparing the CET scores of EMI students with those of students in Chinese-medium instruction (CMI) courses during their first and second years, the study found that EMI students did not surpass CMI students in their CET scores after one year of EMI courses. However, Lei and Hu pointed out a potential misalignment between the test they employed and the specific language skills targeted in EMI. This led them to suggest the need for future research to incorporate measures of discipline-specific English proficiency to gain a more accurate understanding of language learning outcomes in EMI settings.

In a South Korean university, Lee and Kim (2007) explored EMI's impact on content and L2 learning. They compared EMI and Korean-medium instruction (KMI) math courses, assessing 170 undergraduates before and after a nine-week EMI lecture. Results defied expectations, with EMI students outperforming KMI peers in content knowledge and disciplinary register tests,

challenging the belief that EMI hinders academic success. The researchers assumed that EMI students' motivation to overcome language barriers may explain this. A potential limitation involved test suitability, as the disciplinary register test asked EMI students to translate Korean sentences into English, possibly assessing general English proficiency. Despite this concern, the study suggests EMI can be as effective as teaching content in students' first language as well as their L2 learning.

Similarly, Shim's (2012) study centered on undergraduate students in a Korean university, specifically within six business classes. She used pre- and post-tests, designed with reference to commercial TOEFL practice exams, to evaluate students' academic English listening proficiency. The results of her research revealed a statistically significant difference between the pre-test and post-test scores, suggesting that EMI had a positive effect on both content learning and the enhancement of academic English listening skills. This outcome underscored the potential benefits of EMI in simultaneously advancing students' knowledge of subject matter and their competence in academic English listening.

On the other hand, Rogier's (2012) investigation took place in universities located in the United Arab Emirates (UAE). Rogier's primary focus was on evaluating the effectiveness of EMI in fostering students' English language proficiency. To achieve this, the study tracked the changes in IELTS scores for 65 undergraduate students from diverse academic disciplines over a four-year period. The findings presented a promising trend as students' average IELTS scores in various areas, including vocabulary, grammar, listening, and writing, exhibited notable improvement after undergoing four years of EMI courses. This suggested that EMI could indeed contribute positively to enhancing students' overall English language skills. However, one aspect that remained unclear from Rogier's study was whether students from different disciplinary backgrounds experienced varying levels of English language development through EMI. This raises an intriguing question about the potential influence of academic specialization on the effectiveness of EMI, an area warranting further exploration in future research.

Marsh, Hau, and Kong's (2000) study in Hong Kong is among the few that examined the effects of EMI on both language and content learning in secondary schools. Over three years, they tracked students in EMI and Chinese Medium Instruction (CMI) schools, conducting standardized tests in language (ESL and Chinese) and content subjects (mathematics, science, geography, and history). Their findings showed that EMI had a positive impact on ESL grades but negatively affected content subjects. This was attributed to students' struggles in learning new content in a non-native language. Marsh et al. stressed the importance of giving students time to adapt to the specialized vocabulary in content subjects for better comprehension and classroom engagement. Their study holds significant value due to its comprehensive investigation of multiple disciplinary subjects within a school setting to assess the impact of EMI. This approach allows for a broader understanding of how

EMI influences various academic domains. However, the study does have a noteworthy limitation. It assessed students' English language proficiency through the use of randomly selected language items, which were not aligned with the specific content taught during EMI classes. This misalignment between the test items and the actual EMI classes may introduce a potential source of bias and may not accurately reflect the true impact of EMI on language acquisition. Furthermore, the study employed identical test items for all four disciplinary subjects, overlooking the potential variations in language use and acquisition across different fields of study. This uniformity in test items across diverse subjects raises questions about whether the research comprehensively and accurately assessed students' language acquisition from various EMI classes.

In a study by Coxhead and Boutorwick (2018), researchers embarked on a longitudinal investigation within a German EMI secondary school. Their primary objective was to delve into the development of vocabulary knowledge among students over seven years. To accomplish this, students were categorized into three cohorts: native speakers (NS), non-native speakers (NNS), and non-native speakers who attended EAL classes (NNSEAL). Each cohort underwent annual assessment using the Vocabulary Levels Test designed by Schmitt, Schmitt, and Clapham (2001). The study's results showcased consistent improvements in vocabulary test scores as students progressed through their academic journeys. A noteworthy discovery was that NNSEAL students exhibited the most substantial enhancements in vocabulary knowledge. This suggests that ESL students with limited English proficiency can indeed acquire a considerable amount of academic vocabulary in EMI environments, provided they receive additional language support. The implications of this study underline the significance of technical vocabulary development within EMI classes at the secondary school level. The interplay between technical vocabulary and content knowledge emerges as a crucial area for future research, further emphasizing the vital role language support plays in the academic growth of ESL students.

While the studies previously mentioned have contributed valuable insights into the impact of EMI on students' language learning, they share a common limitation. These studies predominantly focused on assessing the overall development of students' English proficiency, overlooking the crucial aspect of the language used and taught within EMI classrooms. It is essential to recognize that the language employed in content classes may significantly differ from that taught in dedicated language courses or used in everyday communication (Fang, Schleppegrell, & Cox, 2006; Shanahan & Shanahan, 2008). As a consequence, the English that students are expected to acquire within EMI classes tends to be discipline-specific rather than of a general nature. This specialization in language usage reflects the unique terminology, vocabulary, and communication styles particular to each academic field.

Consequently, a pressing need arises to delve deeper into whether students acquire English in a discipline-specific manner within EMI settings.

Understanding the distinct nature of the language utilized in EMI classrooms becomes pivotal in evaluating the efficacy of such instruction. This exploration not only sheds light on the tailored language needs of students but also informs the development of targeted language programs that align with the specific demands of various academic disciplines, ultimately enhancing the overall effectiveness of EMI as a pedagogical approach.

Overall, although research on students' language learning in EMI is still scarce, the existing studies have made important contributions to answering the question of whether EMI has effects on ESL students' learning of content and English. However, almost all previous EMI research on students' English learning examined students' general English development, not disciplinary English. Therefore, it is clear that there needs to be research that examines if students learn disciplinary English taught in EMI classes.

2.4 The nature and role of language in EMI

In the context of academia, the concept of literacy extends far beyond mere reading and writing proficiency. Instead, it encompasses students' competence and abilities to engage in a multifaceted manner within their academic community. This entails not only the capability to comprehend and produce academic texts but also the aptitude to effectively communicate and interact with peers and educators in the context of their academic pursuits (Airey & Larsson, 2018; Van de Poel & Gasiorek, 2012).

Recognizing the comprehensive nature of literacy, researchers have advocated for a broadened perspective on the role of reading and writing in education. While literacy has traditionally been associated with language subjects, there is a growing consensus that its significance should extend well beyond these domains into other disciplinary subjects. Consequently, within the context of EMI, which primarily focuses on content learning, there exists an opportunity to leverage EMI as a means to enhance L2 (English) proficiency among ESL students (Bradford & Brown, 2017).

The rationale for this expansion of focus lies in the understanding that the language employed in teaching content subjects differs markedly from that used in everyday communication. As Schleppegrell (2004) and EMI researchers have asserted, the nature and roles of language within EMI classes diverge from those of language courses or casual language use outside the classroom (Airey & Larsson, 2018; Dafouz, Hüttner, & Smit, 2018; Hong & Basturkmen, 2020; Shanahan & Shanahan, 2008; Yang, 2014). In essence, EMI serves as a unique linguistic context, where the language becomes a vital tool for the acquisition of complex subject matter, making it distinct from both language-focused instruction and informal language interactions.

The concept of academic literacy is firmly rooted in the belief that various academic disciplines employ language in distinct and substantive ways across all educational levels (Bloome, Carvalho, & Ryu, 2018; Lea & Street, 2006). In the academic context, acquiring academic literacy is not merely a linguistic

endeavor but an integral part of the process of acculturation into a particular discipline. This process involves students immersing themselves in the language-related practices inherent to the unique academic cultures of various disciplines (Van de Poel & Gasiorek, 2012).

Within this framework, students are expected to attain proficiency in what is referred to as 'academic language'. This term encompasses the vocabulary, syntax, and discourse strategies essential for conveying intricate concepts, abstract ideas, and cognitive processes that transcend disciplinary boundaries. These language skills are pertinent across all levels of education, from primary to higher education (Pritchard & O'Hara, 2017). In essence, students are encouraged to develop the linguistic competence necessary for effectively navigating and participating in the diverse linguistic landscapes of academic disciplines, thus facilitating their successful integration into the academic community regardless of their educational stage.

In recent years, there has been a noticeable shift in the way researchers approach the concept of literacy within educational contexts. This shift involves a transition from the traditional view of academic literacy to a more specialized perspective known as 'disciplinary literacy'. Researchers such as Kuteeva and Airey (2014) have been at the forefront of this evolving discourse. They contend that disciplinary literacy encompasses far more than the basic reading and writing skills typically associated with literacy. Instead, it extends to encompass the creation, negotiation, and dissemination of knowledge within a specific discipline. These processes involve a wide array of semiotic resources that hold significant meaning within the context of that discipline.

Furthermore, the intertwining of literacy and disciplinary content within the classroom becomes apparent when one considers that disciplinary knowledge is predominantly accessible through language (Fang, 2012; Stohler, 2006). Consequently, researchers have increasingly recognized that the language used for teaching and learning disciplinary content within educational settings exhibits a distinct discipline-specific nature (Airey & Linder, 2008), regardless of the medium of instruction.

This discipline-specific language, with its unique discourse features, can pose challenges for students attempting to comprehend and engage with disciplinary knowledge if they are not fully acclimated to its intricacies. In this context, as Woodward-Kron (2002, 2008) argues, students' proficiency in using disciplinary language becomes fundamental to their successful acquisition of disciplinary knowledge. That is, mastery of this language allows students to effectively demonstrate their understanding of disciplinary norms and concepts, providing a crucial bridge between their language abilities and their academic achievement.

The concept of disciplinary literacy aligns closely with the objectives of EMI. Disciplinary variations in language usage, as highlighted by Kuteeva and Airey (2014), are the outcomes of diverse knowledge-making practices and educational goals within each discipline. Disciplinary literacy, in essence, seeks to equip students with the skills and competence to actively engage in the

social, cognitive, and semiotic practices characteristic of experts in a particular field (Fang, 2012). EMI shares a parallel goal with disciplinary literacy, albeit with a distinct focus on utilizing L2 (English) as a medium of instruction. EMI is designed to prepare ESL students to navigate an increasingly globalized educational landscape, economy, and job market.

An essential aspect of EMI is its role in constructing meaning through the English language (Baker & Hüttner, 2017; Macaro, 2019; Schleppegrell, 2020). Llinares, Morton, and Whittaker (2012) emphasize that language in content classes serves an ideational function, enabling students to represent and express disciplinary concepts they have acquired. In EMI contexts, this language typically assumes a discipline-specific character. Dafouz et al. (2018) similarly assert that EMI has given rise to a complex interplay between disciplinary content and the appropriate use of English to convey expertise in a discipline-specific manner.

Furthermore, within EMI classes, language becomes a tool for content teachers to assess the accuracy of students' comprehension of disciplinary content (Macaro, 2018). Schleppegrell (2020) emphasizes the importance of ESL students in schools understanding how language is employed to construct and present knowledge in discipline-specific ways within their second language. Additionally, for high school students, fluency in using language in these subject-specific ways, both in written and spoken form, can be viewed as evidence of academic success (Schleppegrell, 2002). In this context, EMI environments are considered pivotal in fostering students' development of disciplinary English (Hong & Basturkmen, 2020). These settings play a crucial role in nurturing students' ability to engage with content in a discipline-specific manner, thereby enhancing their academic proficiency and readiness for success in their chosen fields.

Teaching and learning disciplinary subjects in English, particularly for students who do not have English as their first language, present considerable challenges, a point underscored by numerous researchers (Dafouz et al., 2018; Hong & Basturkmen, 2020; Macaro, 2018). In light of these challenges, a noteworthy debate has arisen within the linguistic aspect of EMI classrooms – whether to incorporate students' first language into the instructional process.

The use of students' first language in EMI classrooms has been a topic of considerable contention. While traditional SLA theory has often regarded the use of the first language as potentially detrimental to the acquisition of a L2, many studies on EMI have suggested a more nuanced perspective. They propose that students' first language and L2 (English) can complement each other effectively, with the use of the first language proving essential in addressing challenges associated with English-medium instruction, such as issues related to clarity, redundancy, and precision (Breetvelt, 2018; Kim et al., 2017; Kirkpatrick, 2017; Lee, 2010; Yeh, 2014).

Yeh (2014, p. 10), for instance, contends that when students share their first language with their EMI teachers, it can alleviate their sense of burden by providing "alternative channels of teacher-student communication." Macaro

(2019) emphasizes that the primary objective of EMI is content teaching, not language instruction. Consequently, it may be acceptable to utilize the first language in EMI classes as long as it does not significantly undermine the implicit goal of EMI – incidental acquisition of English.

Chalmers (2019) further supports the use of the first language in EMI classes, advocating for a flexible approach where EMI teachers or lecturers can employ both the first language and L2 to facilitate students' comprehension of content knowledge and language proficiency. Additionally, Chalmers asserts that even within EMI classes, students should possess proficient academic language skills in their first language, as these skills can be transferred to their L2 learning. In essence, the debate surrounding the use of students' first language in EMI classrooms underscores the complexity of balancing language and content teaching, while also acknowledging the potential benefits of linguistic flexibility in supporting students' learning experiences.

While the practice of using students' first language in EMI classrooms remains limited, some empirical research has shed light on content teachers' use of the first language during their EMI instruction (Costa, 2012; Hong & Basturkmen, 2020). This use of the first language, often referred to as code-switching, has been observed in specific EMI settings. For example, a descriptive study conducted in the context of Italian higher education (Costa, 2012) revealed an interesting pattern. Six Italian content lecturers, each teaching different subject areas, were found to employ code-switching, which involves alternating between Italian and English. They did so strategically to aid their Italian-speaking students in better comprehending technical terminology and expressions. This decision stemmed from an understanding that their students might lack familiarity with these terms, necessitating the use of their native language to bridge comprehension gaps. Additionally, these lecturers went further by providing translations of their English explanations into Italian, further facilitating their students' understanding of the subject matter.

Hong and Basturkmen (2020) extended this line of inquiry by exploring the potential influence of content teachers' first language backgrounds on their use of the first language in EMI teaching. Their study, conducted in South Korean EMI high schools, yielded intriguing findings. It revealed that the practice of employing the first language, either through code-switching or translation, was a common pedagogical strategy among Korean first language teachers. The teachers used this approach to enhance their students' comprehension. However, in contrast, this practice was notably absent in the classes taught by English first language teachers.

These observations suggest that content teachers' decisions regarding the use of the first language during EMI instruction can be influenced by their own linguistic backgrounds and perceptions of their students' needs. This variability in the use of the first language underscores the nuanced nature of EMI classrooms, where teachers may employ diverse strategies to strike a balance between content delivery and linguistic support for their students.

2.5 EMI teachers' perceived roles and practices in relation to teaching English

This section reviews EMI teachers' perceptions of their roles in relation to supporting their students with language and their actual language-related practices reported in the previous EMI studies. EMI researchers have tried to find answers to whether EMI teachers consider they have a role in teaching English. Early literature on EMI has consistently reported that EMI teachers do not perceive language teaching as part of their responsibility (e.g., Airey, 2012). For example, in Airey (2012), the EMI lecturers in physics reported that they did not think teaching students how to use English in physics was their job. One reason for this was because they were not confident and comfortable correcting students' English. Block and Moncada-Comas (2022) also examined how STEM lecturers in EMI higher education settings struggle with the idea of identifying themselves as English-language teachers (ELTs), as revealed through interviews in which they openly reject this characterization. These lecturers did not view the presentation of language-related elements or the correction of students' English as within their role as EMI educators.

Albeit scarce, some recent EMI research has reported that EMI teachers perceived language teaching as part of their roles. Basturkmen (2018) examined two EMI lecturers' perceptions of their role and found that both lecturers thought facilitating their students' development of disciplinary register was important part of their EMI teaching. Also, these EMI lecturers were observed to use corrective feedback strategies (e.g., recast, paraphrase, repetition) used by language teachers in ESL classrooms. Similarly, Hong (2022) examined high school EMI teachers' language-related challenges and practices in online EMI settings. She found that EMI teachers believed they have language-related roles in teaching, but in terms of the level of disciplinarity of language, they responded differently according to disciplinary backgrounds. While the history EMI teacher perceived his role to include teaching general or academic English, the mathematics EMI teacher reported that teaching mathematic vocabulary was the only language-related part of her teaching.

A recent study by Abouzeid, Liardét, and Khachan (2023) examined EMI teachers' teaching experiences, perspectives, and actual practices in the Lebanese context. Surveying 63 EMI teachers from two Lebanese universities and conducting interviews with eight, the findings revealed a majority of the teachers acknowledged the dual role of teaching English alongside content. Still, the interviewed instructors tended to distance themselves from the dual responsibility even though they reported their practices of teaching English. The study highlights the need for clearer definitions of EMI teachers' roles in order to maximize EMI's effectiveness.

Although EMI teachers may not consider that teaching English language is part of their role, there is research evidence to show that EMI teachers often incorporate a focus on language within their content teaching. Many EMI researchers emphasize that teachers go to great lengths to support their

students by making decisions about what language items to attend to and how (Basturkmen, 2021; Gibbons, 2003). Moreover, it is widely acknowledged in EMI research that ESL students benefit implicitly from EMI (Airey, 2016; Kamaşak et al., 2021; Rose, Curle, Aizawa, & Thompson, 2020), with classroom interaction serving as a pivotal component in their concurrent acquisition of both content knowledge and English language skill (Hong & Basturkmen, 2020; Macaro, 2018; Pica, 2002).

The process of language learning through interaction plays a crucial role in EMI classrooms. SLA researchers argue that this productive interaction connects input, the students' selective (incidental) attention to language, and their output (Long, 1996). To facilitate the L2 learning process during these interactions, Gass (1997) suggests two interventions that teachers can employ in ESL classes: making input more comprehensible and encouraging increased output. Swain (2000) further emphasizes this L2 learning process and suggests that it can be explored by examining interactional sequences, specifically language-related episodes (LREs). LREs represent incidental instances during classroom interaction when teachers and students discuss "the language they are producing, question their language use, or correct themselves or others" (Swain & Lapkin, 1998, p. 326). LREs can enhance the input provided by proficient speakers (teachers) and stimulate increased output from students (Swain, 2000).

Attention to language during classroom interaction may play a more important role in EMI classes than ESL classes as the focus of EMI is entirely on teaching and learning content knowledge, not language. This attention to language encompasses both planned and incidental attention to language (Ellis et al., 2001a; Hong & Basturkmen, 2020). Planned attention to language consists of teachers' or lecturers' prior decisions to target specific linguistic items (Ellis et al., 2001a; Hong & Basturkmen, 2020). By contrast, incidental attention to language occurs spontaneously when teachers or students focus transiently on language during class interactions without any prior intention (Ellis et al., 2001a).

Some classroom-based studies have examined what EMI teachers actually do to help students with language in their teaching practices (An, Macaro, & Childs, 2019; Basturkmen & Shackleford, 2015; Hong, 2021; Martinez, Machado, & Palma, 2021) focusing on one single type of attention to language, namely incidental, unplanned attention to language that arises during classroom interaction. Moreover, these studies used LREs to quantify instances where EMI teachers and students incidentally attended to language during EMI classes.

Previous studies have confirmed the frequent occurrence of LRE in class interaction and found that most LREs focused on vocabulary. For example, in New Zealand, Basturkmen and Shackleford (2015) observed undergraduate accounting classes of two lecturers to examine LREs in teacher talk and teacher-student interactions. LREs were found to occur at a rate of one LRE every three minutes. It was the teachers who initiated a great majority of the

LREs, and they did so more pre-emptively than reactively to address expected linguistic difficulties. Vocabulary received the most attention, followed by a conventional articulation of proposition in accounting, discourse, and grammar. The authors concluded that such episodes can be a crucial means by which EMI teachers integrate their attention to language into their content teaching.

Drawing on the methodology used in Basturkmen and Shackleford (2015), Hong (2021) examined the characteristics of LREs in an undergraduate computer programming class in a Korean university in a similar line of inquiry. She found that LREs ranged in length from six to 19 seconds. The teacher in her study, too, initiated almost all the LREs – mostly pre-emptively to focus on vocabulary. There were no LREs that focused on grammar. Interestingly, the teacher initiated vocabulary-focused LREs mostly to deal with spellings of technical terms while using a programming language for coding. Hong concluded that lecturers' strategies for attending to the same linguistic category might vary from discipline to discipline.

In their observational study, Martinez et al. (2021) found that teachers and students had different views towards lexis-focused LREs arising in three different EMI classes in the Brazilian higher education context. While EMI teachers in their study felt apologetic for initiating LREs due to the negative influence LREs may have had in students' learning of content knowledge, the students in fact recognized LREs as helpful for their lecture comprehension as well as content knowledge development.

Recently, the focus of EMI research on LRE has expanded from higher education to secondary education. An et al. (2019) examined LREs arising in science classes in EMI high schools in China. They observed two lessons of 15 English first language teachers from seven schools making a total of 15 hours and 20 minutes of video recordings. Unlike the findings of the previous studies reviewed earlier, their study found that only a small proportion of the class time (3%) was given to LREs. Still, about 80% of that time was given to LREs focused on vocabulary, followed by grammar and idiom.

While previous studies predominantly focused on incidental attention to language, recognizing its prevalence during classroom interactions, recent research has expanded to explore planned attention to language as well (Hong, 2022; Hong & Basturkmen, 2020). In a study by Hong and Basturkmen (2020) on LREs in two EMI classes (economics and politics) in two different high schools in South Korea, it was found that the occurrence of LREs was frequent in both EMI classes. One noticeable finding was that the frequency and types of LREs was not significantly affected by the teachers' different first language backgrounds or disciplinary areas. Interestingly, the study also found that the economics teacher spent far more time on the vocabulary-focused LREs than the politics teacher. Hong and Basturkmen explained that the reason for such a result was because of the economics teacher's use of code-switching, which was not observed in the politics teacher's teaching practices. They also assumed that as an ESL speaker, the economics teacher might

have had an "instinctive understanding of the potential level of (linguistic) difficulty" that his students would encounter during his EMI classes (p. 7). Although the focus of the study was incidental attention to language, both the teachers were observed to pay attention to language when they planned and prepared for their teaching to help the students, for example, by providing their classes with a glossary or wordlist of disciplinary vocabulary. The authors suggested that the way EMI teachers perceive their roles in relation to their EMI teaching and their planned attention to language also need to be examined, along with incidental attention to language.

In the sequent study, Hong (2022) examined LREs in online EMI classes and compared them with the findings of Hong and Basturkmen. She reported that LREs were usual and frequent in online EMI classes with a rate similar to that found in the face-to-face (F2F) EMI classrooms in Hong and Basturkmen. One difference between online and F2F EMI settings was that the students in the online setting initiated more LREs than those in the F2F setting. Hong explained that the use of synchronous text-based chat appeared to encourage the students to notice and correct their own or others' language errors. However, the EMI teachers reported to have difficulties in interacting with their students in the online EMI classes, which they did not have in F2F classes.

Hong (2022) and Hong and Basturkmen (2020) argue that as planned attention to language is also an indispensable part in teaching and learning a language (Ellis et al., 2001a), both planned and incidental attention to language need to be considered when supporting students with language challenges in EMI settings.

2.6 Summary

This chapter has provided an overview of various dimensions of EMI, ranging from the linguistic challenges encountered by both teachers and students to the pedagogical practices adopted by EMI instructors. Notably, research on language teaching and learning in EMI has made substantial contributions at both secondary and tertiary education levels.

However, as pointed out by Sah (2022a), there remains a distinct need for further investigation into the dynamics unfolding within EMI classrooms, particularly focusing on how EMI teachers deliver linguistic support to students and the extent to which students derive language proficiency from this support. From a methodological perspective, there arises a crucial necessity for the development of research methods tailored to scrutinize and comprehensively analyze students' language acquisition experiences within the EMI context.

This book's overarching aim is to address these research imperatives, shedding light on the intricate facets of language learning within EMI classrooms and proposing innovative methodologies to facilitate a more thorough examination of this pivotal aspect of EMI education.

3 Case studies

3.0 Introduction

This chapter describes the case study approach used to investigate EMI teaching in two different educational settings, a high school and a university, in South Korea. The case study focused on how EMI teachers in South Korea attended to language issues and questions in teaching disciplinary content to their English second language (ESL) students. Research is needed to build an understanding of how EMI teachers deal with language issues because of the potential linguistic barriers to ESL students' learning of disciplinary content in EMI contexts.

As reported in Chapter 2, previous studies on EMI have shown that language sometimes becomes a topic of discussion in EMI classes; however, there has been little information about content teachers' or lecturers' attention to language when they plan or prepare EMI teaching. Moreover, although many researchers have claimed that EMI is effective for ESL students' development of disciplinary English, little attention has been given to the learning language dimensions that are focused on in EMI classes. The main purpose of the case studies was to investigate how content teachers in the South Korean context provided language support to their students in their planned and incidental teaching practices and whether there was evidence of students' learning of language from vocabulary LREs in classroom interaction, which was a significant form of support observed.

This study was guided by the following research questions:

(1) What is the planned attention to language in two EMI settings in South Korea?

  (1.1) What are the types of planned attention to language?
  (1.2) What are teachers' and lecturers' reasons for their planned attention to language?

(2) What is the frequency and nature of language-related episodes (LREs) in disciplinary classes in these settings?

  (2.1) To what extent do LREs occur in the EMI classes?
  (2.2) What are the characteristics of LREs in the EMI classes?

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(3) Do students learn linguistic items targeted in LREs in these settings?

    (3.1) What characteristics of LRE are associated with students' learning of language?

This chapter begins with a description of the context of the study and the settings and EMI courses involved, including information about the teacher and student participants. The chapter then describes each type of data collected and the methods used to do so. Finally, the chapter describes the ways the data were analyzed.

3.1 Research design

The reported study at hand encompassed three objectives, each focusing on distinct facets of EMI classrooms within South Korean secondary and higher education contexts. Firstly, the study aimed to unravel how EMI teachers strategically integrated language support within their instructional planning – a process referred to as planned attention to language. In particular, it sought to discern the specific categories of language support that EMI educators intended to incorporate into their teaching methodologies. Furthermore, it delved into the underlying motivations guiding these pedagogical choices, seeking to comprehend the desired outcomes that teachers aspired to achieve through the incorporation of language support.

Secondly, the study shifted its focus to the practical implementation of language-related aspects during classroom instruction, described as incidental attention to language. It focused on the spontaneous handling of language issues by EMI teachers within the teaching process itself. To achieve this, the study conducted an examination of the instances and nature of LREs occurring within classroom interactions. These LREs represented moments where language matters surfaced organically during the course of instruction.

Lastly, the study transitioned to evaluate the impact of these LREs on students' language acquisition – a crucial aspect of incidental attention to language. It probed into the extent to which students were able to absorb and comprehend the targeted language items presented within LREs. Additionally, the study explored potential correlations between various characteristics of LREs, such as their initiator and duration, and the subsequent impact on students' language learning.

In essence, this comprehensive study aimed to illuminate the intricate interplay between deliberate instructional planning, spontaneous language issues, and student learning outcomes within EMI classrooms, ultimately contributing to a more nuanced understanding of the integration of language within these educational settings.

The study was based on a case study approach. A case study approach is a holistic and in-depth exploration of the complexity, particularity, and uniqueness of a single phenomenon or multiple phenomena (Dörnyei, 2007;

Duff & Anderson, 2015). As reported in Chapter 2, there has been a lack of research on teaching and learning of language in EMI classes in school and university settings. When little is known about a phenomenon, a case study approach is appropriate because it allows researchers to build an understanding of new topics or novel aspects of topics. It is thus particularly suitable for topics that have not been subject to extensive prior research.

The case study reported in this book involved two institutions: a high school and a university in South Korea. This study took place in two different settings, Sokuk High School and the University of Seoul, both located in Seoul, South Korea. The pseudonyms Sokuk High School (SHS) and the University of Seoul (UoS) were used to protect the institutions' anonymity.

The research used a mix of qualitative and quantitative methods. The mixed methods increase the strengths of both qualitative and quantitative methods used in the study while overcoming their weaknesses (Dörnyei, 2007). Moreover, it is particularly appropriate when researchers aim to gain breadth and depth of understanding of a complex phenomenon and improve the validity of their research (Clark, Creswell, Green, & Shope, 2008).

This study involved two sequential phases for data collection: one initial qualitative phase and the other quantitative phase. Data for the study were collected across two phases. In Phase One, qualitative data were collected from classroom observations and recordings and semi-structured interviews with the EMI teachers. In Phase Two, quantitative data were collected from a language test that was tailor-made for this study.

3.2 Case context and participant: Sokuk High School

Sokuk High School (SHS) is a public school in Seoul, South Korea, which was established in 2008. The school aims to address educational inequality through its policy of recruiting more than 30% of its students from low-income families. All subjects except Korean language and history and languages other than English are taught through the medium of English. English language classes are taught by ESL teachers. The school follows the national curriculum and teaches the official academic subjects set by the Korean Ministry of Education (MoE). It also provides some Advanced Placement (AP) subjects to prepare students for the SAT, a standardized test used for HE admissions in the United States. As of 2022, there are four AP subjects (economics, calculus, human geography, and world history) included in the school's curriculum.

The school's official education plan is to "teach not only the English language but various content subjects in English to expose students to English" (Sokuk High School, 2018, p. 7). The school hoped that EMI would improve students' oral communicative English proficiency as students interact with their teachers during classes (Sokuk High School, 2019). In 2020, the school began to provide support language programs for all first-year students, such as a general English language camp and after-school English language programs. The aim of such programs is to help students acquire basic communication skills in English so that they can be motivated to participate in EMI courses more actively (Sokuk High School, 2019).

The students at SHS are Korean first language speakers. They are all expected to meet a sufficient level of competence in general English at school admission that is equivalent to the Test of English as a Foreign Language Internet-based test (TOEFL iBT) minimum score of 60 (Sokuk High School, 2019). The school evaluates candidates for admission based on the result of an interview with both content and ESL teachers in English and their English grades from middle school.

Out of 70 Korean first language teachers, 42 (60%) hold a master's degree and nine (13%) doctorate degrees in relation to their teaching subjects. There are 11 non-Korean teachers who are English first language speakers, comprising approximately 14% of the total number of teachers. In order to work at public schools in South Korea, English first language teachers are required to hold a bachelor of specialist subjects and optionally an official teaching certificate and are recruited by the Seoul Metropolitan Office of Education (SMOE). Eight out of 11 (73%) English first language teachers hold a master's degree.

The school provides a teacher professional development program called the EMI teacher development program for Korean first language teachers. It is outsourced to an external organization that is specialized in ESL teacher training. The program's aims are to improve the teachers' confidence in using English for teaching and to improve the academic English they need for teaching (Sokuk High School, 2018). The program involves various types of activities, such as group discussions, practice lesson planning, practice teaching, and peer feedback. It is compulsory for all Korean first language teachers to attend the program. The following is an example of the contents of the program (see Table 3.1).

Table 3.1 The content of the professional program at SHS (Sokuk High School, 2018, p. 4)

Session	*Description*
Understanding classroom language	• Defining how lessons are started and finished • Identifying elements and phrases that can be used to start a lesson • Developing ways to promote social language when starting and finishing a class • Evaluating the success of language used to start and finish lessons
Understanding teacher language	• Identifying and categorizing functions of teacher language • Modifying classroom language to suit the level of their learners • Recognizing and utilizing methods of elicitation • Producing content-checking questions which help to improve learner understanding
Giving instructions, practice, and application	• Exploring different strategies to minimize verbal instructions but retain clarity • Analyzing activities and breaking them down into basic steps

There is no collaborative work between EMI teachers and ESL teachers who teach English as a separate subject. Also, the school does not have any professional programs for English first language teachers; however, the annual report of 2019 (Sokuk High School, 2019) states a need for such a program to support English first language teachers – most of whom have less experience in teaching their content subjects in EMI for ESL students.

Two EMI teachers, Kim and Glenn, from SHS agreed to participate in our research. One EMI class in the school setting that we observed is Kim's economics class. Kim is a Korean first language speaker who uses English as a second language. He received his bachelor's degree with double majors in economics and education and passed the national employment exam for a teaching position. In our interview with Kim, we found out that he did not have any experience of studying overseas, but during his undergraduate degree, he took at least one EMI course every semester. After teaching economics at public high schools for five years, in search of development and a challenge, he applied for a teaching position at SHS. Although he had no experience teaching economics in English before he moved to the school, he had above-average scores in all sections of TOEFL.

At the time of the study, Kim had taught first- and second-year economics for three years at SHS. At the time of the study, he was teaching four economics classes, two for first- and two for second-year students. Each class met twice a week. For the study, we observed one of his second-year economics classes four times over the two weeks. Kim had developed his own economics English language in-house textbook. Kim reported that the teacher professional program provided by the school helped him improve his English language proficiency. In Kim's economics class, 27 students participated in this study. They were all Korean first language speakers who had English as their second language. None of the students in Kim's class had experiences of living in English-speaking countries.

The other EMI class observed in this study is Glenn's mathematics class. Glenn is an English first language speaker from Ireland. From our interview with Glenn, we found that he had a bachelor's degree with a double major in biology and physiology and a postgraduate diploma in science and maths education from a university in the United Kingdom. After receiving his postgraduate diploma, he worked for three years as a science and maths teacher at a secondary school in Ireland. He came to South Korea to apply for an ESL teaching position at an elementary school in Seoul. He taught ESL classes for Korean first language students at the elementary school for two years and taught Korean first language students aged 16 to 18 English writing at a private English academy. In our interview with Glenn, we found out that he started teaching mathematics and biology at SHS in 2017.

At the time of the study, Glenn was teaching EMI mathematics to second-year students twice a week. For the study, we observed his second-year mathematics classes four times over the two weeks. In Glenn's mathematics class, 23 students participated in this study. They were all Korean first language

speakers who had English as their second language. Two of them had experiences of studying or living in English-speaking countries.

3.3 Case context and participant: University of Seoul

The University of Seoul (UoS) is a private university located in Seoul. It consists of seven faculties: arts, law, education, global studies, business, engineering, and mathematics and sciences. Since the first introduction of EMI to global studies and business in 2006, the university has expanded its scope to other faculties. Although the exact number of EMI courses provided in the UoS was not shown in any of the official documents, it is mandatory for all the faculties to provide at least 20% of their courses in EMI. The annual report of the university (University of Seoul, 2020) states that all faculties are, at their discretion, to determine which subjects are to be taught in English except for Korean studies and language studies other than English (e.g., Japanese or French).

As of 2020, there were 188 international teachers (27% of the total 690 teachers) who were from overseas and used Korean as a foreign language. Around 13% of the total number of undergraduate students were international students who had Korean as a foreign language (University of Seoul, 2020). All students are expected to have high English proficiency, equivalent to the TOEFL iBT minimum score of 65 or the International English Language Testing System (IELTS) overall score of 5.5 (University of Seoul, 2020).

The university offers a supportive language program called the Individualised English Education Programme for all first-year students. The stated goal of the course is to help students become confident in using academic English for undergraduate-level study. All first-year undergraduate students who do not have English as their first language are required to do a computer-based English proficiency assessment before registration. Then they are allocated to an EAP course according to their assessment results. The assessment consists of academic reading, writing, and listening tasks and is scored on a five-band scale; one is the lowest and five is the highest. Students take their allocated EAP course throughout their first year. The courses are taught by English first language EAP instructors, all of whom have bachelor's degrees in majors related to either language teaching or linguistics. There is no collaborative work between EMI lecturers and EAP instructors. Also, the university does not have any professional programs for EMI lecturers. The following is an example of the contents of the EAP program (see Table 3.2).

One EMI class in the university setting that was observed in this study is Chen's accounting class. Chen is a Chinese first language speaker who uses both English and Korean as foreign languages. He received both an MEcon and a PhD in economics and business from a private university in South Korea. From his experience of studying and working in South Korea for nearly 15 years, Chen has a near-native command of Korean. He also had advanced levels in all sections of TOEFL at the time he applied for a lecturer position at the UoS.

Table 3.2 The content of the EAP program at the UoS (University of Seoul, 2020)

Lesson	*Description*
Strategies for reading academic texts	• Identifying words or phrases connected with the topic in the text • Identifying your purpose of reading • Finding specific information • Making course notes
Strategies for writing academic texts (1)	• Writing a crafted text using researched material in EAP • Using linking words and phrases (coherence)
Strategies for writing academic texts (2)	• Exploring different citation styles (in-text citations) • Paraphrasing and summarizing for various sections of research reports • Exploring ways to avoid plagiarism

Chen had been teaching undergraduate EMI accounting courses at the UoS for six years. During the observed semester, he taught two undergraduate accounting courses, one for first-year students and the other for fourth-year students, each of which met twice a week. All the teaching materials (e.g., textbooks, handouts, lecture slides) used in Chen's classes were written in English.

In Chen's accounting class, 42 students, all of whom were from the Faculty of Business, participated in the study. Chen's class had 19 international students. The only demographic information gathered from Chen was their nationalities: 14 from China, three from Pakistan, and two from Germany. These students spoke neither Korean nor English as their first language. We observed his first-year accounting course over the two weeks (a total of eight hours of recording). It is a compulsory EMI course for all the first-year students in the Faculty of Business, regardless of their first language background. All students in Chen's classes speak English as L2 and are taking EAP courses.

The other class in the university setting that we observed is Luke's mathematics class. Luke is an English first language speaker from India who does not speak Korean to any great degree. He holds a PhD in applied mathematics from a private university in South Korea. He started working as a lecturer at the UoS in 2012 and has been teaching EMI mathematics courses since then. During the observed semester, Luke taught two undergraduate mathematics courses, one for first-year students and the other for fourth-year students. There were 31 students in Luke's mathematics from the Faculty of Mathematics and Science. All of them were Korean first language speakers, and only four of them had experience of studying or living in English-speaking countries.

We observed his first-year engineering mathematics course, a mandatory course, four times over the two weeks, and a total of five hours and 57 minutes of recordings were made. All the teaching materials (e.g., textbooks, lecture slides, handouts) used in Luke's classes are in English.

3.4 Semi-structured interviews

This section explains the interview design we used to gather data on the teachers' plans for attending to language in their teaching and the roles they thought they should play in helping students with language issues. The term teachers' planned attention refers to teachers' prior decision to target specific linguistic items in anticipation of challenges that students may encounter during class. For example, syllabi, lesson plans, glossaries, or wordlists of vocabulary that are provided to students.

We conducted individual semi-structured interviews with the teachers in order to understand the purpose of their attention to language in planned practices, such as the provision of wordlists. An interview protocol was developed to elicit the teachers' perspectives of their role and purposes for providing planned attention to language (see Appendix A). The interviews were held individually with each teacher after the period of observation and conducted in English or Korean according to each teacher's preference. The interviews were audio-recorded and transcribed verbatim.

We also collected institutional and teachers' documents (e.g., annual reports, educational curricula, lesson plans, syllabi) and used them to corroborate the findings from the interview data, following suggestions from Brown (2018) on the need for triangulation of data types in interview-based inquiries. Also, by referring to documents, we were able to understand and interpret the teachers' responses to the interview questions.

The interview recordings were transcribed verbatim. We used thematic analysis for the interview data following Braun and Clarke (2006), using deductive approaches. The deductive approach refers to a process of data coding without attempts to fit them into a pre-existing coding frame. We used a deductive approach, which allowed us to begin the coding process with predetermined themes reflecting the purposes of the research question: (1) EMI teachers' perceived roles in relation to EMI and (2) the anticipated functions of their planned language support.

We coded the interview data manually based on the pre-determined themes, the perceived role, and the anticipated functions of planned language support. Any words, phrases, or paragraphs related to these themes were assigned the codes (e.g., Teaching content, Class management, as seen in Table 3.3). We reviewed interview scripts and looked for markers related to our research questions (e.g., I think, I believe, my responsibility, it is because, or the reason is) and generated codes relevant to each theme, as shown in Table 3.3.

In addition to data from interview recordings, we used available data from other sources for each teacher, including classroom recording transcripts and teachers' documents. We delved into teachers' documents, seeking specific indicators and markers related to language teaching and learning. These documents encompassed a range of materials, such as syllabi and instructional plans. Our focus within these documents was to identify any explicit language learning goals or objectives that were articulated. This helped us to pinpoint

Table 3.3 Examples of themes and codes for interview data analysis

Topics of interview questionnaires	*Transcripts of interviews*	*Codes*
Role of teachers/ lecturers	Since it is engineering mathematics, and application-oriented, **my job is** to *teach them where that mathematics is going to be used in real life*. So, **I think** *I need to teach them to think more mathematically*, **help them** *practice how to use those terms* and equations in relation to their future career in the field and *understand the subject*.	Teaching content Teaching content Supporting vocab learning Teaching content
The function of language support	I want them to *get out of their comfort zone* and expose themselves to new economics concepts, and terms . . . because I wanted them to use it as *an immediate hint* when they work on exercises in the textbooks or read the text and come across new terms. But **I'm sure that** it's important to give them a glossary *prior to teaching* each lesson, *otherwise I will spend all my time explaining the terms.*	Class engagement Class engagement Timing of provision Class time management

instances where language development was formally integrated into the curriculum and to gauge the extent to which teachers incorporated language-related elements into their teaching strategies. Then, we categorized codes identified from interview data according to the questions in interview protocols. At the same time, we examined the teachers' planned practices in general with reference to the field notes and transcription of classroom recordings to find any codes that either corroborated or contradicted the codes from each participant's interview data.

3.5 Classroom observations and LRE analysis

To examine the occurrence and nature of LREs in the EMI settings, we collected data from classroom observations and recordings of the observed classes. Through the classroom observations, we aimed to gain an understanding of

the teaching context, including the activities during the classes and the situations that unexpectedly occur. Four naturally occurring EMI classes were observed and recorded for four lessons each. We used three wireless voice recorders to capture classroom interactions. The first recorder was attached to the teacher's lapel to record teacher-student interactions as they go around the classroom. Two recorders were placed in the front and the back of the classroom to record teacher-to-class (teacher to whole class and teacher to a group of students) interaction.

For the purpose of developing language test items based on certain types of LREs, it was necessary to track students who were engaged in LREs used for test. To trace such students without collecting their names, student ID numbers, or any other personal information, we allocated numbers to all seats in the classroom by providing laminated number plates on the first day of the observation. We asked all students in each class to bring their number plates and place them on their desks for all four lessons observed so that she could trace them even if they changed their seats.

One of the researchers was also present during all observations as a nonparticipant observer. She sat in the back of the classroom, observed the teachings, and took notes regarding the nature of the lessons observed, any notable classroom interactions that may not have been captured by the audio-recording, and classroom activities. Field notes were made for each lesson observed; most of the notes taken during the observations consisted of the allocated number of the students who were engaged in those LREs either by making linguistic errors, to which the teachers attended to or by making queries about language items. Copies of any teaching materials (e.g., activity sheets, handouts) used in the classes were also obtained from the teachers.

After transcribing all the class recordings, we identified LREs from the transcription of recordings of the lessons observed. In this study, an LRE started when a teacher or student produced an unsolicited query or advice about a linguistic item (e.g., Teacher-initiated or Student-initiated, preemptive LREs) or when a teacher or student responded to a problematic utterance produced by another participant either because its meaning was unclear or because it had a linguistic error (e.g., Teacher-initiated or Student-initiated, reactive LREs).

One LRE was composed of one linguistic item. To illustrate, the following excerpt shows a dialogue from Kim's economics classes. While discussing economic content (calculating economics formula), Kim takes transitory time-outs from this discussion to focus on language. He rephrases "Q" with "the quantity" and "AFC" with "average fixed cost," presumably to help his students understand the acronyms better. Also, he rephrases the words "average total cost" and "average variable cost" with their acronyms. Although these four language items occur within one short teacher-talk, we coded them as four separate LREs as there were four different linguistic targets, in this case, four different vocabulary items.

Excerpt

T: If you divide this by Q, the quantity, you will get the average total cost, ATC, and the average variable cost, AVC, and then AFC, average fixed cost.

We identified a total of 430 LREs: 233 LREs from SHS and 197 LREs from the UoS. The LREs identified from the transcriptions of class recordings were coded for their types and characteristics drawing primarily on the analysis in the studies of Basturkmen and Shackleford (2015) and Hong and Basturkmen (2020). We coded each LRE for initiator (Teacher- or Student-initiated), interactional types (pre-emptive or reactive), and linguistic categories (vocabulary, grammar, discourse, or disciplinary speak). In the following sections, each category used for coding LREs is described in detail.

(1) Initiator and interactional type

The initiator type describes who initiated an episode. It includes two different categories: Teacher-initiated (T-initiated) and Student-initiated (S-initiated). The interactional type demonstrates how an episode is initiated and is divided into two categories: pre-emptive and reactive. In our study, the term pre-emptive refers to "an unsolicited query or advice about a linguistic item" (Loewen & Reissner, 2009, p. 105). Teacher-initiated, pre-emptive LREs provide an indication of any linguistic items that the teachers assume may be problematic or challenging to students. Student-initiated, pre-emptive LREs were defined as episodes that occur when a student raises a query about a linguistic item by directly asking a question or based on intonation. Pre-emptive LRE begins at the moment a linguistic item is asked and ends when neither the teacher nor the student addresses the linguistic item. Excerpt 3.1 illustrates a Teacher-initiated (T-initiated), pre-emptive LRE in which the teacher uses an acronym, k, but immediately provides the economic term, capital, supposedly anticipating that some students might get confused with k.

Excerpt 3.1 (economics, T-initiated, pre-emptive)

T: You can see that Bob is on the k, the capital, that means capital is fixed in the short-run.

Reactive LREs refer to episodes that arise in response to a problematic utterance or because a participant fails to comprehend something another has said (Ellis, Basturkmen, & Loewen, 2001a; Hong & Basturkmen, 2020). A reactive LRE starts at the moment a participant produces either a linguistic error or problematic utterance that another participant cannot comprehend and ends when neither of the participants addresses the error or utterance that

has triggered the LRE. Excerpt 3.2 later illustrates a Teacher-initiated, reactive LRE in which the teacher reacts to a student's erroneous use of language to articulate a formula in mathematics.

Excerpt 3.2 (Mathematics, T-initiated, reactive)

Teacher And . . . what's the range?
Student P bigger than q.
Teacher Uh, huh?
Student Y is greater than . . . ?
Teacher Yes, and?
Student Ah, y is greater than or equal to q.
Teacher Yes, y is greater than or equal to q.

(2) Linguistic categories

Linguistic categories refer to whether episodes targeted vocabulary, grammar, discourse, or disciplinary speak, following Basturkmen and Shackleford (2015) and Hong and Basturkmen (2020). Vocabulary includes both single-word and multi-word units. Multi-word units are lexical units formed by two or more words to denote disciplinary concepts. Discourse refers to instances when speakers refer to "the organisation of language above the level of the clause or sentence and to the connectivity of text", including cohesive devices and discourse acts (Hong & Basturkmen, 2020, p. 4). Disciplinary speak refers to disciplinary expressions of propositional meaning or ideas in conventionalized ways that are meaningful and appropriate to a particular discipline. Table 3.4 shows examples of disciplinary speaks of two different disciplines.

(3) Complexity

The last category is complexity, which is divided into simple and complex. Simple LRE refers to an episode that consists of no corrective response (teacher-talk or self-correction) or one response of the teacher to either a language item

Table 3.4 Examples of disciplinary speak

Subjects	*Disciplinary speak*
Economics	T: Firms are responsible for corrective taxes because they . . . ? S: Because they ***did bad things.*** T: Yes, because they ***caused a negative externality.***
Mathematics	T: What would the range be for this? S: ***y is equal to or more than zero?*** T: Yes, so, in that case, ***y is greater than or equal to zero.***

Table 3.5 Complexity of LRE

	Types	*Example*
Simple	Teacher-talk (no response) Self-correction One teacher response to a trigger	T: You can see that Bob is on ***the k, the capital***, that means capital is fixed in the short-run. S: For those ***who doesn't, who don't*** get how to figure this out, if there's add something, you should, you can just divide them with quantity. T: We will be working on this number. ***What does MC stand for?*** C: ***Marginal cost.*** T: And the next one is . . . T: You can get the x-intercept in that one, too. S: ***X-intercept?*** T: ***Yes, intercept.*** If you look at the handout (wordlist) . . . ***it says 'the point that the graph crosses on the x-axis'.*** Okay? Let's move on to the next question.
Complex	Multiple teacher responses to a student's linguistic error One teacher response to silence in teacher-talk	T: And . . . what's the range? S: ***P bigger than q.*** T: ***Uh, huh?*** S: ***Y is greater than . . . ?*** T: ***Yes, and?*** S: ***Ah, y is greater than or equal to q.*** T: ***Yes, y is greater than or equal to q.*** T: What does C stand for? Anyone? ***(silence)*** T: Cost.

that triggers an LRE (Teacher-initiated, pre-emptive) or a student's linguistic error or question (Teacher-initiated, reactive or Student-initiated). LREs that involve a student's self-correction are also regarded as simple LREs. A complex LRE refers to an episode that consists of either one teacher response to silence (Teacher-initiated, pre-emptive) or more than one teacher response to a student's linguistic error or question (Teacher-initiated, reactive or Student-initiated). Table 3.5 shows examples of simple and complex LREs.

3.6 Tailor-made written language testing

In this study, data were gathered from naturally occurring groups by employing a tailor-made written language test. This test focused on language items that were the subject of attention during LREs. The primary aim of this test was to assess whether students who had previously encountered difficulties with specific language items during class appeared to have grasped these items subsequently. Additionally, the study aimed to explore the influence of various characteristics of LREs on students' ability to learn the targeted language items.

A quasi-experimental design was added to the study. Quasi-experiments are appropriate when researchers cannot randomly assign student participants to orders of conditions (Dörnyei, 2007). A quasi-experimental design is used to evaluate the effectiveness of a treatment, such as an educational intervention, and it involves a procedure of pre-test, treatment, and post-test on naturally occurring participants (Loewen, 2004).

Typically, a pre-test is administered to gauge students' prior knowledge of language items before any instructional intervention. However, due to the unforeseeable and incidental nature of LREs in EMI classrooms, it was not feasible for us to predict which language items would be incidentally addressed before the occurrence of LREs (Loewen, 2002; Swain, 2001). Consequently, an innovative approach was adopted for our study. The LREs themselves were used as a form of pre-test, signaling students' initial lack of familiarity with the language items addressed in these episodes.

Our decision to employ LREs as a pre-test aligns with Guba and Lincoln's (1989) alternative perspective, which challenges the conventional criteria of validity and reliability often associated with research instruments. Traditional research places a strong emphasis on establishing the validity and reliability of instruments to ensure consistent and accurate results.

However, when using LREs as pre-tests, several factors come into play that question these traditional criteria. Firstly, Guba and Lincoln emphasize the importance of contextual understanding. The spontaneous nature of LREs poses a challenge in creating a standardized pre-test instrument, given the contextual variations in EMI classrooms. This variability may impact traditional notions of reliability, as replicating the exact conditions under which LREs occur proves difficult.

Furthermore, Guba and Lincoln advocate for a flexible, responsive research design, while LREs are inherently spontaneous and may not align with structured, pre-designed measures typically used in traditional pre-tests. The emergent and adaptive nature of LREs can challenge the reliability of a fixed pre-test instrument. In light of these considerations, our approach to assessing our research instrument takes into account these unique considerations raised by the use of LREs as a pre-test.

The process of developing, conducting, and analyzing this unique test, which drew upon the LREs identified in each EMI class, will be explored in greater detail in Chapter 6. This examination will follow an in-depth analysis of the frequency and characteristics of LREs, which will be presented in Chapter 4 and Chapter 5.

3.7 Summary

In this chapter, we have provided a detailed exposition of the research design, methodologies employed, and the procedures governing both data collection and analysis, all of which formed the foundation of our study. We have also furnished comprehensive profiles of the study participants and contextualized the research within its specific setting.

As we move forward into the subsequent chapters, our focus will shift towards presenting the outcomes and insights yielded by this study. These findings will offer a deeper understanding of the subject under investigation, shedding light on the implications and conclusions drawn from our research endeavors.

Part II

Case study findings

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4 Planned language support

4.0 Introduction

In Chapter 3, we stated that the first major purpose of the study was to examine what EMI teachers in high school and university settings do to support their students with English. In this book, planned attention to language refers to teachers' attention to preselected linguistic items in anticipation of challenges that students may encounter during class. This consists of syllabi, lesson plans, glossaries, or vocabulary wordlists provided to students.

This chapter presents the findings from the analysis of teachers' documents and interviews with the EMI teachers. It provides illustrations and discussion of the kinds of materials the EMI teachers developed to help their students with language in each setting. It then offers the findings from the interviews in which the EMI teachers described their roles and their thinking behind these practices or reasons for supporting students with English for disciplinary study.

4.1 Teachers' planned language support at Sokuk High School

This section begins with an illustration of the types of planned language support the EMI teachers in the high school setting, Kim and Glenn, provide to help their students and their reasons for providing such language support.

We first looked into the types of planned attention to language of the teachers. Through examining their teaching documents, Kim and Glenn seemed to have different views on the importance of considering linguistic aspects in their EMI classes. Kim appeared to consider students' learning of the English language at all stages of their EMI classes, whereas Glenn did not. In the course outline, Kim, the economics teacher, specifically stated the aim of learning the disciplinary ways of using vocabulary, "to learn to communicate using economics terms". He also mentioned that he would mark students' correct use of economics terms in examinations or writing assignments. In addition, during our interview with Kim, we noted that he focused on his students' general English proficiency at the beginning of each year. According to Kim, he referred to each class's overall ESL subject grades for developing and modifying textbooks and handouts every year. On the other hand, Glenn, the

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mathematics teacher, did not include any language-related learning goals in his course outline, nor did he consider students' incorrect use of mathematical terms when marking their writing assignments or exam answers.

In terms of the types of planned language support, we found that Kim and Glenn offered similar types of language support, focused solely on disciplinary vocabulary. Kim provided his students with two types of planned language support: a glossary of new economic terms and small glosses of economics vocabulary in the textbook he developed. He created a glossary for each chapter consisting of English definitions and acronyms or abbreviations of five to ten economic terms (Figure 4.1). According to Kim, he referred to various types of economics textbooks written in English and used in Hong Kong or Singapore in a belief that students in these countries would have similar English proficiency as his students. In the interview, Kim mentioned that he intended not to use any Korean in the glossary as he wanted to minimize confusion that his students may encounter when using two different languages. Yet, he reported that he occasionally uses teaching materials taken from the textbooks written in the Korean language to help his students' comprehension of disciplinary content, especially when teaching the first-year students.

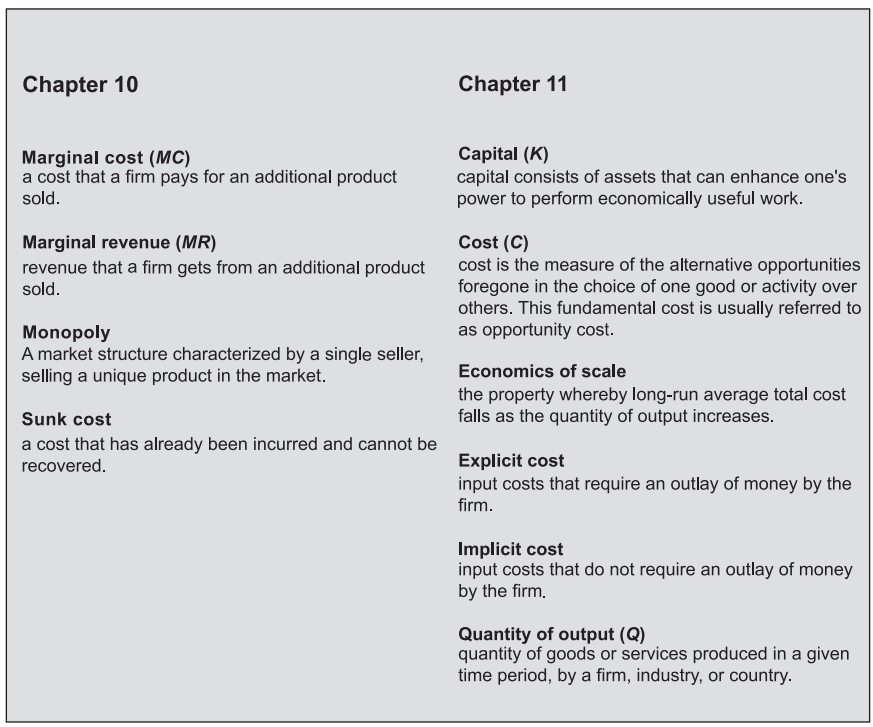


Figure 4.1 Kim's planned language support – glossary of economic terms

Kim offered each glossary to the class at the beginning of a lesson when a new chapter started. During our observations, we noted that Kim occasionally referred students to the glossary during his teaching. In Excerpt 4.1 subsequently, Kim asks the students to take a moment to read the glossary before he explains a new economic concept.

Excerpt 4.1

Kim: We are now moving on to the new topic, the production functions, right? We will start with the growth activity from the market. . . . So anyone had a look at the glossary I gave you last time?
(silence)
Kim: No? Then, can you guys take a look at it quickly?

Sometimes, Kim was observed to use the glossary to check how well his students followed the class. In Excerpt 4.2, Kim refers to the glossary to explain the economic concept of opportunity cost and the disciplinary meaning of the term cost.

Excerpt 4.2

Kim: So, the cost, in this case, is $1,200. Everyone got it? Am I talking about the cost that we need to pay for something here?
Student: No.
Kim: Then can anyone explain what's the difference between "cost" here and "cost" we usually use?
(silence)
Kim: What, what did I put in the glossary? Do you understand the definition there?

Another way Kim helped his students with the language was by devising small glosses of definitions of economic terms on one side of the pages in the textbook he developed, as shown in Figure 4.2. He included three to four glosses on each page. All the words in the glosses were multi-word units that Kim did not include in the glossary.

For his mathematics class, Glenn also provided two types of planned language support, a wordlist of mathematical terms and glosses of vocabulary included in the handouts, which were similar to Kim's. However, unlike Kim's glossary for the economics class, Glenn's wordlist did not include any definitions of terms but only corresponding Korean words for all mathematics terms in English that were used throughout the semester (see Figure 4.3). According to Glenn, he developed the wordlist with other fellow Korean mathematics teachers. Also, they decided which mathematics terms to be included in the wordlist. He distributed the wordlist to the class at the beginning of each semester, and the students were required to bring it to every lesson.

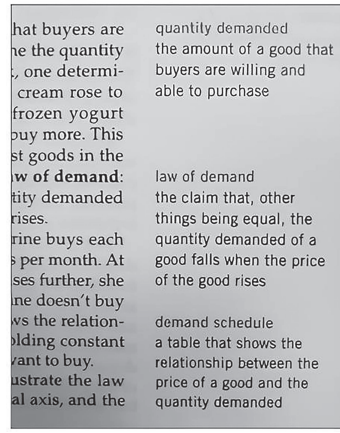


Figure 4.2 Kim's planned language support – glosses with economic terms

Math Vocabulary (수학 1-1단어)

Simplify – 간단히 하다

Expand – 전개하다

Expression – 표현

Polynomial (expression) – 다항(식)

Variable – 변수

Coefficient – 계수

Addition – 덧셈

Subtraction – 뺄셈

Multiplication – 곱셈

Division – 나눗셈

Add – 더하다

Subtract – 빼다

Multiply – 곱하다

Divide – 나누다

Sum – 합

Difference – 차

Product – 곱

Quotient [ˈkwoʊʃnt] – 몫

Dividend – 피제수

Divisor – 제수

Remainder – 나머지

Constant (term) – 상수

Ascending (increasing) order – 오름차순

Descending (decreasing) order – 내림차순

Power – 멱

Property – 성질

Commutative law – 교환법칙

Associative law – 결합법칙

Distributive law – 분배법칙

Calculate – 계산하다

Evaluate – (값을) 구하다

Determine – 결정하다

Solve – 풀다

Area – 넓이

Volume – 부피

Length – 길이

Width – 폭

Height – 높이

Expansion – 전개식

Formula – 공식

Remainder theorem [θiːərəm] – 나머지정리

Identity – 항등식

Equation – 방정식/등식

System of equations – 연립방정식

Condition – 조건

Satisfy – 만족하다

Linear (expression/equation/function) – 일차 (식/방정식/함수)

Factor – 인수 (하다)

Factor theorem – 인수정리

Figure 4.3 Glenn's planned language support – word list of mathematics terms

Another type of language support Glenn used was glosses with mathematical terms. Glenn included small glosses of mathematical terms in handouts (Figure 4.4). Each gloss consists of mathematical terms with corresponding Korean words used in practice exercises, and it was located right next to the activities in handouts. In handouts, Glenn sometimes included a section on the definition of some mathematical terms that were introduced for the first time, as seen at the top of Figure 4.0. In the interview, Glenn explained that he put fewer definitions in his planned language support as he was concerned they would make students feel "overwhelmed". Also, Glenn mentioned that he received help from his fellow Korean mathematics teacher to find appropriate Korean words for each mathematics term as he spoke little Korean and thus did not know the disciplinary way of using the Korean language. When asked about any negative influence the Korean language may have caused

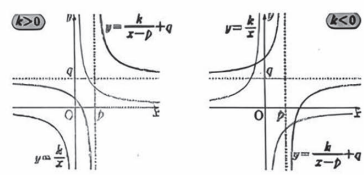
[Vocabulary]
radicand
근호 안의 값

[Definition]
For a function $y=f(x)$, when $f(x)$ is an irrational expression in x, this function is called an ***irrational function.***
For example, the functions $y=\sqrt{x-2}$, $y=\sqrt{x}+5$, $y=\sqrt{1-x^2}$ are all irrational functions.
In general, when the domain of an irrational function is not stated, the domain is the set of all real numbers that make the radicand greater than or equal to 0.
For example, the domain of the function $y=\sqrt{2x-1}$ is _____.

[Exercise 3] 교과서 p.232 문제3
Find the domain of the following functions.
(1) $y=\sqrt{6-2x}$ (2) $y=-\sqrt{3x+8}-5$

[Note]
If we translate the graph of $y=f(x)$ p units horizontally and q units vertically, then the equation of the translated graph is $y=f(x-p)+q$.

[How to draw the graph of a rational function $y=\frac{k}{x-p}+q$]
The graph of a rational function $y=\frac{k}{x-p}+q\,(k\neq 0)$ is translated ____ horizontally (in the direction of the x-axis) and _____ vertically (in the direction of the y-axis) from the graph of a function $y=\frac{k}{x}$.
In this case, the domain of the function $y=\frac{k}{x-p}+q$ is _____ and the range of this function _____. The asymptotes are the two lines _____.



[Vocabulary]
translation 평행이동
quadrant 사분면

For example, the graph of the function $y=\frac{1}{x-2}+1$ is translated 2 units to the right and 1 unit upward from the graph of the function $y=\frac{1}{x}$.
Thus, the graph can be drawn as in the figure on the right.
The domain of this function is _____ and the range of this function is _____.
The asymptotes are _____.

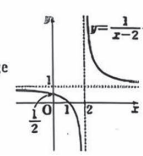


Figure 4.4 Glenn's planned language support – glosses of mathematics terms

in the course of students' learning of disciplinary register in English, Glenn talked about his belief that the advantages of using Korean far outweigh the disadvantages. It was because he wished his students to understand new disciplinary content "as accurately as possible," and the Korean language could be an effective means for this even in EMI settings.

Two factors related to the reasons that Kim and Glenn provided planned language support was their perception of their role and anticipated functions of the language support. In terms of perception of their roles in relation to EMI, Kim and Glenn had somewhat different perceptions, even though they were in the same school setting. When we asked Kim in the interview about his role, he said his understanding of himself was "a model" for his students because he also had experienced learning economics in English like them. He described this role as "never a consideration" when he taught the same class in Korean. He responded that although he is mainly responsible for teaching content knowledge, he believed it was also part of his responsibility to help students accurately express what they had learned in English. He had a belief that students learn through imitation during the class; one of his ideas was that he models the language of economics, and students copy or imitate him. This is well illustrated in Excerpt 4.3, taken from the last observed class, in which Kim asks the students to memorize some expressions he had used to describe a graph.

Excerpt 4.3

Kim: The graph depicts an increase in demand from D1 to D2. Please, please remember that you need to say, 'from one point to the other point' when you describe any graphs, not just 'D1 and D2', right?

Also, Kim did not see himself as directly teaching English but as providing his students with some language support, and in this regard, he thought of himself as a "*facilitator*". Although he was vague and could not identify any specific practices when we questioned his practices as a facilitator, during the observation, we noted that Kim occasionally used Korean to translate his English explanation or to provide corresponding Korean words in teaching (code-switching) to help students understand the content. Moreover, he sometimes allowed students to use Korean to express their thought, as illustrated in Excerpt 4.4.

Excerpt 4.4

Kim: How do we calculate the DWL? **? Will you tell us the answer to question 3?
Student: Uh. . . . I don't know . . .
Kim: You don't have the answer? Or you don't know how to explain it in English?

Student: I don't know how to say.
Kim: Okay, then, why don't you say it in Korean first? And then I will translate it into English.

In the interview, Kim reported that he considered students' general English proficiency as a prerequisite for taking EMI classes. It was because he thought students should be able to "distinguish important terms or expressions of economics" from English used outside of his economics class. He further explained that the ability to distinguish between general and disciplinary English vocabulary was what he regarded as "a starting point" for learning "economical ways of using English", which relates to the concept of disciplinary literacy (Airey, 2016). During the interview, he often expressed his concerns about the lack of support for students concerning general English:

> Although these students have passed the entrance exam, I think that's not enough. Especially, compared to other subjects like science or maths, students may find learning social science subjects in the foreign language much challenging . . . so, there should be supportive language programmes for students, and they don't have to be related to content subjects, just teaching basic English will do.

Kim's belief that general English influenced the students' grades in economics seemed to lead him to adjust the level of English used for the textbook and reading materials to the level of students' English proficiency, referring to their English subject grades and advice from the ESL teachers to do so.

Glenn, on the other hand, appeared to view his role somewhat differently from Kim. When we asked about his role in the interview, Glenn said he thought about himself as *an instructor* in relation to his EMI classes. The construction of his role as an instructor appeared to be connected with his experience of teaching mathematics at high schools in Ireland, which he described as "not so much different to teaching in Korea". He also mentioned that teaching mathematics in English at SHS is "like teaching Irish students maths". Glenn believed that his responsibility would be "to give them a good basis for further studying", whether he works in South Korea or Ireland. He further explained that teaching students to use mathematics registers naturally and correctly was part of his responsibility as a mathematics teacher in both countries.

Glenn had an experience as an ESL instructor in Korea. When questioned about any differences in his role between ESL classes and EMI classes, he said the difference between the two positions was simply "what to teach". During the interview, Glenn repeatedly mentioned that he tried to keep the focus of his EMI class more on mathematics than English. In the observations, however, we noted that Glenn frequently focused on general English to help students comprehend written maths problems, as can be seen in Excerpt 4.5 from the third lesson observed. In the excerpt, Glenn asks the students if they

know the difference in meaning between 'a number of' and 'the number of' while reading the written maths problems.

Excerpt 4.5

Glenn: So, do you guys know the difference between 'a number of' and 'the number of'? We've discussed it last semester, right?
Student: 'A number of' means 'many'?
Glenn: Yes, yes.

In terms of the function of planned language support, both Kim and Glenn shared similar perceptions – supporting effective class time management. During the interview, Kim and Glenn talked about their expectation that their language would help them manage class time more effectively. Kim said that he did not want to "sacrifice" time for teaching economics due to spending too much time dealing with language. Similarly, Glenn described the wordlist he provided to the students as "a time-saver" for teaching as well as "basic support" not only for students but for himself to secure enough time to focus on disciplinary content.

However, Kim and Glenn showed some differences in how to use the planned language support. Kim emphasized the importance of students' reading of the glossaries before the class and even stated it in the course outline. Moreover, Kim mentioned that he wanted his students to learn new general English vocabulary or expressions in the textbook or reading materials before each lesson. During the observations, we noted that he often asked his students to skim through the following chapters and preview any unfamiliar words in the texts.

On the other hand, Glenn did not state any language-related aims in the course outline. He mentioned that he only considered not breaking the class flow important, especially when doing practice exercises. Thus, he encouraged his students to refer to the wordlist during the class so that they would not have to ask questions about language:

> **Glenn**: I believe it'd be harder for students to learn maths in English because they have to practice maths exercises every lesson. . . . If I don't give them those sections (with maths terms), they will spend more time raising their hands and asking 'what does this mean?' when they are supposed to do the exercises.

Also, we found another difference between Kim and Glenn regarding the function of language support they expected. During the interview, Kim said that he considered students' emotional aspects when preparing for his EMI class. In this regard, he described the language support as a "key assistant" for the students to "get out of their comfort zone", use L2 without hesitance, and engage in the EMI class more actively. His belief appeared to relate to his experience of seeing some of his students not participate in a class or even give

up on economics because of English in his first year of teaching at SHS. Since then, he began to include small glosses of economics terms in the textbook so that his students can use them as an "immediate hint".

On the other hand, Glenn described the language support as a "promise" between him and the students to stick to the definitions of mathematical terms included in the wordlist. Glenn believed that by using the shared definitions of mathematical terms and registers in his class, he could communicate with the students more effectively. Although he did not use such language support when he taught in Ireland, he believed that students' mathematics performance (grade) largely depends on their learning of "conventional ways" of using language in mathematics regardless of their first language background. So, Glenn believed that students could benefit from the wordlist since they could repeatedly be exposed to "unfamiliar" mathematics terms, distinguish them from other general English words, and recognize those terms in various word forms.

4.2 Teachers' planned language support at the University of Seoul

In this section, we look into the types of planned attention to the language used by the two EMI teachers in the university setting, Chen and Luke, to help the students and describe their reasons for providing it. Through examining the teachers' documents, we found that Chen and Luke had different views on providing language support, which was reflected in their course outline. The accounting teacher, Chen, appeared to consider the linguistic aspect when planning and preparing his class. In the course outline, Chen included a language-related learning aim, encouraging students "to become familiar with the use of accounting language to generate reports about the entity". Through examining the lecturer's documents, Chen appeared to consider the linguistic aspect when planning and preparing his accounting course. In the course outline, Chen stated that the language-related aim of his course. On the other hand, Luke's mathematics course outline did not state any language-related aims.

Chen and Luke provided planned language support in the same way they included it in their lecture PowerPoint slides. Also, their planned language support only focused on the disciplinary use of vocabulary. Chen included one or two PowerPoint slides containing definitions of accounting terms marked with blue in the lecture slides for each lesson (see Figures 4.5 and 4.6). In those slides, Chen included not only English definitions but synonyms of accounting terms that he felt were new to some students. Furthermore, Chen gave the class a quiz on new accounting terms at the end of each lesson to have students review the terms and their definitions (see Figure 4.7).

Luke added lecture notes containing definitions of mathematics terms that he thought were important to the PowerPoint slides used for each lesson, and these slide notes were shown when printed out (see the highlighted part in Figure 4.8). Also, he sometimes included synonyms and antonyms of mathematics terms.

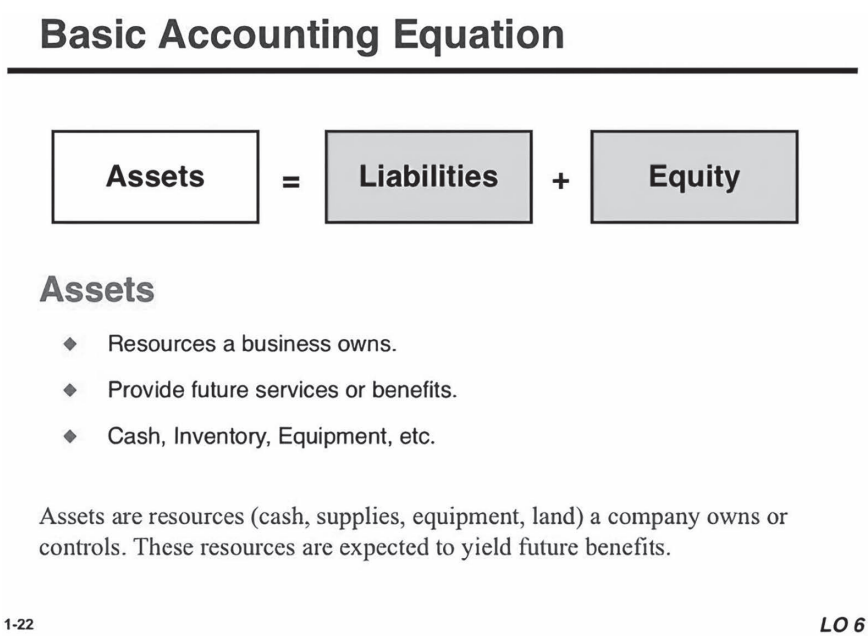


Figure 4.5 Chen's planned language support – slides of the definitions of accounting term, Assets (texts at the bottom)

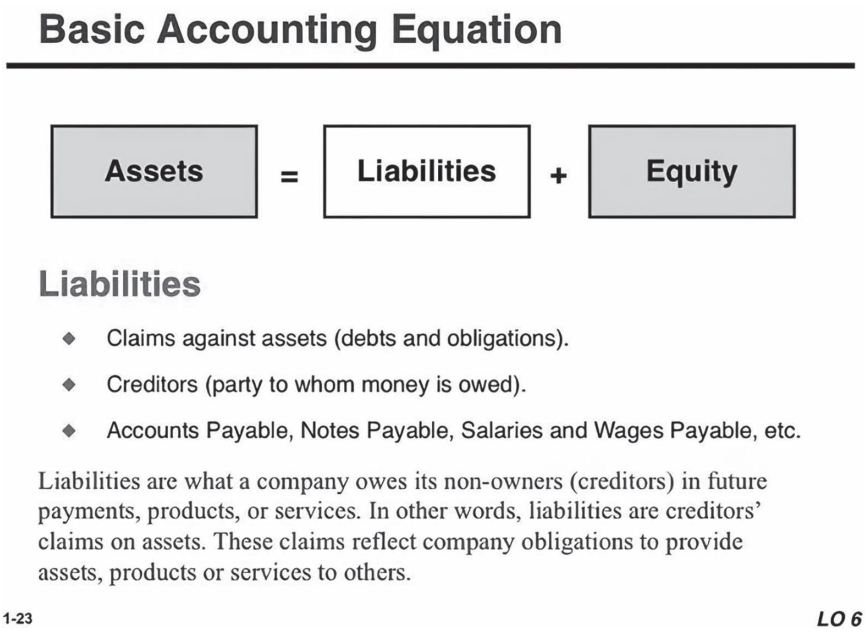
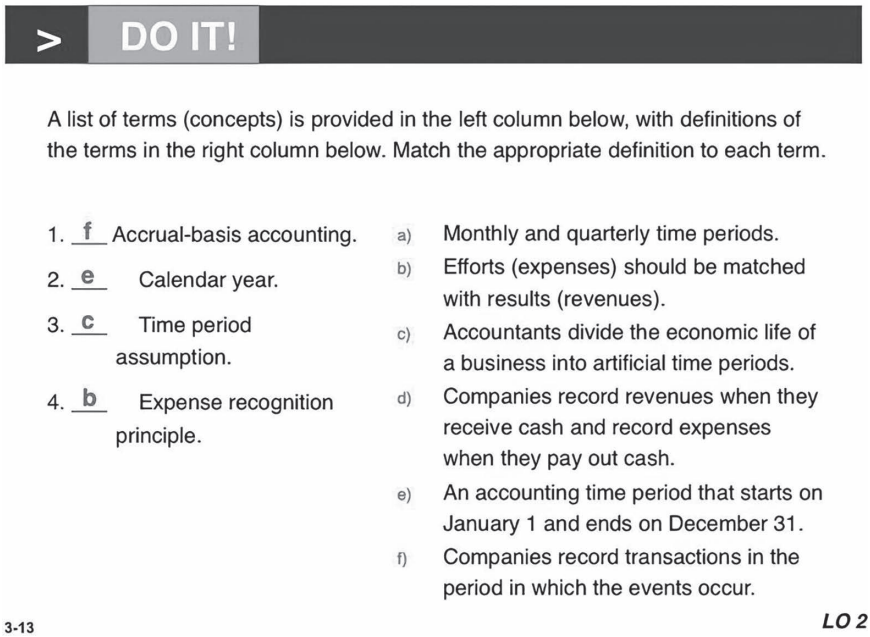


Figure 4.6 Chen's planned language support – slides of the definitions of accounting term, Liabilities (texts at the bottom)



> DO IT!

A list of terms (concepts) is provided in the left column below, with definitions of the terms in the right column below. Match the appropriate definition to each term.

1. f Accrual-basis accounting.
2. e Calendar year.
3. c Time period assumption.
4. b Expense recognition principle.

a) Monthly and quarterly time periods.
b) Efforts (expenses) should be matched with results (revenues).
c) Accountants divide the economic life of a business into artificial time periods.
d) Companies record revenues when they receive cash and record expenses when they pay out cash.
e) An accounting time period that starts on January 1 and ends on December 31.
f) Companies record transactions in the period in which the events occur.

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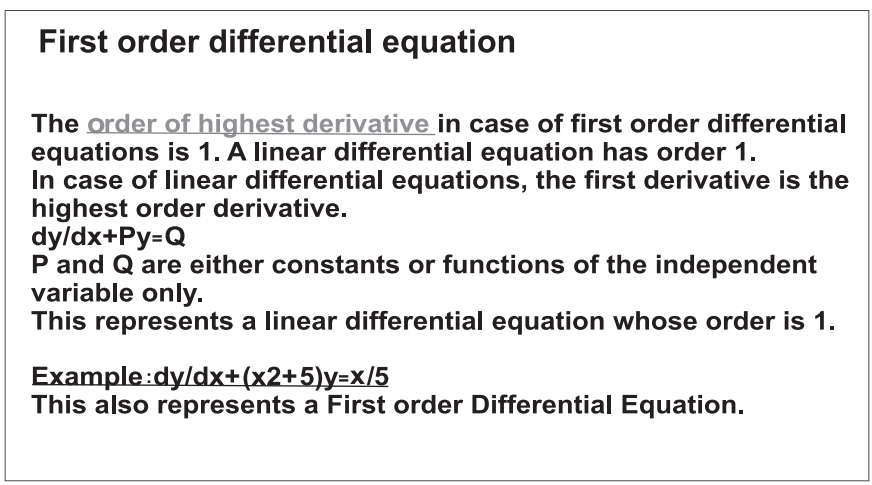
Figure 4.7 Chen's planned language support – review quiz on accounting terms



First order differential equation

The order of highest derivative in case of first order differential equations is 1. A linear differential equation has order 1.
In case of linear differential equations, the first derivative is the highest order derivative.
dy/dx+Py=Q
P and Q are either constants or functions of the independent variable only.
This represents a linear differential equation whose order is 1.

Example:dy/dx+(x2+5)y=x/5
This also represents a First order Differential Equation.

Order of highest derivative: The derivatives other than the first derivative. Also called as Higher Order Derivatives

Figure 4.8 Luke's planned language support – lecture note including definition of mathematics term (highlighted part)

One factor which guided whether teachers provided language support was their perception of their role. When we asked how they perceived their roles, Chen and Luke said that they thought of themselves mainly as content teachers. However, this does not mean that they considered language to be unimportant. They both seemed to believe that teaching the disciplinary register was integral to their EMI teaching. Also, despite a difference in degree, they both expressed a need to help their students successfully "master" disciplinary language during their undergraduate years.

Chen reported that he saw himself as an accounting lecturer. He described his role as "bridging the gap between content, English, and students". Chen was well aware of the linguistic challenges that his first-year students may have. When questioned about his practices in this regard, Chen mentioned that he tried to check how well students understood the lecture as often as possible and occasionally translated his English oral explanation into Korean or Chinese to support his students' lecture comprehension. Also, during the interview, Chen frequently emphasized the importance of students' first year in EMI settings. He further explained that his experience as a Chinese student taking EMI courses at a Korean university had helped him become more aware of the linguistic challenges for his students. He pointed out that such linguistic challenges were mainly related to students' ability to understand the usage of technical terms, which he believed to play an essential role in studying accounting.

Chen further explained that as his class had some international students who speak both English and Korean as their foreign languages, supporting his students with language was a part of his responsibility.

> I think being able to use English or Korean in my class would, in turn, help the students themselves succeed in my class.

In this regard, Chen said that he usually let his students freely use their first language during the class and intentionally formed groups to include students from diverse first language backgrounds in order to make them use L2 (either in English or Korean) more while participating in group discussions or projects.

Luke reported that he saw his role as "a trainer" who prepares students for their future careers and also helps them become competitive in the global job market. He believed that it was his responsibility to support his students to be fluent in using mathematics terms and expressions in English so that they could "think more mathematically and talk more mathematically" and "communicate with others in the same industry". His belief seemed to relate to his experience of working with many non-native English-speaking colleagues who could not fully demonstrate their vast disciplinary knowledge at work due to "language barriers".

Throughout the interview, Luke repeatedly emphasized that for students to succeed in the global job market, it is inevitable to teach mathematics

in English. He believed his Korean first language students should "master" technical terms and expressions in English before graduation for a successful international job search. In this regard, Luke thought his course should provide opportunities for his Korean first language students to practice using "mathematical language" in English. Unlike Chen, however, Luke could not specify the difficulties that students would have faced with language, although he was well aware that language difficulties influenced students' content learning.

We also examined another factor, which was the teachers' thinking around the functions of language support. The university EMI teachers construed learning the disciplinary register mostly in terms of learning disciplinary uses of vocabulary. This was well represented in their views of the functions of their language support. In the interview, Chen described his accounting course as "fundamental" for students' future careers because undergraduate students were usually expected to "master" conventionalized ways of using terms and expressions in accounting during the first year. He believed that he needed to take steps to support his students to use technical accounting terms confidently and fluently and understand them correctly. He thought the planned language support, PowerPoint slides introducing new technical terms, acted as "a guide" for his students to distinguish technical terms from general English words more efficiently and to learn how those terms were used in sentences:

> I think it (accounting) is a combination of numbers, and these (technical) terms, which means students should be able to use accounting terms fluently with confidence and understand them more correctly.

In our interview with Luke, he described the language support, the PowerPoint lecture notes, as a "sign" emphasizing the importance of specific mathematics terms that he wished his students to remember. Although Luke thought it would be more effective for students to search for definitions of mathematics terms on their own, he believed that he should sometimes directly take steps to highlight some of the more essential terms:

> I don't think it's necessary to give them (students) definitions of all the words because it's their responsibility to study those terms by themselves. . . . The reason I use those notes is to point out which terms are more important than other terms.

In the interview, Luke noted that he did not provide any of this kind of support to the fourth-year students. When questioned about his decision, he talked about his intention to focus solely on content in his fourth-year courses. Luke also reported that he expected his students to become "highly skilful" at "using mathematics language" without any language support by the time they reached their fourth year.

4.3 Summary

This chapter has presented the types of planned attention to language the EMI teachers used to support their students with English for disciplinary study. It also described their perceptions of their roles as EMI teachers and their thinking behind their practices or reasons for supporting students with language.

All the EMI teachers in both settings provided their students with at least one type of planned language support. However, there were differences in the kind of language planned support between the settings. The schoolteachers offered planned support in the form of a glossary or wordlist, including the disciplinary vocabulary and small glosses in the handouts or the textbooks used in classes. The university teachers' planned language support was in the form of PowerPoint slides or slide notes containing definitions of disciplinary vocabulary.

Another noticeable point is that all the planned language support identified in this study focused mainly on disciplinary vocabulary preselected by the teachers; the EMI teachers appeared to think of disciplinary language learning as disciplinary vocabulary learning regardless of their disciplinary and first language backgrounds. This suggests that the teachers may have believed learning (mastering) disciplinary vocabulary was the basis for content learning.

The reason for providing planned language support can be explained by how the teachers perceived their roles in EMI teaching. EMI researchers and teachers have consistently raised questions as to who is responsible for the provision of linguistic support to students in EMI settings (Airey, 2014; Galloway & Ruegg, 2020; Macaro, 2018). Our interview data indicated that the EMI teachers regarded proactive support for students to use disciplinary language as an integral part of their role as EMI teachers. All were aware that novice students would encounter difficulties when using the disciplinary register, which would pose challenges for students' content learning. In this regard, they felt responsible for supporting students to overcome linguistic challenges. This finding is in line with Basturkmen (2018), who also found that accounting lecturers teaching EMI courses thought they had a crucial role in student's development of the accounting register.

However, there was a difference among the EMI teachers in terms of the extent to which they should provide linguistic assistance. Kim and Chen, who were ESL speakers, appeared to consider students' general English proficiency when developing planned language support and also designing their teaching, although they did not have any knowledge about language teaching. This was not the case for the other teachers who were native English speakers. One explanation can account for their experience of taking EMI lectures as ESL students. That is, Kim and Chen may have had an instinctive understanding of the potential level of difficulty that their students might have with comprehending their EMI classes.

5 Language support during classroom interaction

5.0 Introduction

The previous chapter focused on case study findings concerning the planned language support the EMI teachers provided. This chapter focuses on findings on the unplanned language support they provided through language-related episodes (LREs) that occurred spontaneously in classroom interaction. These LREs arose when the teachers introduced language forms and expressions in the spur of the moment, responded to language issues that occurred, or when students raised language queries.

The main goal for student learning in EMI is generally construed as the development of disciplinary content knowledge and skills (Airey, 2016). However, EMI may include some language support for ESL students who are trying to learn subject content while they are simultaneously being exposed to English (Coleman, 2006). Not surprisingly, in these circumstances, language, on occasion, becomes the topic of discussion in the classroom, often in the form of language correcting or commentary (Hynninen, 2012) or in the form of queries about language. LREs of this kind are the focus of the present chapter.

Section 5.1 introduces the system of analysis of LREs developed in the case study. Sections 5.2 and 5.3 report findings about the frequencies and types of LREs observed in the recordings of classroom interaction from the four EMI classes that participated in the study. In Section 5.4, the findings from the school and university settings are compared.

5.1 How language-related episodes were identified and coded

The study drew on the seminal definition of language-related episodes from the field of Second Language Acquisition (SLA). In this field, an LRE has been defined as any part of a dialogue in which classroom participants "talk about the language they are producing, question their language use, or correct themselves or others" (Swain & Lapkin, 1998, p. 326). Drawing on the earlier definition in research into EMI classroom interaction, Basturkmen and

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Shackleford (2015, p. 89) described an LRE as any instance when teachers and learners talk about languages, such as grammar or vocabulary, or a feature of the discourse or phonological systems within communication that is primarily concerned with the exchange of messages about disciplinary content (Basturkmen & Shackleford, 2015, p. 89). In the present case study, observations of EMI classroom interaction generally showed that LREs were characteristically brief interludes, or time-outs, from discussion of disciplinary content to talk about language expression or choice.

Very often the LREs in the case study focused on vocabulary. Excerpts 5.1 and 5.2 later illustrate LREs in classroom interaction in Chen's accounting class. In the first excerpt, Chen, the teacher, uses the term 'creditors' and then initiates an LRE when he quickly follows the term with an explanation of its meaning, presumably because he is not sure that all the students know this term. In the second excerpt, a student initiates an LRE when she checks whether the term 'net earnings', which Chen had just used, is synonymous with 'net income'. The LREs from the university in both excerpts concern vocabulary.

Excerpt 5.1 Vocabulary-focused LRE (creditors) initiated by the teacher

Chen You may need to borrow money from one side. You need to borrow money from *creditors, those people you borrow money from like a bank, a commercial company.*

Excerpt 5.2 Vocabulary-focused LRE (net earnings) initiated by a student

Student *Are net earnings net income?*
Chen Yes, yes, you can call it net income.

Sometimes, more than one LRE occurred concurrently. To illustrate, Excerpt 5.3 later shows the next stage of discussion triggered by a student's question about net earnings in Excerpt 5.2. In Excerpt 5.3, which was taken from the university context, Chen initiates an LRE to check that the other students know the meaning of net income.

Excerpt 5.3 Vocabulary-focused LRE (net income) initiated by the teacher

Chen *What's the meaning of net income again? It's the final amount of money after you minus all the expenses from sales, right?*

Excerpt 5.4 Vocabulary-focused LRE (account payment) initiated by the teacher reactively

Student It's the *account payment.*
Chen *No, the account payable.*

LREs had variable characteristics. Some LREs, such as those shown in Excerpts 5.1 and 5.3 earlier, involved teacher-talk only. Others, however, such as that shown in Excerpt 5.2, involved teacher-student interaction. LREs could be initiated either by the teacher (Excerpts 5.1, 5.3 and 5.4 earlier) or by a student (Excerpt 5.2 earlier). LREs could be triggered reactively because of an unclear message or as a correction to a language error, as illustrated in Excerpt 5.4 earlier, or they could be triggered pre-emptively (not as a corrective response), as illustrated by Excerpts 5.1, 5.2, and 5.3 earlier. The term 'reactive LRE' was used in the study to refer to an episode that arose either in response to a problematic utterance or because a participant failed to comprehend what another has said (Ellis, Basturkmen, & Loewen, 2002; Hong & Basturkmen, 2020).

Complexity was a further variable characteristic. Complex LREs were those in which the teacher provided multiple responses to a problematic utterance by a student, as illustrated in Excerpt 5 later. All other LREs were classified as simple. In Excerpt 5.5 from the mathematics class in the school setting, Glenn, the teacher, does not accept the student's answer 'asymptote' as a complete answer and extends the episode with further moves until she elicits the complete lexical expression 'horizontal asymptote' (a technical term in mathematics). In this book, the uppercase TAL reflects stressed intonation, as seen in the excerpt subsequently.

Excerpt 5.5 Complex vocabulary-focused LRE (asymptote) initiated by the teacher reactively

Glenn So, when this y equals zero, the x axis will be what?
Student Asymptote.
Glenn Yes, yes. It's asymptote, but what kind of?
Student It's . . .
Glenn Starts with 'h'.
Student Horizon?
Glenn Right, horizonTAL asymptote. Very good.

Once the LREs had been identified in the transcripts of classroom interaction, each LRE was classified for initiator (teacher- or student-initiated), interactional type (pre-emptive or reactive) and complexity (simple or complex).

Each LRE was further coded for its linguistic focus, following Basturkmen and Shackleford's (2015) four-way classification system of vocabulary, grammar, discourse, or disciplinary speak.

Table 5.1 provides definitions and illustrations of each type of linguistic focus. Vocabulary-focused LREs included single-word as well as multi-word units. The term 'multi-word units' was used to refer to lexical units formed by two or more words to denote disciplinary concepts, such as 'marginal cost' from economics, 'residual value' from accounting, and 'horizontal asymptote' from mathematics. In this study, we use the term 'multi-word units' as a subcategory of vocabulary that related to disciplinary content. To check that the

Table 5.1 LRE linguistic categories

Focus	*Definition*	*Example*	*Comments*
Vocabulary	Word forms, multi-word units, denotations including technical terms, collocations, spelling, pronunciation, synonyms, antonyms, & abbreviations	T: It reflects the increase in the velocity. You know what I mean? ***The velocity, the speed.***	Synonym
		T: We will be working on this number. ***What does MC stand for?***	Acronym
		C: ***Marginal cost.***	
		T: Good.	
		T: So, when this y equals zero, the x-axis will be what?	Technical term
		S: Asymptote.	
		T: Yes, yes. It's asymptote, but what kind of?	
		S: It's . . .	
		T: ***Starts with 'h'.***	
		S: ***Horizon?***	
		T: ***Right, horizonTAL*** asymptote. Very good.	
Grammar	Syntactic and morphological aspects, articles, & verb tenses	S: For those ***who doesn't, who don't*** get how to figure this out, if there's something you add, you can just divide them with quantity . . .	Verb form
Discourse	Organization, text connectivity, & cohesive devices	T: I calculated irrational expressions in the same way as ***yours.***	Cohesive device
		S: *Huh?* ***What you mean?***	
		T: *In the same way as* ***your rational expressions.***	

(*Continued*)

Table 5.1 (Continued)

Focus	*Definition*	*Example*	*Comments*
Disciplinary speak	Conventional way of expressing an idea in a discipline	T: Firms are responsible for corrective taxes because they . . . ? S: Because they ***did bad things***. T: Yes, because they "***caused a negative externality***".	Economics speak
		T: So, y will have real value. Um, what would the range be for this? S: ***y is equal or more than zero?*** T: Yes, so, in that case, ***y is greater than or equal to zero***.	Mathematics speak

Table 5.2 Key terms used in coding LREs

Initiator of the LRE	*Interactional type of LRE*	*Complexity of LRE*	*Linguistic focus of LRE*
Teacher Student	Pre-emptive Reactive	Simple Complex	Grammar Vocabulary Discourse Disciplinary speak

units were technical vocabulary, specialist dictionaries were consulted. The specialist works were *A Dictionary of Economics* (Black, Hashimzade, & Myles, 2017), *Dictionary of Accounting* (Law, 2016), and *The Concise Oxford Dictionary of Mathematics* (Clapham & Nicholson, 2014). LREs were classified as discourse-focused when they concerned the organization of language above the level of the clause or sentence, text connectivity, and cohesive devices. The disciplinary speak category was used when LREs were concerned with the expressions of ideas in relation to conventional norms.

Key terms used in the coding of LREs were introduced earlier. Table 5.2 brings these terms together for readers' ease of access. Each LRE was coded for initiator, interactional type, complexity, and linguistic focus.

5.2 Language-related episodes in Sokuk High School

We first examined the frequency of LREs in the school setting. LREs were frequent and accounted for a fair amount of class time in the school setting (one LRE every 2.19 min). When compared between the classes, the frequency

of LREs was higher in Kim's economics class than Glenn's mathematics class (1 LRE every 1.32 min and 3.07 min respectively). Among 233 LREs identified in the school setting, 162 LREs were from the economics class, and 71 were from the mathematics class. Also, the total time spent on LREs was longer in the economics than in mathematics, and LREs accounted for 12.9% of the total class time in economics and 6.1% in mathematics.

In terms of the initiator and interactional type of the LREs, we found that in both classes, nearly all the LREs were initiated by the teachers (97.4% and 2.6% respectively), and only few were initiated by the students. Regarding the interactional types, however, one difference was found between the classes; Kim initiated LREs mostly in a pre-emptive manner (81.4%), whereas Glenn initiated LREs more reactively (64.6%). Such a difference would be because of the frequent classroom activities in the mathematics class. In every lesson, Glenn was observed to offer at least two or three mathematics questions which students had to solve on their own. Glenn initiated most of the reactive LREs during the classroom activities to address the students' incorrect use of conventionalized ways of saying mathematical symbols or formulas. If there were more class activities in Kim's class, more reactive LREs could have been initiated by Kim to attend to students' linguistic errors.

Both the teachers and students in the school setting initiated pre-emptive LREs to focus on the use of vocabulary. Kim and Glenn initiated pre-emptive LREs to offer students with definitions, explanations, or synonyms of technical terms, presumably in anticipation that some of their students may not be familiar with the terms. Likewise, the students made almost all the LREs pre-emptively to ask about the definition of technical terms.

In terms of linguistic categories of LRE, we found a difference between the teachers. Kim initiated most of the LREs to focus on vocabulary (83%), distantly followed by disciplinary speak (12%). Kim frequently drew attention to technical terms or their meanings, and he did so by using elicitation similar to practices in ESL classrooms. In Excerpt 5.6, Kim asks the class the meaning of 'corrective' in the economic term 'corrective taxes'.

Excerpt 5.6 (Vocabulary-focused LRE by the teacher preemptively)

Kim *What does 'corrective' mean here?*
Student *To fix . . . ?*
Kim *Yes, yes.*

In Excerpt 5.7, a disciplinary speak-focused LRE from the economics class, Kim attended to conventional ways of discourse in economics. During the discussion of economic entities responsible for corrective taxes (subject content), a student's response, *they did bad things*, gives rise to an LRE. Kim appears to respond to the student's contribution by reformulating it in a conventional way of articulating the idea in economics – *Anyone who causes a negative externality or produces demerit goods in production or consumption.*

Excerpt 5.7 (Disciplinary speak-focused LRE by the teacher reactively)

Kim So, who's responsible for the corrective taxes?
Student Firms?
Kim Firms are responsible for corrective taxes. Because they?
Student Because, because *they did bad things?*
Kim *Yes*, ** (student's name) just got the answer. *Anyone who causes a negative externality or produces demerit goods in production or consumption*. Then, who will be collecting the corrective taxes?

On the other hand, Glenn initiated the majority of LREs to focus on disciplinary speak (46%), followed by vocabulary (34%). Such a difference can be explained by the findings related to interactional types of Teacher-initiated LREs. Glenn initiated the reactive LREs mostly to focus on disciplinary speak while correcting linguistic errors that his students had made with the use of conventionalized ways of articulating the idea in mathematics. In Excerpt 5.8, Glenn recasts a student's prior utterance, *y is equal or more than zero?*, in a conventionally accurate way of expressing the range of a function. Although Glenn focused on disciplinary speak the most, it should be noted that Glenn also initiated vocabulary-focused LREs quite often.

Excerpt 5.8 (Disciplinary speak-focused LRE by the teacher reactively)

Glenn So, y will have real value. Um, what would the range be for this?
Student *y is equal to or more than zero?*
Glenn Yes, so, in that case, *y is greater than or equal to zero.*

Kim and Glenn rarely focused on grammar and discourse. However, Glenn tended to initiate grammar-focused LRE more frequently than Kim did (15% and 1% of all the LREs respectively). This could be because of Glenn's experience of teaching ESL before joining SHS as an EMI teacher. Glenn may have instinctively felt that he needed to correct students' grammatical errors while teaching more than Kim, who did not have such experience. Both teachers attended to grammar reactively rather than pre-emptively. In Excerpt 5.9, Glenn reactively attends to a student's grammar mistake, *are somewhat raise*, which was made during her oral presentation about the way she solved a maths problem by recasting it correctly.

Excerpt 5.9 (Grammar-focused LRE by the teacher reactively)

Kim Uh, k will be less than one.
Student So, *is denominators are somewhat raise*?
Kim Yes, denominators *are somewhat rising.*
Student Yup, okay. And we only need to . . .

In Excerpt 5.10, Kim reacts to a student's omission of the third person singular morpheme, -s, by reformulating her utterance – *decreases or will decrease*.

Excerpt 5.10 (Grammar-focused LRE by the teacher reactively)

Kim What's gonna happen to the average total cost over time?
Student *Decrease.*
Kim Yes, it *decreases or will decrease.*

In both classes, the students mostly initiated vocabulary-focused LREs to question the meaning of technical terms or self-correct their incorrect use of technical terms in their utterances. In Excerpt 5.11, Glenn's use of a multi-word, *x-intercept*, draws a student's attention. The student expresses difficulty in comprehending the word, and then Glenn provides the formal definition, referring to the wordlist of mathematical terms.

Excerpt 5.11 (Vocabulary-focused LRE by student pre-emptively)

Glenn You can get the *x-intercept* in that one, too.
Student *X-intercept?*
Glenn Yes, intercept. If you look at the handout (wordlist) . . . *it says 'the point that the graph crosses on the x-axis'.* Okay? Let's move on to the next question.

The last category we looked into was the complexity of LREs. In both Kim's and Glenn's classes, nearly all the Teacher-initiated LREs were simple (97% and 84% respectively), which suggests that the teachers initiated LREs to either simply offer information about language items or respond only once to deal with any questions or students' linguistic errors. Also, both Kim and Glenn used elicitation in complex LREs. That is, they usually elicited students' responses through multiple responses to give them chances to notice their linguistic errors or to complete their utterances. Excerpt 5.11 illustrates a Teacher-initiated, pre-emptive LRE that involves multiple response moves between Kim and a student. In the discussion of a negative externality (subject content), Kim incidentally shifts his attention to a technical term by asking if the class remembers the term introduced in the previous lesson (Turn 1). Instead of immediately providing the answer, Kim elicits a student's response through multiple response moves (Turns 2 and 4) until she completes the multi-word *marginal private benefit.*

Excerpt 5.11 (Complex LRE by the teacher pre-emptively)

Kim When there's a product that has a negative externality, this demand curve represents what?
(silence)

Kim It's the keyword from the last lesson. Can anyone tell me what that is? *Three words that start with 'marginal'.*
Student *Private?*
Kim *Yes, marginal private. And then?*
Student *Benefit?*
Kim *Benefit? Did you say benefit? Right. Marginal private benefit.*

On the other hand, Glenn initiated the majority of LREs to focus on disciplinary speak (46%), followed by vocabulary (34%). Such a difference can be explained by the findings related to interactional types of teacher-initiated LREs. Glenn initiated the reactive LREs mostly to focus on disciplinary speak while correcting linguistic errors that his students had made with the use of conventionalized ways of articulating the idea in mathematics. Although Glenn focused on disciplinary speak the most, it should be noted that Glenn also initiated vocabulary-focused LREs quite often.

5.3 Language-related episodes in the University of Seoul

In the university setting, LREs did occur in the to and fro of classroom interaction (1 LRE every 6.11 min), although it was more infrequent than in the school setting. LREs were more frequent in Chen's accounting class than in Luke's mathematics classes (1 LRE every 3.12 min and 8.3 min respectively). Among the total 197 LREs, 154 LREs were from Chen's class, and 43 LREs were from Luke's class.

In addition, the total time spent on LREs was longer in Chen's class than in Luke's class. In Chen's class, the total time spent on LREs was 17.38 minutes, which was 3.62% of the total class time, and in Luke's class, the total time spent on the LREs was 6.71 minutes, accounting for 1.9% of the total class time.

In terms of the initiator and interactional type of the LREs in the university setting, almost all the LREs were initiated by the teachers (95.6%), whereas students initiated only a few LREs (4.4%). There were more pre-emptive LREs than reactive LREs in both classes. However, Luke initiated reactive LREs far more frequently than Chen (23.3% and 2.6% respectively). This could be because of the mathematics questions provided to students during Luke's class. Luke was observed to attend to students' incorrect use of mathematical registers, including technical terms, when they were explaining their answers.

A similar pattern in the linguistic categories of LRE was seen across the classes, with about 84% of LREs focused on vocabulary. Both Chen and Luke initiated vocabulary-focused LREs most frequently, distantly followed by disciplinary speak and discourse (9.1% and 6.3%, respectively). In both classes, students also initiated vocabulary-focused LREs most often.

Interestingly, neither the teachers nor students initiated grammar-focused LREs identified in any of the lessons observed in the university setting. This could be explained by the interview responses of the teachers that they did not consider dealing with grammatical mistakes of students as their responsibility.

Regarding the complexity of LREs, nearly all the LREs observed in Chen's and Luke's classes were simple LREs (98.7% and 97.5% respectively), which had either one single response by the teacher to a previous utterance or no response (teacher-talk). There were only three complex LREs identified in the university settings: two from Chen's class and one from Luke's class. In both classes, students initiated no complex LREs.

5.4 Comparison of language-related episodes between the settings

LREs, the moments in which attention was drawn to the language during the discussion of content, were common in the EMI classes not only in the university setting but also in the school setting. LREs were frequent in the to and fro of classroom interaction in all the four EMI classes. This suggests that the EMI teachers in this study used LREs to integrate their attention to language into incidental content teaching practices in very subtle and transient ways. Also, students seemed to use LREs as opportunities to ask for help with linguistic issues or address any linguistic mistakes they noticed in their incorrect language use.

Regarding the frequency of LRE, a difference was found between the settings. LREs occurred nearly three times more frequently in the school setting than in the university setting (1 LRE every 2.19 min and 6.11 min respectively). Moreover, despite the relatively short class time, the proportion of class time spent on LREs was considerably higher in the school setting than in the university setting (around 9.5% and 2.8 respectively). This could be because of the gap in the students' linguistic repertoire that Kim and Glenn, the schoolteachers, expected may have been greater than the gap anticipated by Chen and Luke, the university teachers. Also, considering the clear aim for EMI in the school setting, *preparing students academically for universities overseas*, the schoolteachers may have been held more accountable for their students' learning progress than the university teachers, so that they felt the need to pay more attention to language as frequent as possible during their teaching.

Another possible explanation for the different frequency of LREs between the settings would be that the teachers may have had different degrees of expectations regarding students' autonomy of learning. During interviews, both Chen and Luke mentioned the importance of students' self-study of technical terms or expressions before coming to classes, which was not mentioned by the schoolteachers, and so may not be expected by Kim and Glenn. So, Kim and Glenn may have thought that their EMI classes would be the only context where their students learn the disciplinary English and thus tried to deliver as much linguistic knowledge to the class as possible within the given time.

We then compared the findings from each setting in terms of the initiator and interactional types of LREs. Initiator and interactional types of LREs did not markedly differ regarding the settings and the teachers' first language

background. In all the classes, it was the teachers who initiated nearly all the LREs (a range from 91.5% to 96.4%). Of course, this would be because it is usually teachers who lead the class discussion and directed topics as they have greater knowledge about the conventionalized way of using language to convey disciplinary meanings than students. Also, it could be due to the instruction style of the EMI classes in this study. In both settings, the students were observed to use LREs when working on practice exercises or participating in classroom activities (e.g., group discussion) to directly ask questions about language items. All the observed classes were mainly teacher-fronted with a few class activities. Had there been more opportunities for students' productive language use during classes, students would have initiated more LREs.

Overall, there were more pre-emptive LREs than reactive LREs in both settings. This suggests that the EMI teachers were well aware of the linguistic challenges students would have when using and comprehending the disciplinary language. That almost all the pre-emptive LREs initiated by the teachers involved their expectation of a linguistic gap students may have had would be an explanation. Also, this finding can relate to the way the teachers perceived their roles as EMI teachers. In the interviews, they reported that they were well aware of the fact that the distinctive nature of the disciplinary register would cause some learning challenges and feel responsible for proactively supporting students' learning of the disciplinary register. The relatively low frequency of reactive LREs in both settings could be because the teachers thought attending to students' linguistic errors may impede the flow of the class or demotivate them from learning.

When looking at each EMI class separately, however, one interesting difference was observed. Glenn and Luke, the mathematics teachers, initiated reactive LREs more frequently than Kim and Chen, the social science teachers. In particular, Glenn initiated LREs more reactively than pre-emptively, a finding which stood in contrast to observations of the other classes. This could be explained by the teacher's use of classroom activities. Both Glenn and Luke gave at least two to three mathematics questions in every lesson, while there was none in Kim's and Chen's classes. Glenn and Luke usually initiated reactive LREs when correcting students' incorrect use of disciplinary ways of expressing mathematical symbols or formulas during classroom activities. Thus, if there were more classroom activities in the other social science classes, Kim and Chen would have used more reactive LREs to address students' linguistic errors.

Given that Glenn and Luke were both English first language speakers, it is possible that such a difference was due to the teachers' first language background. Also, Glenn's experience as an ESL instructor may have made him instinctively feel the need to correct students' linguistic errors during his teaching more than the other teachers who did not have such experience.

In terms of the linguistic categories of LREs, we found that across all the classes, LREs was focused mainly on disciplinary vocabulary and disciplinary speak. Considering that the teachers' planned language support was also

focused on vocabulary, they seemed to construe learning of disciplinary register largely as learning of disciplinary vocabulary. They may have perceived vocabulary as the core of disciplinary literacy. During the interviews, all the teachers reported their beliefs that novice students should first master disciplinary vocabulary in order to succeed in their studies. Also, the teachers appeared to think of vocabulary as a good starting point for ESL students to be introduced to a new disciplinary way of using their L2 (English). Possibly, if the teachers had used students' first language as a medium of instruction, they would have attended to other linguistic categories more often.

One last explanation for the large amount of incidental attention on vocabulary could be that the teachers believed that the use of planned language support alone would not guarantee students' successful vocabulary acquisition and also comprehension of new content knowledge.

In both the school and university settings, disciplinary speak received the second-most attention. The teachers were observed to focus on disciplinary speak when highlighting, modelling, or demonstrating the conventionalized ways of expressing propositional ideas in their disciplines, which seemed to be the way of acculturating their students into their disciplinary discourse community. Thus, this finding supports the hypothesis that EMI can be the context with the opportunity for ESL students to develop disciplinary knowledge and the ability to use English in a discipline-specific way (Airey & Larsson, 2018; Fang et al., 2006).

Interestingly, unlike the other teachers, Glenn frequently attended to disciplinary speak. This can be explained with what Glenn reported in the interview. He believed that it is crucial to explicitly and repeatedly teach conventionalized expressions of mathematical formulas regardless of students' first language background. Moreover, he was aware of his frequent intervention to help students with reading aloud mathematics formulas correctly while teaching. Luke also attended to disciplinary speak more often than the other teachers from social science, although he did not focus on mathematics speak as much as Glenn did, nor did he mention teaching it in the interview. Possibly, the educational level could affect the degree to which Glenn and Luke perceive the importance of teaching disciplinary speak even though they were in the same discipline. Glenn perhaps wanted his students to be fully familiar with the way English was used in mathematics before they transition to higher education. Likewise, Luke may have wanted his students to master the disciplinary way of using language before they enter the industry and tried to correct students' incorrect language use.

All the teachers did not seem to construe grammar and discourse as part of the disciplinary language. Especially grammar received the least or no attention in all the EMI classes. This could be due to the teachers' understanding of the language used in their EMI classes. In interviews, the teachers perceived grammar as general English to be taught in ESL classes, while they thought that vocabulary and disciplinary speak are closely related to content learning. Their thoughts on grammar, however, are in contrast with the argument that

grammatical and discoursal features are also parts of the disciplinary register, which varies across disciplines and that students need knowledge about using them (Fang et al., 2006; Schleppegrell, 2002). As these were content teachers, it is unlikely that they would have been aware of the importance of other components of language competence, including discourse competence or grammar.

The teacher's first language background also appeared to be another reason for little attention to grammar in these EMI classes. During the interview, Kim and Chen, who were ESL speakers, mentioned their lack of confidence to correct students' grammar mistakes in writing and spoken production because they did not have much knowledge about English teaching.

Another possible explanation resides in the lack of chances for students to produce stretches of languages in either written or spoken production. For example, in all the EMI classes except Chen's accounting class, the students did not have any written assignments in the EMI classes observed. It was only Chen who gave two short essay assignments. If the students were required to do more writing or oral presentations, the teachers would have probably intervened to emphasize or correct discoursal or grammatical features.

The last comparison was made for the complexity of LREs in both settings. The teachers did not spend much time on language during their teaching in either setting. Nearly all the LREs found in this study was simple LREs in which the teachers did not make multiple responses. Given that these were content classes, the relatively low frequency of complex LREs is not surprising. They may not have wanted to "sacrifice" too much of class time dealing with language issues, as some teachers mentioned in the interviews. This interpretation can be supported by the teachers' reason for providing planned language support. The teachers reported that they used planned language support to secure enough class time for teaching disciplinary content. Also, it is possible they may have felt that taking multiple responses to deal with language would be disruptive of the flow of the discussion of content or demotivate their students from learning content knowledge.

5.5 Conclusion

This chapter provided the descriptions of incidental attention to language in the EMI classes in both high school and university settings. LREs were common and frequent during the classroom interaction in all the EMI classes, which suggests that language was a "topic worth discussing" (Basturkmen & Shackleford, 2015, p. 4). LREs appeared to be a common feature of the EMI teachers' instruction. By using LREs, the EMI teachers appeared to proactively modify the information about language items, offer corrections to students' incorrect language use, and help students realize any gaps in their knowledge about language. Students, too, seemed to use LREs as opportunities to ask teachers for help with linguistic issues or deal with a gap they noticed in the language input they received.

LREs were more frequent and spent more class time in the school setting than in the university setting. Regardless of the settings, LREs were predominantly initiated by the teachers to focus on vocabulary and disciplinary speak, and grammar received the least attention in all the EMI classes. However, the mathematics teachers initiated disciplinary speak-focused LREs more often than the social science teachers. The teachers, except Glenn, the mathematics teacher in the school setting, initiated LREs mostly pre-emptively. Nearly all the LREs were simple in all the classes. On the whole, the EMI teachers' incidental teaching practices reflected their perceptions of their role and the way they viewed the language they used in EMI classes.

6 Students' language learning from language-related episodes

6.0 Introduction

Chapter 5 showed how the EMI teachers integrated attention to language into their incidental teaching practices to support students' learning. It showed that language-related episodes (LREs) were frequently initiated during the classroom interaction in all the EMI classes observed in the study reported in this book.

Chapter 6 focuses on the role of classroom interaction in students' learning of English for disciplinary study in EMI settings. That is, it is concerned with students' learning of the language items targeted in the LREs and the characteristics of the LREs that were correlated with the students learning of language items.

This study used tailor-made test items that assessed learning of the language items targeted in the LREs. Students in any disciplinary study setting have varying linguistic knowledge. It is not necessarily the case that when a disciplinary lecturer corrects a linguistic expression produced by one student in the class, who presumably made an error because he or she could not accurately use the expression, the other students would all also not be able to produce the expression correctly. Likewise, a student may ask the disciplinary teacher about the meaning of a word the student is unfamiliar with, but other students in the class may know the word's meaning.

The purpose of the test was to find if a student with difficulty with a specific language item targeted in an LRE appeared to have acquired the item through the occurrence of the LRE.

Section 6.1 illustrates the different kinds of test items that we devised to assess student learning of the language items targeted in LREs. Then, findings about the extent of learning from LREs in each setting will be reported in Sections 6.2 and 6.3. Then findings from the school and university contexts are compared in Section 6.4.

6.1 How the language test was devised and conducted

This section illustrates how we devised tailor-made written language test items and how we scored students' responses to the test items. It also details how the test was conducted in each EMI class.

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Test items were devised based on the LREs observed in the naturally occurring classroom interaction recorded in the earlier part of the study. The test was not based on an experimental design, and the students were not randomly assigned to different groups for different treatments. When an experimental design is not possible, aa quasi-experimental design, which involves a pre-test, treatment, and post-test procedure, may be used (Dörnyei, 2007; Loewen, 2004). The pre-test determines students' prior knowledge of a language item. However, because of the incidental and unplanned nature of LREs, it was impossible for us to predict who would initiate LREs and which language items would be addressed during classroom interaction. Thus, we decided to use LREs as a type of pre-test as an LRE indicates a student's lack of or inaccurate prior knowledge about the language item targeted in the LRE. We selected two kinds of LREs: LREs that had arisen either when a disciplinary teacher corrected a language error made by a student and LREs that arose when a student made a language query. Thus, the two kinds of LREs used for test purposes were student-initiated, pre-emptive LREs, and Teacher-initiated, reactive LREs.

LREs 6.1 and 6.2 are examples of Student-initiated, pre-emptive LREs. LRE 6.1 from Glenn's mathematics class was pre-emptively initiated by a student, Minha, to question the meaning of a technical term, *intercepts*. LRE 6.2 is another example from Kim's economics class that shows inaccurate knowledge about the use of a technical term, *constant*, of a student, Yong.

LRE 6.1 (Student-initiated, pre-emptive, vocabulary)

Minha: Uh . . . *Sir? What do intercepts mean?*
Glenn: They're the points where these graphs cross the x-axis or y-axis.

LRE 6.2 (Student-initiated, pre-emptive, vocabulary)

Yong: Mr **? *Do I use constancy or constant?*
Kim: *It's constant. Constant returns to output.*

LRE 6.3 is an example of Teacher-initiated, reactive LRE from Chen's accounting class. Chen initiated LRE to deal with inaccurate knowledge of a technical term of a student, Noah (*Dep, depresment?*). All these LREs arose because of the students' lack of or inaccurate prior knowledge about targeted language items.

LRE 6.3 (Teacher-initiated, reactive, vocabulary)

Chen: That is a sum of explicit cost and accounting profit and . . . ?
Noah: *Dep, depresment?*
Chen: *Pretty close. Depreciation.*

Regarding linguistic categories, we used two linguistic categories, vocabulary and disciplinary speak, as the vast majority of the LREs focused on these two categories. We devised two types of test items, drawing on Loewen (2005): suppliance and correction. Suppliance-type test items ask the learner to either supply the meaning or the form of a language item, in this case, the meaning or form of a word or disciplinary expression. They were devised for Student-initiated, pre-emptive LREs.

Table 6.1 illustrates how the LREs 6.1 and 6.2 were used for devising suppliance test items. LRE 6.1 was used for a meaning suppliance test type as Minha asked about the word's meaning in the LRE. LRE 6.2 was used for a form suppliance test type as Yong asked about the appropriate form of the word during the LRE. Both test items were used to find if Minha and Yong learned from the LREs and could provide the meaning or correct form of the words they had questioned about.

Correction-type test items ask a student to correct an incorrect sentence containing the same kind of language error that they made in the classroom interaction, leading to an LRE. They were devised for Teacher-initiated, reactive LREs. Table 6.2 shows how the LRE 6.3 was used for devising a correction test item. In LRE 6.3, Chen corrects Noah's linguistic error.

Table 6.1 Test example – suppliance

LRE used for test	*Test item*
LRE 6.1 from Glenn's class (Student-initiated, pre-emptive, vocabulary) **Minha: Uh . . . Mr. **? *What do intercepts mean?*** **Glenn: *They're the points where these graphs cross the x-axis or y-axis.***	Please provide the meaning of the following word: ***Intercepts***
LRE 6.2 from Kim's class (Student-initiated, pre-emptive, vocabulary, simple) **Yong: Mr **? *Do I use constancy or constant?*** **Kim: *It's constant. Constant returns to output.***	Please fill in the blank with the appropriate word: ***C_____ returns to output.***

Table 6.2 Test example – correction

LRE used for test	*Test item*
LRE 6.3 from Chen's class (Teacher-initiated, reactive, vocabulary) Chen: That is a sum of explicit cost and accounting profit and . . . ? Noah: *Dep, depresment?* Chen: Pretty close. *Depreciation*.	The underlined word in the following sentence is incorrect or inappropriate. Please replace it with the correct or appropriate word. Total revenue is a sum of explicit cost, accounting profit, and ***depresment***.

The test item was used to find if Noah learned from the LRE and could correct the same linguistic error he had made. Some more test items used for the study are provided at the end of this chapter (see Appendix B on page X).

Responses were scored as correct or incorrect. A response was scored as correct if students either correctly supplied the targeted linguistic items or corrected the linguistic errors they had made. Student responses that were nearly correct, involving minor spelling mistakes but with clear intentions, were scored as correct. A response was scored as incorrect when a student failed to either provide the targeted linguistic item correctly or any responses to the test item. Table 6.3 shows examples of correct responses. Minha and Yong responded to the test items with the correct meaning or form of the word; thus, their responses were correct.

Table 6.4 shows examples of students' incorrect responses. In LRE 6.3, Noah did respond to the test item but failed to correct the linguistic error presented. Thus, his answer was scored as incorrect. Also, students' responses were scored as incorrect when they failed to provide any responses to the test items, as can be seen in LRE 6.4.

The tailor-made written language tests were conducted a week after the last observation was made for each EMI class. The test was administered to all students during normal class time. Although the test was given to the whole class, we used only the test answers of the students who were responsible for the specific LREs, either by making a linguistic error (Teacher-initiated, reactive LREs) or initiating a question about a language item (Student-initiated, pre-emptive LREs), for analysis. Also, even though students who audited or observed LREs may have benefited from the exposures, it was not possible for us to confirm in advance whether they had prior knowledge about the targeted language items or not. Therefore, in this study, we decided not to consider the test results of such students for the analysis.

Table 6.3 Examples of correct response

LREs used for test	*Test items and students' responses*
LRE 6.1 from Glenn's class (Student-initiated, pre-emptive, vocabulary) **Minha: Uh . . . Mr. **? *What do intercepts mean?*** **Glenn: *They're the points where these graphs cross the x-axis or y-axis.***	Please provide the meaning of the following word: ***Intercepts*** **Minha's response: *points that the graph crosses the axis* (correct)**
LRE 6.2 from Kim's class (Student-initiated, pre-emptive, vocabulary) **Yong: Mr **? *Do I use constancy or constant?*** **Kim: *It's constant. Constant returns to output.***	Please fill in the blank with the appropriate word: C_____ returns to output. **Yong's response: *constant* (correct)**

Table 6.4 Examples of incorrect response

LRE used for test	*Test item and student's response*
LRE 6.3 from Chen's class (Teacher-initiated, reactive, vocabulary) Chen: That is a sum of explicit cost and accounting profit and . . . ? Noah: *Dep, depresment?* Chen: Pretty close. *Depreciation*.	The underlined word in the following sentence is incorrect or inappropriate. Please replace it with the correct or appropriate word. Total revenue is a sum of explicit cost, accounting profit, and *depresment*. **Noah's response: *decreasement* (incorrect)**
LRE 6.4 from Luke's class (Teacher-initiated, reactive, vocabulary) Luke: Jin, I think you have the answer. These two lines are called? Jin: *Perpen* . . . Luke: *Perpen, perpendicular, right?*	Please provide the synonym for the following word: Orthogonal *P*_____ **Jin's answer: perpenal (incorrect)**
LRE 6.5 from Glenn's class (Teacher-initiated, reactive, vocabulary) Glenn: What's the shape (of the graph) gonna look like? Yuri: *Line* . . . ? Glenn: Yes, *linear*, good, good.	The following sentence contains an error. Please find out the error and correct it to improve the sentence: The shape of the graph looks like line. **Yuri's answer: (incorrect – no answer is given)**

All students were asked to write down their allocated numbers that we provided on the first day of classroom observation on the test papers. In this way, we could track the responses of the individual students who engaged in specific LREs. We matched the allocated numbers of the students and the relevant test items for each student.

6.2 How the language test results were analyzed

In terms of distribution of tested LREs, 33 LREs identified from the school and university settings were used for testing. Twenty-three LREs (12 from Kim's and 11 from Glenn's classes) were tested in the school setting, and 10 LREs (four from Chen's and six from Luke's classes) were tested in the university setting.

In addition to descriptive analysis on the test results, we performed inferential statistics using the Statistical Package for the Social Sciences (SPSS) 27.0 to examine if there were any statistically significant relationships between the characteristics of LRE and students' correct test item responses. We used the Chi-square test and Fisher's exact test (two-sided) on the raw data and set an alpha level of $p < .05$ for all the tests. The analysis consisted of three phases; an overall analysis of the relationship between LRE and test results; a separate analysis for each setting; and a comparison of test results between the school and the university settings. The results will be illustrated in the following sections.

6.3 Overall results for student language learning

Overall, the students appeared to learn the language items targeted in the LREs during their EMI classes. Students responded correctly to 21 of the 33 (64%) test items. The finding that the students correctly responded to most of the test items suggests that learning of the items targeted in the LREs had occurred.

The relationship between the LRE type (Student-initiated, pre-emptive and Teacher-initiated, reactive) and students' responses was analyzed. As seen in Figure 6.1, the students correctly responded to all the test items based on Student-initiated, pre-emptive LREs. In contrast, they correctly responded to only around half the test items based on Teacher-initiated, reactive LREs (100% and 53.8%, respectively).

In addition, Fisher's exact test (two-sided), performed on the frequency of students' correct and incorrect test item responses, showed a statistically significant difference between the different types of LREs. Correct responses were significantly more frequent for the test items based on Student-initiated, pre-emptive LREs. This indicates that students acquired more linguistic items targeted in the Student-initiated LREs, which involved their attempts to initiate explicit attention to the language items, than those in Teacher-initiated LREs, which contained the teacher's attempts to correct students' linguistic errors.

This is an important finding as it contradicts the EMI teachers' beliefs they had reported in the interviews. They reported that they should take pre-emptive action to reduce potential linguistic challenges before students encounter any linguistic challenges or raise questions. In this study, Student-initiated LREs appeared to be instances that allowed students to notice gaps

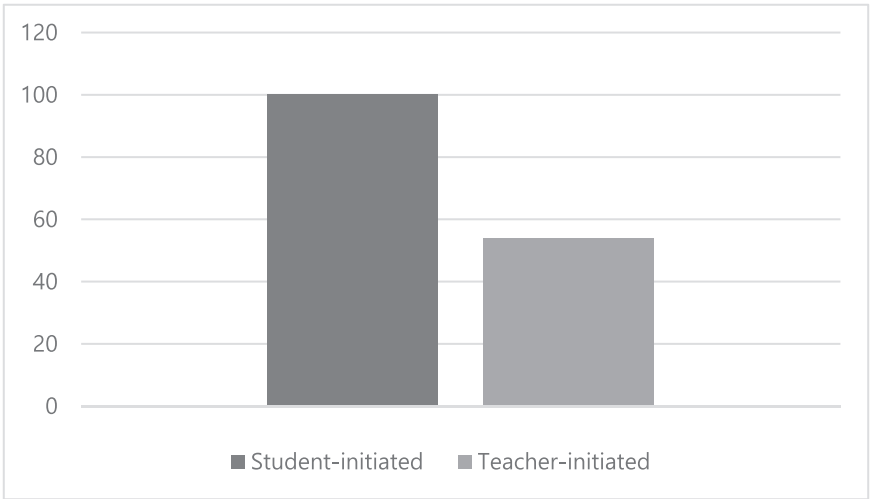


Figure 6.1 Percentage of correct test item responses for the type of LRE

in their knowledge about linguistic items and to address gaps they perceived on their own.

The relationship between the two linguistic categories of LRE, vocabulary and disciplinary speak, and students' test item responses were analyzed. We found similar percentages of correct test item responses for vocabulary and disciplinary speak (63.6% and 64% respectively). However, there did not appear to be any discernible differences in the effects of LRE on students' language learning when considering different linguistic categories. Fisher's exact test (two-sided) did not show any significant relationship between the language categories and students' responses. This suggests that LREs had a similar or no effect on students' learning of vocabulary and disciplinary speak in these EMI settings.

Complex LREs were more effective for students learning targeted language items than simple LRE. Students provided more correct responses to the test items based on complex LREs than test items based on simple LREs (91.7% and 47.6% respectively), as seen in Figure 6.2. Fisher's exact test (two-sided) revealed a statistically significant difference in the frequency of correct/incorrect answers. This finding indicates that complex LRE appeared to have resulted in more students' correct test item responses than simple LRE.

This is another finding that runs counter to the concerns the teachers expressed in the interviews. The teachers were concerned that spending too much time on language during their EMI teaching would waste time. However, this finding suggests that the more time teachers spend making multiple responses to students' linguistic errors, the better the students acquire disciplinary registers. In addition, the importance of the complexity of LRE in EMI settings should be noted as it is related to the degree of explicitness of

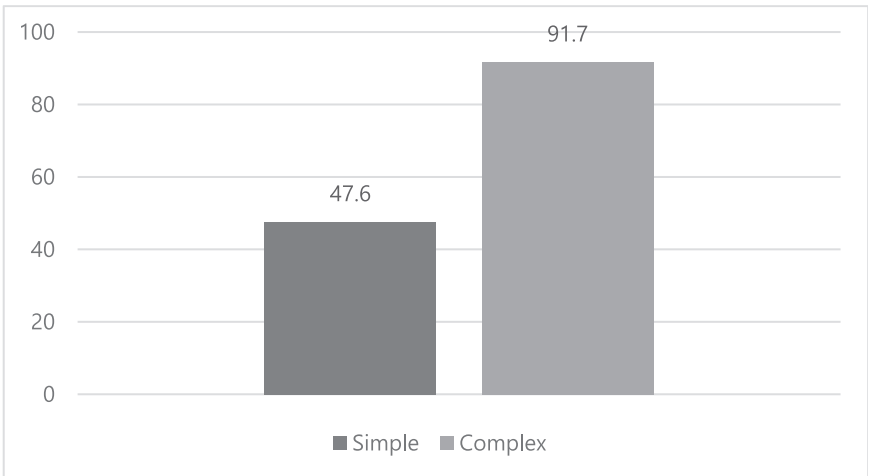


Figure 6.2 Percentage of correct test item responses for complexity

attention to language and the extent to which students notice their language gaps. In other words, by taking multiple turns in complex LREs, EMI teachers can clarify what is being targeted and induce students to recognize targeted linguistic items.

Moreover, considering that complex LREs were far less frequent than simple LREs in all the EMI classes, we suggest it would be the quality rather than the quantity of LREs that plays a decisive role in students' successful language learning in EMI settings. Regardless of educational level, mere attention to language does not seem to be enough for students in EMI settings, no matter how frequent it is. Even with the relatively low frequency, complex LREs can be more effective for students' language learning as they involve in-depth attention to language. Also, in all the complex LREs used for testing, the teachers initially endeavored to elicit linguistic information from students instead of the immediate provision. Thus, complex LRE can be an opportunity for EMI teachers to scaffold students' language learning by allowing them enough time to notice what is being focused on or the language gaps they have in their knowledge.

6.4 Results of language learning at Sokuk High School

This section presents the findings of students' learning at Sokuk High School (SHS). In the school setting, students appeared to learn from the LREs. Students responded correctly to 14 of the 23 test items (60.9%). More than half of the students who participated in the test could either correct linguistic errors they had made or provide correct words or meanings of words that they had questioned in the LREs. This suggests that LREs appeared beneficial for students' learning of the language items the LREs targeted in the school setting.

We first examined the relationship between LRE type and students' learning. In this school setting, students correctly responded to all the test items based on the Student-initiated, pre-emptive LREs they had initiated. In contrast, they correctly responded to slightly over half of the test items stemmed from the Teacher-initiated LREs (100% and 52.6% respectively), as seen in Figure 6.3. However, Fisher's test (two-sided) did not show any statistically significant differences, suggesting that the different LRE types had equal effects on students' language learning in the school setting.

Another factor is the relationship between linguistic categories and students' learning. Students provided slightly more correct responses to the test items on vocabulary than disciplinary speak (64.3% and 55.6% respectively). Fisher's exact test did not show any statistically significant differences between the linguistic categories, suggesting that linguistic categories of LRE had equal or no effects on students' learning.

We also examined the relationship between complexity of LREs and students' learning. In the school setting, complex LREs were more effective than simple LREs. Students responded correctly to the test items based on complex

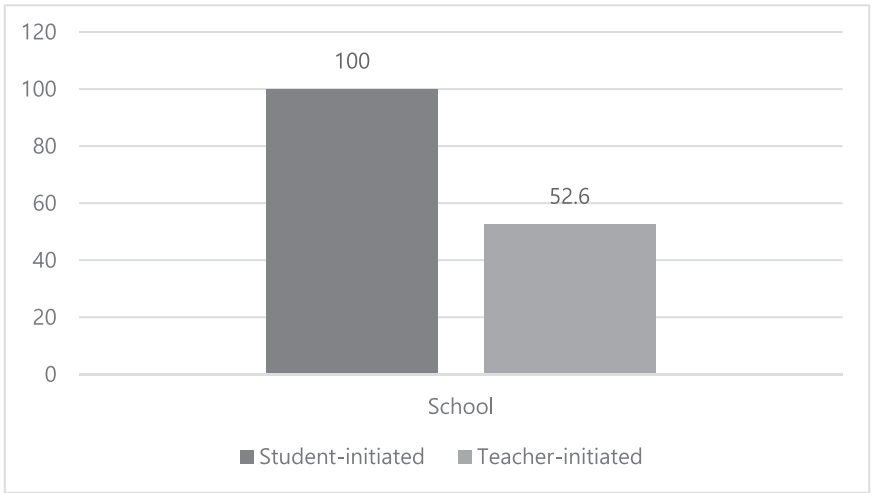


Figure 6.3 Percentage of correct test item responses for the type of LRE at SHS

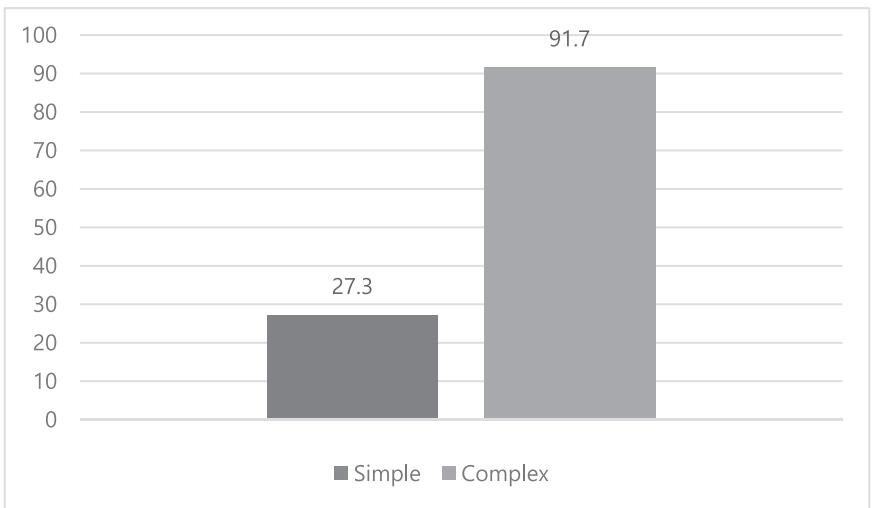


Figure 6.4 Percentage of correct test item responses for complexity in SHS

LREs far more than those based on simple LREs (91.7% and 27.3% respectively), as seen in Figure 6.4. Fisher's test also revealed a statistically significant difference between simple and complex LREs ($p = .004$) in the school setting. This indicates that the complex LREs were significantly more effective for students learning targeted language items than simple LREs.

6.5 Results of language learning at the University of Seoul

This section presents the findings of students' learning at the University of Seoul (UoS). In the university setting, the students appeared to learn from the LREs. They responded correctly to seven of the 10 test items (70%). Most students who participated in the test could either correct the linguistic errors they had made or provide the correct meaning or form of words they had questioned in the LREs. This indicates that LREs were effective for students' language learning in the university setting.

We analyzed the relationship between LRE type and students' learning and found that student-initiated, pre-emptive LREs were more effective for students' language learning than Teacher-initiated, reactive LREs in the university setting. Students responded correctly to all the test items derived from Student-initiated, pre-emptive LREs. On the other hand, they did so to just over half of the test items based on Teacher-initiated, reactive LREs (100% and 57% respectively), as seen in Figure 6.5. Fisher's exact test (two-sided), however, did not show any statistically significant difference between the LRE types (p = .475). This suggests that both types of LRE were equally effective for students' learning of language in the university setting.

In terms of the relationship between linguistic categories and students' learning, students in the university setting responded correctly to the test items based on disciplinary speak-focused LREs more than vocabulary-focused LREs (100% and 62.5% respectively), as seen in Figure 6.6. Yet, Fisher's test showed no statistically significant differences between the linguistic categories (p = 1.00). This indicates that different linguistic categories of LRE appeared

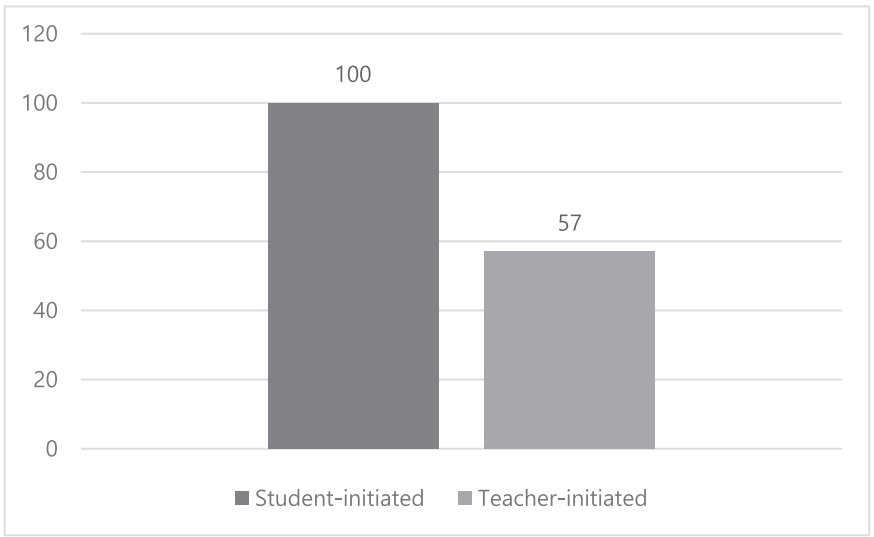


Figure 6.5 Percentage of correct test item responses for LRE type in UoS

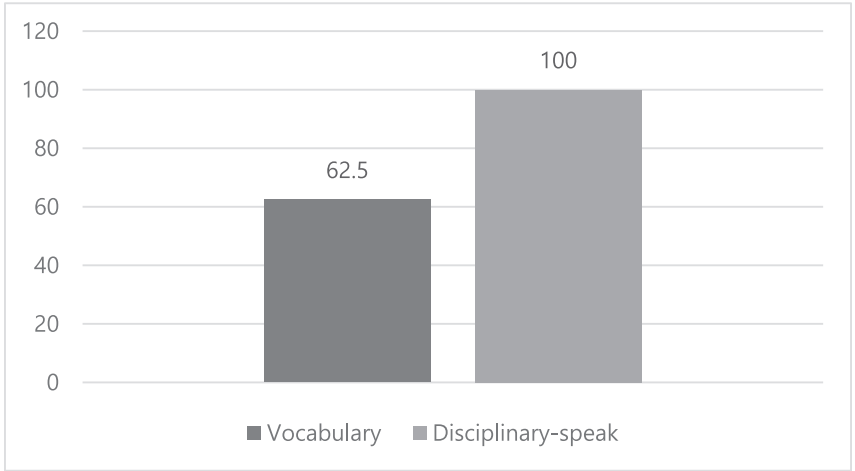


Figure 6.6 Percentage of correct test item responses for linguistic categories in UoS

to have equal effects or no effect on students' learning of language in the university setting.

We analyzed the relationship between complexity and students' learning. All the test items were based on simple LREs in the university setting. Students correctly responded to most of the test items (70%). According to Fisher (1970), inferential statistics cannot be computed when the variable is a constant (single variable). Thus, we decided not to perform statistical analysis for complexity and test item responses in the university setting.

6.6 Comparison between the school and university settings

We first compared students' overall learning between the settings. Students responded correctly to more than 60% of the test items in both settings (see Figure 6.7). Thus, LREs appeared to be effective for students' language learning in both school and university settings. A difference that we found between the settings was that the percentage of students' correct test item responses was slightly higher in the university than in the school.

Despite the different percentages of correct test item responses, Fisher's test (two-sided) did not show any statistically significant differences between the settings on the frequency of correct test item responses. This finding suggests that LREs were equally beneficial for students to learn the language items targeted in the LREs regardless of the setting.

We then compared students' learning by the type of LRE and found a similar pattern regarding students' test item responses for the type of LRE (Student-initiated, pre-emptive and Teacher-initiated, reactive) in both settings. It was Student-initiated, pre-emptive LRE that resulted in more

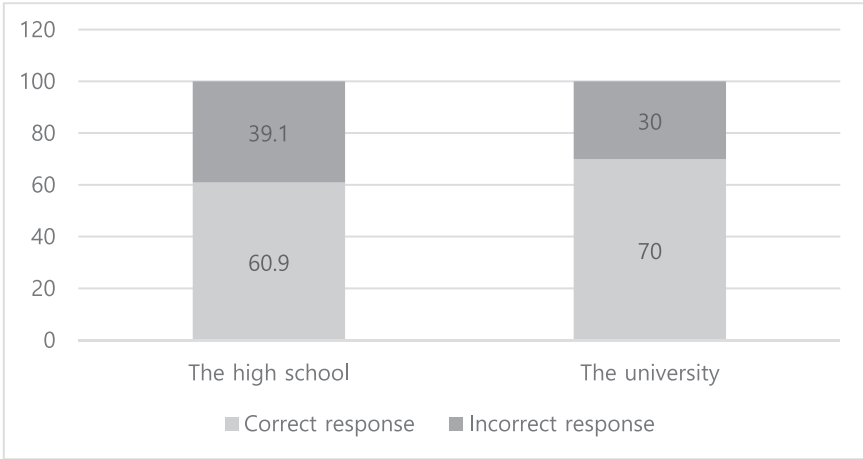


Figure 6.7 Distribution of correct and incorrect test item responses in each setting

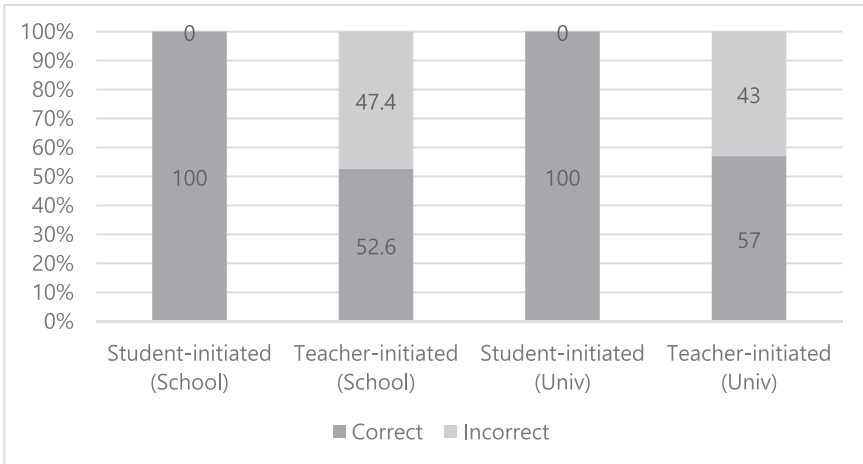


Figure 6.8 Test item responses for type of LRE in each setting

students' correct test item responses than Teacher-initiated, reactive LRE, as seen in Figure 6.8. Furthermore, it was noteworthy that the students correctly responded to all the test items that were based on Student-initiated, pre-emptive LREs.

Comparison of students' learning was also made between the linguistic category of LRE. We found a similar percentage of students' correct test item responses for vocabulary in both school and university settings (64.3% and 62.5% respectively), as seen in Figure 6.8. On the other hand, the percentage

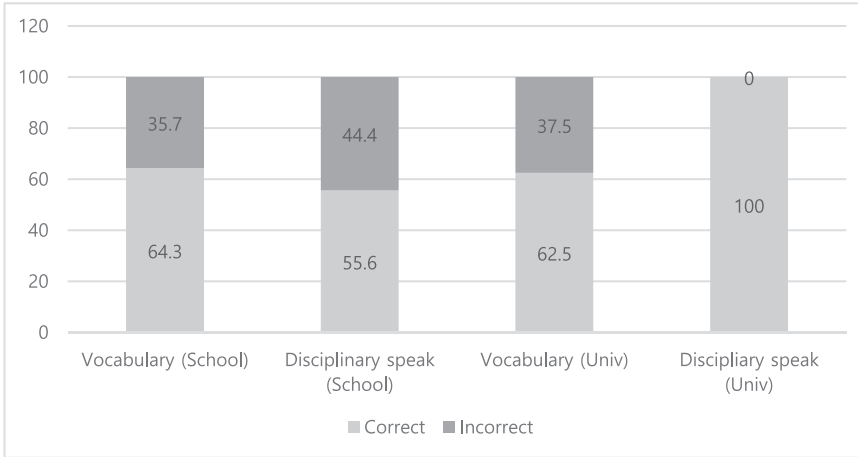
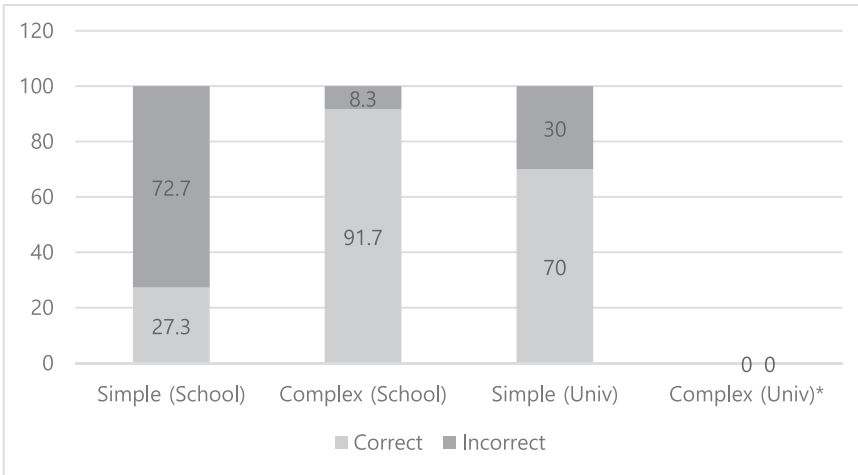


Figure 6.9 Test item responses for linguistic categories of LRE in each setting



* No complex LREs tested in the university setting

Figure 6.10 Test item responses for the complexity of LRE in each setting

of correct test item responses for disciplinary speak differed between the settings. The percentage was far higher in the university than in the school setting (100% and 55.6% respectively). That is, the students in the university setting responded correctly to all the test items on disciplinary speak, while those in the school setting did not.

The last comparison was made between the complexity types of LRE. We compared students' responses to the test items based on simple LREs between

the settings, as there were no test items based on complex LREs in the university setting. It was a noticeable result that simple LREs led to more than twice the correct responses in the university than in the school (70% and 27.3% respectively).

6.7 Conclusion

This chapter has discussed the results of the tailor-made written language tests in EMI settings. This study appeared to show that students' learning of language occurred in all four EMI classes. The students appeared to learn the language items targeted in the LREs that arose in the to and fro of the classroom interaction in all the EMI classes. They responded correctly to nearly 64% of the test items. There has been little information about students' learning of language items taught in EMI classes, although the literature has consistently claimed that EMI is effective for students' simultaneous learning of content and language (Macaro, 2018; Rose et al., 2020). The study reported in this book has confirmed students' acquisition of language in EMI settings. The study's findings support researchers' arguments that LREs in classroom interactions benefit learners' L2 acquisition (Doughty, 2003; Ellis, 2001; Williams, 2001). Moreover, they support the claim that input modified by teachers during classroom interaction is effective for students' language acquisition because such modifications are individualized for each student and delivered at the moment when needed (Gass & Mackey, 2006; Kartchava, 2018; Long, 1996).

Two characteristics of LRE, type and complexity, were statistically significantly related to students' correct responses. Student-initiated, pre-emptive LREs derived more correct responses than Teacher-initiated, reactive ones. This finding indicates that students' noticing was crucial in the successful learning of disciplinary register in L2, which supports SLA researchers' claim that teachers' external attention to a language item does not always reflect actual gaps in students' knowledge of the language or match students' internal attention to the item (Ellis et al., 2001a; Schmidt, 2001, 2012) and that students are more likely to acquire linguistic items that they proactively focus on to understand (Williams, 2001). It appears that the students needed to realize linguistic gaps in their knowledge and address the gaps at the moment they arise by initiating an LRE.

The study's findings reveal an interesting pattern regarding the impact of complex and simple LREs on students' correct responses, shedding light on their effectiveness in promoting the acquisition of targeted language items. Complex LREs demonstrated a notable advantage over simple LREs, as they resulted in a higher number of students providing correct responses. This suggests that complex LREs proved more beneficial for enhancing students' grasp of the language items under consideration.

However, it is equally noteworthy and encouraging that even simple LREs exhibited efficacy in facilitating students' learning of linguistic items, despite

their transient nature. While the percentage of correct responses for simple LREs may appear relatively low, it is crucial to consider that these language items were addressed incidentally during content subject classes. This indicates that even subtle exposure to language items within a different instructional context can contribute to students' linguistic development.

Furthermore, it's interesting to observe that complex LREs were predominantly initiated by the EMI teachers through the elicitation of students' responses. This finding aligns with Lyster's (2001) assertion that elicitation serves as a potent method to prompt students to actively produce linguistic items themselves, rather than merely receiving language information. Complex LREs likely played a role in enhancing students' linguistic fluency and accuracy by raising their awareness and encouraging them to notice the targeted language items.

When comparing the test results of each setting, we did not find any statistically significant differences in the frequency of students' correct test item responses, which signals that LREs were equally effective for the students regardless of the setting. Simple LREs resulted in more students' correct test item responses in the university than in the school setting, which can be explained by students' motivation for disciplinary language acquisition. It has been argued that motivated learners would learn L2 better than unmotivated learners as they pay more attention to information (Gardner, 1988; Schmidt, 2012). As claimed by Schmidt (2012), attention to language results in more noticing, and motivated learners would achieve enhanced learning as they endeavor to comprehend the information about the noticed language. As the university students in this reported study committed to the specific discipline that they had chosen, they were more likely to be motivated to learn the new disciplinary language than the school students who studied multiple subjects.

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Part III
Looking forward

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7 Applications for EMI teachers' professional development

7.0 Introduction

EMI can present various challenges for students, content teachers, and institutions, which rarely occur when the medium of instruction is students' or teachers' first language (Bradford, 2013; Nieto Moreno de Diezmas & Fernández Barrera, 2021). One major factor in the success of EMI is the roles and competence of EMI teachers. Against this backdrop, EMI teacher education has emerged as an area of research interest (Breeze & Sancho Guinda, 2022), and writers in the field (Chang, 2023; Richards & Pun, 2022) have argued for the need for professional development opportunities for EMI teachers. EMI teachers play a major role in facilitating their students' development of disciplinary literacy, yet they themselves may have limited information and training in how to facilitate such development best.

Chapter 7 focuses on the topic of professional development for EMI teachers. Section 7.1 describes the current situation of EMI professional development in South Korea, and it describes forthcoming initiatives that aim to provide training for EMI teachers. Section 7.2 discusses EMI teacher education needs in general and proposes a set of broad goals for professional development with reference to recent literature. The previous chapters reported the cases study in the South Korean context, which investigated a specific topic in EMI, namely how teachers integrate a focus on language into their disciplinary teaching. Section 7.3 suggests applications of the findings for EMI teachers in any context who wish to develop their practice. Section 7.4 sets out two reflection-on-practice projects that can be used by EMI teacher educators or by EMI teachers for the purposes of self-development on the topic.

7.1 Current status of EMI teachers' professional development in South Korea

Recently, the importance of professional development for EMI teachers has begun to receive attention in schools and universities in South Korea. Some of these institutions seem to use external professional development programs. For example, Sokuk High School, which was introduced in Chapter 3, invited

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external English specialists who ran a professional development program for EMI teachers. However, the EMI teachers in our study criticized the program for focusing only on general classroom English and failing to meet their actual needs. In addition, the program targeted only Korean first language teachers, not the other international EMI teachers working in the school.

Some universities in South Korea have attempted to develop their own professional development for EMI teachers, although most of their initiatives did not come to fruition. One private university in South Korea has developed and provided an EMI professional development for the Economics department since 2012 (Korea University Centre of Teaching and Learning, 2012). The program was developed to train graduate students in economics with the goal of developing graduate students' EMI teaching skills before their graduation. Yet, it focuses on English for academic purposes (speaking and writing) and classroom English and still lacks the focus on discipline-specific English.

There is no government-led initiative for professional development for EMI teachers. At present, only local initiatives have been set in the South Korean context. Recent EMI professional development programs for EMI teachers in South Korea appear to consider discipline-specific English use. An EMI teacher education certificate program was recently established by Jiye Hong (Research Institute of Integrated Education [RIIE], 2022). The program targets in-service or novice EMI school or university teachers from diverse disciplines including arts, mathematics, music, science, and the social sciences, language specialists who wish to coordinate the integration of language and disciplinary content subjects in their institutions, and student-teachers or graduate students with various first language or disciplinary backgrounds. The program aims are (1) to help EMI teachers identify the language needs of their EMI students, (2) to show EMI teachers ways that can be used to integrate a focus on language into their disciplinary teaching, (3) to enhance the teachers' understanding of disciplinary registers and (4) to introduce EMI teaching strategies, (5) to increase their intercultural competences, and (6) to help them reflect on and evaluate their EMI teaching (Research Institute of Integrated Learning, 2022). Park et al. (2022) have also proposed an EMI professional development model for EMI teachers in HE in South Korea based on their research findings from EMI teachers' needs analysis. Their model includes a focus on English proficiency in relation to discipline, and it is about to be used by EMI teachers in university settings in South Korea.

7.2 Professional development needs and goals

The provision of EMI does not simply mean the change of the medium of instruction; pedagogic strategies may need to change or be adapted. Regardless of first language backgrounds, disciplines, or educational levels, there is a need for EMI teachers to develop the pedagogy necessary for teaching in students' L2 (Ball & Lindsay, 2013). For EMI teachers to develop their pedagogic skills, professional development opportunities may be required.

However, teachers' needs may vary. We would expect that EMI teachers would have different needs according to the educational levels they teach. In the interview data reported in Chapter 4, the schoolteachers and university teachers mentioned different needs. Kim and Glenn, the schoolteachers, talked about their need for support in classroom management. For example, they talked about their need for information on different ways of interacting with students in EMI and on ways to help their students with English texts or flexible management of class time or curriculum. However, this was not mentioned by the university teachers. The needs that the university teachers mentioned were mostly support for their students to improve their general English proficiency.

Professional development for EMI teachers needs to be context-specific. For example, in South Korea, schools are required to follow a national curriculum and academic achievement standards for each grade set by the Ministry of Education regardless of the medium of instruction. Also, the fact that the Korean college entrance examination is conducted in the Korean language can double the burden on both teachers and students in EMI settings, as EMI would narrow students' choices when transitioning to HE. Thus, professional development without any consideration of these contextual aspects would not meet the needs of EMI teachers in South Korea. Such contextual constraints can only be addressed with tailor-made professional development that is more context-specific (Lo, 2021; Park et al., 2022). When developing and providing professional development programs for EMI teachers in an institution, experienced EMI teachers from the institution may participate as they would have more knowledge of the needs of other EMI teachers and students and contextual information.

EMI teachers' needs may also vary due to their first language backgrounds or disciplines. For example, Kim and Chen, who had English as their L2, felt a need for the improvement of English proficiency and support for their students with English writing, while this was not the case for Glenn and Luke. However, this does not mean that English first language EMI teachers do not need support for professional development. They may still feel the need to learn about teaching strategies used in ESL or EAP classes. Also, EMI teachers may want information about students' L2 learning, such as the relationship between students' first language and English, the learning process, learning strategies, or L2 motivation to cope with their students' linguistic challenges or facilitate their language learning better. Thus, when planning professional development for EMI teachers, a context-specific approach may be required.

In addition, professional development can include information about conceptualization of English in EMI, which would help EMI teachers understand the nature and role of language used for their EMI classes. The way language is used differs across disciplines, and students are introduced to and taught distinctive and conventionalized ways of using language in a discipline by content teachers. Thus, EMI teachers may need to be aware of the discipline-specific

Table 7.1 Language-related goals for EMI professional development

No.	*Language-related goals*
1	Ways to integrate a focus on language in teaching disciplinary content
2	Helping teachers to develop English language skills for managing classroom interaction
3	Raising teachers' awareness of academic and disciplinary varieties of English
4	Developing teachers' ability to diagnose students' language difficulties
5	Developing teachers' knowledge of ways to provide students with language support
6	Raising teachers' awareness of strategies for using the first language within EMI teaching
7	Raising teachers' awareness of ways to provide corrective feedback on students' writing or speaking
8	Ways to integrate a focus on language in student learning evaluation (if necessary)

nature of English they use in their disciplines prior to planning and teaching their EMI courses.

EMI scholars have proposed goals for professional development (Dafouz, 2021; Morton, 2016; Yuan, 2019). Yuan (2019) suggests four main goals for professional development: (1) to promote ownership of English as a lingua franca; (2) to develop effective classroom language; (3) to develop teachers' disciplinary pedagogical competence in EMI education; and (4) to create a community of practices focused on EMI teaching. A recent survey of university EMI teachers in Korea (Park et al., 2022) found that the kind of professional development they required was support for developing their own English language proficiency and skills for teaching content and language in one class.

Drawing on findings from the case studies reported in previous chapters and with reference to ideas in the literature outlined earlier (Dafouz, 2021; Morton, 2016; Park et al., 2022), we propose a set of language-related goals for professional development. See Table 7.1. As argued earlier, the choice of goals for a specific professional development program would depend on teachers' needs in the context in question.

The case study reported in Part II of this book focused mainly on ways EMI teachers integrated a focus on language in their teaching of disciplinary content. Therefore, the following two sections (7.3 and 7.4) provide suggestions for addressing this topic, that is, the first goal listed in Table 7.1.

7.3 Ways to integrate a focus on language in EMI

In South Korean, it is generally expected that students will improve their English in the course of their study in EMI settings, although language learning outcomes may not be explicitly stated in the EMI course syllabi or curricula. One way that EMI may achieve this is by means integrating a focus on language into EMI teaching. In the following, we offer some practical suggestions for steps EMI teachers can take to include a focus on language.

Suggestions for EMI teachers

Before teaching (planned attention to language)

In the stage of preparing for teaching, EMI teachers can consider how to integrate the focus of language into the aims of their EMI classes. Class aims can be set in detail by year, grade, month, week, or day. They may consider the following points when setting aims and goals for EMI classes.

Point 1: Student population

- Are students in my EMI class from the same cultural or first language background or not?
- Are there any students who do not speak the national language well?
- What is the average English level of students in my EMI class?
    - What are the language requirements for admission at my school or university in terms of EMI classes?
    - What are students' grades of English as a second language (ESL) subject?
    - What are students' scores on general English proficiency tests such as TOEFL or IELTS?
- What are students' reasons for and expected outcomes of taking my EMI classes?
    - Are they planning to transit to universities overseas?
    - Are they planning to find a job or continue studying overseas?
- Have they taken EMI classes before?

Point 2: Learning outcomes

- Can I use the same aims and goals for EMI that I use for my classes that use the national (local) language?
- (In schools) Are my students preparing for college entrance exams overseas?
- How do I conceptualize English in my EMI class? Do I want students to learn discipline-specific English or general English?
- Do I consider students' English development in assessing them in my EMI class? If so,
    - How do I assess students' English learning?
    - If I assess their learning of technical vocabulary, should I consider their ability to use the vocabulary in writing or speaking, or their ability to understand it in reading or listening?
- Do I consider students' linguistic errors when I evaluate their exam answers or written assignments?

Point 3: Contextual consideration

- Are there any English language support programs available for students in my institution?
- Do I teach on my own or in collaboration with another teacher (co-teaching)?
- Are there any guidelines in my institution that I can refer to design my EMI class?
- Are there syllabi, teaching materials, or exam papers developed and used by previous teachers in my institution that I can refer to?

Once the aims of the EMI class are determined, teachers may want to consider developing planned language support for students. By using planned language support, EMI teachers can reduce the repetition of similar questions that students ask about the use of language during class, use limited class time more efficiently, and concentrate more on teaching disciplinary content. Also, planned language support can be useful for students to be prepared for every lesson, immediately solve questions related to a language that suddenly comes to their mind during class, and review what they have learned during class. Planned language support can be in the following forms:

- Glossaries or wordlist of technical terms (English only or a mix of English and Korean)
- Translated summaries of each lesson or each chapter of the textbook
- Small glosses included in the textbooks or handouts, which can serve as immediate hints for students
- PowerPoint slides that include definitions of technical terms
- Review activities on technical terms or expressions at the beginning or end of the class (e.g., gap fill activity using Coxhead's (2000) Academic Word List)

During teaching (incidental attention to language)

Supporting students with language during teaching can be difficult for teachers as most of the language-related issues and questions arising in EMI classes do not usually occur when the medium of instruction is Korean or teachers' first language. It can be more challenging for teachers when their first language is not English or if they do not share the same first language with students. Also, EMI teachers may not be confident in correcting students' linguistic errors during class. However, as suggested by the findings of this study reported in Part II, students do learn from incidental attention to language, even in EMI settings. Moreover, by incidentally attending to language, EMI teachers can check the level of students' understanding of the class, recognize any learning difficulties students have, and encourage students to participate more in the class. EMI teachers can integrate the focus of language in their incidental teaching by considering the following strategies:

- At first, pitch the level of English you use for teaching slightly lower and then gradually increase the level as students get used to instruction in English

- Develop and provide a list of classroom English for students to use for asking questions, talking about their ideas, answering questions, etc
- Offer more oral or writing classroom activities for students to practice using technical terms or expressions (English for Academic Purposes teaching materials may be used if available)
- Ask students for the definitions or acronyms of technical terms you use in your classes and give them enough time to think of the answers rather than providing the information yourself immediately
- Encourage students to actively utilize any planned language support or dictionaries during class
- If the class share the same first language, draw on the first language on occasion, for example, to help students better understand the content, build rapport, or manage the class
- Include more group discussions to stimulate students' curiosity about language while communicating with peers

Encouraging collaborations between EMI and ESL teachers

Another practical suggestion for institutions we would provide is to encourage collaboration between EMI teachers and ESL teachers, including ESP and EAP specialists. Other EMI researchers too have argued the case for subject and language specialists to collaborate to benefit students' learning of both subject knowledge and the language skills (Jiang et al., 2019). The EMI teachers in the study reported in Part II perceived that supporting students' learning of English was part of their responsibility. However, neither setting in the study had practical suggestions or guidelines for how their EMI teachers could integrate a focus on language within their EMI teaching. EMI teachers should not be expected to take full responsibility for students' disciplinary language development. Therefore, we would suggest that institutions encourage their EMI teachers to collaborate with ESL teaching colleagues.

Such collaboration could take place when planning EMI classes. At the beginning of the year, ESL teachers can share information about students' English language grades with EMI teachers to enable them to adjust the level of English used in teaching to the level of students' English proficiency. Recent research (Rose et al., 2020) indicates that students' grades at the end of a university ESP course strongly correlated with their scores in an EMI course. Their scores in tests of general English language proficiency also correlated to a lesser extent with success in EMI instruction.

ESL teachers may also share their knowledge about methods for highlighting language with EMI teachers and suggest ways EMI teachers could extend their teaching methods to deal with linguistic issues that arise in teaching. On invitation, ESL teachers could observe EMI classes to understand what happens in the class and learn more about disciplinary language use. This would be one way that university EAP and ESP teachers might acquire content knowledge and come to better understand specialized communication (Arnó-Macià, Aguilar-Pérez, & Tatzl, 2020). Likewise, EMI teachers could observe

ESL classes to understand language teaching strategies used in the classes. Observing each other's classes could enable EMI teachers and ESL teachers to exchange their ideas about integrating content and language and might lead to joint ventures for developing discipline-specific English language support programs for students.

7.4 Reflection on EMI teaching practice projects

One major focus of professional development for EMI teachers is to advance their understanding of how teaching their discipline through the medium of English differs from teaching it through the student's first language. However, because EMI teachers are not language teachers, they may have limited awareness of the kinds of language difficulties the students may face, and the important role language plays in facilitating the learning process (Richards & Pun, 2022). EMI teachers may underestimate the importance of the kinds of language support they can provide for their students. They are more likely to integrate language support into their planned practice when they consider its potential value and know relatively straightforward and easy ways to provide it.

Project 1 recordings and transcriptions

Incidental language learning support

This project relates to the kind of spontaneous actions teachers take during classroom interaction. Video recordings allow teachers to have a vision of themselves that is otherwise largely unavailable to them, and that reading a transcription of classroom talk can reveal details of interaction that tend to be hard to notice from listening alone. In this project, EMI teachers use video and/or transcriptions to reflect on their use of the strategies they use to manage classroom interaction.

Classroom interaction is very largely realized through language. The classroom is a complex and dynamic environment in which nearly all interaction and language use emerge in real time rather than being scripted and planned. As a result, the verbal micro actions teachers regularly take, such as responding to students' linguistic difficulties or gaps in their ability to express ideas linguistically, tend to go unnoticed as they are not generally available for review and reflection.

The case study reported in earlier chapters of this book has shown the kind of verbal strategies used in teacher talk by teacher participants in the South Korean EMI context. The functions of teacher talk focused on in the observations of classroom interaction in the study, such as how the teacher highlighted disciplinary vocabulary and expressions or responded to students' linguistic

difficulties in expressing ideas and information, can be used by EMI teachers in other contexts as topics for examining their own practices.

In the project, video recordings and transcriptions are used by EMI teachers or lecturers to help them develop awareness of practice, and possibly to identify existing strengths and areas that the teacher may wish to change or develop. The recordings and transcriptions can be used further for collaborative forms of professional development. Video recordings and/or transcriptions of classroom interaction can provide a useful means by which teachers can see what their teaching looks like.

Options for obtaining the classroom interaction data on which to reflect include the following:

(1) Record Zoom classes
(2) Record Zoom classes with audio transcripts enabled
(3) Set up audio or video recording devices in face-to-face classes
(4) Use class recordings from any school/university recording system that is already in place

Options for structuring the project:

(1) Develop a baseline recording: Record one class early on to use as baseline data against which to compare change and development over time.
(2) Choice or range of strategies: Identify a teacher talk function of interest, or devise a list of functions to search for in the recording/transcripts, for example, strategies used to correct students' use of disciplinary vocabulary. The teacher identifies instances in the classroom interaction when the function occurred and notes the language or strategy he or she used. Is the teacher satisfied with the current practice, or would the teacher wish to make changes?
(3) Setting an aim for development: Identify an aim for development. For example, I want to know if I am improving how I respond to my students' questions about language or vocabulary in the discipline. Use the recordings/transcriptions to trace improvements over time and identify strengths.
(4) Sharing practices: Two or more EMI teachers work collaboratively to share recordings and/or transcription or to report on the observations made of their own practices. Recordings, transcriptions, and reports of practice allow teachers to see into each other's classrooms, share ideas, and discuss alternatives. Sharing practices can also be used for the purposes of peer review and feedback.

Possible topics for observations are listed in Table 7.2. These topics are linked to the case study reported in Part II of the book.

Table 7.2 Topics for observations

Teacher's response to students' queries about language
Teacher's highlighting of vocabulary and disciplinary expressions
Teacher's correction of a student's language expression
Teacher's use of the students' first language
Teacher's attention to language issues (frequency of teacher-initiated language-related episodes LREs)

Project 2 documents review

Focused language learning support

In this project, EMI teachers review their instructional documents, such as lesson plans, teaching materials, assigned readings, materials and tasks, in terms of the language demands these present to the students. They consider their students' English language proficiency levels and whether any forms of language support have or could be incorporated into the instruction. Although EMI teachers may, in principle, support the notion that they have an important role to play in providing language support, they often do not have much time to invest in coming up with ideas for forms of support. The ideas later build on findings from Chapter X in the case study and add some new ideas for forms of focused language support that would not require much preparation time for the EMI teacher.

Examples

In reviewing a task assigned to students, the EMI teacher considers ways the students have or could be helped with the linguistic demands of the task, such as by means of the provision of a glossary of disciplinary terms, a template of headings to show how the text the teacher requires the students to produce can be organized, or a link to linguistic resources that would help the students deal with the linguistic aspects of the task.

In reviewing a lesson or lecture plan, the EMI teacher considers the kinds of specialized vocabulary or language functions (for instance, language to express formulae) that will likely be used. Has any form of language support been built into the lesson plan? If not, should or could it be provided? A list of keywords or expressions that will be used in the lesson or lecture can be provided to the students in advance. Or, the keywords can be on a PowerPoint slide for use in the lesson/lecture. Could students be asked to do some form of merged language-content preparation, such as being directed to a brief introductory text on the topic (for example, an encyclopaedia entry) of the upcoming lesson/lecture and asked to underline two important ideas or concepts in the text, noting how these have been expressed.

In reviewing lecturer/teacher-made materials, such as a lecture handout or notes, the teacher considers the English language proficiency level of the

students. If, on review, the EMI teacher recognizes that some parts may be linguistically challenging and unlikely to be understood, could rephrasing or reformation of one or two key ideas be used to modify the linguistic complexity of the material? The idea of reformation is to retain the original content of the idea or information but to modify the language expression. For example, one long and complex sentence might be broken down into two sentences, or an unusual word might be replaced with a more familiar one.

7.5 Application tasks

Here we provide two types of application tasks that can be used by EMI teacher educators in training sessions or by EMI teachers working independently. The tasks provide data adapted from the case study, and EMI teachers try out the same techniques to LRE analysis and test item development used in the case study reported in Part II of book. The aim is for EMI teachers to experience first-hand practical ways that they can analyze attention to language (LREs) in transcripts of classroom interaction or ways to devise test items based on LREs that have been observed. At a later point, EMI teachers may wish to explore interaction in their own classroom and may consider drawing on these techniques to do so.

Task One is for the practice of identifying and coding LREs. Later are two short segments from transcripts in the case study data set. You will identify and code LREs in these for the characteristics introduced in Chapter 5. You will see later two transcripts of classroom interaction, each of which includes a discussion of disciplinary content and, within it, an LRE, when the teacher and/or student turn their attention to language/linguistic expression. The first transcript has been adapted from interaction in a school economics EMI class. Examine the transcript and then complete the guided coding grid after it. The second transcript has been adapted from interaction in a university mathematics class. Examine the transcript and then fill in the coding grid (unguided) after the transcript.

TRANSCRIPT 1 from a school economics class

T: Remember, whether delivering 100 carrots or 1,000 carrots, the sellers hire only one truck driver, and the fuel costs would not be that different. Am I right?
S1: Yeah.
T: And ultimately, the companies will?
S2: *규모의 경제를 실현한다?*
T: Can you say that in English?
S2: Companies can get economic scale.
T: Good. Companies can achieve economies of scale by lowering costs. Alternately, you can say economies of scale occur in the companies.
T: Right, look at the graph on the next page, everyone.

Guided coding grid for LRE 1

Look at Transcript 1 and identify the boundaries of the LRE. That is where discussion about language/a linguistic expression begins and ends. Mark the boundaries of the LRE on the transcript.	LRE begins . . . . . and ends . . . . .
What is the linguistic focus of the LRE focus (grammar, vocabulary, discourse, or disciplinary speak? If you are not sure about these terms, refer to the definitions and examples of linguistic categories in Figure 5.1 on page X.	Linguistic focus . . .
Who initiated the LRE (the teacher or a student)?	Initiator . . .
Was the LRE a reactive response to a problematic utterance produced by a student, or was it triggered pre-emptively (not in response to a problematic utterance or difficulty in understanding?	Interactional type . . .
If it was a reactive response, was the LRE complex? That is, did the LRE involve more than one response move by the teacher)? Or was it simple in that it did not involve more than one response move by the teacher?	Complexity . . .

TRANSCRIPT 2 from a university mathematics class

T: So, I just want you to do the first exercise. I will give you five minutes. (The students begin working on the exercise individually.)
S1: Professor, what does yield mean in this question?
T: It's 'to give'. You give an answer. Like a theorem, XY yields a equals b. So, what's your answer?
S1: It's one pi and two pi.
T: Yes, that's perfect. *It's one pi and two pi*. So, this is the formula. Which of the equations do you think have periodically oscillating solutions as that?
S2: Number 3?

Note: Pi, which is written as the Greek letter for p, or π, is the ratio of the circumference of any circle to the diameter of that circle.

Coding grid (unguided) for LRE 2

LRE boundaries
Linguistic focus
Initiator
Interactional type
Complexity

Task Two is for the practice of devising test items. This subsection presents three excerpts of LREs in classroom interaction. By applying the test item construction procedures introduced in Chapter 6, you will examine the excerpts and then complete the grids after them.

Excerpt A from a school mathematics class

T: Um . . . what would the range be for this?
S: Y is equal or more than zero?
T: Yes. . . . Actually, can you say that again?
S: Y is equal and more than zero?
T: Okay. . . . So, in that case, y is greater than or equal to zero.

Who initiated the LRE (the teacher or a student)? Was it a reactive response, or was it triggered pre-emptively?	LRE was initiated by . . . The interactional type was . . .
What is the linguistic focus of the LRE focus? If you are not sure about the types of linguistic focus, refer to the definitions and examples of each linguistic category in Figure 5.1 on page X.	Linguistic focus . . .
Was the LRE complex? That is, did the LRE involve more than one response move by the teacher)? Or was it simple in that it did not involve more than one response move by the teacher?	Complexity . . .
Which test type would apply to the LRE (correction or suppliance)?	The applicable test type for the LRE is . . .
If the test type is suppliance, would it focus on word form or meaning?	The test focuses on . . .
Devise the test question.	
What would be the correct response?	The correct response is . . . Incorrect response would include . . .

Excerpt B from a university accounting class

T: Let's say I own a car whose useful life is ten years, and . . .
S: You can't use that car anymore because of its useful life?
T: Yes. In accounting, we say, 'the residual value for the car is zero'.

Initiator and interactional type of LRE
Linguistic focus of LRE
Complexity of LRE
Test type
Test question
Correct response for the test item

Excerpt C from a school economics class

T: So, I believe we don't have any other questions for the exercise 2?
S: Mr. **? Then, how do we say something isn't an incentive?
T: Are you talking about the one on page *?
S: Yes.
T: So, in that case you can use 'disincentive', as in the sentence on page **, 'the effect was a huge disincentive to save water or reduce water consumption.

Initiator and interactional type of LRE
Linguistic focus of LRE
Complexity of LRE
Test type
Test question
Correct response for the test item

Answer keys and discussion of the application tasks are given at the back of the book on page X (Appendix C).

7.6 Conclusion

In this chapter, we have considered the needs and goals for professional development for EMI teachers and give some general advice and guidelines for ways EMI teachers can integrate a focus on language into their planned teaching practices and into their classroom interaction. The chapter has also provided specific reflection-on-practice projects and application tasks that can be used in professional development for EMI teachers. It is hoped that the chapter's content will be of interest to in-service EMI teachers and to EMI teacher educator regardless of the educational levels or geographical contexts in which they work. The content may also be of interest to those planning to work in EMI contexts in the future.

8 Conclusion

8.0 Introduction

This book has sought to demonstrate why it is important to examine everyday teaching practices in EMI, including classroom interaction, to illustrate ways a focus on language can be integrated naturally into EMI teaching and to provide evidence of students' learning of disciplinary English through EMI. The final chapter of the book reports some conclusions and identifies topics related to EMI teaching and learning for the future research agenda (including methodologies).

8.1 Conclusions of the reported study

This section reports conclusions that are drawn from the findings of the study reported in Part II. The reported study was situated in EMI classes in two different academic disciplines, social sciences and mathematics, which has enabled us to compare teaching practices across the two disciplines. The study was conducted in two settings, namely a school and a university in South Korea. It examined the kinds of language support that four EMI teachers provided in their planned and incidental teaching practices and whether the attention to disciplinary uses of English in their incidental teaching practices appeared to lead to students' English learning.

We used a mixed-method design, including classroom observation and analysis of transcripts, interviews, document analysis, and tailor-made language tests. The EMI teachers' planned practices were examined through an analysis of their teaching materials (e.g., syllabus, handouts) and interviews with them about their roles and intentions to support their students' development of disciplinary uses of English. We also examined the teachers' incidental attention to language through an analysis of language-related episodes (LREs), instances where teachers and students encounter a problem in understanding or producing the language and subsequently focus on addressing this issue. In addition, tailor-made language tests were devised to ascertain whether students appeared to learn the language items targeted in the LREs. Conclusions drawn from the findings of the study are as follows:

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(1) Addressing language (English) questions and issues appeared to play a key role for the EMI teachers in the contexts investigated in the study. The findings of the study showed that although the focus of the EMI classes was content knowledge, the EMI teachers perceived helping students with language to be an integral part of their EMI teaching. They attended to language in their planned practices (e.g., via glossaries of disciplinary English vocabulary) and in their spontaneous classroom interaction.
(2) EMI classes in both school and university settings included incidental and transient LREs. Language frequently became the topic of discussion during classroom interaction in the EMI classrooms observed in the reported study. The teachers' and students' brief shifts of attention from disciplinary content to language were frequent and common during the classroom interaction in EMI classes. In particular, attention to language appeared to be a common feature of the EMI teachers' instruction even though the focus of their classes was on disciplinary content teaching. The EMI teachers were able to integrate a focus on language smoothly into the discussion of content through occasional LREs. They appeared to be aware that planned language support alone did not guarantee students' acquisition of disciplinary English and thus initiated LREs to facilitate students with language.
(3) LREs can be effective for ESL students' learning of disciplinary language (English) in EMI classes in both the school and university settings. There has been a controversy as to the effects of EMI on students' simultaneous learning of disciplinary content and English, especially in the South Korean context (Cho, 2012a; Choi, 2015). LREs that were pre-emptively initiated by students were found to have effects on their learning of the language items targeted in the LREs. Also, the more time the EMI teachers took to address students' linguistic errors or questions through complex LREs, the better the students learned the targeted language items. The EMI teachers appeared to use various strategies, such as elicitation, recast, or explicit correction, to focus on language issues to facilitate their students' understanding of complex LREs. That our study provides evidence of the effects of LREs on students' language learning in both the school and university settings can be an encouraging result for EMI stakeholders, including EMI teachers, students, policymakers, and researchers.

Even though an effort was made to address generalizability in this study by examining four different EMI classes in two distinctive settings with different educational levels, the results of our study pertain to these specific contexts. We suggest that further research, drawing on the methodology we used in this study, could be conducted to investigate attention to language in teaching practice across a larger number of content teachers and lecturers and across various disciplines and educational contexts.

8.2 Future EMI research in the South Korean context and beyond

Many educational institutions around the world, especially at the tertiary level, adopt EMI to provide instruction in English, enabling internationalization and facilitating communication in the global academic community. South Korea, too, has embraced EMI in its educational system over the past two decades. Many higher education institutions in South Korea offer EMI courses with the belief that EMI is effective for simultaneous learning of content and disciplinary English, attracting international students and enhancing the global competitiveness of their education system. Additionally, as English language education is a significant component of the curriculum at various levels of schooling, EMI is now provided in primary and secondary school settings in South Korea (Hong & Basturkmen, 2020).

Despite the fast growth of EMI across the world, there has been little classroom-based research that examines what happens in EMI classrooms to understand better how students' English development can be supported and if students do learn language in EMI classrooms. Especially, EMI has been greatly under-researched in the South Korean context. The study reported in this book is the first to examine the ways EMI teachers facilitate their students with language and if students learn disciplinary English in EMI in South Korea. In order for the continuous development of EMI worldwide, more research that studies EMI from various angles is needed. We would like to suggest some research agendas for the future EMI research not only in the South Korean context but also in other geographical context.

First, there needs to be more classroom-based research in EMI settings, especially in the South Korean context. For research that is close to the field and can be applied directly to the field, EMI researchers need to increase their understanding of the field. Although it is not easy to access EMI classes, classroom-based research allows researchers to access factors that are difficult to reveal only with surveys. One possible way to conduct EMI research in school settings is to invite EMI teachers as co-researchers or teacher-researchers who have experiences as schoolteachers, as they may have a comprehensive understanding of the school field. This would also allow EMI teachers themselves to reflect on their teaching. For research in university settings, it can be good to begin with EMI classes in the institution where researchers work as they are familiar with the target setting. It is also possible that the presence of researchers may have an impact on teaching and learning. Researchers may use recordings of EMI classes in school archives or may join the EMI classes via online meeting platforms. In addition, given the complex and dynamic nature of educational environment, classroom-based EMI research can be done in the form of a case study that involves one or multiple cases for in-depth exploration of real-world EMI contexts.

For classroom-based research in EMI, the use of stimulated recall interviews with EMI teachers or students would present a valuable methodological

approach for researchers aiming to examine the underlying intentions or beliefs of teachers or students involved in EMI. Specifically, this approach could be insightful when applied to LREs that occur in EMI classrooms. If the reported study included stimulated recall interviews with teachers or students focusing on spontaneous LREs that were identified from the class recordings, we would have been able to uncover the rationale behind why the EMI teachers and students initiated LREs. Also, the method may allow for an examination of the way students process and understand language input that is the focus of LREs during real-time interactions in EMI classrooms. This, in turn, would contribute to a more comprehensive understanding of the effectiveness of EMI as an instructional approach as well as the ways where both teachers and students navigate challenges and opportunities for language acquisition in pursuit of educational goals.

We propose that future classroom-based research in the domain of EMI should encompass an exploration of interactions among students. The study we have presented in this book did not delve into the examination of LREs occurring within student-student interactions. Some previous classroom-based investigations conducted within ESL contexts have revealed a significant prevalence of LREs within student-student interactions (e.g., Erlam & Pimentel-Hellier, 2017; Kim & McDonough, 2008; Leeser, 2004).

To advance our understanding of EMI and its dynamics, it is imperative to investigate the occurrence and efficacy of LREs that emerge during interactions between students in EMI classrooms. This avenue of research holds immense potential in shedding light on the nuanced ways in which students engage with language-related challenges and opportunities in peer-to-peer exchanges within the EMI framework. By delving into this aspect, we can further enrich our comprehension of the role of language within EMI, offering valuable insights that contribute to effective language learning strategies and instructional practices.

We would like to put forth a suggestion regarding the direction of EMI research, particularly within the context of South Korea, emphasizing the need to shift the focus towards the effectiveness of EMI on students' learning outcomes. More specifically, we propose that EMI research should prioritize the examination of its impact on learning outcomes through the analysis of objective indicators, such as students' academic results or language proficiency scores, as opposed to solely relying on the perceptions of EMI students and teachers.

This shift in focus involves a comprehensive evaluation of EMI's influence on students, encompassing their academic achievements and the development of English proficiency. To facilitate this research, a comparative approach may be adopted, similar to the methodology employed in the study presented in this book, which compared different educational levels (high school vs. university) or considered variations in students' first languages or disciplinary backgrounds.

To effectively assess the effectiveness of EMI, data collection could involve gathering students' academic records over specific time periods or acquiring

scores from widely recognized English proficiency tests like TOEFL or IELTS. This approach would offer a more robust and objective measure of the impact of EMI on students' educational and language development, thereby contributing to a deeper understanding of its effectiveness across different educational contexts and student demographics.

In certain EMI settings, researchers may encounter challenges when attempting to collect students' academic records. This issue is particularly pronounced in South Korean elementary schools, where the removal of midterm and final exams in 2011 has rendered such data inaccessible (Bahk, 2021). To address this obstacle, researchers can turn to the construct of 'uptake' within the field of SLA.

Uptake is defined as a student's reactive response within an LRE that signals a gap in their knowledge. This gap can manifest as an error, a question, or a failure to answer a teacher's query (Ellis et al., 2001b, p. 286). According to Ellis et al. (2001b), uptake has the potential to create conducive conditions for L2 acquisition. However, it is important to clarify that uptake itself is not evidence of L2 acquisition, nor is it a prerequisite for acquisition to occur. Instead, uptake serves as a mechanism that can facilitate students' L2 acquisition by providing them with opportunities to practice and engage with the target language items (Ellis et al., 2001b; Lyster & Ranta, 1997).

By examining both the frequency and characteristics of students' uptake, including whether it is successful or unsuccessful, researchers can gain insights into the extent to which LREs contribute to students' learning of language items. This analytical approach offers an alternative means of assessing the impact of EMI, particularly in contexts where traditional academic records may be inaccessible, shedding light on the effectiveness of EMI in promoting language development and proficiency.

Another valuable approach for assessing the effectiveness of EMI is through the utilization of tailor-made tests, drawing upon the methodologies employed in the study reported in this book. These customized tests offer a precise means to analyze the impact of EMI on students' acquisition of both content and English language skills within EMI settings. These tests are grounded in the data obtained from classroom observations and recordings within the specific EMI context, providing a nuanced understanding of the educational outcomes.

Furthermore, it is important to recognize that EMI teachers often possess a deeper knowledge of their respective disciplines compared to EMI researchers. Therefore, involving EMI teachers in the development of tailor-made tests can enhance the alignment of these assessments with the curriculum and teaching objectives. EMI teachers can contribute by reviewing and refining test items or by participating in the scoring process of students' responses.

To gain a more comprehensive perspective on students' learning of disciplinary English in EMI settings, an analysis of their academic written work is also recommended. This suggestion addresses a limitation of the reported study, which primarily focused on verbal interactions between teachers and students

in EMI classrooms. By considering students' academic writings, researchers can delve deeper into their ability to apply language items acquired from LREs within the context of their academic writing.

Additionally, EMI teachers may provide corrective feedback on linguistic errors in students' writing, which can offer valuable insights into the development of language proficiency in these settings. It is worth noting that while EMI teachers in the reported study seldom addressed grammar issues during classroom interactions, they may pay more attention to such errors when evaluating students' writing assignments or theses, thus further emphasizing the significance of examining academic writings as part of EMI research.

Beyond exploring the effectiveness of EMI, it is equally crucial to direct research efforts towards developing robust methods for assessing students' learning within EMI contexts. To date, limited attention has been devoted to investigating the approaches for evaluating students' educational achievements in EMI settings, particularly within the South Korean context.

To establish a comprehensive understanding of EMI's impact, it is imperative to undertake research that focuses on the development and validation of appropriate assessment methodologies. These methodologies should be designed to accurately gauge students' learning outcomes within the EMI framework. Moreover, there is a pressing need to reach a consensus within the research community regarding the components to be prioritized in these assessments. Should the emphasis be placed on evaluating content knowledge, English language proficiency, or both? Clarifying these priorities will contribute to the refinement of assessment practices that align with the goals and objectives of EMI.

Another significant avenue for future research in the realm of EMI pertains to the evolution of perceptions among various EMI stakeholders, encompassing educators, students, and policymakers. South Korea, as an illustrative example, has traversed more than a quarter-century since the Korean Ministry of Education (MoE) introduced EMI to higher education institutions. Initially propelled by the pursuit of internationalization in education, EMI has firmly established itself within the South Korean educational landscape.

As educational landscapes continue to evolve worldwide, the objectives of EMI need to be redefined beyond internationalization. Consequently, research exploring shifts in the perceptions of EMI stakeholders becomes not only relevant to South Korea but also applicable to diverse geographical contexts. Such research would offer a current assessment of EMI's status in various educational systems and informs the direction in which EMI should evolve to meet the changing needs of global education.

In addition to the research avenues discussed previously, further exploration in the field of EMI should encompass an in-depth analysis of EMI policies across diverse types of educational institutions. A comprehensive examination of publicly accessible EMI policies at various educational levels can offer invaluable insights into the nuanced approaches and strategies employed within the educational spectrum. This broader perspective on EMI policies may

help shed light on the differential degrees of integration and implementation throughout the South Korean educational landscape.

Furthermore, one of the under-explored domains in EMI research pertains to professional development. Future research in this context should lay the groundwork for establishing robust frameworks and support systems for EMI teachers. This endeavor may entail conducting comprehensive needs assessments for both EMI teachers and students. Moreover, it is essential to explore the potential and effectiveness of collaboration between content teachers and English teachers in EMI settings to facilitate research on professional development.

When delving into the specifics of professional development, researchers should consider the distinctive nature of each discipline, tailoring their investigations accordingly. However, it's worth noting that gathering data for professional development purposes, such as classroom observations, interviews, and surveys, may create some discomfort among EMI participants. Therefore, fostering a collective understanding of the imperative nature of professional development for EMI teachers and encouraging active participation with an open mindset is a pivotal initial step. Ensuring a supportive and cooperative atmosphere within educational institutions is crucial to the success of such research initiatives.

8.3 Summary

This chapter draws conclusions from the study presented and offers insights for future research within the realm of EMI that extend beyond the boundaries of South Korea. While EMI in South Korea has traditionally been prevalent in the private sector, leading to concerns about educational inequality, we hold the belief that the fundamental objective of official English education in any context should be to empower students to harness the English language as a tool for knowledge acquisition. Our conviction is that EMI can prove to be an effective avenue to attain this goal, not only in private institutions but also within the public school system, provided it is executed effectively.

In our pursuit of empirical validation for these beliefs, we conducted the study documented in this book within a public school setting. The intention behind this endeavor was to offer evidence that supports the viability of EMI within the public education sector, transcending regional boundaries. Our hope is that the findings presented in this book, along with our recommendations, will serve as a valuable contribution to the broader understanding and research of EMI, SLA, and EAP. These findings hold significant implications for researchers and EMI stakeholders, encompassing educators, institutions, and policymakers, not only in South Korea but also in diverse geographical contexts worldwide.

Appendix A

Interview questions on language support

What kind of language support (e.g., glossary, translated summary, etc.) do you provide to students prior to teaching?

Probe: How long have you provided support to students?
Who is involved in developing support?
Are there any guidelines from the school/department?
Do you provide support to students prior to the class or after the class?
How frequently do you provide them to students?

How do you use the support in relation to EMI classes/lectures? (e.g., reading through the glossaries together, asking students to read summaries before the class, etc.)

Probe: Which of the strategies you have mentioned was most effective?

How do you perceive your role in relation to your EMI classes?

Probe: Do you think dealing with English is a part of teaching your subject in English?

If yes,
Do you sometimes collaborate with ESL/EAP teachers?
Do you sometimes correct any English mistakes students make in speech or in writing?

C4. What do you see as the functions of the language support you provide?

Appendix B

Language test sheet

Written language test (Economics)

1. **The following sentence contains an error. Please find out the error and correct it to improve the sentence:**

   The acronym, *K*, stands for quantity.

(Answer: Capital)

2. **The following sentence contains an error. Please find out the error and correct it to improve the sentence:**

   In the beginning, ATC decreases and eventually, it increases. So, if you draw the ATC graph, the shape of the graph will be reverted U-shape.

(Answer: reverted → reversed)

3. **The following sentence contains an error. Please find out the error and correct it to improve the sentence:**

   The shape of the graph looks like line.

(Answer: line → linear)

4. **Please provide the meaning of the following word:**

   Outlay

(Answer: an amount of money we spend on something)

7. **Please fill in the blank with the appropriate word:**

   C_____ returns to output

(Answer: Constant)

8. Please rewrite the underlined section in the following sentence correctly:

   By lowering costs, a company can *get economic scale*.

   *A*_____

(answer: achieve economies of scale)

9. Please rewrite the underlined section in the following sentence correctly.

   According to the law of diminishing returns, marginal cost *is relation of* marginal product.

(Answer: is reciprocal of)

10. Please provide the meaning of the following word:

    Welfare

(Answer: to live well/healthy/happily)

5. **The following sentence contains an error. Please find out the error and correct it to improve the sentence:**

   f-1(f(x)) is a combined function

(Answer: combined → composition)

6. **Please provide the appropriate word for the following definition:**

   This occurs when the consumption or production of a good causes a harmful effect to others.

   N_____ **E**_____

(Answer: negative externality)

11. Please rewrite the underlined section in the following sentence correctly.

    Companies *get diseconomy* early in their business growth.

    E_____

(Answer: Experience diseconomies of scale)

12. Please rewrite the underlined section in the following sentence:

    Opportunity Cost (OC) *is plus of* implicit cost and explicit cost.

(answer: is sum of)

Written language test (Mathematics)

1. **Please rewrite the underlined section in the following sentence correctly:**

   The graph will be *transited* two units vertically.

(Answer: translated)

2. **Please provide the meaning of the following word:**

   Intercepts

(Answer: a point on the y-axis)

3. **The following sentence contains errors. Please find out the errors and correct them to improve the sentence:**

   Y is equal or more than zero.

   _____

(Answer: y is greater than or equal to zero)

7. **The following sentence contains errors. Please find out the errors and correct them to improve the sentence:**

   The range of y is equal or better than zero

(Answer: The range of y is greater than or equal to zero)

8. Please fill in the blank with the appropriate word.

   The name of the value inside the roots is R_____.

(Answer: radicand)

9. Please provide the appropriate word for the following definition:

   The numbers that is in front of a variable and multiply the variable.

   C_____

(Answer: coefficient)

4. **The following sentence contains errors. Please find out the errors and correct them to improve the sentence:**

   X is more or equal to three and y is small than two.

   _____
   _____

(Answer: x is greater than or equal to 3 and y is less than 2)

5. **Please rewrite the underlined section in the following sentence correctly:**

   After we got all the numbers, we need to *choose* x and y.

   _____

(answer: label)

6. **Please fill in the blank in the following sentence with the appropriate word:**

   When y equals to zero, the x-axis is the H____ asymptote.

   _____
   _____

(Answer: horizontal)

10. The following sentence contains errors. Please find out the errors and correct them to improve the sentence.

    The range is y is bigger than or similar to q.

    _____
    _____

(Answer: The range is y is greater than or equal to q)

11. Please rewrite the underlined section in the following sentences correctly.

    The graph *goes three times positive x.*

    _____
    _____

(Answer: The graph moves three units in the x-directions/
The graph moves three units to the right)

Written language test (Accounting)

1. **The underlined word in the following sentence is incorrect or inappropriate. Please replace it with the correct or appropriate word.**

   Total revenue is a sum of explicit cost, accounting profit, and *depresment.*

(answer: depreciation)

3. **Please provide the synonym for the following term:**

   Net earnings

   _____
   _____

(Net income)

2. **Please rewrite the underlined section in the following sentence correctly.**

   The amount that a company owes to its creditors or suppliers is called *account payment*

   _____

(Answer: account payable)

4. Please rewrite the underlined section in the following sentence correctly.

   The monthly portion of the total amount *will be cut in* the unearned revenue.

   _____

(answer: will be deducted from)

Written language test (Mathematics, university)

1. **The following sentence contains errors. Please find the errors and correct them to improve the sentence.**

   X is same to 1π and 2π

   _____

(Answer: X is equal to 1π and 2π)

2. **Please provide the meaning of the underlined word:**

   Adding 3 and 4 *yields* a result of 7.

   _____

(Answer: to give)

3. **Please provide the synonym for the following term:**

   Orthogonal

   P_____

(Answer: Perpendicular)

4. **Please provide the original term for the following acronym:**

   GKD

   _____

(Answer: Generalized Kronecker Delta)

5. Please provide the original term for the underlined abbreviation in the following sentence:

   Find the derivative of y *w.r.t.* x.

   _____

(Answer: with respect to)

6. Please fill in the blank in the following sentence with the appropriate term:

   A function has a repeating pattern, and it is called P_____ function.

(Answer: periodic)

Appendix C

Answer keys for the tasks in Section 7.5

Task one: identifying and coding LREs

(1) LRE in transcript 1 from a school economics class

The LRE begins with *Can you say that in English?* It ends with *Look at the graph on the next page*. The linguistic focus is on *disciplinary speak* – in this case, on a way of expressing an idea in economics. The teacher initiates this LRE by saying *Can you say that in English?*, thereby shifting the topic of discussion briefly from economics to language. The LRE is a reactive type because it is triggered as a response to a problematic utterance by a student (the student's utterance in Korean). It is a complex LRE as it involves more than a response move by the teacher. The teacher's first response move was *Can you say that in English?* The teacher's second response move began with *Good, economies can achieve economies of scale . . .*

(2) LRE in transcript 2 from a university mathematics class

The LRE begins with *What does yield mean in this question?* It finishes with *So what's your answer?* The linguistic focus is on vocabulary – in this case, the focus is on the meaning of *yield*. A student initiates this LRE by asking what *yield* means in a question the class is working on, thereby shifting attention temporarily from mathematics to language. The LRE is a pre-emptive interactional type. It has not arisen because of a problematic student utterance. It is a simple LRE.

Task two: devising test items

(1) For the excerpt A from a school mathematics class

The LRE was initiated by the teacher, and it was a reactive response to a student's utterance (Y *is equal or more than zero*), which the teacher perceived as problematic. The linguistic focus of the LRE was disciplinary speak (the way a mathematic formula is read). It was a complex LRE that consisted two

teacher responses (*Actually, can you say that again?* And *Okay, so, in that case, y is greater than or equal to zero*). The correction test type is applicable for this LRE as the students had been corrected for their incorrect use of language during the LRE. The test question can be '*The following sentence contains an error. Please find out the error and correct it to improve the sentence*' followed by the transcript of the student's erroneous utterance. The correct response is '*Y is greater than or equal to zero*', and any other responses would be incorrect.

(2) For the excerpt B from a university accounting class

The LRE was initiated by the teacher, and it was a reactive response to a student's utterance. The teacher explicitly said the correct way of using English in accounting (*The residual value for the car is zero*), thus, the linguistic focus is disciplinary speak. It was a simple LRE as it only involved one teacher response. For this LRE, correction type is applicable to see if the student had learned the disciplinary way of describing a residual value of an object. The test question can be '*The following sentence contains an error. Please find out the error and correct it to improve the sentence'*, followed by the transcript of the student's utterance or possible exemplar sentence which would be '*A car cannot be used anymore because its useful life is zero*'. The correct response is '*because the residual value for the car is zero*'.

(3) For the excerpt C from a school economics class

The LRE is initiated by the student in a pre-emptive manner. The student asked the teacher about the discipline-specific way of saying '*How do we say something isn't an incentive?*. Therefore, the linguistic focus of the LRE is disciplinary speak. This LRE is a simple LRE as the teacher answered the student's language-related question by making one single response (*So, in that case ~ water consumption*). For this LRE, a suppliance test type can be used, and the possible test question would be '*What is the appropriate word for the blank in the following sentence?*' followed by a sentence with a blank. Drawing on the excerpt C, the possible sentence with a blank would be '*The effect was huge _____ to save water or reduce water consumption*'. The correct response is '*disincentive*'.

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