Content and language in EMI assessment practices: challenges and beliefs at an Engineering Faculty in Turkey

Content and language in EMI assessment practices: Challenges and beliefs at an Engineering Faculty in Turkey

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Abstract

With recent trends toward the internationalization of higher education, the number of English-medium programs at higher education institutions around the world has grown rapidly. Research on English-medium instruction (EMI) has examined stakeholders' attitudes, classroom interaction, students' achievement in content subjects, and teachers' and students' levels of English proficiency. However, what is missing from this growing body of work is research addressing issues of assessment in EMI contexts, where students' English proficiency is not explicitly measured but inevitably plays a role in the assessment process, as students are required to interpret and respond to assessment tasks in English. In this chapter, we attempt to address this research gap by examining the relationship between content and language in EMI assessment practices. The chapter begins with a theoretical discussion conceptualizing the role of language in EMI assessment, addressing issues of content knowledge, academic literacy, and the explicit and implicit linguistic demands of assessment tasks. The chapter then provides an overview of existing empirical research on EMI assessment. Given the lack of theoretical and empirical research on assessment practices in higher education contexts, this research aims to investigate assessment practices in EMI engineering courses in terms of course-related, teacher-related, and student-related issues. Employing a qualitative research method, data were collected through interviews and focus group discussions with university lecturers and students at an engineering faculty in Turkey in order to explore how lecturers and students perceive the role of language in EMI assessment and describe their own assessment practices. The findings shed light on how students use the resources available in their linguistic repertoires to make sense of assessment tasks and how teachers approach students' responses to assessment tasks with consideration for students' language proficiency and preference. The findings have implications for EMI teachers' pedagogical practices as well as for EMI teacher training courses.

Keywords: English as a medium of instruction (EMI); higher education; EMI assessment

Introduction

With the internationalization of higher education, English-medium instruction (EMI) has become a common form of education worldwide. Research on EMI has examined classroom interaction (Pun & Macaro, 2019), stakeholders' attitudes (Dearden & Macaro, 2016), and content learning outcomes (Rose et al., 2019). Despite this growth in research, assessment in EMI has remained under researched (Lo & Fung, 2018). In EMI content classes, where students are tasked with learning academic subject material through an L2, students' English proficiency is generally not explicitly measured through assessment tasks. Nonetheless, student proficiency may inevitably play a role in the assessment process, since students are required to interpret and respond to assessment tasks in English. As such, students' ability to understand and respond to exam questions in English may influence academic outcomes. Given the complex dynamics between language and content learning in EMI contexts, research is needed to provide a deeper understanding of EMI assessment challenges and strategies to overcome those challenges in order to address issues of fairness and equality in education.

This chapter takes a step in addressing the research gap by examining the relationship between content and language in EMI assessment practices. The chapter begins with a theoretical discussion conceptualizing the role of language in EMI assessment. Here, we discuss language and content learning in EMI settings, and we provide an overview of the existing empirical research on EMI assessment, noting that few studies have been conducted in this area. The chapter then reports on a study conducted at an engineering faculty at a university in Turkey. Through focus groups and interviews, the study investigated assessment practices and teachers' and students' perceptions of language-related challenges and coping strategies in EMI assessment.

The role of language in EMI

EMI is commonly defined as '[the] use of the English language to teach academic subjects (other than English itself) in countries or jurisdictions where the first language (L1) of the majority of the populations is not English' (Macaro, 2018, p. 19). Accordingly, the primary aim of EMI programs is typically considered content learning of academic subject material. Notably, Macaro's (2018) definition does not explicitly include language learning as an outcome of EMI, a feature which distinguishes EMI programs from other forms of English education such as Content and Language Integrated Learning (CLIL), which has more explicit language learning outcomes. Whereas English is typically considered a tool through which academic teaching occurs in EMI contexts, CLIL is "a dual focused educational approach in which an additional

language is used for the learning and teaching of content and language" (Coyle, Hood, & Marsh, 2010, p.1).

Although Macaro's (2018) commonly-cited definition of EMI does not include language learning as an explicit aim, other researchers have defined EMI more broadly to encompass language learning. For example, Taguchi (2014) considers language development to be an essential component of EMI in his definition of EMI programs as "curricula using English as a medium of instruction for basic and advanced courses to improve students' academic English proficiency" (p. 89). Even in contexts where EMI does not include explicit language learning outcomes, the development of students' English proficiency is often considered an implicit benefit of EMI (Chapple, 2015). This has led researchers to conclude that "a widely purported benefit of EMI is that it kills two birds with one stone; in other words, students simultaneously acquire both English and content knowledge" (Rose et al., 2019, p. 2). Students in EMI courses may be presumed to improve their language proficiency because EMI "expose[s] students to large quantities of the target language" (Macaro, Tian, & Chu, 2018, p. 1). However, the assumption that English is best or more easily learned through maximum exposure to the language remains debated (see Rose & Galloway, 2019).

Language and content learning in EMI

Despite perceptions that language learning is an expected or implicit benefit of EMI programs, research has found that language teaching rarely occurs in EMI content classes (Airey, 2012; Block & Moncada-Comas, 2019). A study conducted with EMI content teachers at a university in Sweden found that teachers do not consider themselves language teachers (Airey, 2012), even though they lecture in their and their students' L2. Studies in other contexts have reported similar findings (e.g. Moncada-Comas & Block, 2019, in Spain). Empirical evidence has also suggested that focus-on-form instruction rarely occurs in EMI classes (Costa, 2012).

Moreover, the evidence with respect to language development through EMI programs is mixed, with some studies suggesting modest language learning gains (Yang, 2015; Rogier, 2012) and others suggesting that EMI does not improve students' English proficiency (Bozdoğan & Karlıdağ, 2013; Hu & Lei, 2014). A recent systematic review of EMI research concluded that there was insufficient evidence to determine the effective of EMI for English language learning, since relatively few studies have examined English development through empirical measures (Macaro, Curle, et al., 2018).

Other studies have sought to examine content learning in EMI programs, particularly with respect to students' English proficiency as a predictor of academic success (Rose et al., 2019; Xie & Curle, 2020; see also Hu & Lei, 2014, for a qualitative study). The study conducted in Japan by Rose et al. (2019) found that English language proficiency and academic English

skill, measured according to students' TOEIC exam scores and end-of-term grades for an ESP course respectively, were statistically significant predictors of success in EMI academic content courses. Similarly, Xie and Curle (2020) found that English proficiency was a predictor of academic success among EMI business students in China. Relevant to the current study, these studies suggest that students' English proficiency levels are positively correlated with their academic achievement in EMI courses. However, the studies are limited to business students in China and Japan, and further research is needed to understand the nature of this relationship in different contexts and academic fields.

While research on language and content learning in EMI has provided inconclusive evidence concerning the benefits of EMI, an overwhelming body of research seems to suggest that students experience language-related challenges in EMI programs (Galloway & Ruegg, 2020; Hu & Lei, 2014; Jiang, Zhang & May, 2019). The language-related difficulties reportedly experienced by EMI students include asking and answering questions (Sert, 2008), understanding lectures in English (Hellekjær, 2010), and understanding discipline-specific vocabulary (Evans & Green, 2007; Kırkgöz, 2009). Other studies have found that EMI lecturers simplify content to improve student comprehension in lectures (Beckett & Li, 2012; Sert, 2008) and that EMI results in lower levels of classroom interaction compared to contexts in which the L1 is used as the medium of instruction (Lo & Macaro, 2012; Pun & Macaro, 2019; Sahan, 2020). These studies have highlighted the challenges that students face learning in EMI classrooms. However, less empirical evidence is available concerning the challenges students face in EMI assessment contexts.

Assessment in EMI

The role of language in EMI assessment remains an under-researched area. Few studies have investigated assessment practices in EMI contexts, although more empirical research exist with respect to assessment in secondary school CLIL contexts, perhaps due to CLIL's more explicit focus on the dual aims of content and language learning. Moreover, to our knowledge, there are no studies investigating language and assessment in EMI content classes at Turkish universities. As noted earlier in this chapter, EMI teachers often do not consider themselves as language teachers (Airey, 2012; Block & Moncada-Comas, 2019). As such, assessing students' learning of field knowledge in an L2 might raise validity and reliability issues (Lo & Lin, 2014), since students might be able to express their knowledge better in their L1 than L2 (Gablasova, 2014). Therefore, assessment in the L2 "may bear the risk of not accurately reflecting (and indeed very likely underestimating) students' actual knowledge in content subjects" (Lo & Fung, 2018, p. 3).

Lo and Fung (2018) conducted a study to examine the interplay of cognitive and linguistic demands in CLIL assessment by analyzing nearly 5000 questions used in various forms of secondary school assessment in Hong Kong. The findings revealed that students' academic performance in CLIL assessment decreased as the linguistic demand of the assessment

task increased. However, the study's focus on textual analysis ignores the perspectives of students and teachers. In other words, while Lo and Fung (2018) underscore the complexity of assessment in CLIL/EMI contexts, the study does not provide insight into how teachers and students cope with challenges stemming from the use of English as an assessment language. Moreover, the study was conducted in a secondary school CLIL context, and its implications for university-level EMI assessment remain unclear.

Also conducted in the secondary school context, Shaw and Imam (2013) evaluated the linguistic demands of a high-stakes English-medium assessment for secondary school students. The researchers found that students needed sufficient academic English skills in order to succeed in English-medium assessment and that higher proficiency provided an advantage "to develop arguments needed for higher grades" (p 452). However, Shaw and Imam concluded that students' low grades stemmed from a lack of knowledge in the subject course rather than language-related problems. These results indicated a complex relationship between language skills and content knowledge in CLIL/EMI assessment.

While the research highlighted above has suggested that higher language proficiency helps students to reflect their actual field knowledge in assessment, it remains unknown how these findings might translate to university-level EMI contexts, which typically do not include language learning aims. A study conducted by Kao and Tsou (2017) investigated EMI teachers' assessment practices in Taiwanese universities through survey results and interviews, and the findings revealed that EMI teachers mostly employ summative assessment tools such as written final examinations, term projects, and in-class quizzes to evaluate students' content learning. In order to assist learners in coping with language-related challenges, teachers reported various practices including codeswitching, use of visual aids, and peer collaboration in EMI assessment. Other research examining assessment issues at EMI universities has found that teachers are less likely to assess students' higher-order cognitive abilities in English than in L1 assessment tasks (Li & Wu, 2018). In the Turkish context, Kirkgoz (2013) explored how an EAP curriculum could be designed to address the academic writing needs of EMI economics students through a needs assessment which included evaluating exam prompts in EMI content class. To our knowledge, this is the only study which has attempted to address the complex issue of language in EMI assessment in the Turkish higher education context. The current study attempts to contribute to this limited body of research by examining Turkish EMI engineering teachers' and students' perceptions of the role of language in EMI assessment and the strategies that they use to overcome language-related challenges in assessment. In doing so, it addresses a research gap by exploring issues of language and assessment in EMI programs in Turkish higher education.

EMI in the Turkish context

EMI in Turkey dates back to the Ottoman period with the founding of Robert College in 1863 by American missionaries. Kırkgöz (2007) has suggested that the introduction of EMI was connected with efforts to westernize the Ottoman education system. In Republican times, EMI was offered at secondary schools known as Anatolian high schools (*Anadolu liseleri*) starting in 1955 and introduced at the university level in 1956 with the founding of Middle East Technical University. Although the system of EMI in Anatolian high schools was abolished in 2006 (Kırkgöz, 2007; Selvi, 2014), the number of universities offering EMI programs in Turkey has increased over the last two decades (Kırkgöz, 2014), in line with the expansion of the higher education sector.

Despite its long history, EMI in Turkey has been criticized by scholars who argue that it "exacerbates socioeconomics inequalities in the country" (Selvi, 2014, p. 143) and threatens Turkish language and culture (Buyukkantarcioglu, 2004). Other researchers have argued that EMI in Turkey leads to reduced comprehension of content material (e.g. Kırkgöz, 2014; Sert, 2008), in part to due to students' low levels of English proficiency (Kırkgöz, 2009).

In order to address issues of English proficiency, language support is provided to EMI students in Turkey through the preparatory year model (see Macaro, 2018, for discussion of EMI models of language support), which requires students who do not meet their universities' prerequisite levels of English proficiency to complete a one-year, intensive English program. Although the English preparatory program (EPP) aims to improve students' language skills to prepare them for EMI classes, research on EMI in Turkey has suggested that students often enter EMI departments with limited English proficiency (Ekoç, 2020; Kırkgöz, 2009). To contextualize the reported language challenges experienced by EMI students in Turkey, it would be helpful to understand the structure of the EPP at many universities: the EPP is typically a unit separate from EMI departments, and follows a curriculum focused on general English skills. The focus on general English occurs in part because 1) teacher resources are often not insufficient to meet discipline-specific English language needs, 2) students are not placed in groups based on their academic disciplines, and 3) it is difficult to find and integrate discipline specific materials into the program. Furthermore, there is a lack of communication and collaboration between EPP and EMI departments regarding students' specific language needs for their departmental studies(Şahan, Çoban, & Topkaya, 2016).

Research questions

This study addresses the following research questions:

1. How do teachers and students perceive the role of language in EMI assessment?
2. What language-related challenges do teachers and students perceive in EMI assessment?
3. How do teachers and students resolve issues related to language in the assessment of disciplinary knowledge in EMI classrooms?

Methodology

Because research has yet to examine language and assessment in EMI programs in the Turkish higher education context, this study was designed as an exploratory study to investigate the issue. As such, this research is a small qualitative case study conducted with teachers and students in a single higher education institution in Turkey. Specifically, the case study investigates an engineering faculty at a state university. The teacher and student participants came from engineering departments where the medium of instruction was 30% English and 70% Turkish, according to the policies of the university. Teachers who were delivering EMI engineering courses and students who were enrolled in EMI engineering departments at the case university were invited to participate in the study, and those who responded positively to the research invitation were included. In accordance with research ethical considerations, participants were informed as to what the research aimed to investigate, how the data they provided might be used, measures taken related to the storage of data and security, and anonymity of participants and the institution. Five content teachers, who were all males, and 14 students (11 males and 3 females) from three EMI engineering departments volunteered to participate in the study.

Data were collected through semi-structured interviews with the teachers and focus group (FG) discussions with students. In line with the exploratory nature of the study, focus groups were conducted to gather rich, in-depth data from students. Semi-structured interviews were deemed a more appropriate method of data collection for teachers, given teachers' busy schedules and the sensitivity of assessment practices, which teachers may have been reluctant to discuss in front of colleagues. The interviewed teachers (T1, T2, T3, T4, and T5) had differing teaching experiences and came from diverse professional backgrounds. All the teachers had varying degrees of teaching experiences in both EMI and Turkish-medium (TMI) subject courses. Table 1 summarizes demographic information for the five participant teachers.

Table 1: Teachers' demographic information

Teacher	*Department*	*Teaching experience in English*	*Teaching experience in Turkish*	*Country where PhD was obtained*
T1	X Engineering	15 years	6 years	USA
T2	X Engineering	7 years	30 years	Turkey
T3	Z Engineering	10 years	3 years	Turkey
T4	Y Engineering	3 years	3 years	UK

T5	Z Engineering	4 years	7 years	Turkey

The FG discussions with students were conducted in three groups (FG1, FG2, and FG3) based on their departments (X, Y, and Z engineering). To further protect the anonymity of participants in such a small-scale study, we decided not to identify students' and teachers' specific engineering sub-fields or the department courses, since there are a limited number of universities in Turkey with this combination of undergraduate EMI engineering programs.

The composition of the FGs was as follows:

FG1: There were six students (S1 – S6) from X engineering department. They were all male and fourth-year students.

FG2: There were four students (S7 – S10) from Y engineering department. While three students were males, one student was female. Three were third-year students whereas one student was in the fourth year of study.

FG3: There were four students (S11– S14) from Z engineering department and the gender distribution was equal in this group. One participant was a fourth-year student; one student was in his first year of departmental study; and two students were in their third year of study.

The interviews and FG discussions were carried out in the participants' L1 (Turkish) so that the respondents could express themselves comfortably and give detailed answers. The sessions lasted from 17 to 50 minutes and were voice-recorded and transcribed using *NVivo* 12. The answers that respondents provided during interviews and FG discussions were examined through inductive qualitative content analysis (Selvi, 2020) in order to arrive at categorical themes. The data analysis process included three phases. Firstly, one of the authors read the transcripts and coded data thematically through a process of open coding. Secondly, the second author coded three transcripts using the preliminary codes developed by the first author in order to assess fit and appropriateness of the initial coding scheme. Disagreements between coders were resolved through a follow-up discussion at this stage, and a final coding scheme was agreed upon by the two researchers. Thirdly, the analysis of the transcribed data was completed using the final coding scheme. In line with the procedures of inductive qualitative content analysis, the development of the coding frame was data-driven, but no changes were made to the coding scheme during the main analysis (Selvi, 2020).

Findings

The findings are presented according to the research questions. Figure 1 illustrates the major themes that emerged from the analysis.

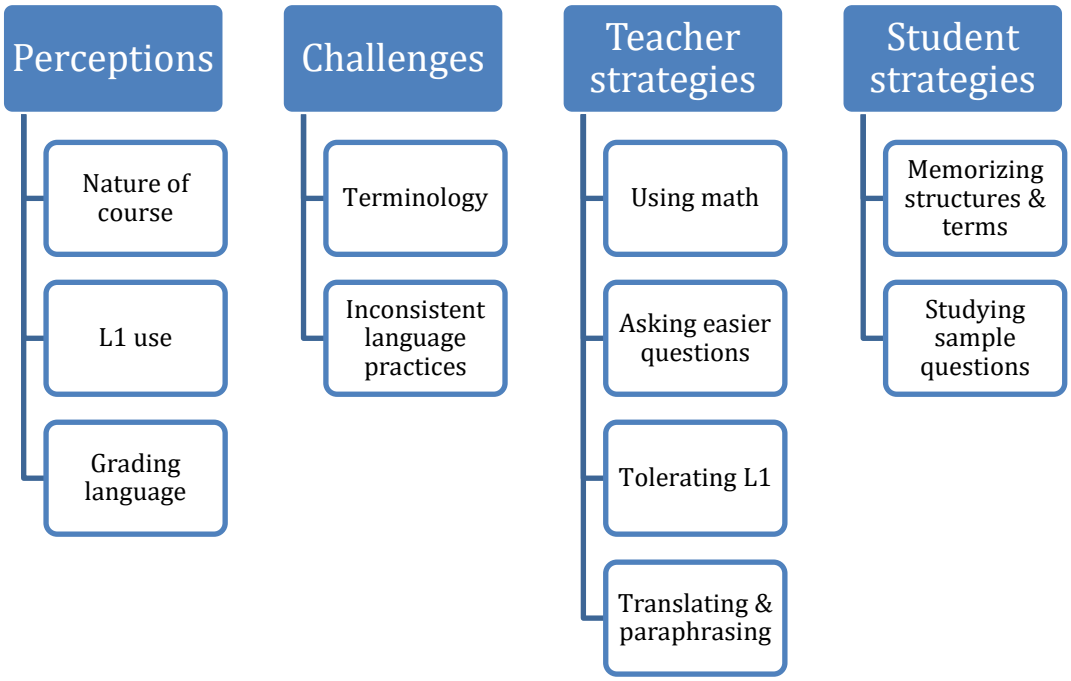

Figure 1: Major themes from analysis

RQ1: How do teachers and students perceive the role of language in EMI assessment?

Although participants' reported that several assessment tools were used to evaluate students' performance in the engineering departments, students and teachers reported open-ended questions as the most commonly used question type to assess students' academic performance in formal examinations such as midterms and final exams. Nonetheless, as the students started their internships[1] towards their final year of study, some teachers tended to opt for projects over exams as assessment tools, in which students first conducted research experiments and then reported their findings. Regardless of how students were evaluated, English was expected to be used as the official assessment language. However, teachers and

[1] Engineering students at this university were required to complete an internship with a local company as part of their degree requirements. The internships generally lasted one academic term, and students received academic credit toward their degree as part of the internship requirement.

students' perceptions of the role of language in EMI assessment were found to vary due to several factors including teachers' policy implementation, course content, and question type.

Firstly, teachers and students distinguished courses offered in engineering departments in terms of course content and how they were assessed. In this sense, the participants grouped the courses in two categories: math-based and theoretical/conceptual courses. The participants described math-based courses as those in which mathematical language (e.g. numbers, formulas, equations, etc.) was used in the delivery of disciplinary knowledge and the assessment of students' achievement while linguistic explanations (e.g. words, terms, conceptual definitions, etc.) played a more dominant role in the latter type of courses. In math-based courses, both teachers and students reported that English was not an issue for students while answering the questions because "*the language used in our courses is indeed mathematics*" and *"we use math in the delivery of mechanics courses… and I don't have language-related challenges"* (T1). As such, "*even if students' English is weak, they don't necessarily have difficulty in the exams because they use four operations, math language*" (T5). The following excerpt from a student FG illustrates how students perceived the role of mathematical language in EMI exams:

Excerpt 1:

> Using English in math-based course assessments is not an issue at all in that we say "derivative" instead of "*türev"* or we say "we took integration" instead of *"integral aldık"* and the remaining part is just playing with the numbers…. In the exams of theoretical courses, you need to know technical terms, I mean, terminology, and we need to take notes in the lectures to be able to write accordingly on the exam papers. Actually, that is why such courses are more difficult in English in that if they were Turkish courses, it would be easy to process and reflect our knowledge on the exam paper but when it is English, you need to know the terms very well. (S4)

As S4 summarizes, students perceived a difference in the role that language played in EMI assessment depending on whether they considered the course to be math-based or theoretical. While S4 perceived terminology to be a potential challenge in theoretical classes, he did not perceive the translation of terminology between English and Turkish in math-based courses to be as challenging.

Although teachers and students agreed that English played less of a role in the assessment of math-based courses, they disagreed on whether L1 use was acceptable in EMI assessment and on the extent to which language was assessed in EMI examinations. The following three interview excerpts demonstrate the range of teachers' perceptions of L1 use in EMI assessment:

Excerpt 2:

> If students are using Turkish in the exams, it generally means that they have not studied well for the exams. Indeed, language proficiency and disciplinary knowledge are somewhat correlated. When students are not very interested in a lesson, they fail to learn

the subject in English and inevitably, they tend to use Turkish in the exams. When students respond to the question in Turkish, their answers are rarely correct. What do I do in such cases? If the question values 10 points, I only award 2-3 points. I mean, I am trying to grade the content a little and not all the teachers would do this favor. (T3)

Excerpt 3:

T5: I do not push students to write in English. It is their preference to use Turkish or English. When they write in English, if I understand what they are trying to say, I mean, let us say they write the formulas with 'this is this' and 'that is that' kind of sentences, it is enough for me. I am not a language teacher and these kids will be engineers.

Excerpt 4:

T4: If they [write in Turkish on the exams], they get zero. I can show you the exam papers. For example, if students write even a single word in Turkish in response to case study questions, they get zero. I talk about this with students at the very beginning though.… I check students' English. I cut off points when they make grammar mistakes but if some part of the answer is Turkish, students just fail. I believe that this is a fair policy but I have no idea what others are doing in the department.

As can be understood from the three teachers' responses, the role of language—both L1 and L2—in EMI assessment differs depending on teachers' perspectives on evaluating students' academic performance in EMI courses. T3, T4, and T5 disagree on whether, or to what extent, L1 use is acceptable on EMI exams. For example, T3 (Excerpt 2) seems to expect students to use only English on exam papers but tolerates Turkish to a certain extent. However, he deducts points when the answer is given in Turkish even if the response is fully correct. T4 (Excerpt 4), on the other hand, enforces a strict English-only policy in his assessment practices. Students fail when they use even one word in Turkish, and he grades language including grammar on exam papers. However, T5 (Excerpt 3) does not have a preference in terms of language use and allows students to respond to questions in L1.

In addition to highlighting differing beliefs concerning L1 use, these comments also highlight varying assessment practices in terms of grading content and language. While T5 (Excerpt 3) asserted that he was *"not a language teacher,"* T4 (Excerpt 4) reported deducting points for bad grammar. Despite T3's (Excerpt 3) belief that *"language proficiency and disciplinary knowledge are somewhat correlated,"* the teachers in this study generally reported that effective English use on an exam did not necessarily affect their evaluation of the content of a student's response. On the contrary, students consider high English proficiency to be an advantage for academic success. This belief that English proficiency improved exams scores is illustrated in the following excerpts:

Excerpt 5:

> Well, because I trust my English, I feel comfortable in the exams, in which we are expected to respond to case questions that require interpretation of the given information. In such cases, I can write a full-page answer to a single question comfortably thanks to my English. My peers who are not proficient in English have difficulty even in the exams of easy lessons. They cannot express themselves in English, I mean. (S1)

Excerpt 6:

> I am very positive that I pass the exams with my English proficiency. I do not study for EMI exams; I only write complex and long sentences on EMI exams, deceive teachers, and pass the exams. Teachers look at my paper, compare it with other students' papers, and give high grades to my English. (S7)

Excerpt 7:

> Some teachers care about our English proficiency and, for example, when I give lengthy and indirect answers to the questions using complex sentences, I tend to get higher grades than those who give direct and correct answers. I mean, teachers pay attention to good English use on the exams. (S4)

Although language was not an explicit learning outcome in their EMI courses, students believed that language was graded by some teachers. As such, this situation might result in unfair assessment for students if they are evaluated on their English proficiency but not explicitly taught English in the course. Moreover, the students appeared to associate 'good' English skills with 'complex and long sentences' (S7) or 'lengthy and indirect answers' (S4). In these examples, students described their language proficiency not in terms of coherence but in terms of length. Nonetheless, these responses suggest a disconnect between what teachers say they do and what students think teachers do in terms of evaluating language in EMI assessment.

These findings suggest that teachers and students perceive the role of English in EMI differently depending on the nature of the course and support the findings of previous studies, which have suggested that EMI content teachers rejected a language teacher identity (Airey, 2012; Block & Moncada-Comas, 2019). However, teachers were also found to vary in their approaches to the role of language in EMI assessment.

RQ2: What language-related challenges do teachers and students perceive in EMI assessment?

When students were asked about the language-related challenges that they experienced in EMI assessment, they reported that a lack of terminological knowledge was the most salient language-related issue (Evans & Green, 2007; Kırkgöz, 2009). Students also reported that teachers were inconsistent with their language preferences between lectures and exams.

One reason why students identified technical terminology as a challenge in EMI assessment appears to relate to the structure of EPPs, which typically cover general English skills in their curriculum as opposed to English for Specific or Academic Purposes (ESP or EAP). Two students drew attention to the challenge of learning English terminology in engineering classrooms as in the following excerpts:

Excerpt 10:

> I completed the English preparatory program with a very high score. My average score was something like 90. Therefore, when I started the department, I was confident about my English. However, I realized that I did not know any terms in engineering. For example, I learned the term 'strength of materials' at the department for the first time. When you [literally] translate it into Turkish, it would be something like *maddenin gücü* or *maddenin dayanıklılığı*, but the actual [Turkish] term is *mukavemet.* We learned many terms in the department courses and we did not learn these things in the preparatory program. (S3)

Excerpt 11:

> We are receiving engineering education to which we had not been exposed in our primary or secondary education. Even before we successfully learn and understand the engineering terms in Turkish, we try to learn them in English… We learn *mukavemet* [strength of materials] in English but we actually do not know what it means in Turkish. Therefore, I believe that we will have many problems in the future. (S6)

As can be seen from student responses, terminology was perceived as a challenge for successful content learning. Despite the high-quality English education that students reported receiving through the university's EPP, the lack of ESP in the curriculum seems to have created language-related challenges for students in engineering departments. Like students, teachers in this study also reported that knowledge of technical terminology was a challenge on exams. The following excerpts illustrate the role of English terminology in communicating disciplinary knowledge, according to the content teachers:

Excerpt 8:

> Even if the language is really bad, I can assess whether a student knows the topic. Let us say English use is very poor, there is no correct grammar in the answer. If I see the terms somewhere in the answers, I say OK, this student knows the topic but could not express it in English. (T2)

Excerpt 9:

> When students do not understand the exam questions, it is mostly because of the lack of vocabulary knowledge. For example, we use a book in the course and I prepare the questions using literature words covered in the book. [In the exams] students complain about not seeing the words in the question beforehand… It shows these students do not study at all. (T4)

As reported by the content teachers, knowing technical terminology in English and being able to use it on the exams was important for successful content learning.

Another challenge reported by students was teachers' inconsistent language preferences in the lectures and examinations. Although English was the official instructional and assessment language, students reported problems understanding and answering exam questions in English because some of their teachers lectured in Turkish. For example, one student reported, "*I did not know the meaning of a word [in English] on the exam because the teacher lectured in Turkish… and I asked him but he said I should know what it means"* (S12). One teacher reported that he "*allows students to speak Turkish in the classroom when they have trouble expressing themselves in English… [but] not in the exams as they are official documents"* (T1). As such, these situations might result in issues of fairness in EMI assessment, as students should be tested on what they learn and how they learn it. In EMI contexts, this logic would include testing students in the language(s) in which they are taught. Such inconsistent enactments of language-related policies in EMI departments might affect the reliability and validity of the assessment practices in EMI departments.

In sum, these findings suggest that students experience language-related challenges understanding and using technical vocabulary on exams, and they support the findings with respect to RQ1 that teachers vary in their approaches language-related issues in EMI assessment, discussed further in the next section.

RQ3: How do teachers and students resolve issues related to language in the assessment of disciplinary knowledge in EMI classrooms?

Both teachers and students reported various strategies to resolve language-related issues in the assessment of EMI engineering disciplinary knowledge. To begin with, student and teacher responses to the interview questions revealed that teachers employed strategies that include asking easier questions and using mathematics and Turkish to deal with language issues on exams. First, one student reported that, "*English exam questions are easier [than Turkish exam questions] because it is more difficult for us to understand and answer English questions compared to native speakers [of English]"* (S9). In other words, this student believed that teachers simplified exam questions in English in order to cope with students' limited proficiency. A similar idea was expressed by another student: "*the courses are less efficient in English and questions are easier on English exams since the content delivered [in EMI courses] is not as difficult as the content in Turkish classes"* (S7). Teachers reported that they asked math-based questions, which they did not necessarily perceive as easier. However, their rationale for asking more math-based questions on English assessments compared to Turkish assessments echoes students' statements regarding language challenges. Teachers stated that they preferred to ask math-based questions because:

1) students' had low English proficiency: "*students' English proficiency is no longer good enough to answer definition or description questions"* (T1)

2) math-based questions were easier to assess: "*academics in the field of engineering prefer asking math-based questions because they do not want to deal with English and students' proficiency level is low"* (T4).

As evident by T4's statement, the use of math-based questions was perceived to alleviate not only issues concerning students' English proficiency but also issues concerning assessment of students' responses in English. Although both teachers and students perceived language-related challenges in EMI assessment, a subtle difference was found in how they perceived teachers to overcome this problem: students perceived teachers to ask easier questions, while teachers reported asking math-based questions to overcome low student L2 proficiency.

Moreover, two teachers reported L1 use as a strategy to overcome language challenges in EMI assessment. As part of EMI policy, exams should be administered in English. However, these teachers allowed students to respond to exam questions either in Turkish or in English, whichever was convenient for the students, as in the following excerpts:

Excerpt 12:

> I am okay with students' using Turkish in the exams to some extent. I mean I allow them to respond to the questions when they need to. Nonetheless, some students who strive to write in English in the exams do a really bad job mostly. (T2)

Excerpt 13:

> Students passed or failed my course through a term project and only one student submitted her report in English. Actually, I do not care whether students use Turkish or English in the exams or in other term papers. I am not a language teacher and they will be engineers, so I prioritize content over language. (T5)

As can be seen from these excerpts, some teachers perceived English as a pedagogical tool rather than a learning outcome. As such, these teachers allowed students to use Turkish in exams and other assessment tasks, since they were primarily concerned with students' content knowledge. However, as discussed with respect to RQ1 and RQ2, not all teachers allowed Turkish on exams.

The final strategy that some teachers reported using was to translate or paraphrase exam questions. For example, one teacher reported that he "*explains the exam instructions in Turkish as this generation has trouble following instructions"* (T3). Two teachers reported that they "*translate the terms into Turkish*" (T1 and T2), "*especially if they are advanced words"* (T1). Alternatively, when students had trouble understanding exam questions, some teachers reported that they "*paraphrase the EMI exam questions"* (S2) in English to make sure students understood what was asked.

In order to deal with language-related challenges, some students reported that they "*memorized the engineering terms before the exams"* (S4). Moreover, one student stated, "*we have a lot of conceptual courses and we need to memorize the notes in English before the exams, but we would not do so if they were Turkish*" (S8). In the same vein, one student reported memorizing terminology and lecture notes as a study strategy:

Excerpt 14:

> We have a lot of lecture notes… Translating them into Turkish and studying for the exams from Turkish notes and then translating them back to English and memorizing English terms is becoming a great burden for us. Instead, we sometimes just memorize the definitions in English before the exams rather than try to understand them. When we see one word related to that definition in the question, we just write down what we have memorized. (S7)

As evident from students' responses, when language was perceived to be a challenge on the exams, students reported memorizing course content and definitions instead of trying to learn concepts and terms. In other words, the enforcement of an English-only policy in exam situations might decrease the quality of learning, as students in this study seemed to prioritize passing their exams over understanding course content. Another strategy used by students to deal with language in the exams was to study sample exam questions. For example, "*when you search the terms 'questions strength of materials course,' I come across 40-50 questions asked in different universities and our teachers generally select questions from these" (S4).* Although the strategy reported by S4 with respect to sample questions could also be used by students in TMI courses, this student reported using this strategy as way to cope with language-related challenge in EMI assessment.

Discussion and conclusion

The findings of this study have revealed that the role of language in EMI course assessment varied according to course type and teachers' individual language practices. While discussing the role of language in EMI assessment, it is important to understand how CLIL and EMI differ from each other in terms of the role of language. Language is explicitly articulated as a learning outcome along with content in CLIL contexts while it is often considered a tool to teach disciplinary knowledge in EMI settings (Macaro, 2018). In this sense, EMI teachers do not typically think of themselves as language teachers (Airey, 2012; Block & Moncada-Comas, 2019). Of the five teachers who participated in this study, none reported practices related to focus-on-from instruction or language teaching in class; nor did students report such practices in focus groups. Moreover, T5 stated twice during interviews that he was not a language teacher, indicating that he did not feel responsible for evaluating students' English use on exams. These findings suggest that a 'CLIL-ised' model of EMI (Block & Moncada-Comas, 2019) is not implemented at the case university, since language learning outcomes do not appear assessed in course evaluations. While these findings support those of previous studies (Airey, 2012; Block &

Moncada-Comas, 2019; Moncada-Comas & Block, 2019), this study also found that one teacher (T4) graded and corrected students' English on exams, which challenges previous findings in the literature and suggests that EMI content teachers hold different views regarding the role of language and language teaching in EMI courses.

The findings of this study suggest issues of fairness in EMI assessment, given the variation in reported practices across teachers' classrooms. In this study, teachers differed in their perspectives on the acceptability of L1 use in EMI assessment and their approaches to grading students' English on exams. In order to address these problems of fairness, clear policies are needed with respect to EMI assessment practices. These policies can be determined at either the institutional or departmental level, but they must be clearly communicated with teachers and students in order to ensure consistency in EMI assessment.

In addition to raising issues of fairness, these findings also echo debates concerning the definition of EMI, specifically whether language learning is an (explicit or implicit) objective of EMI programs. Based on the findings of this small-scale qualitative study, teachers appear to differ in whether they perceived the scope of EMI assessment to include students' language skills. Moreover, teachers and students differed in their perceptions of how language proficiency affected exam success, with students reporting that higher English proficiency resulted in better exam scores regardless of content knowledge. This finding corroborates previous studies, which have found a correlation between students' English proficiency and academic success (Rose et al., 2019; Shaw & Imam, 2013; Xie & Curle, 2020). If higher English proficiency leads to better exam scores in EMI assessment, then EMI curricula should be revised to include ongoing ESP support courses in parallel to students' content classes (Jiang, et al., 2019), to ensure that lower proficiency students are not at a disadvantage because of their language skills. EAP or ESP courses offered in parallel with EMI classes could provide students with the linguistic support needed for deeper content understanding, provided that EAP/ESP courses are tailored to meet the specific language needs of EMI students. In this Turkish context, this would require additional English support classes after the EPP and a shift toward more discipline-specific EAP/ESP course, rather than a general English curriculum. Language teachers should collaborate with content lecturers in order to understand students' discipline-specific English language needs in EMI assessment (Kirkgoz, 2013).

Teachers and students in this study perceived that math-based courses were less linguistically demanding than conceptual courses, although more research is needed to validate this claim. We are using the categories of 'math-based' and 'conceptual' EMI classes because this was a dichotomy drawn by our participants. However, the notion of 'math-based' or 'conceptual' classes have not been operationalized for EMI research, and these categories should be problematized. Moreover, participants reported that conceptual courses were more difficult due to the use of technical terminology. Other studies have also reported that students have difficulty understanding technical terms (Evans & Green, 2007; Kırkgöz, 2009). However, Macaro (2020) has argued that technical terminology is an undertheorized concept in EMI

research and that a deep understanding of a concept requires more than an understanding of its definition. In other words, in applied science subjects like engineering, an understanding of a mathematical equation may not necessarily indicate deep, conceptual understanding of its corresponding abstract notion and real-world application. The assumption that math reduces the linguistic burden of engineering content without sacrificing conceptual knowledge requires further interrogation: certainly, to apply mathematical equations to complex engineering problems, a student must grasp the conceptual nuances of both theory and terminology. Moreover, research is needed to ensure that a preference for math-based questions does not sacrifice the cognitive demands of assessment in English.

In terms of the coping strategies reported to overcome linguistic challenges in EMI assessment, students perceived that they were given less cognitively demanding questions in English compared to exams in L1 as suggested by Li and Wu (2018). However, assessing students with easier questions might negatively affect content learning outcomes compared to TMI courses. In the Turkish context, where engineering programs are offered in full EMI, partial EMI, and TMI, differences in assessment standards due to language could affect the quality of learning outcomes. As stated above, universities and departments should take action by crafting and communicating clear EMI assessment policies in order to prevent from unfair assessment practices, which might stem from inconsistent approaches towards language use in EMI assessment.

In addition, some teachers reported flexibility in allowing students to respond to questions in Turkish and preferred to ask math-based questions. These findings overlap with the findings of Kao and Tsou's study (2017), which reported using L1 and visual aids as coping strategies for language-related challenges. However, the findings of this study suggest that teachers' decisions might be made on an ad hoc basis rather than the result of well-considered pedagogy (Macaro, 2020). As such, professional development opportunities with a focus on the role of language in EMI assessment should be offered to content lecturers in order to support teaching and assessment practices. This could be achieved by providing TESOL training on content lecturers' professional development courses or as a qualification for EMI teachers. Finally, with respect to the strategies that students used to overcome language challenges in EMI assessment, memorization might lead to reduced learning outcomes. EMI students who rely on memorization to overcome language challenges might pass their exams but not fully understand content. This, in turn, could have detrimental effects on their professional lives.

Due to its small sample size and qualitative approach, the generalizability of this study is limited. This study examined one academic discipline (engineering) at one university. More research is needed to examine how its findings might relate to other contexts. In particular, research is needed to evaluate the relevance of these findings for other disciplines, especially social sciences and humanities. Moreover, due to ethical consideration, we did not have access to

students' exam papers in order to investigate language use on exams, particularly in comparison to the self-reported practices presented in this study.

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