



Exploring Needs, Challenges, and Teaching Norms in English-Medium Instruction Programs: Perspectives from University Students and Teachers

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Research on English-medium instruction (EMI) is still in its infancy in Science and Technology universities in Thailand. Thus, this two-stage study explored the students and teachers' perceptions toward EMI programs, challenges, needs and teaching norms. Two instruments were used to collect the data and triangulate the results: (1) a survey questionnaire, and (2) semi-structured interviews to students and teachers. The first stage of the study collected the perceptions of 97 Agricultural Technology (AgriTech) and Science students enrolled in partial EMI programs using a survey questionnaire. In the second stage, 24 students and 7 lecturers were purposely chosen to attend the semi-structured interviews. Descriptive results of the survey revealed that students have favorable attitude toward EMI since it is beneficial for developing their English, making friends, developing cultural awareness, enhancing their future career, and increasing their self-esteem. However, despite the benefits, difficulties persist in speaking, reading, writing and cognition. Students believed that they needed support, such as resources in English language development, opportunities to use English in the campus, and activities that could develop their English language proficiency. From student interviews, themes derived regarding challenges include linguistic challenges, lack of self-esteem, cognitive challenges, and teachers' accented speech. Data from teachers affirmed students' cognitive and linguistic challenges. The other themes induced were cultural challenges, language anxiety and lack of self-esteem. Teaching norms highlighted ways to support content comprehension, for instance, summarizing lessons in L1.

Keywords: English-medium Instruction (EMI), agriculture technology, science, challenges and needs of students and lecturers, teaching norms

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INTRODUCTION

As English proficiency has been linked to academic achievement (Rose et al., 2020), the fusion of subject matter and language has spawned several instructional approaches. This has led to the emergence of diverse frameworks for integrating English language and content, especially in non-English-speaking environments. Within the Thai context, the implementation of English-medium instruction (EMI) varies across institutions. For instance, some educators within specific academic programs employed Thai as the medium of instruction, even when utilizing English language materials (Hengsadeeikul, et al., 2010). Others opted for a bilingual approach, often with a 50-50 or 70-30 distribution. Regardless of differing practices, EMI implementation is found beneficial including language improvement - desire to improve the students' English language skills, for subject matter learning -maximize subject integration, for career prospects - work and study abroad opportunities, and as an internationalization strategy - nation-building and being at par with English-speaking neighbors (see Tang, 2020).

In this study, EMI refers to as “the use of the English language to teach academic subjects in countries or jurisdictions where the first language (L1) of the majority of the population is not English (Dearden, 2014, p. 2). It may or may not have specific aim of developing students' English language abilities (Brown & Bradford, 2016). Unlike other approaches, for example, Content and Language Integrated Learning (see Piacentini, 2021), English serves as a vehicular language to deliver content lessons and content mastery (Dearden & Macaro, 2016; Smit & Dafouz, 2012; Unterberger, 2014; Unterberger & Wilhermer, 2011).

Thai students' insights on English-medium instruction resonate similarities across various disciplines of study. Among nursing students, they acknowledged their worries regarding content comprehension, limited vocabulary knowledge, unable to catch up with the content lessons taught in English, inability to interact with others using English, low proficiency in English and inability to understand accented speech (Pomat et al., 2022). In another study, Wilang and Nupong (2022) elicited eight factors affecting Thai engineering and nursing students' attitudes including difficulties of the English language, availability of resources and opportunities, personal goals in life, limitations of time when studying content courses in English, providing activities to improve English language proficiency, enhancement of career goals, supports needed, and motivation and intercultural ability.

Similar results were also found in various EMI contexts worldwide (Evans & Morrison, 2011; Hellekjaer, 2020; Wilkinson, 2003). For example, difficulty with technical terms in the lecture, difficulty understanding lecturer language, difficulty following frequent and lengthy code-switching, difficulty following subject courses after prep year program, difficulty listening and speaking, and difficulty listening and writing simultaneously (Airey & Linder, 2006; Basibek et al., 2014; Galloway et al., 2007; Soruc & Griffiths, 2018; Tatz & Messnarz, 2012). Similar to Thai students, Indonesians prefer Bahasa Indonesia over English to understand the subject. In addition, they have difficulty in dealing with specific terms in terms of its meaning, pronunciation and use. Not only that, students have limited vocabularies (Syakira, 2020).

Among Thai university lecturers, Tang (2020) reported four challenges they faced. These include students' linguistic challenges (i.e., unable to understand the basic concepts affecting the quality of project reports), cultural challenges (e.g., difficulty to understand the content in English due to translations), structural challenges (i.e., challenges in academic writing), and identity-related (institutional) challenges (e.g., lack of interaction between international and domestic students. Recently, Pomat and colleagues (2022) outlined several challenges experienced by Thai lecturers, such as focus on content delivery, lack of time to prepare lessons to help motivate students learn both content and language, lack of time prepare teaching resources in English, lack of confidence to teach content in English, fear of making mistakes, and hesitancy to ask help from colleagues. In another study, students prefer local teachers speaking English over native speakers due to accented speech (Ammon & McConnel, 2002; Martinez-Espinosa & Moll, 2015). It was also reported that teachers have limited proficiency in English and there is insufficient bilingual materials and spaces promoting English atmosphere (Baa, 2018; Syakira, 2020; Vu & Burns, 2014). Thus, apart from improving scientific literacy, furthering internationalization, among other aims, content teachers face the "weight", for instance, of integrating language in any topic in their lessons. Hence, pedagogical practices and professional growth are sought to provide scaffold to students who experience mounting challenges due to English-medium instruction. Content teachers should possess both language awareness and subject knowledge.

Regardless of the growing literature on EMI in Europe and in other parts of the world (i.e., Sanchez-Garcia, 2023), research is still on its infancy in Thai universities with focus on science and technology programs. This paper reports on a university in Thailand, where English is encouraged as the medium of instruction. In fact, some courses are entirely taught by non-Thai lecturers, of which English is solely used in the lecture. Other courses are partially taught in English. In this report, we explored the perceptions, challenges and needs of the stakeholders – students and teachers when EMI is used. Moreover, we also elicited the norms in teaching EMI courses. Thus, four questions are sought: (1) What are the perceptions of students toward EMI? (2) What are the students' challenges? (3) What are the students' needs? (4) What are the norms in teaching EMI courses?

METHOD

This two-stage study was conducted in a renowned science and technology university in Thailand. A triangulated mixed-method approach was used to know the insights of the stakeholders about the topic at hand. In the current study, four questions were sought. The data to answer the first question on the attitudes of the students toward EMI programs were generated from the survey questionnaire, which was collected in the first stage of the study. The data to answer the second and third questions on the needs and challenges of the students as well as teaching norms were elicited from the survey questionnaire (Stage 1) and semi-structured interviews from both students and teachers (Stage 2). The last question deduced the norms in teaching.

Stage 1: Participants, Instruments, Data collection procedures and analysis

Table 1
Student-participants in Stage 1

Year	Program of study	Gender		Common European Reference Framework (CEFR) level					
		Male	Female	A1*	A2**	B1+	B2++	C1^	C2^^
1	<i>AgriTech</i>	15	12	16	6	0	3	2	0
	<i>Science</i>	12	8	11	5	0	2	2	0
2	<i>Agri Tech</i>	1	2	1	2	0	0	0	0
	<i>Science</i>	7	13	6	11	2	1	0	0
3	<i>Agri Tech</i>	9	20	17	7	5	0	0	0
	<i>Science</i>	1	1	0	0	1	0	1	0
4	<i>Agri Tech</i>	3	4	5	1	1	0	0	0
	<i>Science</i>	7	2	0	1	4	3	1	0

*,**Basic English User; +,++Independent English User; ^,^^Proficient English User

This stage collected survey data from student-participants to know their attitudes quantitatively. Convenience sampling was used. In total, 97 students participated - 46 Agricultural Technology and 51 Science students (see Table 1). Their Common European Reference Framework (CEFR) level is based on their perceived English language proficiency.

The online survey questionnaire was adopted from an existing EMI-based questionnaire widely used in Thai context (see Pomat et al., 2022; Wilang & Nupong, 2022). Keeping in mind the proficiency of the students, the survey items were written in both Thai and English to ensure the comprehensibility of questions among Thai and international students. It consisted of five sections such perceived benefits of EMI, perceived difficulties of EMI, perceived personal challenges in learning content in English, perceived support needed, and attitudes toward learning content in English. The survey has 46 items in a 4-point Likert scale, namely “Strongly disagree”, “Disagree”, “Agree”, and “Strongly Agree”. The reported Cronbach’s alpha was found at 0.81, high reliability (Wilang & Nupong, 2022). Descriptive analysis was used to analyze the data to ascertain the mean scores and standard deviations.

Stage 2: Participants, Instruments, Data collection procedures and analysis

From the first stage, insights were elicited from 24 student- and seven teacher-participants to probe their attitudes toward EMI. A semi-structured interview was conducted individually. Thirteen student-participants from AgriTech and 11 from Science (see Table 2) were selected based on their responses to the survey questionnaire. They have varied proficiency levels – from A1 to C1. The interview was conducted in Thai so that students can express themselves eloquently. The questions delved into their perceptions (i.e., confidence to study the content in English), preparedness (i.e., experiences when studying in an EMI course), challenges (i.e., difficulties encountered in the EMI course), and needs (i.e., supports needed). Each interview lasted between 8-10 minutes.

Table 2
Student-participants in Stage 2

Perceived CEFR level	Interviewees	
	<i>Agri Tech</i>	<i>Science</i>
A1 Basic English user	5	2
A2 Basic English user	5	1
B1 Independent English user	2	3
B2 Independent English user	1	2
C1 Proficient English user	0	3

The interview data was transcribed and translated into English. Two Thai colleagues were asked to check the validity of translations. Adjustments were done to ensure the voice of the participants. Then it was then coded inductively to elicit the themes (Braun & Clarke, 2006). To ensure reliability, two colleagues were asked to review the codes assigned. The Cronbach alpha was .90, high reliability.

For the teacher- participants, seven ($n=4$ Agri Tech, $n=3$ Science) were invited to share their insights about the topic at hand (see Table 3). All have PhD from various countries and teach subjects related with their expertise.

Similar with the student-participants, the semi-structured interviews for teachers focused on their perceptions (e.g., confidence in teaching EMI, advantages and disadvantages of EMI, proficiency of students and its effects in teaching content in English), preparedness (e.g., preparedness in terms of content; language and teaching techniques), challenges (e.g., enjoyment in teaching content in English), and needs (e.g., resources and trainings). Unlike with the students, the interview was conducted in English, but teachers were free to share their insights in English or Thai. Each interview lasted between 20-30 minutes. The data was coded inductively (Braun & Clarke, 2006). To ensure reliability, two colleagues were asked to review the codes assigned and the Cronbach alpha was .92., high reliability.

Table 3
Teacher-participants in Stage 2

Participants	Nationality	Highest educational attainment	Subject taught	Place of study
<i>Agri Tech</i>				
1	Thai	PhD	Animal technology and invention	Thailand
2	Thai	PhD	Animal technology and invention	USA
3	Thai	PhD	Food science and technology	South Korea
4	Thai	PhD	Biological technology and fundamental biology	USA
<i>Science</i>				
5	German	PhD	Mathematics for physicists and mechanic physics	Thailand
6	Thai	PhD	Fundamental physics	Thailand
7	Thai	PhD	Thermophysics and mechanic physics	USA

FINDINGS

This section answers questions on the perceptions of students and teachers toward EMI programs, challenges and needs, and norms in teaching.

What are the perceptions of students toward EMI programs?

In table 4, the most striking perception is the strong emphasis on practical and career-oriented motivations. Participants rated enhancing future employment opportunities (item 8) and increasing the value of their degree (item 9) as highly significant. This underscores a clear recognition of the role English proficiency plays in the global job market and the perceived value of an English-medium education in terms of employability. Another notable motivation is the aspiration to boost self-confidence in using English (item 10). This suggests that students perceive EMI as a means not only to acquire knowledge but also to enhance their communication skills, leading to greater self-assuredness in English language usage. The desire to improve English skills (item 1) and enhance subject knowledge (item 2) are moderately important motivations. This indicates a balanced consideration of both language acquisition and content mastery, implying that participants view EMI to simultaneously improve their academic and linguistic competencies. On the social and cultural fronts, motivations such as making friends from other countries (item 5), developing cultural awareness (item 6), and becoming a multicultural person (item 7) are moderately rated. These motivations highlight an interest in intercultural experiences and global perspectives, although they might not be the primary drivers for choosing EMI. Interestingly, the motivation to study abroad (item 3) receives a relatively lower rating. This suggests that, while some students see the potential for international mobility through EMI, other motivations might outweigh the appeal of studying abroad.

Table 4
Perceptions of students toward EMI

Statement	M, SD, Interpretation
1. To improve my English skills	3.07, 0.75, Agree
2. To enhance my knowledge in a subject taught in English	3.14, 0.71, Agree
3. To study abroad (e.g., exchange program)	2.86, 0.70, Agree
4. To use English on a daily basis	3.25, 0.65, Strongly agree
5. To make friends from other countries	2.69, 0.82, Agree
6. To develop cultural awareness	2.57, 0.80, Disagree
7. To become a multicultural person	2.87, 0.79, Agree
8. To enhance my future employment opportunities	3.59, 0.53, Strongly agree
9. To enhance the value of my degree	3.43, 0.62, Strongly agree
10. To increase my self-confidence in using English	3.51, 0.63, Strongly agree

Some quotations were also shown below supporting the findings above. The quotes express a consensus on the value of English proficiency in enhancing job prospects and potential earnings, viewing it as a skill that complements their education and provides a wider range of perspectives (i.e., Quote1). Despite some underlying fears about their current language abilities, there is a prevailing sentiment of confidence and a desire for improvement. The students understand that immersion in English, through studying or

using it in practical scenarios, is key to becoming more proficient, recognizing this proficiency as a significant asset in the competitive job market.

“Learning English, I think it can help me get a good job. I can also get a higher salary if I am good at English”. – Quote 1

“It’s like I learn science with language skills, not only science. I have a chance to read and use more English which I think it will benefit my future. I can see things in different perspectives”. – Quote 2

“I think I feel more confident because I need to read and write in English. Actually, I’m afraid but I’d like to improve my English”. – Quote 3

“I know that if I’m good at English, I’ll have more chances to get a good job.” – Quote 4

“I think studying in English will help me get better at English.” - Quote 5

Further findings have shown positive perceptions toward EMI. In table 5, the acknowledgement that English skills have improved since beginning the course (item)

Table 5
Perceived benefits of EMI programs

Items	<i>M, SD, Interpretation</i>
11. My English skills have improved since I have started studying in this course/program	2.81, 0.50, Agree
12. My progress in the content subject would be faster if studying it in my native language (e.g., Thai)	2.98, 0.62, Agree
13. It's not time consuming	2.91, 0.84, Agree
14. I spend less time looking for the resources for learning content in English	2.71, 0.64, Agree
15. To understand content studied in English I often use resources in my native one (e.g., Thai)	2.93, 0.65, Agree
16. The resources I use develop my knowledge of content but do not help me with the language	2.71, 0.70, Agree
17. It's not difficult to stay motivated	2.71, 0.72, Agree
18. It's not easy for me to effectively express my ideas when studying the content in English	2.87, 0.71, Agree
19. When studying content in English I have learned to develop cultural sensitivity	2.90, 0.70, Agree

11) demonstrates a positive impact of EMI on language development. This suggests that despite the challenges faced, participants perceive an enhancement in their English proficiency over time. Participants recognizing that progress in the content subject might be faster if studied in their native language (item 12) is significant. This response points towards the acknowledgement that while EMI contributes to English language development, there might be certain subjects or contexts where native language instruction could potentially lead to quicker comprehension and progress. The consideration of EMI not being time-consuming (item 13) is a promising observation. This could indicate that participants don't necessarily view EMI as a hindrance in terms

of time management, potentially reflecting the effectiveness of the instructional approach in terms of time utilization. Similarly, participants acknowledging that finding resources for learning content in English isn't overly time-consuming (item 14) and that it's not difficult to stay motivated (item 15) could signify a sense of efficient resource accessibility and a generally positive attitude towards the learning process. The recognition that using resources in the native language (e.g., Thai) aids in understanding content studied in English (item 16) emphasizes the importance of supplementary materials to bridge potential language comprehension gaps. This aligns with the idea of creating a supportive learning environment. Participants also note that while the resources they use develop content knowledge, they don't necessarily help with language skills (item 37) highlights the need for more integrated resources that address both content and language aspects concurrently. The acknowledgment of the difficulty in effectively expressing ideas when studying content in English (item 18) underscores the complexities of academic expression in a non-native language. This could reflect challenges in articulating complex concepts accurately. Lastly, the indication that EMI has led to the development of cultural sensitivity (item 19) is a positive observation. This suggests that participants perceive a broader educational impact beyond language and subject matter, which aligns with the broader goals of internationalization in education.

What are the challenges of students toward EMI programs?

In table 6, across the spectrum of language skills, participants rate the challenges relatively similarly. The challenges with reading texts in English (item 22), comprehending spoken English (item 23), writing in English (item 24), and thinking in English (item 25) are generally perceived as moderately difficult. This suggests a consistent level of struggle across these language dimensions, indicating that students find a comparable level of difficulty in both receptive (reading and listening) and productive (writing and thinking) aspects of English. In terms of oral communication, participants find it moderately difficult to speak English (item 21). This could indicate a certain level of anxiety or hesitancy in oral expression, possibly related to factors such as pronunciation and fluency. Interestingly, while content difficulty is often associated with EMI, participants rated the content being difficult to learn in English (item 20) lower than some language-specific challenges. This might indicate that while the content poses a challenge, participants are somewhat more concerned about language-related hurdles. The perception that the learning process in English is difficult (item 26) reinforces the notion that the overall instructional experience might be challenging for participants. This could encompass various aspects, from understanding lectures to participating in discussions and completing assignments. Cultural component of the lesson being difficult to grasp (item 27) is also moderately rated. This suggests that participants might experience challenges in Figure 2 understanding cultural nuances embedded within the educational content, reflecting the multifaceted nature of EMI challenges.

Table 6
Perceived challenges toward EMI

Statement	<i>M, SD, Interpretation</i>
20. The content is difficult to learn in English	2.63, 0.60, Agree
21. It is difficult to speak English	2.77, 0.73, Agree
22. It is difficult to read texts in English	2.61, 0.75, Agree
23. It is difficult to comprehend spoken English	2.75, 0.72, Agree
24. It is difficult to write in English	2.74, 0.73, Agree
25. It is difficult to think in English	2.90, 0.70, Agree
26. The learning process when studying in English is difficult	2.60, 0.74, Agree
27. It is difficult to know the cultural components of the lesson	2.65, 0.78, Agree

Similar with the findings above, the students in the quotes below (see Quotes 6-9) are grappling with the complexities of learning and using English, particularly in academic contexts that require a deep understanding of technical content. One student is challenged by the difficulty of scientific texts necessary for their studies, acknowledging that full comprehension eludes them at times. Another struggle is the need to mentally translate thoughts into English before speaking, a process that slows down communication and may negatively affect their academic performance. The last speaker's difficulty with unfamiliar technical terms and complex vocabulary necessitates extra effort to translate and understand these concepts in their native language, Thai, indicating an additional layer of complexity in their learning process. Collectively, these insights underscore the intricate relationship between language proficiency and academic success, highlighting the additional cognitive load for non-native speakers and the potential impact on their educational outcomes.

“Because I need to read a lot of articles about sciences. The content is very hard. I need to read for my study and sometimes I don’t understand it all”. – Quote 6

“For me, when I want to speak something, I need to think a lot. I mean I translate it into English in my head before I speak. I can’t speak in English right away. I can’t express in English, so it may have an impact on my grades”. – Quote 7

“I’m not familiar with technical terms and some difficult words, so I need to take more time to find out what they mean in Thai.” – Quote 8

“Since I’m not good at English, it’s hard for me to understand the content.” – Quote 9

Other difficulties are revealed in table 7. For instance, the participants' perception of having a low level of English proficiency (item 28) is notable. This challenge underscores the fundamental importance of language proficiency in EMI contexts. It reflects the reality that students are aware of their own linguistic limitations and the potential impact on their academic performance. The difficulty of the content (item 29) and the struggle to understand it in English (item 30) are closely related challenges. This suggests that participants not only find the subject matter challenging but also face additional hurdles due to the language of instruction. These challenges could potentially

affect the depth of their understanding and engagement with the material. The program's lack of support to enhance English ability (item 31) and to understand difficult content (item 32) is a significant finding. It highlights the need for robust support mechanisms within EMI programs. This includes resources that aid language development and provide supplementary materials to facilitate better content comprehension. Participants acknowledging their lack of motivation for learning (item 33) is also insightful. While moderately rated, it underlines the importance of maintaining high levels of student motivation within EMI settings, considering the additional demands that learning in a non-native language may impose. The participants' recognition of their lack of intercultural ability (item 34) reflects a self-awareness of the need for enhanced cross-cultural skills in an EMI environment. This challenge emphasizes the broader impact of EMI beyond language and subject matter proficiency. The lack of an environment to practice English (item 35) suggests that students feel a deficit in opportunities for practical language use. This could impact their language acquisition and confidence in real-world communication situations. Interestingly, participants rating unclear instructions in English (item 36) relatively low is promising. This might indicate that, despite other challenges, the participants generally find the instructional language to be relatively clear, emphasizing the importance of effective communication within EMI programs.

Table 7
Perceived difficulties of students toward EMI

Statement	<i>M, SD, Interpretation</i>
28. Low level of my English proficiency	2.80, 0.87, Agree
29. The difficulty of the content	2.83, 0.67, Agree
30. My difficulty with understanding the content in English	2.96, 0.67, Agree
31. The program's lack of support to enhance my English ability	2.36, 0.68, Disagree
32. The program's lack of supports to understand the difficult content (e.g. supplementary resources)	2.20, 0.72, Disagree
33. My lack of motivation for learning	2.71, 0.76, Agree
34. My lack of intercultural ability	2.48, 0.84, Disagree
35. The lack of environment to practice English	3.08, 0.80, Agree
36. The instructions in English are unclear to me	2.11, 0.70, Disagree

Additionally, the table below presents an alignment between the insights gathered from student interviews and the survey data. Students acknowledged challenges in comprehending technical terminology and their hesitation in speaking English, a sentiment that echoed across both data sources. Moreover, the observed lack of self-esteem among students resonated with teachers' observations. Alongside linguistic obstacles, cognitive difficulties were evident – manifested in struggles to grasp technical vocabulary and lectures. Notably, Science teachers exhibited accented speech, potentially stemming from their diverse national origins, thereby exposing students to a range of English variations.

Table 8
Challenges from students' insights

Categories of challenges	Example codes
Linguistic challenges	The difficulty of writing English in long sentences; Unable to understand the technical terms; Can't express thoughts in English
Lack of self-esteem and language anxiety	Feeling anxious when questions are asked; Feeling anxious with oral presentation activities; Reluctant to speak English in class
Cognitive challenges	The difficulty of listening to a lecture in English; The difficulty of reading textbooks; Difficulty of understanding the technical terms; Cannot understand the lecture
Teacher-provoked challenges	Unclear pronunciation; Reading from PPT slides; Taught in unattractive tone; Fast pace of speech; Unable to understand teacher's accent
Teaching materials	Complex teaching materials in English; Lack of external material; Insufficient supplementary materials; English learning resources are not up to date

From the interview data of the teachers (see Table 9), students in AgriTech and Science experienced five challenges on their cognition, culture, language, anxiety, and self-esteem. Regarding cognitive challenges, students (referred to *Ss* in the table) have difficulty in remembering previous lesson. Added to that, the difficulty of the lesson and lack of background knowledge left students unsure about where to start. The students' reluctance to point out teachers' mistakes and their dependence on the teacher could aggravate the difficulties they experienced in the EMI class. Another factor is the linguistic challenges, of which, the students have low English proficiency in English affecting their ability to do the exam in English and inability to understand the readings. More so are the psychological constructs of language anxiety and lack of self-esteem, which are common challenges experienced by students where English is used as foreign or second language.

Table 9
Challenges of students from teachers' insights

Categories of challenges	Examples codes
Ss cognitive challenges	Rarely remember previous lessons; Lack of background knowledge about the content; Lesson content is difficult; Don't know where to start
Ss cultural challenges	Afraid to point out mistakes in the content; Less self-autonomous; Used to teacher-centered instruction
Ss linguistic challenges	Low language proficiency; Lack of comprehension to do the exam in English; Lack of comprehension to understand the assigned readings
Ss language anxiety	Afraid to speak English
Too shy or not confident	Ss lack of self-esteem

What are the needs of students toward EMI programs?

Table 10 shows the collective call for more resources for studying content in English (item 37) and studying the English language itself (item 38) reflects a balanced

approach to content and language enhancement. This indicates an awareness that both elements are crucial for a successful EMI experience, emphasizing the need for a comprehensive learning ecosystem. The recognition of the importance of interactive resources that encourage English usage (item 39) underscores the participants' desire for dynamic, engaging materials. This reflects their understanding that interactive resources can stimulate active language application and content engagement. The participants' aspiration for a supportive learning environment (item 40) highlights the significance of creating a setting that addresses both academic and emotional needs. This aligns with the acknowledgment that EMI might introduce additional challenges, necessitating robust support mechanisms. The collective desire for increased opportunities for student-teacher interaction (item 41) and peer activities (item 42) emphasizes the participants' recognition of the value of interpersonal connections in the learning process. This indicates an understanding that interaction fosters both language practice and content comprehension. The emphasis on activities that develop language skills - speaking (item 43), writing (item 44), listening (item 45), and reading (item 46) - underscores the comprehensive nature of language proficiency. These responses highlight the participants' awareness that effective communication encompasses all modalities and is essential for academic and real-world success.

Table 10
Resources to support EMI programs

Statement	AgriTech <i>M, SD, Interpretation</i>
37. Prepare more resources for studying content in English	3.21, 0.55, Agree
38. Prepare more resources for studying English language	3.20, 0.56, Agree
39. Make the available resources more interactive in using English	3.48, 0.60, Agree
40. Create the environment where students are supported	3.33, 0.57, Agree
41. Provide more opportunities for student-teacher interaction	3.25, 0.63, Agree
42. Provide more opportunities for peer activities	3.22, 0.65, Agree
43. Activities which develop speaking skills	3.46, 0.57, Strongly agree
44. Activities which develop writing skills	3.34, 0.59, Strongly agree
45. Activities which develop listening skills	3.35, 0.62, Strongly agree
46. Activities which develop reading skills	3.55, 0.50, Strongly agree

"I wish I could have more chances to be exposed to the English environments".
– Quote 10

"I think the university should provide more databases because it is important when I need to do a project". – Quote 11

"For me, I want to join a club because I want to practice speaking. Like, I want to practice more with friends and teachers". – Quote 12

"I want to learn about communication. I want to be able to speak". – Quote 13

"Like we should study in a course that English is used 100%. It will be very good, I think". – Quote 14

“I need an additional Thai document or summary because I don't want to miss any important details.” – Quote 15

“I believe that a list of key words will be helpful for me.” – Quote 16

Form the quotations above (10-17), it presents a spectrum of needs and desires from learners seeking to improve their English proficiency and academic performance. Quote 10 shows a yearning for more immersive English experiences, which suggests that exposure to English-speaking environments is seen as crucial for language development. In Quote 11, the call for more academic databases indicates a practical need for resources to support university projects. The desire to join a club, expressed in Quote 12, and the aspiration to learn about communication in Quote 13, demonstrate a proactive approach to language practice, emphasizing speaking skills and interaction with peers and teachers. Quote 14's preference for a fully English-taught course implies a belief in immersion as an effective learning strategy. The request for Thai documents in Quote 15 highlights a need for resources in the native language to ensure complete understanding, while Quote 16's mention of a key word list reflects a strategic approach to language learning, focusing on essential vocabulary. Together, these insights suggest that the students are seeking a holistic approach to language learning that includes immersive environments, practical resources, peer interaction, and supportive materials in both English and their native language.

As outlined in table 11, six needs were mentioned to support EMI implementation from the interview data. Students mentioned about an intensive English course to support content learning, reduction of other general courses and replace it with English for specific purposes courses, focusing on language practice in class, pedagogical practices, hiring of native and non-native content teachers, and encouraging out-of-class English-related out-of-class activity.

Table 11
Resources needed in EMI programs

Categories of resources	Example codes
Pre-sessional activity	Provide intensive English courses for Science before the start of year 1
Curriculum revision	Reduction of general education courses and replace it with English courses
English practice in class	Assigning presentations in English Communicate with students in bilingual method; Allow students to practice speaking in class; Provide a chance for everyone to practice speaking English in class; Provide opportunities to take written and oral exam in English; Teachers should initiate conversations in English with students
Pedagogical practice	Teach how students how to visualize the word not just memorizing it; Teach technical terms as language in daily life; Provide the vocabulary list in advance; Provide multiple resources; Let English instruction help students improve their language skill; Translation of key vocabularies taught in class; Allow students to ask in Thai language; Use activities to lessen students' stress; Focus on comprehension; Have sympathy for students
Hiring of foreign lecturers	Students can practice speaking English Have native and non-native English teachers
Out-of-class activity	Assign one day in a week to encourage all to speak English in the campus

What are the norms in teaching EMI courses?

The data from Table 12 provides insightful observations into the teaching norms adopted by content teachers in an EMI setting, particularly within the context of teaching subjects in English to Thai-speaking students. These norms highlight a range of strategies and approaches employed by teachers to enhance student understanding and learning of the subject matter, despite the language barrier.

One of the key strategies observed is the summarization of lessons in Thai, the students' first language (L1). After teaching a concept in English, teachers take the additional step to recapitulate the main points in Thai. This practice ensures that students who may have faced difficulties comprehending the content in English can gain a clear understanding in their native language. This dual-language approach is crucial in bridging potential gaps in comprehension and reinforces the students' grasp of the subject matter.

Another significant norm involves the simplification of the English language used in teaching. Teachers consciously modify their language, opting for simpler vocabulary, using synonyms, and employing other techniques to make the content more accessible. This method acknowledges the varying levels of English proficiency among students and demonstrates a commitment to adapt teaching methods to meet these diverse needs. By reducing the complexity of the language, teachers facilitate a more inclusive learning environment where all students can engage with the subject matter more effectively.

Table 12
Norms in teaching

Norms in teaching	Example utterances from teachers
Summarizing the lessons in L1, i.e., Thai	<i>After I finish teaching, I will ask if they understand what I've taught first. After that, I will summarize it in Thai so that I can be certain that they really understand what I have taught.</i>
Simplifying the English language	<i>I need to read books before I teach. And they are difficult. I then help my students by making it easier like change the words, use synonyms". "I watch video on YouTube to learn about teaching techniques and I would like to develop my teaching" "I have to go through the background knowledge before teaching the current course content."</i>
Providing bilingual materials in English	<i>"When I do my PPT, I use simple words. Not too long. Not too complicated". "I make PPT in English. When I teach, I use English to explain to the students and then translate it into Thai". "I always used PowerPoint in English because I think it's very helpful for students to learn content in a specific context." "And they can also learn English at the same time."</i>
Teaching grammar, i.e., passive voice	<i>When I see some important rules that I think confusing, especially for Thai students, like passive voice, I will teach them because it is normally seen in science. It may help them understand the text better".</i>
Providing recorded videos of lessons taught	<i>"After class, If I have time, I will give the students the videos I taught again like during the COVID-19 pandemic so that the students can review what they have learned". "I record my teaching videos for those students who want to take the time to listen and understand more."</i>
Encouraging students	<i>"English is not a one-day thing, like, you cannot build Rome in a day. You have to collect and try to put that into daily life bit by bit, at least in my class". "I definitely believe that English is important. I try to make them to believe that it is important. At the same time, I like to make them have self-awareness, like what level they are now so they can improve".</i>

The provision of teaching materials in English is another notable practice. Teachers use English in PowerPoint presentations and other instructional materials, providing students with simultaneous exposure to both the content and the English language. This approach is instrumental in helping students learn the subject matter while also enhancing their English skills, particularly in terms that are relevant to their field of study.

Focusing on specific aspects of English grammar is also a prevalent teaching norm. Teachers address grammar points, such as the passive voice, commonly found in scientific texts. This targeted instruction aids students in navigating complex grammatical structures they are likely to encounter in academic readings, thereby aiding both their language development and content comprehension.

Additionally, the provision of recorded video lessons has emerged as a valuable teaching tool. These recordings allow students to revisit and review the content at their own pace, an aspect particularly beneficial for those requiring more time to process information presented in English.

Lastly, the encouragement and motivation provided by teachers play a pivotal role in the EMI environment. Teachers not only emphasize the importance of English proficiency for academic and professional success but also encourage students to consistently work on improving their language skills. Through fostering self-awareness and advocating for a gradual, persistent approach to language learning, teachers strive to build confidence and resilience among students in facing language-related challenges.

DISCUSSION

The insights from students and teachers are not surprising about difficulties or challenges students face when English is used as a medium of instruction in countries where English is not the main language for communication and instruction. Similar findings were reported in previous studies in Thailand (Galloway et al., 2007; Pomat et al., 2022; Wilang & Nupong, 2022). Several reasons why English language difficulties persist despite educational reforms include lack of English language exposure outside the classroom, high level of foreign language anxiety, students, and teachers' lack of confidence to use English language, and excessive focus in teaching grammar. Teachers, regardless of nationality, must strive to facilitate comprehension. Despite challenges, Science students see the importance of English language in their career. Perhaps, program administrators need to offer contextualized EMI programs to delimit challenges in learning content in English. For example, instead of EMI, CLIL Science-based programs could be introduced, whereby language and content are learnt (see Piacentini, 2021).

One interesting finding in need of attention is the high level of support and number of resources afforded to students by the content teachers. It appears that Thai lecturers provide enough bilingual materials and support as compared to previous findings (Baa, 2018; Syakira, 2020). This suggests the high level of preparedness the university has instituted. The autonomy afforded to teachers allowed them to design and use appropriate instruction to the emerging challenge in using EMI. However, to provide meaningful solutions to the difficulties observed by the teachers and noted by the students, not only teachers but administrators are encouraged to continuously elicit feedback from the students. For example, specific teaching practices are suggested by the students. In this case, top-down policies must incorporate voices from the bottom – the students.

Deviation from global practices of EMI should be initiated embracing contextual differences of stakeholders' needs and challenges, specifically, the students. For example, the act of bilingual translation afforded to students should not be seen as a weakness rather than strength. To understand more of the stakeholders' perceptions, emic perspectives should be elicited in aid of quantitative data. Such insights would provide holistic views for the administrators, for example, in knowing designing contextualized EMI programs. Perhaps, contextualized EMI programs allow limited

Thai instruction (to focus on comprehension), promote grammar instruction (to improve students' language proficiency), and use corpus-based instruction (to provide specific list of lexical items).

The findings also underscore the importance of knowing the insights from the stakeholders in designing EMI programs. In this study, students have high regard for the benefits of EMI programs to improve their career opportunities and future life. Similar findings were reported among Thai nursing and engineering students (Wilang & Nupong, 2022). Still, the students' English language abilities remain a herculean effort for teachers and administrators to address. Knowing their language weakness, students suggested several resources such as providing pre-session intensive English language courses, focusing on English practice vis-à-vis content learning, flexible pedagogical practices, having a more international faculty, and encouraging out-of-class activities where students are encouraged to speak English.

Findings of the study with regards to students' perceptions have shown that they agree or strongly agree with statements related to self-development, intercultural ability, and career goals. Similar findings were shown in the literature among Thai students (Pomat et al., 2022; Wilang & Nupong, 2022). The qualitative results also coincided with the quantitative findings, of which students claimed that EMI agriculture helped improve their academic knowledge, professional experiences, communicative and language skills. However, they disagreed with the item "to develop cultural awareness". The disagreement could be the result of the students' lack of awareness regarding the cultural component of the content lessons. It could also be the teacher's non-integration or non-mention of cultural components when teaching about agricultural concepts. Thus, teachers may explicitly mention the cultural components of the lesson to increase agricultural-related cultural knowledge of the students. Regarding the difficulties experienced by the students, survey results have indicated receptive, productive, and cognitive challenges. Individually, they have low level of English language proficiency, difficulty to understand the content in English, lack of materials for learning and absence of environment of to practice English.

Despite the challenges, the students underscored the support provided by the program and the teachers. Like Asian students, many struggles in EMI courses due to low English language proficiency (see Ansarey, 2016; Ismael et al., 2010; Veranita, Syahrial & Koto, 2017). Due to low proficiency, it is possible that students become demotivated in learning. This could to a greater challenge of understanding the content lessons taught in English. Program administrators should then be sensitive to the kind of support they offer to students to help them achieve the lesson and course outcomes and career goals. In this study, students specifically mentioned activities focusing on receptive and productive skills development.

It can be noted that EMI program administrators and teachers face enormous task in helping students become proficient in English and comprehend the content lessons. Other than student-related problems, insights from the participants had mentioned teacher-related problems in language and pedagogical practices. For example, some teachers have unclear pronunciations, fast pace of speech, and read PPT slides. In

addition, some teachers taught in ‘unattractive tone’ with teaching materials with ‘less’ details coupled with lack of supplementary materials. Such problems have also been reported by Tang (2020) and this could be a common occurrence among non-native speakers of English.

From the interviews, learning strategies were also elicited and employed by the students including finding supporting materials or online courses, asking teachers to record and provide teaching videos, reviewing the lessons, and taking photos or screenshots during the lesson. Moreover, they have used the affordances of technology, for example, Google Translate and other bilingual dictionary tools. In this case, teachers may provide tools or raise awareness of various tools to help students with language and content comprehension challenges. However, caution must be exercised as dependence on tools may have negative effects. Added to that, knowing the specific needs of the students before the start of the programs (like pre-sessional activities as suggested by Macaro et al., (2018) could help students better prepared for English medium instruction.

CONCLUSION AND SUGGESTIONS

This two-part study investigated EMI programs in a Science and Technology university in Thailand, which is a relatively new area of research. The study explored the perceptions of teachers and students towards EMI programs. Moreover, the findings yielded a comprehensive list of challenges and needs from students of EMI programs in a science and technology university. Additionally, it uncovered the norms in teaching EMI programs.

As seen from the findings of this study, EMI programs can be very challenging to the students. Thus, teachers and administrators need to provide affordances and student agency to facilitate content and language learning and maximize the benefits of EMI programs. Before the start of the term, teachers may utilize self-rating tools to know the difficulties students may experience in learning content lessons in English. Simultaneously, it would raise awareness among the students themselves of the challenges ahead. For teachers, the results could help them plan their lessons. Some affordances, i.e., technology, may be shared. For the students, they may know their weakness and devise self-regulatory practices to overcome the difficulties. During the semester, teachers may continue providing varied resources in response to individual student needs. Students may work collaboratively, and content teachers may seek help from language experts. After the semester, both students and teachers may write retrospective reflective journals. Doing so would help monitor their own performance during the semester. Lastly, teachers may adopt data-driven approach so students may independently use widely available tools to help themselves with language learning within the content lessons.

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