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Challenges experienced by students studying medicine through English medium instruction

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English is increasingly being used as a medium of instruction (EMI) in many institutions for teaching academic subjects, such as physical science and medicine. Although research evidence is emerging to support the positive effects EMI has on student learning such as preparing them for professional careers and improving their English language proficiency, students also encountre challenges when studying through EMI, particularly linguistic related challenges. This study aims to investigate the challenges that medical students face when learning medicine through EMI in medical context in Saudi Arabia. To achieve this aim, a mixed-method research approach was adopted.A questionnaire was distributed to 373 students studying at four medical schools, and follow-up with semi-structured interviews with 60 students. The findings revealed that students encountered numerous challenges when studying medicine through EMI including reading medical materials, understanding lectures taught purely in English, giving presentaions and speaking fluently. Notably, these challenges were more salient in the students' first or second years of their university studies, however dissipated as students progressed in their studies. Pedagogical implications of these findings are discussed.

KEYWORDS

English medium instruction, medicine, Saudi Arabia, higher education, challenges

Introduction

Recently, the trend of using English as the medium of instruction (EMI) has gained significant momentum in higher education (HE) institutions worldwide. This approach is defined as "The use of the English language to teach academic subjects other than English itself in countries or jurisdictions where the first language of the majority of the population is not English" (Macaro, 2018, p. 18). EMI in medical education uniquely supports the acquisition of critical medical terminologies and professional medical genres, such as writing medical reports (van Wyk, 2014). This focus enhances global professional medical genres, which are imperative given the international nature of medical research and practice. Such emphasis distinguishes EMI in medical education significantly from other disciplines where EMI may primarily focus on general language acquisition and academic fluency. EMI is purported to improve students' English language proficiency, believed to enhance students' employability, increases institutional rankings, and facilitates access to cutting-edge global research knowledge (Macaro et al., 2018; Curle et al., 2020a). The adoption of EMI is particularly impactful in the field of medical sciences, where precision in medical terminology and staying updated with international medical research are paramount (Almoallim et al., 2010; Wu et al., 2023).

This study distinctly contributes to the field of English medium instruction (EMI) and Content and language integrated learning (CLIL) by demonstrating how these educational frameworks enhance both language proficiency and medical-specific skills in Saudi Arabian medical students. It provides empirical data showing that EMI not only improves English language skills (Ball and Lindsay, 2013; Jiang et al., 2024) but also equips students with crucial professional competencies needed in the global healthcare environment (Alqarni et al., 2024). The research explicitly links these educational approaches with the development of critical thinking, problem-solving, and effective communication skills in a medical context, filling a significant void in the existing literature that often overlooks the specific needs of medical education in non-English speaking regions. This detailed examination of EMI and CLIL within such a specialised and high-stakes field marks a pivotal advancement in understanding their broader applicability and impact (Werther et al., 2014).

Background of the study

EMI in Saudi medical schools

Although Saudi Arabia (SA) does not have a colonial past, it is one of the monolingual countries that have: adopted English as the medium of instruction (MOI) in higher education. EMI in Saudi Arabia has been exponentially growing in the last decade. In SA, Arabic is the official language and is used as the language of instruction across all levels of education. However, with the recent changes seen in globalisation, modernisation policies and the emergence of Saudisation (i.e., the process of affirmative action for Saudis) after 2003, the government began more intentionally internationalising its HE institutions by positioning English as a medium for academic knowledge production (Mahboob and Elyas, 2014). This has resulted in adopting English as a MOI for teaching science subjects such as mathematics, engineering, and computer science. Notably, one area of HE that has always adopted English as its MOI is medicine (Raffaa et al., 2024). From the very beginning, since the first medical school in SA (King Saud University) was opened in 1967, educational policies instituted that English would be the MOI for medicine (Alshareef et al., 2018; Yüksel et al., 2022). Within 8 years, four medical schools were established at four universities: King Abdul-Aziz University, King Faisal University, Umm Al-Qura University and King Saud University branch in Abha. Since 2000, SA has undergone a fundamental change driven to excellence and recognition by international agencies and institutions. At this stage, many new medical colleges have been established. From 2000 to 2008, 25 medical colleges joined the original five medical schools, 25 of which are government funded and free for all Saudi students, all offering EMI courses. These schools adopted various new teaching and learning approaches: problem-based and student-centred approaches (Telmesani et al., 2011). The assessment of students' knowledge and their performance is based on both written (portfolios) and oral communication (objective structured clinical examinations; Bajammal et al., 2008). These schools are under constant pressure to increase graduate numbers in order to cover the shortage of physicians in Saudi healthcare settings and achieve Saudisation (Barnawi and Al-Hawsawi, 2017).

The rationales behind adopting English as the MOI for medical education in SA were the lack of medical resources available in the Arabic language, the status of English as the language of science, the need for international communication and professional preparedness (Xie and Curle, 2020; Alhamami and Almelhi, 2021). In addition, the establishment of the Saudi Medical Licensure Examination (SMLE), a national exam assessing recent graduates' and foreign professionals' readiness to practise medicine or matriculate to further postgraduate training (Bajammal et al., 2008), was one of the reasons for teaching medicine in English, as the exam is conducted in English. This study provides an original contribution by examining the challenges medical students face due to top-down imposed EMI policies. Adopting EMI aids in integrating language learning with medical content, enhancing students' engagement with subject-specific discourse and their preparation for international professional environments (also see Elyas and Al-Hoorie, 2024). This research illuminates how EMI supports language proficiency and professional readiness in medical education within a non-English speaking context.

Challenges associated with English medium instruction

Despite the popularity and extensive implementation of EMI in many foreign language countries, implementing the EMI policy in HE institutions is still widely debated, and a number of challenges have been raised regarding the teaching and learning of content exclusively in English (Aizawa et al., 2020; Soruç et al., 2021). These challenges are broadly identified in terms of the challenges of EMI programmes, the challenges of teaching (challenges that teachers face) and learning the content in a foreign language (challenges that students face). Although many institutions have established EMI programmes, several factors hinder the success of these programmes. These include a lack of instructional materials, limited focus on teaching the required workplace skills and a lack of training for the lecturers. For example, Yang et al. (2019) identified limited materials as one of the main obstacles to the success of EMI programmes in China. They found that a shortage of appropriate teaching materials such as textbooks written in English and a lack of focus on teaching professional communication skills stand as barriers to the success of EMI medical programmes. Students educational background is another problem facing the success of EMI programmes. Many students in non-English speaking countries learn subject matter in the L1, and when they start university, they find challenges in terms of transition (from local language to English) and new teaching environment (Aizawa and McKinley, 2020). For example, Aizawa and Rose's (2020) study of the transition stage of Japanese undergraduates reveals that students who attended Japanese medium high schools have less academic vocabulary size and are likely to encounter academic challenges at the university compared to those who learned through English.

Another issue impeding the effectiveness and success of EMI is the dearth of EMI-specific training programmes. Tsui and Ngo (2017) argue that such training programmes equip teachers with the skills needed for teaching EMI content, update them with teaching approaches and help them address students' language difficulties. In their recent examination of the EMI Omani and Taiwan contexts, Hua (2019) Alhassan et al. (2021) and identified challenges faced by both

EMI teachers and students and concluded that teachers need to understand students' challenges in order to help them overcome those challenges. To do so, they need to have systematic training and professional development. This need was also highlighted in other global contexts, France and Turkey. Dearden's et al. (2016) (Turkey) and Ben Hammou and Kesbi (2021) (France) studies showed that even though teachers supported an EMI policy, they criticised the way it was implemented. Particularly the lack of teacher preparation and training. They therefore recommended EMI-specific training programmes to prepare teachers, to equip them with the most up-to-date teaching methods and teaching strategies to support students in learning new contents and the foreign language in an integrated way. Finally, teachers delivering courses in English in health-related fields face unique challenges, such as the need to simplify complex medical concepts without compromising academic rigor. Research by Kim et al. (2024) indicates that this balance is difficult to achieve and often requires additional pedagogical support and resources to ensure effective instruction.

Research has also focused on the challenges related to teaching content using EMI (Troudi, 2009; Aizawa, 2024). Although some studies have reported that teaching the content in English is easier for professors than teaching in their first languages (Airey, 2012; Barrios et al., 2016), some research has shown that many teachers encounter numerous challenges, including linguistic and pedagogical challenges, when teaching the content in an additional language (Pun and Thomas, 2020; Soruç et al., 2021; Thomas et al., 2022). A frequent theme that has emerged in research is teachers' limited English competency for delivering advanced EMI content (Lasagabaster and Sierra, 2009; Ozer, 2020). This linguistic issue was highlighted in Tren's (2017, p. 38) study. Tren argued that one of the largest challenges in EMI programme is finding a faculty who are able to present lectures completely in English. Part of the reason for this difficulty is clearly related to language. These challenges have been observed in teachers' teaching practices. For example, Costa and Mariotti (2017) found that teachers speak more slowly and use more repetition, and formal style and Dimova and Kling's (2018) assessment of language proficiency of EMI teachers reveals that teachers encounter difficulties in explaining information in different ways for lack of specific vocabularies. Similarly, in Danish EMI classrooms, Nilas et al. (2016) examined the difficulties Danish practitioners face when teaching and found that they experience challenges in speaking fluently and with clear pronunciation. Another challenge facing EMI instructors is the students' low level of English language proficiency. Barrios's et al. (2016) and Ben Hammou and Kesbi (2021) studies of French and Spanish EMI classrooms highlighted how students' levels of English are important for the success of EMI. In their investigation, they found that classes with low-English-level students demotivate instructors to teach the content in English effectively, as teachers are not able to cover content in depth. To overcome this problem and facilitate comprehension of the content, many instructors tend to use students' L1 ortranslanguaged or simplified their English language when teaching. The practice of translanguaging is often perceived as an effective strategy for teaching EMI content to ensure students' understanding of content knowledge (see Kleyn and García, 2019; García and Kleifgen, 2020; Genc et al., 2023). Recent studies highlight that students in health-related EMI programs frequently struggle with the high linguistic demands of medical terminology, which is often less familiar and more complex than general language use (Besa, 2014; Huang et al., 2024). These linguistic barriers can lead to significant misunderstandings in both learning and practical applications, impacting student outcomes negatively.

Furthermore, research has highlighted pedagogical challenges manifested in workloads more time on preparation, adopting new teaching methodologies and limited class time where teachers cannot cover the assigned materials on time (Airey, 2011; Hung and Lan, 2017; Ruegg, 2021). For example, Bradford's (2015) observation of Japanese EMI classrooms revealed that some instructors watered down the curriculum when teaching the content through EMI. In this regard, Galloway (2017) concluded that teaching through EMI requires extra time, as teachers need to repeat information and use more examples, especially when teaching low-English-level students. This demonstrates the strong effect challenges have on teaching and learning through EMI. This study therefore focuses on challenges in the Saudi EMI medical context.

Students' challenges in learning content through EMI

Learning disciplinary knowledge through an additional language and at the same time learning that language as well as professionally relevant genres bring academic and non-academic challenges (linguistics and psychological challenges) for many students (Dearden et al., 2016; Ruiz-Madrid and Fortanet-Gómez, 2023). These challenges are anticipated, especially in the context of English as a foreign language, where students have limited levels of English (Heugh et al., 2017; Wilang and Nupong, 2022). Much research has examined students' challenges related to learning subject content through EMI. For instance, recently, Pun and Jin's (2021) investigation of the Chinese EMI classroom reveals that a lack of vocabulary knowledge and unfamiliarity with disciplinary language appear to be one of the significant factors that impede students understanding learning materials and comprehension of lectures as well as their communications in the classroom. Aizawa et al.s' (2020) study of the Japanese EMI context shows that speaking and reading skills were the most difficult skills students found when learning the content through EMI. In two different (yet similar) geographical contexts, Korea and Singapore, Bolton et al. (2017) and Kim (2017) found that students encounter difficulties in reading course materials, writing academic texts and participating in group discussions in English. Similarly, Kamaşak et al. (2021) looked at the experience of 498 students learning content through EMI in Turkey and found that students experienced difficulties in all language skills. Particularly challenging were writing for academic purposes and in-class EMI speaking.

In the medical context, Yang et al. (2019) observed similar struggles among Chinese first-year pharmacy students. They found that students have difficulties in understanding content and expressing empathy to patients and are unfamiliar with technical vocabulary. Such challenges were also experienced by Arab undergraduate students. Alazemi's (2017) and Ali's (2020) studies of Kuwaiti Omani students' experiences of learning subject matter in English revealed that many students face difficulties in understanding content knowledge, comprehending oral lectures, asking questions during lectures and responding to examination questions. In the Saudi context, using EMI for teaching science subjects also resulted in a number of challenges, including

difficulties in understanding reading materials, writing for medical purposes and understanding lectures delivered purely in English (Gaffas, 2016; Al-Kahtany and Alhamami, 2022). Consequently, these challenges adversely affect the academic performance of students, especially those with limited proficiency in English. This results in poor grades, leading to confusion, demotivation, and a sense of being "lost in translation." Such experiences may ultimately lead to some students dropping out or changing their majors (Ebad, 2014, p. 141). In fact, these challenges are not only experienced by students who study EMI content in English as a foreign language context, international students studying in English-speaking countries, for example in Australia, also found difficulties in understanding course content, reading medical journals and writing for medical contexts (Kay-Lambkin et al., 2002; Fang et al., 2006).

Studies have also shown that the level of students' learning difficulties in EMI classes varies depending on students' experiences in learning the subject in English and their English proficiency levels (Gaffas, 2016; Kir, 2024). In particular, first-and second-year students were found to struggle more in understanding EMI content than senior students (Kim, 2017). These linguistic challenges increase students' study workloads, requiring additional study time and extra effort (Hellekjær, 2009; Huang and Lu, 2022; Jones et al., 2022). These challenges also negatively impact students' learning experiences, causing anxiety and a lack of confidence (Lei and Hu, 2014; Bolton et al., 2017; Thompson et al., 2019). Researchers across these contexts argue that such challenges hinder students' comprehension of the content and cause significant impacts on their learning experiences in these EMI contexts. In addition, Schleppegrell (2007) stressed the importance of students' familiarity with disciplinary knowledge as it is important for facilitating content comprehension. She also indicated that learning the content through an additional language requires students to invest extra effort as they learn the language and content knowledge simultaneously.

Some researchers (see Curle et al., 2020b; Altay et al., 2022) have found that students' English proficiency was not a significant predictor of EMI academic success. These studies suggest that students' linguistic challenges stem from their lack of proficiency in the language of instruction, which hinders students' understanding of the content and thus affects their academic performance. This supports Yuksel's et al. (2021) findings which showed that the more proficient students were in English, the higher they achieved in their EMI academic courses. Rose et al. (2020) also argued that knowledge of academic English is a significant predictor of students' success in EMI, thus, students' language proficiency needs to be considered when designing such EMI courses. To overcome these challenges, researchers emphasise the need for language support systems to equip students with the academic language skills needed for discipline specific activities in EMI programmes (Galloway and Ruegg, 2020; Yuan et al., 2023). They argue that such support would address the linguistics challenges encountered by students across their EMI studies as well as raise their confidence to be more successful in their EMI courses. Medical students, particularly, are expected to have high English proficiency and thus expected to struggle less in EMI contexts. Nevertheless, very little attention has been paid to this area of research. Thus, this study aims to understand the experiences of medical students who study medicine EMI in a foreign language context. It specifically aims to examine the challenges that medical students face when learning content through English only in Saudi medical schools.

Methodology

Context of the study

This study took place at four public medical schools in two Saudi Arabian cities. All four schools use English as the MOI, with the aim of preparing students with the academic skills needed for their future careers in medicine. Three of these offer separate male and female sections for medical instruction. The fourth university's medical programme was established solely for female students. These schools use different learning and teaching approaches, such as the problem-based learning approach, and are equipped with laboratories stocked with teaching aids, such as human anatomical models. These programmes are taught by professionals representing a diverse number of nationalities, such as Saudis, Egyptians, Sudanese, American, British, Indians and Pakistanis. Admission to these schools is generally determined by students' achievements in high school: high school grade point average and the scores of the two national exams, namely, the general aptitude test and the standard achievement admission test. These programmes span 7 years, and students are required to study in a preparatory year programme (PYP) during the first year to equip them with the skills needed for EMI university courses and complete an internship in their final year.

Participants

Using random sampling, 373 students studying medicine at these four medical schools participated in the study. The students' ages ranged from 18 to 26 years, with the majority of them ($n = 227$) aged between 21 and 23 years, as illustrated in Table 1. All students enrolled in these schools were undergraduate Saudi students speaking Arabic as their mother tongue.

The students represented six levels of study: from Year 1 to Year 6. A majority of these students (66%) graduated from public schools,

TABLE 1 Student participant profiles.

Feature	Profile		
Student Numbers	373		
Age	18–26 years		
Level of study	1 year	46	12
	2 years	85	23%
	3 years	68	18%
	4 years	78	21%
	5 years	72	19%
	6 years	24	6%
School type	Government	245	66%
	Private	114	31%
	International school	12	3%

where they learned their content subjects in Arabic. Most of them studied English as a foreign language throughout their primary and secondary education. The students' proficiency levels in English were assessed through a self-evaluating scale; 32% rated themselves as "very good," 31% as "excellent," 7% as "good" and only one (i.e., 3%) rated as having an "acceptable" level.

Study design

This study adopted a mixed-method research approach to comprehensively understand the challenges faced by medical students in Saudi Arabia under English medium instruction (EMI). This approach, integrating both quantitative and qualitative methods, allowed for a more nuanced exploration of the students' experiences (Pun and Curle, 2022). Quantitatively, we utilized a structured questionnaire to collect broad-based data on students' challenges and backgrounds. This questionnaire was carefully designed, drawing on validated instruments and tailored to the specific context of Saudi Arabian medical education. To enhance the reliability of the questionnaire, we conducted a pilot study involving 8 students from a separate but similar cohort to the main study group (see Curle, 2018). The pilot results were used to adjust question phrasing and scale sensitivity, ensuring clarity and respondent understanding. The reliability of the final questionnaire was confirmed via a Cronbach's alpha calculation, which yielded an alpha of 0.87, indicating good internal consistency (De Vaus, 2013; Luu and Hoang, 2022). Descriptive statistics were used to analyse quantitative data. Qualitatively, we conducted semi-structured interviews to delve deeper into the nuances of students' experiences and perspectives. These interviews provided rich, detailed data that complemented and expanded upon the questionnaire findings. The interview guide was developed based on the themes identified in the questionnaire results, ensuring that the questions were open-ended to elicit detailed responses and additional insights into the challenges faced. To validate the interview questions, a trial interview session was conducted with five volunteers who were not part of the study but shared similar characteristics with the target population. Feedback from these sessions was used to adjust the questions to avoid ambiguity and bias, enhancing the construct validity of the instrument. Each interview was recorded and transcribed verbatim, with transcripts reviewed for accuracy by two independent researchers. A subset of interviews was coded independently by two researchers to calculate inter-rater reliability, which was satisfactory and indicated a strong agreement (Kappa = 0.82). Open coding (i.e., interview data was broken down into discrete parts and significant themes and patterns were identified without preconceived categories) was used to analyse the qualitative data (Orafi and Borg, 2009; Blair, 2015).

By employing this mixed-method approach, the study captures a comprehensive picture of the linguistic and pedagogical challenges encountered in EMI settings, ensuring both breadth and depth in the analysis. This comprehensive approach aligns with CLIL methodologies by exploring not just linguistic proficiency but also the integrative learning experiences that are crucial for mastering medical discourse in a second language.

Instrument and procedure

This study used a mixed-method research design to gain a better understanding of the students' experiences in the EMI context (Punch, 2013). Data were collected through a questionnaire and semi-structured interviews from four Saudi medical schools. After ethical approvals were granted from the universities and the students gave their consent, 373 students completed the questionnaire, and 60 students volunteered for a follow-up interview. This questionnaire drew on a validated recent study (AlBakri, 2017), with new items added and existing items modified to suit the Saudi Arabian context and address the aim of the study. The questionnaire comprised 22 questions divided into two main sections, seeking information on the students' backgrounds (e.g., age, level of the study) and the challenges they experienced when learning medicine through English only (e.g., "I found difficulty in reading course materials"). The questionnaire was translated into Arabic to

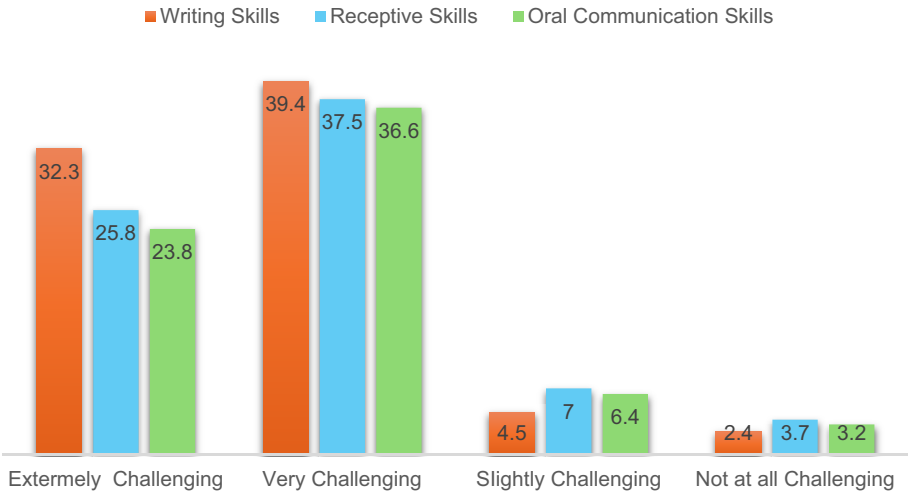

FIGURE 1
Comparison of students' linguistic challenges.

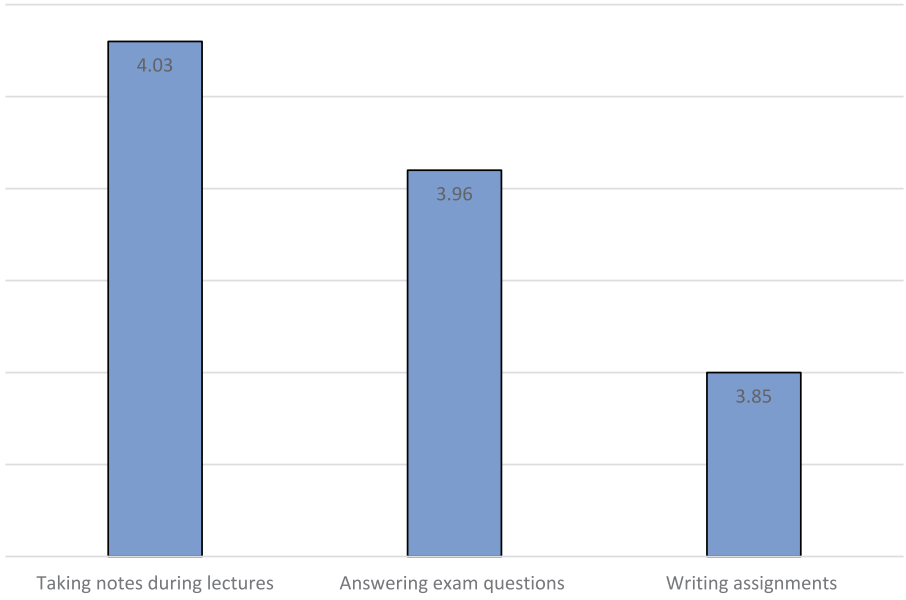

FIGURE 2
Student's challenges in writing skills.

avoid any misunderstandings that might result from the students' English language proficiency (Rubin and Babbie, 2016, p. 127). Once the Arabic version was finalised, it was reviewed by two English-Arab-speaking teachers to ensure the quality of the translations (Riazi, 2016, p. 261). Then, it was piloted with 12 students studying medicine at some of the targeted medical schools and revised accordingly, e.g., any items reported as unclear were rephrased (see Bryman, 2016).

The second instrument used was a semi-structured interview to elaborate on and provide a detailed description and justification of the students' answers to the questionnaires' questions (e.g., "What challenges do you face when teaching medicine using English only?"). Prior to the actual interviews, an e-mail follow-up was sent to the participants 1 day before the interview was scheduled to take place with a reminder about the scheduled interview date, time and location. Most of the interviews were conducted outside class hours in quiet areas on campus, such as an empty classroom or the university library. The interviews were conducted individually and lasted from 10 to 15 min.

Data analysis

The data obtained from the questionnaires were analysed quantitatively using the Statistical Package for the Social Sciences (SPSS) software version 11. Following the initial statistical analysis, descriptive analyses using means were employed to bring objectivity to the results of the study (Punch, 2013). The data obtained from the interviews were transcribed first, translated into English and then analysed qualitatively through a thematic analysis (Bryman, 2008).

Findings

This study examined the challenges medical students encounter when learning the content of medicine through EMI in medical context. The analysis of the questionnaire and the interviews illuminated four major linguistic challenges: understanding pure English lectures, oral communication skills, reading course materials and writing for medical purposes. Across these challenges, the quantitative data revealed that writing for academic purposes is the most challenging skill that the students encounter (39% = very challenging and 32% = extremely challenging), followed by receptive skills of reading and listening (38% = very challenging and 26% = extremely challenging), and speaking skills (37% = very challenging and 24% = extremely challenging), as illustrated in Figure 1. Notably, the challenges that the students highlighted were salient among the younger students (i.e., first-and second-year students). The development of these skills is essential for mastering the academic and professional genres typical of medical disciplines (e.g., medical report and reading medical articles), reflecting the core goals of CLIL to foster both language and disciplinary literacy.

Challenges in writing skills

When looking closely at each skill assessed in the study, the analysis clearly shows that the students particularly highlighted the importance of writing for academic purposes, emphasising its role in their academic success and communication abilities. As shown in Figure 2, they consistently found "taking notes during lectures" (4.03),[1] "answering examination questions" (3.96) and "writing assignments in English" (3.85) to be the most challenging tasks they face in the medical EMI classroom.

1 To facilitate data analysis, the means were interpreted as follows: 1.00–1.80=strongly disagree; 1.81–2.60=disagree; 2.61–3.40=neutral; 3.41–4.20=agree; 4.21–5.00=strongly agree.

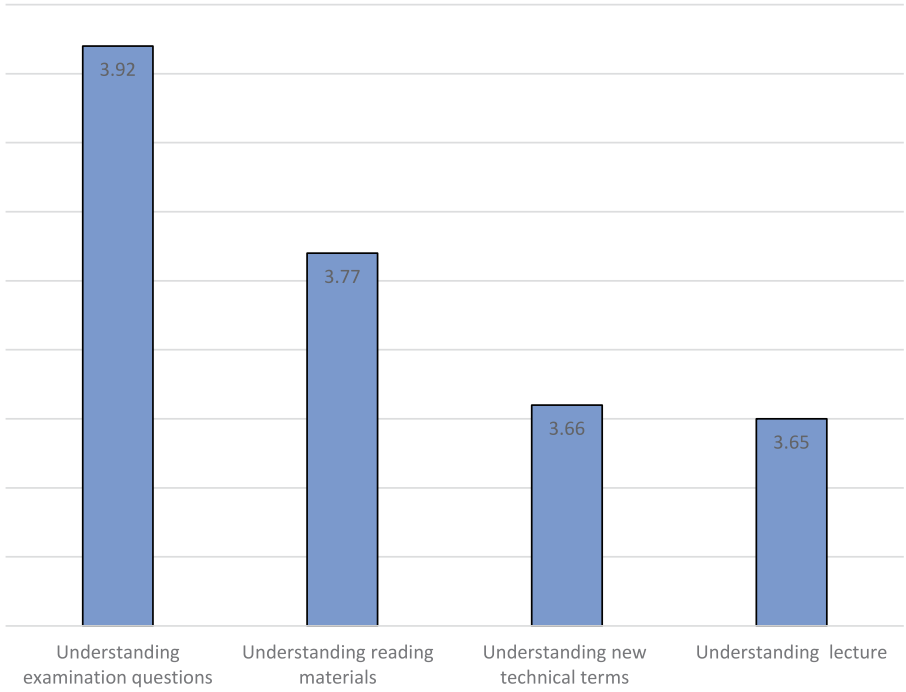

FIGURE 3
Students' challenges in reading and understanding EMI content.

These findings were reinforced in the interview data, where the students interviewed highlighted the difficulties they face with basic writing skills (e.g., grammar, spelling and organisation of ideas), especially when writing for academic purposes (e.g., writing a medical report, writing classroom assignment). One of the key writing challenges students encountered, especially in their first year, was writing notes in English. As a result, many of them chose to write their classroom notes in Arabic during lectures (e.g., "I use Arabic when… writing notes during lectures to catch up with the lecture" [S12-2]). Then, after class, they would rewrite their notes in English, as S7-3 described:

> "I used to write my notes in Arabic in the first year because (I) could not write them in English directly, especially when the teacher speaks fast. And when get back home, I rewrite them in English." [S7-3]

Notably, when talking about their experiences, the high-level-English students frequently recounted how their difficulties with grammatical accuracy and clear writing were most salient in their first years (years 1 and 2). S58-6 indicated that she "faced difficulty with writing a paper with correct grammar and free (of) spelling mistakes in [her] first years." Other students expressed a similar experience, recounting how it was difficult for them to write in their early years, but that they grew more confident and proficient later on.

> "It was really difficult to write in my first year, but now it becomes easier; I can write my assignment and notes directly in English." [S32-4]

> "Writing was very difficult for me when I started my program, however, I noticed that it has remarkably improved, I can write a research paper now without much struggle." [S55-5]

> "Responding to the first-year exam questions was a challenge for me, but now I understand their instruction and able to answer them confidently." [S32-4]

The students also expressed how they become more confident in their writing (e.g., "Compared to last year, I feel that my writing skill has developed in terms of vocabulary and spelling" [S49-3]; "My writing notably improved compared to the last year; I learned a lot and become more confident in writing different types of essays" [S48-3]).

In conclusion, this study underscores the evolving nature of students' writing challenges in a medical EMI context. Initially, students grapple with basic writing skills and adapting to English for note-taking and academic assignments. However, with time and practice, their proficiency notably improves, as evidenced by their increased confidence and ability to write directly in English. These findings highlight the importance of continued support and tailored strategies in the early stages of EMI programs to facilitate smoother transitions and enhanced academic success in writing skills.

Challenges in receptive skills

The second linguistic challenge that the students face is receptive skills (reading and understanding). The analysis of the questionnaire

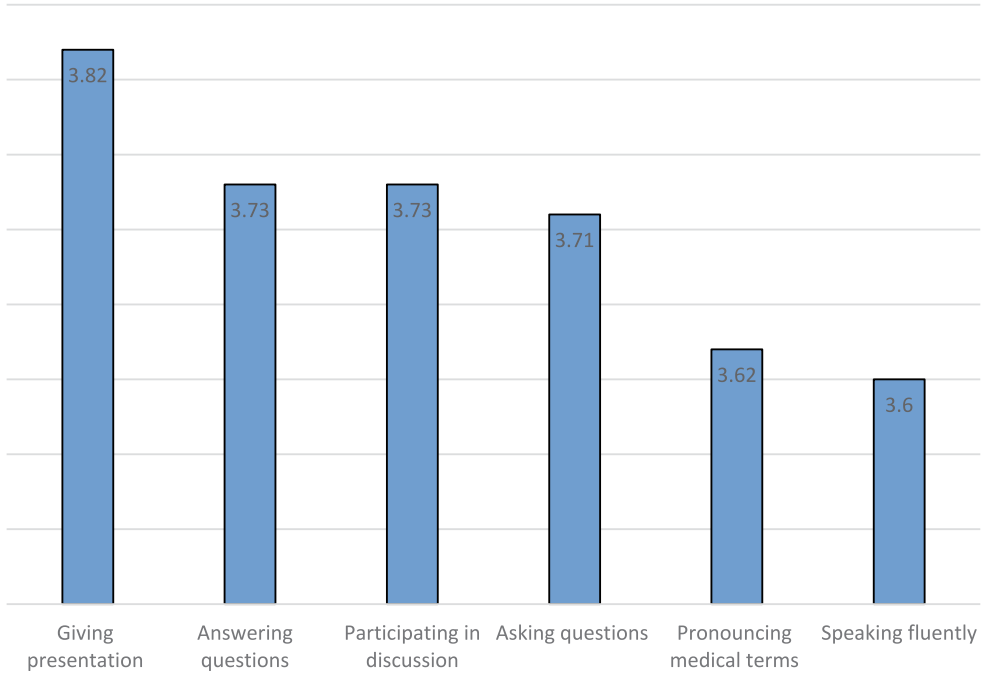

FIGURE 4
Students' challenges in oral communication skills.

revealed that a majority of the students (>63%) indicated great difficulty in reading and understanding the EMI content. As illustrated in Figure 3, the students found difficulty in "understanding examination questions" (3.92), "reading medical materials" (3.77), "understanding new technical terms and concepts" (3.66) and "understanding lectures given purely in English" (3.65).

These results are consistent with the students' views in the interviews, in which many of them commented on how they encountered difficulties in reading and understanding English language in the context of medicine, particularly in their first year. For instance, S12-3 and S20-2 expressed difficulties in reading and understanding course materials, such as medical textbooks and medical articles. To understand these materials, they spend extra effort and much time translating the new words or terms into their L1 and then understanding them, whereas the others who are proficient in English take much less time studying.

> "I faced difficulties in understanding the reading references and the course materials (e.g., textbook) as I met many new medical terms that I am not familiar with. Thus, I spend much time to search for their meaning, translating them into Arabic and then understand them." [S-17-5]

> "In order to understand a lecture, I read it three times, the first reading is just for previewing, the second reading is for searching for unfamiliar terms and translate them, and the third one is for assuring my understanding and this requires longer time." [S49-3]

> "I struggled a lot in my first year. I did not understand much. I used to translate many words to understand the topic." [S13-5]

Challenges in oral communication skills

Another linguistic challenge the students face is oral communication skills. The majority of them (>85%) reported that they struggled most with "giving oral presentations confidently' (3.82), "answering teachers' questions" (3.73), "participating in group discussions" (3.73), "asking questions during the lectures" (3.71), "pronouncing medical terms correctly" (3.62) and "speaking fluently" (3.60; see Figure 4).

The interview data supported these findings. The students described their difficulty in speaking fluently (e.g., "One of the challenges I faced is speaking fluently" [S5-2]), giving presentations (e.g., "I also found difficulties in giving oral presentation in front of the class" [S4-2]), and pronouncing medical terms (e.g., "Pronouncing new technical terms are difficult for me" [S12-2]). Similar to the difficulties described in the section on writing challenges, the data reinforced how these challenges were more salient in the students' first and second years:

> "I was not able to speak fluently when I was in my first year, particularly when giving presentations" [S26-4].

> "The most difficulties I encountered in my first year was speaking in front of the classroom. That [is] because we had no experience in giving presentation in high schools." [S26-4]

One of the main reasons the students cited for their difficulty was their lack of confidence, in which many of them indicated that they felt stressed and anxious when trying to express themselves or present their work in English, particularly in their first years:

> "I felt that I could not speak like other students and had lack of confident and this causes many psychological problems I still suffer from." [S25-4]

> "I was unable to speak in the classroom confidently, and this affected me negatively, making me feel worried and concerned about my grades too." [S26-4]

In summary, the study reveals significant challenges in oral communication skills among medical EMI students, particularly in the early years of their studies. These challenges include difficulties in speaking fluently, giving presentations, and pronouncing technical terms, often compounded by a lack of confidence. These findings suggest a need for targeted support in oral communication skills, especially for first and second-year students, to build confidence and enhance their overall academic performance.

Discussion

Overall, the findings of this study revealed that the students experienced challenges in learning the content of medicine through EMI especially writing for academic context, reading course materials, understanding lectures delivered completely in English and giving presentations confidently. Notably, these challenges were more salient among the first-and second-year students, consistent with Airey's (2010) findings which reveals that students who study subject content for the first time in English face linguistics challenges. However, senior students (e.g., fourth and fifth year students) and proficiency as they progressed through further years of study. Compared to the first 2 years, they reported that they become more familiar with the language of medicine, being able to write for medical context, and comprehend oral lectures. In the Saudi context, these findings underscore the critical need for targeted linguistic support and curriculum adjustments in early years to accommodate the unique educational backgrounds and language proficiency levels of students transitioning into English medium instruction.

The analysis revealed that the most challenging sub-skill the students face is writing in an academic style, one of the most difficult writing tasks that the students struggled with was taking notes during lectures in English. Although this is seen as a productive skill (i.e., writing), the findings suggest that this difficulty may result from a lack of listening proficiency. Students struggle to understand what the instructor is saying during lectures and are thus unable to record notes in English. This interaction of listening and writing skills has been highlighted as a challenge by Yıldız et al. (2017) and Soruç et al. (2018), who investigated students' challenges in some EMI institutions in Turkey and found that they struggled to listen and write simultaneously. In the study context, this dual challenge highlights the necessity for enhanced auditory and language processing supports, such as improved acoustics in lecture halls and the provision of lecture transcripts, to help students better assimilate and record complex medical information presented in English and, therefore, enhance their listening, reading skills and overall, their understanding of the content.

The second most challenging sub-skill students face is oral communication skills, including answering their teachers' questions during lectures, pronouncing technical terms and giving oral presentations. The findings showed that one of the key contributing factors to the issues was a lack of confidence which prevents the students from engaging in classroom participation and group discussions in the classroom, a similar issue raised in other EMI studies (e.g., Bolton et al., 2017; Rose, 2021; Yüksel et al., 2022). Another factor inferred from students' interview was students' educational background where they used to learn through traditional lecturing where they relied heavily on teachers in providing information.

In addition, the students also experienced difficulties with understanding and reading skills. As a result of their unfamiliarity with the medical language (e.g., technical terms) and their limited proficiency in English, many students were unable to fully understand the medical subject matter without translation. This lack of vocabulary knowledge has a significant impact on student understanding of course materials and comprehension of pure EMI lectures and therefore impacts their academic performance, as found in previous research findings (Uchihara and Harada, 2018; Pun and Jin, 2021). Across the interviews, the majority of students indicated that they relied heavily on translation especially in their first 2 years, searching for meanings of new terms, translated them into their L1 and then memorised them in English (form, pronunciation, meaning). These are perceived as time consuming and require extra effort. In additional to this, as found in Alanazi's (2021) study, lack of an equivalent meaning for many medical terms in Arabic is another issue. This requires extra cognitive load where students need to memorise the new terms in English as they are and use them when communicating with patients. This also creates a concern related to the quality assurance in healthcare context (i.e., lack of communication and understanding between patients and physicians).

As a result of these linguistics challenges, students experienced stress, anxiety, and lack of confidence, especially when it comes to giving a presentation in front of the class. These also cause demotivation among highly ambitious students who, after experiencing numerous academic challenges, withdraw or change their majors (Ebad, 2014; Yuksel et al., 2021).

Interestingly, despite the significant linguistic challenges they face, the findings show that the students still preferred learning medicine through "the international language" (English). They feel that English is critical for their professional careers. Thus, they were highly motivated, engaged considerably in self-learning to increase content comprehension (e.g., relying heavily on translation, which is extremely time consuming) and became responsible for developing their knowledge and mastery of the foreign language. This confirms the findings of Thompson et al. (2019) which showed that students with stronger efficacy put more effort and spend much time to succeed in their EMI courses. In SA, this preference for English underscores the broader national policy towards global integration and the increasing demand for English proficiency among healthcare professionals, which aligns with the country's vision to elevate the standards of healthcare education and services.

These linguistics-related challenges were not unexpected in such contexts. Prior to enrolling in university, the majority of these students had studied their subjects in Arabic. When they begin their university degrees, all materials are suddenly taught in English. This sudden change to an English environment often involves dramatically different teaching styles and learning experiences. In fact, these linguistic

challenges are not restricted to Saudi undergraduate students in the current study, these are global issues faced by many undergraduate students studying content subjects through EMI. For instance, in their examinations of Turkish and Hong Kong students' experiences in EMI contexts, Soruç et al. (2021) and Pun et al. (2022) found that students experience challenges in productive skills (writing and speaking) when learning content in English. These challenges have also been observed among international students who study in English-speaking countries (Kay-Lambkin et al., 2002). This issue has also been acknowledged by many researchers and educators (e.g., Halliday and Martin, 2003; Schleppegrell, 2007) who argue that it might be difficult for both English and non-English students to read and understand disciplinary content especially in Science as learning the language of science is considered to be learning a "new language' as it comprises concrete entities and abstract concepts (Martin, 2019). This commonality underscores the importance of cross-cultural studies and collaborative strategies in educational policy-making, particularly in Saudi Arabia, where a balanced approach could significantly ease the transition for students and improve educational outcomes in EMI settings. Such strategies could include bilingual support resources, faculty development programs tailored to EMI environments, and increased availability of content-specific language training. To address the challenges highlighted in the study, it is essential to provide targeted recommendations. Firstly, institutions could enhance their language support services, such as offering specialised medical English courses that focus on terminology and discourse specific to the healthcare field. Additionally, integrating technology-based tools like language learning apps and medical databases can facilitate students' independent study and reduce reliance on time-consuming translation methods. Mentorship programs that pair students with bilingual professionals could also be implemented to provide practical language practice and professional development. These strategies align with the broader educational objectives of enhancing language proficiency while also preparing students for global professional environments, thus supporting Saudi Arabia's vision for healthcare education and services.

The dramatic transition in education (from high school to EMI university level courses) can disadvantage students and present serious challenges to their ability to comprehend and communicate their knowledge as found in previous research findings (Aizawa and Rose, 2020). The findings of this current study suggest that the current foundation programmes in this context do not adequately prepare students into the English-only immersion learning experience, ignoring their limited language proficiency, and learning needs. These raise critical questions about students' readiness for EMI courses, an issue was also raised in a similar context, Oman, where Albakri (2017) and Ali (2020) pointed out that preparatory programs are not adequately preparing student for EMI academic contexts. On this, researchers (e.g., Evans and Green, 2007; Kim et al., 2024) argued that EMI programmes need to have entry requirements that ensure students are ready to commence and succeed in their EMI studies. Enhancing language support systems in EMI settings could further strengthen the dual goals of CLIL by not only addressing immediate linguistic challenges but also by fostering broader educational competencies required in the 21st-century medical field (e.g., interprofessional education, addressing the broader health issues and needs of the population).

Conclusion

To summarise, this study examined students' experiences in learning medical content with EMI in four Saudi medical schools. Four main challenges were identified: writing for academic purposes, reading and understanding medical materials and communicating orally. These challenges were more pronounced among the first-and second-year students, but seemed to dissipate in the later years. Based on these findings, a practical implication might be creating an abridging English language course in the form of EMI to prepare students for EMI medical courses during the PYP. Such a programme might focus on building students' technical vocabulary knowledge and developing their academic reading and writing skills. The course can also focus on students' oral communication skills needed for healthcare settings. As suggested by other researchers (e.g., Aizawa et al., 2020; Galloway and Ruegg, 2020), these schools can also establish support centres (focusing on specific skills needed for EMI contexts), accessible to students during their studies and facilitated by faculty and university language centres. Lecturers teaching through EMI also need to be aware of and understand the linguistic challenges students encounter to help them overcome these challenges. Though EMI teachers may be experienced in teaching (Hua, 2019; Alanazi, 2021), they still need continued professional development to keep them updated on recent teaching and assessment methods, as well as using EMI teaching strategies such as translanguaging (see Alhassan et al., 2021; Richards and Pun, 2022; Yuan et al., 2023).

This study highlights several policy implications that could enhance the effectiveness of EMI in medical education. Policymakers should consider establishing robust language support systems and tailored EMI training programs for both students and faculty to ensure that linguistic competence aligns with the rigorous demands of medical education. Furthermore, the development of specific entry requirements and preparatory programs that address the unique needs of EMI students could mitigate initial academic and linguistic challenges (see Derakhshan et al., 2021). These policies could also promote the integration of technology and innovative teaching methods to support EMI learning environments, potentially increasing student engagement and improving educational outcomes in global medical settings.

The study's limitations include its focus on a single foreign language context and its examination of EMI involving only teachers and students at four universities, while excluding decision-makers, material designers, and English language teachers. For a deeper understanding of EMI's impact, future research could undertake longitudinal studies to assess the long-term effects on medical students' careers, such as professional and communication challenges in the workplace. Additionally, comparative analyses of academic performance and professional readiness between EMI and non-EMI programmes, as well as qualitative investigations into faculty experiences with EMI, would be beneficial.

Further studies might also examine the influence of EMI on clinical communication skills, the role of technology in enhancing EMI learning outcomes, the development of educational policies and frameworks to optimize EMI integration, and the strategies students

use to navigate linguistic and academic challenges in EMI settings. These research directions can deepen understanding of EMI's effectiveness and guide improvements in medical education practices globally.

Data availability statement

The original contributions presented in the study are included in the article/supplementary materials, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by the Macquarie University Ethics Review Committee. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written and oral informed consent to participate in this study. Written informed consent was obtained from the participant(s) for the publication of any data included in this article.

Author contributions

KA: Writing – original draft, Writing – review & editing. SC: Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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