English-Medium Instruction and Content Learning in Freshman Year: An Investigation of a Saudi University Students' Challenges and Learning Strategies

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Abstract

The present study investigates the challenges that science freshmen perceive in English-medium instruction at Prince Sattam bin Abdelaziz University in terms of language and learning as well as the frequency of relevant learning strategies employed by students. A questionnaire was used to collect data from 376 students enrolled in the First Year Program at Prince Sattam Bin Abdelaziz University, considering their gender, scientific tracks, and previous English exposure. Results reveals that females were less comfortable communicating with professionals in their classrooms. Simultaneously, freshmen females perceive greater challenges in content comprehension, knowledge application, and learning adaptability. Therefore, they relied on learning strategies supported by L1 more frequently than males. Comparison of groups based on tracks shows that engineering students have more difficulty communicating with professionals than medical students. Furthermore, freshmen with extensive prior English exposure had fewer difficulties communicating with their peers and professionals. They perceived fewer difficulties with content comprehension, knowledge application, and learning adaptability. In contrast, freshmen with little prior exposure to English relied more on L1-related learning strategies. The findings show significant differences in perceiving EMI-related challenges and adopted learning strategies based on the relevant variables. They suggest that the shift from high school Arabic-medium education to English-medium instruction in higher education requires careful institutional and individual planning.

Keywords: English-Medium Instruction, translanguaging, learning strategies, students' perceptions, science learning, English exposure

1. Introduction

It is now a reasonable assumption that English is rapidly spreading throughout the world due to globalization. People all around the world use a common language in order to share ideas and information. This dominant language has contributed to more widespread implementation of English Medium Instruction (EMI) in education. EMI can be defined 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. 4). There have been no restrictions on the establishment of EMI to date; in general, integrated EMI education is commonly used in tertiary education worldwide. Europe and Asia prevail in the body of EMI research throughout the educational phases. Africa is underrepresented in the other phases. Besides, in primary and high school, studies on the effects of L1 and L2 teaching programs are more prevalent than those in higher education (Macaro, Curle, Pun, An, & Dearden, 2018) . Recent studies have indicated the positive impact of EMI implementation. has shown positive effects of EMI has been found by examining twenty-five empirical studies related to content and language outcomes in Europe and Asia (Graham, Choi, Davoodi, Razmeh, & Dixon 2018). However, it is worth mentioning that Graham et al. (2018) detects various methodological issues that could impact the accuracy of the study results. Education stakeholders are strongly supportive of EMI instruction because it could benefit both students and educational institutions. It is suggested that exposure to L2 will enhance the students' vocabularies and skills they need to have promising future in employment (Adolphs & Schmitt, 2004). Equally important, studies have shown the role of EMI implementation in the increasing labor market's opportunities. For instance, Tamtam, Gallagher, Olabi, & Naher (2012) maintained

that the implementation of EMI in engineering education in Libya will increase the opportunities for the labor market for graduated students. Thus, students' excitement about better future might increase their desire to acquire English through content context assisted by EMI. Another reasonable point of EMI implementation is that EMI programs offer university administrators a direct path to rapid advancement in international rankings, enabling them to hire more foreign faculty members and foreign students. Positive outcomes are consistent with previous research, but they appear to be inconsistent with several studies. For example, Rahman, Singh, & Karim (2018) analyzed EMI policy in higher education in Asia. Accordingly, the findings showed an obvious lack of planning in the policy goals, which threatens the development of knowledge in higher education through the ill-utilization of language policy. In many universities, simply implementing EMI courses creates a gap between an organization's objectives and student perceptions (Tsou & Kao, 2017). Relatedly, the outcomes about applying EMI could be disappointing especially for students whose English proficiency is not sufficient. Almeniei (2005) found that Saudi students are not yet prepared for such challenges. It worth mentioning that Mazak and Carroll (2016) recommended using a multilingual person's entire linguistic repertoire rather than remaining narrowly focused on a single language, suggesting translanguagingas a helpful strategy to overcome EMI challenges in tertiary education.

Previous research on EMI is scarce in the Saudi higher education context. The purpose of the current research isfill in the gap and to know the extent of challenges of EMI for freshmen at Prince Sattam bin Abdulaziz University, Kingdom of Saudi Arabia (PSAU) by using a quantitative method investigating the extent of students' barriers for communicating and learning by L2 as well as the frequency of learning strategies they apply.

1.1 Statement of the Problem

Saudi students generally are not yet prepared to acquire English language which formed a challenge in education (Almeniei, 2005). For this reason, the study was designed to investigate EMI challenges in terms of English language and content learning that obstruct its purposeful objectives in tertiary education for freshmen who are enrolled at PSAU, taking into consideration their gender, field of study (Medical and Engineering), and English exposure before admission to the university. Furthermore, for the same variables, this current study investigates the learning strategies the freshmen at PSAU employ to overcome English Medium Instruction challenges.

The significance of this study stems from the fact that the Saudi higher education context is still underrepresented in EMI-related research. English is considered a foreign language but all science programs in the Sauid universities provide their programs with English as the medium of instruction. It is supposed that this could directly affect the learning outcomes, which necesitates further work on EMI implementation. It is expected that the outcome of the present study will add to the existing body of knowledge for the higher education about the freshmen's situation in order to develop promising plans for continuous improvement by bridging the gap between this awareness and the actual freshmen's linguistic and cognitive challenges.

1.2 Research Questions

The purpose of this research is to investigate whether EMI-related challenges encountered by freshmen at PSAU in Kingdom of Saudi Arabia by using a quantitative method to investigate the extent of students' barriers for communicating and learning by L2 as well as the frequency of learning strategies they apply,with the variables of gender, field of study (engineering or medical), and English exposure (before university) considered. As a result, the overall research objectives generated two research questions as follows:

1. Do EMI-related challenges in language and learning that are encountered by PSUA freshmen differ based on gender, field of study, and previous English exposure?

2. Are there differences in the frequency of EMI-related learning strategies use of PSAU freshmen by gender, field of study, and previous English exposure?

2. Review of Literature

2.1 EMI Implementation Challenges

Some studies focused on EMI implementation challenges in many countries. Previous studies have agreed that there are three main challenges. Tsuneyosh (2005) maintained that there are three categories classified as key issues of the EMI program: linguistic aspects, cultural aspect, and structural issues. Moreover, Kriukow and Galloway (2018) confirmed some obstacles that impede what the EMI looks forward to. Their study included seven higher education institutions in Japan and eight in China. Interviews, focus groups, and questionnaires were used as data collection tools. The findings showed the difficulties of implementing EMI into four main points. The first is language-related difficulties, which include both staff and student issues. The second one is institutional/organizational challenges in

support and collaboration. The third challenge is related to nationality and culture, which includes both staff and student issues. Materials-related challenges represent the last one. Similarly, Vu and Burns (2014) investigated the challenges stakeholders face after the implementation of EMI programs in Vietnamese public universities. They used a semi-structured interview alongside the questionnaire. They found that lecturers were challenged by their own language skills, students' language skills and learning styles, teaching issues, and resource availability.

2.1.1 Language-Related Challenges

Linguistic challenges are language issues that both faculty members and students involved in EMI programs face (Bradford, 2016). For instance, Hellekjær (2017) reported difficulties in taking notes and asking or answering questions in English. Furthermore, the lecturers' lack of proficiency could also be a challenge. Klaassen and De Graaff (2001) emphasized that that content teachers should be qualified enough to teach in English language.

Gröblinger (2017) refers to the difficulties that students face on EMI as a double challenge because they are expected to learn not only the added content in a foreign language but also to improve their English language proficiency, learn new terminology in each field, and become acquainted with different registers. In view of inadequate language proficiency effects on both teachers and students, such instruction frequently has an impact on content learning. Consequently, EMI may not fulfill its goals (Hamid, Nguyen, & Baldauf Jr, 2015). In a recent study, Zumor and Qasem (2019) claimed that using English to teach scientific disciplines has a significant negative impact on 78 percent of the students. They concluded that the English language, which students learn intensively, does not prepare them to act effectively in an environment where English is the medium of instruction for scientific content.

Despite the hundreds of accessible sources on EMI challenges, there are few studies that investigate many influential variables such as gender differences in EMI challenges, field of study, prior exposure to the English language. Nevertheless, few recent international studies take these variables into consideration. For example, Turkish learners perceive EMI courses and English skills as more difficult than international students due to their less exposure to English in preceding tertiary education (Kamaşak, Sahan, & Rose, 2021). On the other hand, Bukve, (2020) focused on the differences in how male and female students assess language use in higher education in Norway and Finland. When male and female students' responses to questions about how language practices influence student participation and learning are compared, EMI appears to have a greater negative impact on learning for female students than males. , In contrast, other studies showed the female dominance of language skills in tertiary education (Daif-Allah & Aljumah, 2020; Tamayo 2019). Besides, Pun and Jin (2021) found that male students seek more explanations for scientific content in L2 than female students.

Furthermore, Wei and Hricko (2021) illustrated some advantages and disadvantages of using EMI in the Taiwanese medical education field. When it comes to the downsides that Taiwanese medical students and faculty members see, it is reasonable to discuss the types of difficulties that even students with high English levels might indeed face when learning content through the use of English, especially if they are used to understanding the content of their curriculum in Chinese. Therefore, they argued that it is self-evident that students with poor proficiency levels of English face greater difficulties as they must master unusual academic content in an unfamiliar language. Moreover, a promising future represents an opposing view, i.e., EMI for medicine and health programs in Taiwanese universities facilitates knowledge and skill transfer across all international boundaries. Joe and Lee (2012) indicated that medical students have higher levels of English proficiency than other majors. Kim, Kweon, & Kim (2016) found that approximately ninety percent of engineering students believe that L1 should be used to aid their learning. It is worth mentioning that Chen and Lin (2021) stated that in Taiwan, EMI challenges for the engineering field are still unexamined.

Furthermore, Pun and Jin (2021) found that students with lower-level English exposure are experiencing more difficulties in the content. However, students at all levels recognized the importance of English proficiency in science education and used a range of different strategies to overcome EMI study obstacles. Matusevych, Alishahi, and Backus (2017) previously reported that a greater cumulative amount of second language exposure leads to better learning performance.

Martínez (2016) maintained that the linguistic problems in Brazil represent the most difficult issues in EMI rather than cultural problems, which can be solved. Another linguistic issue is that many countries offer English as a foreign language at high school. All other subjects, however, are taught in the first language. Starting to implement EMI in higher education makes it an unfamiliar program and very complicated for freshman students. Tamtam et al. (2012) stated that most higher education institutes face similar issues during the EMI implementation process, such as lack of funds, lack of qualified teachers, lack of student understanding and interest, and cultural rejection issues. They , nonetheless, stated that "if the authorities are afraid it might threaten the culture and lifestyle of the population,

only some specializations could be taught through English, like medicine, engineering, science, etc." (2012, p.7).

2.1.2 Culture-Related Challenges

Some studies found out rejection of some nations of the culture that EMI carries, and , therefore, EMI has been considered a threat to national identity. In Italy, attempts to apply EMI have raised concerns about "the creation of an Anglophone élite to the detriment of the Italian language and culture, which are the cornerstones of our richest and enviable tradition and intellectual identity" (Generali, 2013, p. 6, cited in Molino & Campanha, 2014, p. 155). On the other hand, the Malaysian Prime Minister's desire for EMI to be offered in private universities rather than public universities was due to Malay nationalist's objection. Hence, this caused issues because graduates from public universities, who are predominantly Malay in ethnicity, graduated monolingual in Malay, whereas graduates from EMI private universities, who are predominantly Chinese and Indian in ethnicity, had more than language and better employment opportunities (Ali, 2013).

Nevertheless, some researchers have tried to push for the further development of attitudes toward English as a foreign language in their community. Alalwi (2020) found that freshmen at a Saudi university showed favorable attitudes toward EFL. Moreover, students believed that their use of English does not threaten their national identity. The findings also highlighted students' awareness of the importance of English for communication and education. Furthermore, EMI implementation was viewed positively by science students in some Arab countries. For example, Al-Jarf (2004) found out that EMI is preferred by 96 percent of Jordan University students and 82 percent of King Saud University students for engineering education, medicine, and science. This is due to a lack of translations into Arabic, a lack of scientific and engineering research in Arabic, and the industrial market's preference for people who speak English. Similarly, at Qatar University, a study was conducted to assess students' attitudes toward the medium of instruction. The findings confirmed that the higher education must take steps to ensure that graduates' levels of English proficiency meets the requirement of the job market (Ellili-Cherif & Alkhateeb, 2015).

Much of the local research concentrated on the cultural barriers that exist in the classrooms between students and native lecturers. Accordingly, deficient performance and grades, poor knowledge and learning, and low learning outcomes are the results of this challenge. The communication gap between the learners and the instructor in the Saudi community can be attributed to the language barrier besides the cultural differences, which can represent a potential threat to EMI implementation (Ryhan, 2014). The hiring of administrative and teaching personnel is central to the administrative and management aspects of EMI. Program coherence may suffer as a result of structural challenges such as lack of EMI courses, incompetent staff working in diverse populations, underachiving students with low academic potentials needed to study in English; and ultimately students who graduate nearly illiterate (Bradford, 2016).

2.2 Possible Solution for EMI Challenges

Recent studies have indicated some recommendations which can contribute to some EMI possible solutions to these challenges. For instance, several studies suggest a solution to overcome the effect of cultural difference, which EMI carries in other countries' cultures. Martinez (2016) argued that the student should have prior knowledge of English culture. BinSaran (2021) indicated that course contents and language should take into consideration the clear objectives and the expected outcomes of the curriculum. Furthermore, any course content has to be comprehensible to students who have a lack of ability in the English language or even a lower level in addition to those who have limited vocabularies. Also, Ellili-Cherif and Alkhateeb (2015) recommended offering English for Specific Purposes courses that assist students in improving their English skills during their course of study and after graduation.

Furthermore, Luanganggoon (2020) indicated the importance of developing lesson plans for higher education students in Thailand based on approach of learning a language and content simultaneously, which commonly known as Content and Language Integrated Learning (CLIL), taking into account the key issues for CLIL classroom management and assessment both theoretically and practically. Following that, the gaps in various aspects of learning in the CLIL approach to teaching are investigated. According to Rogier (2012), CLIL learners showed significant development in reading abilities and vocabulary retention, which had a positive influence on their other language skills. Furthermore, they were confident students. Similarly, to document the potential impacts of CLIL, Brevik and Moe (2012) compared the development of two commonly used seventh grade assessments in the Norwegian Centre for Foreign Languages in Education. One was for a group of 7ths -grade CLIL kids and the other one was for regular pupils in a control group. According to the qualitative and quantitative findings, the seventh grade CLIL group outperformed the control group in seventh grade. In terms of vocabulary ability, CLIL students were superior to non-CLIL pupils. Adolphs and Schmitt (2004) revealed that the CLIL syllabus includes terminology that is relevant to a particular topic in students' textbooks they studied. Therefore, reading from these books can assist students in

comprehending both the literal and metaphorical or cultural meanings of words, thereby broadening their reasoning and thinking abilities. Further, these academic books instruct and train students to use such terms in their everyday verbal communication to attain a particular level of proficiency in a foreign language as well as success in their academic and professional sectors. In their study, Sanad and Ahmed (2017) found out that the CLIL approach improved Saudi college students' reading comprehension and vocabulary skills. They claimed that CLIL teaching methodology engages students via using topics of interest to them while also improving and enhancing their EFL lexicon retention, allowing them to summarize and connect ideas.

Some pedagogical methods that would help students learn in courses that depend on EMI have been introduced to try to address EMI challenges. Chuang (2015) proposed a number of effective pedagogical strategies. Her research included forty-two undergraduate students from the Website Production class at a public Taiwanese university's Information Management department. A slower speech rate was one of the strategies that were applied by the instructor besides code-switching to Chinese. The students have been provided with simplified terms in the lecture by using simple vocabularies, as well as discussions, class activities, and group projects. Over the course of 18 weeks, the entire pedagogical method was implemented and carried out on a weekly basis. In order to investigate the purpose of the research, the students volunteered and participated on the last day to answer a survey. Findings showed that this learning strategy improved lecture comprehension, increased class engagement, promoted collaborative learning, and boosted subject matter confidence. To improve learning outcomes, Chuang strongly advised instructors to implement these pedagogical strategies in their EMI classes.

Additionally, other studies have highlighted the benefits of translanguaging as a strategy in EMI. Garc á (2011) defines translanguaging as "the process by which bilingual students perform bilingually in the myriad multimodal ways of classrooms—reading, writing, taking notes, discussing, signing, etc." (p. 147). Wei and Hricko (2021) concurred that utilizing translanguaging strategy for post-secondary education EMI instruction in an EFL context occurs when the students and teachers are encouraged to rely fully on their language's repertoire. Their first language should be included in both learning and teaching. Further, Mazak and Carroll (2016) demonstrated translanguaging potential for improving language and academic content learning for multilingual learners. They underscored the role translanguaging playin challenging monolingual ideologies. They also illustrated tensions that arise when translanguaging strategies challenge the monolingual ideologies that are prevalent in many college and university settings in tertiary education. Likewise, Du (2021) showed that in science and math classes, when the main focus was on the content instead of the language, participants were given more flexibility and opportunities to interact in a communicative educational environment.

3. Method

The present study is quantitative, and a questionnaire was used as a data-collection instrument.

3.1 Population

The population of this study consisted of whole first-year students who were enrolled at PSAU,Saudi Arabia in 2022.

3.2 Study Participants

The participants of the study population consisted of regular students, first-year junior undergraduates studying science majors (engineering and health sciences) at PSAU, Kingdome Saudi Arabia. Through random sampling, 376 first-year students participatedMale students represent the majority of the participants (51.9%), whereas (48.1%) were females. Besides, the engineering track students represented (72.3%) of the sample size, while (27.7%) were from the medical track. On the other hand, with regard to the sample's previous English exposure, (4.8%) of the participants studied abroad, (3.5%) have a native parent and (2.9%) have studied in international schools. Generally, the participants study main subjects like English for specific purposes (ESP), English for Medical Purposes (EMP) Course, Integral Calculus, Differential Calculus, Biostatistics, General Physics, English for Technical Purposes, Computer Sciences, reading skills, writing skills, listening skills, and speaking skills. Oxford Online Placement Test's scores are helpful for this study to determine the participants' English proficiency. The placement test has been conducted officially by the program administration. The scores were kindly supplied by the administration. Results showed that 63 percent of population were at A level according to CEFR.

3.3 Instruments

The questionnaire was adapted from Pun and Jin (2021) who investigated the students' perceptions of Hong Kong EMI universities' language learning challenges along with language-related learning strategies. It was specifically selected for this research due to its suitability to the research variables and questions. Besides the required participants' demographic information, the questionnaire is composed of 25 items on Likert 5-point scale. An expert

panel of researchers and science lecturers checked the validity of the content. Pilot tests were conducted on 30 volunteers of first-year students to ensure that the survey could be understood and completed. Table 1 shows the internal consistency of the questionnaire. The scales on the questionnaire measure three items, speaking of English language, learning challenges, and the learning strategies. Language item is made up of seven items that are divided into two subitems. The participants were asked to rate their level of difficulty with each item on a 5-point Likert scale. The range was from 1 (very easy) to 5 (very difficult). Learning had 12 items divided into three subitems used to measure students' perceptions of challenges they have in courses' content. Also, a 5-point Likert scale was applied, ranging from 1 = not challenging to 5 = most challenging. The last item, learning strategies aimed to elicit the freshmen's tendency toward learning strategies which were supported by L2 or L1 to overcome EMI challenges. Two items were established, and the strategies are identified in each statement. Thus, the freshmen are required to decide how frequently they employ them in an EMI learning context on a 5-point Likert scale, ranging from 1 = never to 5 = always.

Table 1. the scale components, questionnaire's items, and their internal consistency

Scale (Number of items)	Cronbach's α	Example of item
Language challenges	0.916	
Communication with peers (5)	0.883	Communicating ideas fluently
Communication with professionals (2)	0.748	Presenting information to lab technicians
Learning challenges	0.897	
Content comprehension (4)	0.776	Understanding the course contents in English
Learning adaptability (5)	0.731	Studying to meet teacher's expectations in a science topic
Knowledge application (3)	0.842	Using the correct English vocabulary and technical terms in writing
Learning strategies	0.815	
Searching for additional L2 support (4)	0.701	Asking science teachers for feedbacks on and corrections of the science writing in English
Searching for additional L1 support (2)	0.765	Requesting additional Arabic explanations from science teacher

3.4 Data Collection and Analysis

The original questionnaire has been modified and items were provided with translated versions in Arabic to avoid misunderstanding. Moreover, the questionnaire consists of four main sections: (a) demographic information; (b) language challenges level; (c) learning challenges level; and (d) students' learning strategies. The questionnaire was distributed and completed at a scheduled specific time. The responses were retrieved anonymously. In the present study, freshmen were divided into three groups based on three factors: gender, previous English exposure, and science tracks (medical and engineering). The collected data was analyzed using SPSS 23. At first, the data for each subscale scoring system were computed by averaging the corresponding elements from the respondents. Freshmen were classified into three groups based on the average value of the items pertaining to their parents' language, studying abroad experience, or education in an international school: students with English low-exposure and students with English high-exposure. Regarding gender, the coding was based directly on students' gender election (Male or Female). Likewise, the two groups according to their field of study were medical or engineering. Subsequently, to compare the means of each pair of groups, the independent t-tests were used. This study used (2-tailed) for all statistical tests.

4. Results

4.1 Challenges of Language Perceived by Freshmen

In terms of all language challenge subitems, a significant statistical difference was found as shown in table 2. This result indicates that females have more difficulty communicating, particularly with professionals in the EMI context.

Table 2. Freshmen Language challenges: t-test and descriptive statistics results (female vs. male)

Scale	Female		Male		Mean Difference	t	df	p
	M	SD	M	SD				
Communication with peers	3.2055	.88354	2.9733	.92997	-.23219	-2.478	374	.014
Communication with professionals	3.5552	.93526	3.2282	.97941	-.32704	-3.306	374	.001

Very easy = 1 / Easy = 2/ Neutral = 3/ Difficult = 4/ Very difficult = 5

*$p \leq 0.05$

Similarly, the field of study variable shows a significant difference in all language challenge subitems. The mean scores of the samples of medical and engineering shown in Table 3 demonstrates that freshmen in the engineering

track tend to face more learning challenges in EMI than freshmen in the medical track.

Table 3. Freshmen Language challenges: t-test and descriptive statistics results (medical vs. engineering)

Scale	Medical		Engineering		Mean Difference	t	df	p
	M	SD	M	SD				
Communication with peers	2.9115	.88079	3.1515	.91949	23993	2.289	374	.023
Communication with professionals	3.2260	1.00937	3.4467	.95078	.22073	1.979	374	.049

Very easy = 1 / Easy = 2/ Neutral = 3/ Difficult = 4/ Very difficult = 5

*p ≤ 0.05

Table 4. Freshmen Language challenges: t-test and descriptive statistics results, high exposure vs. low exposure

Scale	High exposure		Low exposure		Mean Difference	t	df	p
	M	SD	M	SD				
Communication with peers	2.6229	1.15583	3.1326	.87395	.50969	2.536	38.094	.015
Communication with professionals	2.9286	1.27269	3.4326	.92426	.50398	2.282	37.770	.028

Very easy = 1 / Easy = 2/ Neutral = 3/ Difficult = 4/ Very difficult = 5

*p ≤ 0.05

The results in Table 4 show a statistically significant difference between two groups with high and low English exposure in peers communication (t (38.09) =2.5, P =.015) and communication with professionals (t (37.7) =2.2, P =.028).

4.2 Learning Challenges Perceived by Freshmen

Table 5 shows higher mean scores for females on all three subitems than for males, which means that female freshmen might experience more complicated challenges in learning-related practices than males. It is also worth noting that the differences in mean scores between genders are statistically significant in all three subitems.

Table 5. Freshmen learning challenges: t-test and descriptive statistics results (female vs. male)

Scale	Female		Male		Mean Difference	t	df	p
	M	SD	M	SD				
Content comprehension	3.0635	1.02237	2.8603	1.05213	-.20328	-1.898	374	.059
Knowledge application	3.2309	1.01299	2.9477	1.08634	-.28325	-2.609	374	0.009
Learning adaptability	3.2541	.99032	2.9556	.96281	-.29859	-2.964	374	.003

Not challenging = 1/ Slightly challenging = 2/ Challenging = 3/ Very challenging = 4/ Most challenging = 5

*p ≤ 0.05

In contrary, no statistically significant difference between the subitems was found as shown in Table 6. Both groups of two tracks have close results in all three subitems, however, the medical mean score refers to a slightly lower level of challenges in all subscales.

Table 6. Freshmen learning challenges: t-test and descriptive statistics results (medical vs. engineering)

Scale	Medical		Engineering		Mean Difference	t	df	p
	M	SD	M	SD				
Content comprehension	2.8293	1.06765	3.0074	1.02907	.17803	1.485	374	.138
Knowledge application	2.9673	1.07147	3.1287	1.05386	.16137	1.322	374	.187
Learning adaptability	3.0801	1.03602	3.1066	.96838	.233	374	.816	.816

Not challenging = 1/ Slightly challenging = 2/ Challenging = 3/ Very challenging = 4/ Most challenging = 5

*p ≤ 0.05

Table 7 shows there is a statistically significant difference between the high exposure and low exposure groups in all sub-items.

Table 7. Freshmen learning challenges: t-test and descriptive statistics results (high exposure vs. low exposure)

Scale	High exposure		Low exposure		Mean Difference	t	df	p
	M	SD	M	SD				
Content comprehension	2.6000	1.15077	2.9949	1.02441	.39487	2.14	374	.032
Knowledge application	2.6286	1.35746	3.1308	1.01536	.50222	2.12	38.005	.040
Learning adaptability	2.6762	1.13323	3.1427	.96126	.46653	2.68	374	.008

Not challenging = 1/ Slightly challenging = 2/ Challenging = 3/ Very challenging = 4/ Most challenging = 5

*p ≤ 0.05

4.3 Learning Strategies

Table 8 highlights that the mean scores of males in both subscales are lower compared to females. A significant difference was found for two subscales, L2 t (374) =-2.07, p =.039) and L1 strategies t (373.8) =-2.9, p =.004). This result indicates that first-year females look for additional L1 explanations more frequently than male freshmen do.

Table 8. Freshmen learning strategies: t-test and descriptive statistics results (female vs. male)

Scale	Female		Male		Mean Difference	t	df	p
	M	SD	M	SD				
Searching for additional L2 support	2.9738	.91344	2.7679	1.00626	-.20581	-2.071	374	.039
Searching for additional L1 support	3.0967	1.17393	2.7256	1.28847	-.37104	-2.922	373.874	.004

Never = 1/ Rarely = 2/ Sometimes = 3/ Usually = 4/ Always = 5

*p ≤ 0.05

As can be seen in Table 9, the results revealed no statistically significant difference between the medical and engineering tracks in searching for additional support strategies.

Table 9. Freshmen learning strategies: t-test and descriptive statistics results (medical vs. engineering)

Scale	Medical		Engineering		Mean Difference	t	df	p
	M	SD	M	SD				
Searching for additional L2 support	2.9135	.95389	2.8493	.97301	-.06420	-.575	374	.565
Searching for additional L1 support	2.8221	1.36339	2.9357	1.20059	.11355	.746	167.535	.457

Never = 1/ Rarely = 2/ Sometimes = 3/ Usually = 4/ Always = 5

*p ≤ 0.05

The results in table 10 show that there is a statistically significant difference between the two groups regarding their frequent search for additional L1 support, (t (374) = 4.0, p =.001). Low-exposure freshmen made more effort to learning the EMI context by using L1 support in the EMI context than high-exposure freshmen.

Table 10. Freshmen learning strategies: t-test and descriptive statistics results (high exposure vs. low exposure)

Scale	High exposure		Low exposure		Mean Difference	t	df	p
	M	SD	M	SD				
Searching for additional L2 support	2.5857	1.13102	2.8959	.94566	.31018	1.813	374	.071
Searching for additional L1 support	2.1000	1.20538	2.9868	1.22317	.88680	4.090	374	.001

Never = 1/ Rarely = 2/ Sometimes = 3/ Usually = 4/ Always = 5

*p ≤ 0.05

5. Discussion

The present study has provided insights into freshmen's EMI challenges and learning strategies at PSAU based on the examination of three factors: gender, the field of study (Medical, Engineering), and exposure to English before pursuing tertiary education. Overall results showed that the mean scores for each freshmen group at PSAU was about 3, indicating that most freshmen on EMI science disciplines courses encountered reasonable challenges that do not tend to be extremely difficult or very easy in EMI courses. These findings are discussed below in terms of the research questions of this study that investigate EMI with relevance to freshmen's perceived learning and language challenges; and freshmen's learning strategies.

As far as language is concerned, the freshmen's perceived challenges showed that the first-year students experienced slightly challenging obstacles in EMI courses. Unlike the finding by Ali et al. (2019) which stated that Saudi students continue to struggle with English speaking. From our perspective, this finding might be attributed to several factors, such as the increasing awareness towards the importance of proficiency among the Saudi youth. Ying, Siang and Mohamad (2021) found out that integrating social media (e.g., WhatsApp, Facebook, YouTube) and videoconferencing tools during the outbreak of the COVID-19 pandemic, was so effective in improving ESL learners' language skills and overcoming their speaking obstacles.

From the perspective of gender variables in language challenges, both male and female freshmen had similar language difficulties. However, male freshmen demonstrated a better result in communication with peers and professionals than females, and the difference is statistically significant. This finding contradicts with previous research (Daif-Allah & Aljumah, 2020; Tamayo, 2019), which showed the female dominance of language skills in tertiary education. A possible explanation is that anxiety of first-year females in their first university year is common. In these circumstances, the new university environment after high school could play a significant role in females' use

of English in communication. In a recent study, Bensalem (2021) found that female students felt significantly more anxious in English, even though they were well prepared. Apart from that, it is extremely important to encourage freshmen females to actively express their views and questions in English with their peers and professionals.

Another variable taken into consideration in this study was scientific track (medical and engineering) groups. To sum up, mean score differences have been identified in favor of medical freshmen. Thus, the medical group has fewer language challenges than the engineering track, whether in communication with peers or professionals. This is in good agreement with Joe and Lee (2012) who indicated that medical students have higher levels of English proficiency than other majors. In addition, results of the present study overall showed that freshmen with high English background prior to admission at PSAU (i.e., those who study in international schools, studied abroad, or have English-native-speaking parents) have less challenges in communication with professionals particularly compared to first-year students with low exposure to English. This confirms the results of Pun (2022) who found that exposure to English had a significant impact on language acquisition and developing speaking skills.

Secondly, the present study found that most participants reported reasonable difficulties with content learning. Among the freshmen, a difference between genders in learning EMI courses was identified, in favor of males who face less EMI difficulty in EMI content comprehension, knowledge application, and learning adaptability. This finding corresponds with a study of Bukve (2020) which emphasized that EMI had a greater negative impact on learning for female students than males. However, this result is inconsistent with a study conducted at Taif University, which found that the male participants considered learning English more difficult as compared to females (Javid & Al-malki, 2018). Eventually, the differences in EMI tertiary education between genders should be interpreted with caution.

In terms of the two science tracks (medical and science), unexpectedly, no significant differences in EMI learning were found, whether in content comprehension, knowledge application or learning adaptability. This result is different from Joe and Lee (2012) who found that medical students seemed to have an extremely negative attitude towards the EMI impact on their academic achievement in their field. The medical track mean scores, on the other hand, revealed less challenges in all learning subscales than engineering. In addition to freshmen's learning challenges, the current study's findings suggest that most freshmen science students in the two tracks with an English background have the language ability to overcome the most EMI challenges in learning in comparison with first-year students with no previous English exposure. Matusevych et al. (2017) reported that a greater cumulative amount of second language exposure leads to better learning performance and that concurs well with the current study findings.

Lastly, the general finding regarding the science freshmen's learning strategies mean score showed that generally the first-year students used L1 or L2 strategies less frequently in their EMI learning. This result strongly coincides with the findings of Alhaysony (2017), which emphasized that the reason for this is attributed to the insufficient awareness of Saudi EFL students about available strategies (Alhaysony, 2017). Hence, EFL teachers must improve their teaching strategies and include more student-engaged activities in the classes to increase students' awareness of the useful available strategies that help them maximize their learning potential and skills (Alhaysony, 2017; Tamayo, 2019). Furthermore, freshmen with no prior English background are more likely to use L1 learning strategies. Moreover, a statistically significant difference in the frequency of using L1 and L2 related learning strategies between men and women was discovered. Even though Pun and Jin (2021) found that male students seek more illustrations for scientific content in second language than female students, the present study found that freshmen from females used L1 learning strategies more frequently than males. Considering the findings mentioned above about the low English language efficiency of engineering freshmen compared to medical track freshmen, it seems that engineering track freshmen would devote their effort to using L1 strategies to overcome the challenges they encounter. This is in line with Kim et al. (2016) who affirm that approximately 90% of engineering students believe that L1 should be used to aid their learning.

6. Conclusion and Recommendation

The aim of this study was to investigate the freshmen's linguistic and learning challenges, along with the learning strategies they adopted to deal with EMI challenges. It was conducted at PSAU in Saudi Arabia. By using a quantitative design, the findings showed that the freshmen faced typical EMI content challenges. Furthermore, the study revealed the overall mean scores of freshmen who are striving to improve their academic performance in EMI courses by employing learning strategies. Most participants do not use learning strategies frequently enough. This study discovered that freshmen from the medical and engineering tracks perceived reasonable difficulties in EMI academic subjects, including communicating in English as well as content learning. Furthermore, the present study found that students preferred L1-related learning strategies over L2-related learning strategies. Interestingly, females

were less comfortable communicating with professionals in their classrooms. Simultaneously, freshmen females perceive greater obstacles in content comprehension, knowledge application, and learning adaptability. As a result, freshmen females put in more effort than freshmen males to learn science by using L1 learning strategies in the EMI context. The current study revealed that engineering freshmen face more difficulties in communication with professionals than medical freshmen. Besides, freshmen with high previous English exposure had fewer difficulties when communicating with their peers and professionals. Meanwhile, they also conceived a lower level of difficulty in content comprehension, application of knowledge, and learning adaptability. Therefore, freshmen with low previous exposure depended on L1 learning strategies more than freshmen with high previous exposure to English. Future research could be carried out to further study this issue. For example, the questionnaire could be distributed to a larger sample from a broader range of disciplines that employ EMI in their curriculum rather than freshmen, and employ other data collection tools. Also, the present findings might help to continue further studies which need to be undertaken, such as taking lecturers' EMI challenges into account, whether they are from the same study population or from broader local universities.

The findings of the current study have shed light on the levels of language ability and academic adaptability of science freshmen at PSAU. The study's goal was to uncover the knowledge about EMI challenges of science freshmen. The present research, however, is unable to provide broad interpretations for the findings. As a result, additional methodological approaches ought to be developed to provide more detailed explanations. To address this limitation, qualitative research based on an interview instrument could be applied.

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