English as a Medium of Education (EME): Gender, Attitudes, and Cumulative GPA

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الملخص

تهدف هذه الدراسة إلى البحث في تأثير استخدام اللغة الإنجليزية كوسيلة للتعليم في التخصصات العلمية والطبية والهندسية على أداء الطلاب وآرائهم الأكاديمية، بالإضافة إلى وجهات نظر مدرسي المقررات في هذه التخصصات. تعتمد الدراسة على تصميم متعدد الأساليب من خلال تحليل البيانات من ثلاث مصادر: سجلات الخريجين (عددهم 7272)، واستبيان لمدرسي المقررات (عددهم 341)، واستبيان تم توزيعه على الطلاب الحاليين في التخصصات العلمية والتقنية (عددهم 1678). تم تحليل البيانات باستخدام مجموعة متنوعة من الأساليب الإحصائية، بما في ذلك: تحليل الارتباط، واختبار الفروق بين العينات المستقلة، وتحليل الانحدار المتعدد. أظهرت النتائج تسعة نتائج رئيسية. أظهرت سجلات الخريجين ترابطًا مهمًا بين معدل النجاح العام للخريجين ودرجات مقرر اللغة الإنجليزية الأكاديمي في السنة الأولى؛ فروقًا معنوية بين جنس الخريجين ومعدل النجاح العام في البرامج عند التخرج؛ عدم وجود فروق معنوية بين جنس الخريجين ودرجات مقرر اللغة الإنجليزية الأكاديمي في السنة التحضيرية؛ وأن جنس الخريجين ودرجات مقرر اللغة الإنجليزية الأكاديمي يمكن أن يتنبأ بشكل مهم بمعدل النجاح العام للخريجين من هذه التخصصات. أما نتائج استبيان مدرسي المقررات، فأشارت إلى أن معظمهم كان لديهم آراء إيجابية حول مستوى طلابهم في اللغة الإنجليزية، مما يشير إلى اتجاهات إيجابية نحو سياسة استخدام الإنجليزية كوسيلة للتعليم. أما نتائج استبيان الطلاب الحاليين، فأشارت إلى أن معظم الطلاب كان لديهم اتجاهات سلبية ومعتقدات اجتماعية واعتقادات بفعالية الذات سلبية نحو سياسة استخدام الإنجليزية كوسيلة للتعليم. كان معظم الطلاب يفضلون اللغة العربية كوسيلة للتعليم ويعتقدون أنهم سيحصلون على معدل نجاح أعلى إذا تعلموا باللغة العربية في هذه التخصصات. كما ظهرت فروق معنوية بين جنس الطلاب والوسيلة المفضلة للتعليم بناءً على اتجاهاتهم ومعتقداتهم الاجتماعية واعتقاداتهم بمقدرتهم الذاتية. لذلك يجب على واضعي السياسات التعليمية باللغة الإنجليزية كوسيلة للتعليم أن يأخذوا في الاعتبار تأثير السياسة اللغوية على معدلات النجاح للطلاب في هذه التخصصات وأن يدركوا أن جنس الطلاب يلعب دورًا كبيرًا في إنجازاتهم واتجاهاتهم في برامج التعليم باللغة الإنجليزية كوسيلة للتعليم. إن نجاح برامج التعليم باللغة الإنجليزية كوسيلة للتعليم يعتمد بشكل كبير على مستوى الكفاءة اللغوية للطلاب الذين يتم قبولهم. كما يحتاج مدرسو المقررات أيضًا إلى تدريب على تدريس المحتوى للطلاب الذين لا يتحدثون الإنجليزية بطلاقة ويجب عليهم أن يأخذوا في اعتبارهم صعوبات طلابهم في برامج التعليم باللغة الإنجليزية كوسيلة للتعليم.

Abstract

This study aims to investigate the impact of English as a Medium of Education (EME) on students' academic performance and attitudes, as well as content instructors' perspectives. The study employs a multi-method design by analyzing data from three resources: alumni records (n=7272), a survey of content instructors (n=341), and a questionnaire administered to current EME students (n=1678). The data was analyzed using a variety of statistical methods, including: correlation analysis, independent samples t-test, and multiple regression analysis. The results revealed nine main findings. Alumni records showed a significant correlation between alumni CGPA and foundation-year EAP course grades; a significant difference between alumni gender and CGPA; no significant difference between alumni gender and foundation year EAP course grades; and that alumni gender and EAP course grades can significantly predict alumni CGPA. The content instructors' questionnaire results indicated that most content instructors had positive views on their students' English language proficiency, which indicates indirectly positive attitudes toward the EME policy. The current students' questionnaire results showed that most of the students had negative attitudes, normative beliefs, and self-efficacy beliefs toward the EME policy. Most students preferred Arabic as the medium of education and believed that they would have a higher GPA if they were educated in Arabic. There were significant differences between students' gender and preferred medium of education based on their attitudes, normative beliefs, and self-efficacy beliefs. EME policymakers should consider the impact of language policy on students' GPAs and recognize that students' gender plays a major role in their achievements and attitudes in EME programs. The success of EME programs depends considerably on admitted students' level of proficiency. Content instructors also need training on teaching content to students who cannot speak English fluently and should consider their students' struggles in EME programs.

Keywords: *Content instructors' attitudes; English as medium of instruction (EMI); language policy; medium of education, English as a medium of education (EME)*

Introduction

The introduction of English language teaching (ELT) in Saudi Arabia gradually gained importance after being introduced in the 1920s. The subject has been progressively incorporated into the school curriculum, with English originally being taught in grade 7. This was changed to grades 5 and 6 in 2003 and, finally, to grade 4 in 2012. In the first semester of the 2021-2022 academic year, the Saudi Ministry of Education (MoE) introduced ELT beginning in the first grade of primary school (Alsuhaibani et al., 2023).

English as a Medium of Education (EME) policy is the official policy in science, healthcare, and engineering programs at Saudi universities. It might be better to use the term EME instead of English as medium of instruction in this paper to emphasize the educational dimensions of teaching and learning (Macaro & Rose, 2023). In Saudi universities, admitted students are not required to take a standardized English proficiency test, making it difficult to assess their English language proficiency at the time of enrollment (McMullen, 2014). Although Saudi students begin learning English in elementary school, policymakers have found that their English language proficiency is generally low at the time of university enrollment (Alhamami, 2019). This suggests that it is not sufficient for students to simply join EME programs.

In response to this challenge, Saudi universities have established a foundation year/ a preparatory year to teach English (Barnawi & Al-Hawsawi, 2017; McMullen, 2014). These foundation/preparatory years typically last one year and are designed to help students improve their English language skills to a level that is sufficient for university studies. However, the existence of foundation years suggests that there are gaps in secondary school preparation for university studies (Johnson & Tweedie, 2017). Additionally, there is often a mismatch between students' and teachers' views of EME (Johnson & Tweedie, 2017). Despite these efforts, the transition from the Arabic medium of education in compulsory education to EME in college programs poses challenges for Saudi undergraduate students. These challenges include: low English proficiency levels (Alhamami, 2019), gaps in secondary school preparation (Johnson & Tweedie, 2017), and mismatched views of EME between students and teachers (Johnson & Tweedie, 2017). These challenges can lead to negative attitudes among Saudi undergraduate students towards EME and can impede their academic success.

This study used big data to explore the EME policy's impact in a Saudi public university. It examined this impact in 26 undergraduate programs in four major schools: engineering, the sciences, computers, and healthcare. The study examined the relationships among undergraduates' English proficiency level in the foundation year, their gender, and their achievement of program learning outcomes, as indicated by their CGPA after graduation. Moreover, it analyzed content instructors' attitudes toward the EME policy. Next, the study used Ajzen's theory of planned behavior to examine the relationships among the current students' attitude, normative beliefs, and self-efficacy beliefs. Finally, the study examined the relationship among Ajzen's these three constructs and current students' gender in EME programs as well as how these three constructs interact with their preferred medium of education.

The study addresses several critical gaps in the existing literature on EME in Saudi Arabia. Despite the early introduction of ELT in Saudi schools, students often exhibit low

English proficiency upon entering university, which adversely impacts their performance in EME programs. This issue is further compounded by the inadequacy of secondary education in preparing students for university-level English instruction, as evidenced by the establishment of foundation years in universities. Additionally, there is a notable divergence between the perspectives of students and instructors regarding the efficacy and appropriateness of EME, as will be illustrated in the literature review. The study also aims to explore the influence of gender on both academic performance and attitudes toward EME, an aspect not extensively scrutinized in existing literature. Lastly, prior research has not employed large-scale data to holistically examine the impact of EME across diverse disciplines, incorporating variables such as gender, attitudes, and academic performance.

This study utilizes large-scale data for investigating the impact of EME across 26 undergraduate programs in four major academic disciplines within a Saudi public university. Beyond academic performance, the study also investigates the attitudes and beliefs of both students and content instructors, offering a comprehensive understanding of the EME landscape. By employing Ajzen's Theory of Planned Behavior, the study provides a theoretical foundation for understanding the intricate relationships among students' attitudes, normative beliefs, and self-efficacy. The study introduces a gender-based analysis into the EME discourse, thereby adding a critical dimension that is particularly relevant in the Saudi educational context. The findings have immediate relevance for educational policymakers, especially concerning language policy and instructor training. These insights could inform future interventions aimed at enhancing the efficacy of EME programs. The adoption of a multi-method research design and the application of diverse statistical methods contribute to the study's credibility and depth, thereby making it a significant addition to the fields of applied linguistics and educational policy.

Literature Review

Grade Point Average and English for Academic Purposes Courses

The importance of GPA has drawn the attention of researchers from different academic disciplines. Scholars and practitioners widely accept student GPA as a leading marker of success in school (DiPrete & Buchmann, 2013). The impact of the EME policy on students' achievement can be see via their GPA. CGPA is an excellent indicator of students' performance and achievement of program learning outcomes (Dang & Dang, 2021). It is calculated over the duration of a student's enrollment in a program. In many universities worldwide, CGPA is used to measure students' academic performance, acknowledge excellence, and determine recipients of Excellence Awards (e.g., the Dean's list is based on a student's GPA). Higher GPAs are positively associated with not only cognitive ability but also a wide range of non-cognitive skills such as self-esteem, self-discipline, achievement orientation, conscientiousness, and openness (Qian & Yavorsky, 2021). Researchers have examined GPA's influence on and correlation with different variables such as gender (Bećirović et al., 2018), high school background (Allensworth & Clark, 2020), social status (Loeb & Hurd, 2019), and the personality trait of conscientiousness (Nguyen et al., 2005). For example, Hsieh et al. (2007) found that students with lower GPAs were more likely to display performance-avoiding behaviors, and in contrast, students with higher GPAs were more prone to mastery goal orientation.

Language proficiency level can affect students' understanding of content in EME programs. Tenney et al. (2020) found that English language scores correlate more strongly with academic performance than mathematics, chemistry, or Chinese language scores in an EME pharmacy program in Hong Kong. Researchers found that English proficiency standardized tests such as IELTS and TOEFL predict undergraduates' academic achievements, as indicated by their GPA (Schoepp, 2018). However, validity studies investigating the predictive validity of TOEFL and IELTS, expressed as the correlation between test scores and GPA, have yielded different results (Dimova, 2020). For example, Bridgeman et al. (2016) found that Chinese students with lower TOEFL scores performed similarly, on average, to other students, implying that TOEFL scores cannot predict students' performance. The use of English for Academic Purposes (EAP) course grades may be a helpful predictor of students' language proficiency (Dimova, 2020), and EAP courses are designed specifically to help students succeed in the university setting and achieve better grades.

Gender and Academic Major

Pun and Jin (2021) argued that research on EME education has rarely focused on gender effects in learning, and little evidence could be empirically obtained. Gender is a critical factor that may influence students' CGPA and language proficiency (Macaro & Akincioglu, 2018). However, Reus (2020) examined native Spanish speakers' performance in an EME program at a Chilean engineering school. Reus found that performance differences can primarily be attributed to students' performance in previous courses. Language, gender, and attendance have a limited and weak influence in explaining performance differences. Moreover, Kamaşak et al. (2021) found that gender was not clearly related to challenges experienced by students in the Japanese EME context, with the exception of listening. Moreover, Kong and Wei (2019) found no gender effects. They conducted two independent-sample t-tests, and their results showed statistically non-significant differences. More specifically, females scored almost the same as males. The researchers also found positive attitudes toward the EME policy: The participants reported slightly favorable attitudes toward EME.

An academic major or concentration is another critical factor that may influence students' goal to achieve language proficiency levels. Browsing the program conditions on admission online reveals that the linguistics department requires a higher IELTS score than the mathematics department. University students' main field of specialization may impact their final CGPA. Students in fields that require higher English proficiency may achieve a lower GPA because of their lower English proficiency. Soruç et al. (2021) stressed that the language proficiency threshold varies according to the academic division. Altay et al., (2022) investigated the academic achievement of EMI courses in Turkey and found that English language proficiency was a strong predictor of academic achievement for social science students, while success in Turkish medium instruction (TMI) courses predicted EMI success for mathematical, physical, and life sciences students. Yuksel et al., (2023) found that both self-regulation and proficiency impacted EMI students' academic success in engineering, while only proficiency predicted academic success in the social sciences.

Views of Content Instructors and Students

Content instructors, teachers who teach a subject other than language, such as mathematics, computer engineering, and pharmacy, are important stakeholders in EME classrooms (Macaro et al., 2021). These instructors might hold different perspectives than students (Alhamami & Almelhi, 2021). Their attitudes toward students' English proficiency in EME can explain different behaviors in EME classes, such as students' participation in class discussions and written answers on exams. Alhamami (2015) found that most Arabic-speaking scientists in Saudi Arabia support the use of Arabic to teach science subjects in undergraduate programs. Abouzeid (2021) concluded that curriculum designers in EME programs should reconcile instructors' perceptions with the reality of their students' linguistic proficiency and learning needs. Research has also indicated that EME teachers need professional development to teach effectively (Macaro et al., 2020). Teaching in EME demands a high level of proficiency in the language. Teachers need to be not only proficient in English themselves but also able to guide students effectively in using English for academic purposes. Effective EME instruction goes beyond language proficiency; it requires specific pedagogical skills. Teachers should be trained in methods and strategies for teaching content in a language that may not be the students' first language. Assessing students' language and content knowledge in an EME context can be challenging. Professional development helps teachers develop appropriate assessment tools and provide constructive feedback to students.

Undergraduates' perspectives are crucial variables in EME programs (Alhamami, 2019). Undergraduates' self-efficacy beliefs contribute to their engagement in their classes (Thompson et al., 2019): Those with stronger efficacy put forth more effort and regard course activities as development opportunities. Negative attitudes toward EME policy influence undergraduates' behavior in their classes and their achievement of learning outcomes. Social pressure and the opinions of people around undergraduates influence their intention to study and participate in class activities (Alhamami, 2020). Based on the context, undergraduates' concerns regarding their GPA might influence their views toward EME policy. For example, Rose and colleagues (2020) found that students with higher TOEIC scores had an advantage over those with lower proficiency in passing a content course at a Japanese university. However, all students, regardless of their proficiency level, were able to pass the course. The participants also believed that the benefits they gained from the EME program were more important than their GPA.

Ajzen's Theory of Planned Behavior (TPB)

This study employs Ajzen's Theory of Planned Behavior (TPB) as the foundational framework to explore four key constructs: (i) intention, (ii) attitude toward behavior (AB), (iii) subjective norms (SN), and (iv) perceived behavioral control (PBC). Drawing upon theories from social psychology, particularly TPB, enriches the understanding of human behaviors and has been shown to yield insightful results in different disciplines (Ajzen, 2020). In the TPB model, intention serves as a direct precursor to behavior, reflecting an individual's willingness to engage in a specific action. In the context of EMI, students' intentions to engage with English-mediated courses are influenced by their AB, SN, and PBC. In the context of this study, AB refers to the individual's evaluative disposition toward participating in EMI courses,

whether positive or negative. This study aims to assess EMI students' attitudes, both positive and negative, toward EMI and how these attitudes influence their academic engagement.

SN, the second construct, encapsulates the perceived social pressures or expectations from significant others—such as peers, family, and instructors—that influence a student's decision to engage or disengage with EMI courses. This study will explore the subjective norms affecting EMI students in their educational settings. The final construct, PBC, represents an individual's perceived self-efficacy or capability to successfully engage in EMI courses. This study will examine the factors that EMI students believe either facilitate or hinder their successful engagement with English-mediated courses. The study posits that students with positive AB, SN, and PBC are likely to have a strong intention to engage with EMI courses, which in turn is expected to correlate with successful academic outcomes. Conversely, negative perceptions in these constructs are anticipated to correlate with weaker intentions to engage in EMI classes and, consequently, less successful academic outcomes. By employing TPB, this study aims to offer a nuanced understanding of the cognitive and social factors influencing students' engagement and success in EMI settings.

Research Questions

Reviewing the literature revealed that the findings of EME studies vary based on educational, social, political, and economic contexts. Moreover, the impact of important variables in EME programs such as CGPA, gender, academic discipline, language proficiency, content instructors' views, and students' attitudes needs to be analyzed. This study made several contributions to the literature. First, it examined big data from alumni university records. Analyzing alumni records enabled us to understand the relationship between undergraduates' initial proficiency level and achievements of program learning outcomes, as indicated in their transcripts by EAP courses grades and CGPAs after graduation. Second, it examined the impact of English proficiency level and gender on CGPA. Next, the study analyzed the views of content instructors from different academic disciplines regarding EME policy. Finally, the study investigated the relationship between current EME undergraduates' attitudes toward the EME policy, self-efficacy in EME programs, and normative beliefs regarding EME policy and how students' gender interacts with these three constructs.

Q1. What are the relationships between EME alumni CGPA, gender, and students' foundation year EAP course grades in Saudi EME undergraduate programs?
Q2. What are the content instructors' views on their students' English language proficiency in Saudi EME undergraduate programs?
Q3. What are the interrelationships of current undergraduates' attitudes, self-efficacy beliefs, normative beliefs, and gender in Saudi EME undergraduate programs?

Methodology

Multimethod research involves combining any different methods, while mixed methods research more specifically focuses on combining qualitative and quantitative methods (Hunter & Brewer, 2015). The present study employs a multi-method research design to comprehensively investigate the impact of EME on various stakeholders, namely students and content instructors, as well as to explore its correlation with students' academic performance.

This design allows for a nuanced understanding of the complex interplay between language policy, gender, attitudes, and academic achievement within the context of a Saudi public university. The multi-method approach integrates three quantitative data resources, collected from three distinct sources: alumni records, a survey of content instructors, and a questionnaire administered to current EME students.

The data, derived from alumni records, student questionnaires, and instructor questionnaires, were subjected to a variety of statistical analyses, including correlation analysis, independent samples t-tests, and multiple regression analysis. These analyses aimed to identify patterns and relationships among variables such as gender, CGPA, attitudes toward EME. and insights into instructors' attitudes and perspectives on EME. This multi-method design is particularly advantageous for addressing the study's research questions from multiple angles, offering a more holistic view of the subject matter. It also enhances the validity and reliability of the study by enabling data triangulation. The following sections will elaborate on the instruments used, the participants involved, and the procedures followed in data collection and analysis.

Sampling Techniques

In the study, a variety of sampling techniques were applied. Initially, alumni records data included all recent graduates from the past five years, essentially covering the entire recent graduate population. It's important to note that no specific sampling method was employed in this particular case. For the selection of samples from the current EME student and content instructor populations across four colleges (healthcare, engineering, computer, and sciences), the researchers opted for stratified random sampling. They first categorized the students and instructors into strata based on their respective colleges and then randomly picked a sample of students from each stratum. Each student and instructor have the chance to answer the questionnaire. This approach was chosen to ensure that the sample accurately represented the entire population of EME students and content instructors. Stratified random sampling is a type of sampling where the population is divided into groups (strata) based on a specific characteristic, such as age, gender, or region. Then, a random sample is selected from each stratum. This method is used to ensure that the sample is representative of the population with respect to the stratification variable.

Instruments and Participants

The researcher used three data sources to collect data from a Saudi public university. The first source was the EME undergraduate program alumni records. The Division of Alumni Records at the Deanship of Admission and Registrations sent the alumni database for the previous five years in an Excel sheet. The database contains alumni names, university IDs, colleges, academic majors, foundation year EAP course grades, and CGPA. The total number of records for the alumni was 7,272. The alumni attended eight colleges that followed the EME policy. Of the alumni, 2,887 (40%) were female, and 4,385 (60%) were male. They attended 26 undergraduate programs in eight colleges. Table 1 provides the descriptive statistics of the alumni and classifies their gender based on colleges.

Table 1

Alumni Gender by College n = 7272

College	Females n (%)	Males n (%)
1. Applied Medical n = 1300 (18%)	n = 679 (24%)	n = 621 (14%)
2. Computer n = 1316 (18%)	n = 580 (20%)	n = 736 (17%)
3. Engineering n = 1451 (20%)	n = 0 (0.00%)	n = 1451 (33%)
4. Medicine n = 592 (8%)	n = 201 (7%)	n = 391 (9%)
5. Nursing n = 204 (3%)	n = 182 (6%)	n = 22 (0.5%)
6. Pharmacy n = 605 (8%)	n = 318 (11%)	n = 287 (7%)
7. Science n = 1461 (20%)	n = 787 (27%)	n = 674 (15%)
8. Dentistry n = 343 (5%)	n = 140 (5%)	n = 203 (5%)
Total n = 7272	Total n = 2887	Total n = 4385

Students are admitted to EME programs in Saudi universities based on a complex ratio criterion, which includes their cumulative high school grade point average (GPA) (30%), their scores on the General Aptitude Test (GAT) (30%), and their scores on the Academic Achievement Test for Scientific Specializations (40%). All students enrolled in an EME undergraduate program must take and pass the EAP course in their first year. The EAP course is an intensive integrated-skills course that focuses on the four main English skills - reading, writing, speaking and listening. It is designed to develop the English language proficiency of students at the A2 and B1 levels of the Common European Framework of Reference for Languages.

The second data source was the content instructors' questionnaire. It did not include demographic information, but the university website lists the countries where the instructors are from, as well as their mother tongues. The questionnaire was written in English and Arabic and contained six questions on the instructor's attitudes using a six-unipolar scale and one question using a three-unipolar scale. The questionnaire items were validated by six university instructors in the same institution. Based on their comments and suggestions, the questionnaire items were revised.

Four versions of the same questionnaire were sent to the four academic major disciplines using their official university emails: healthcare, computer, engineering, and sciences. The researcher created four versions by changing the adjectives in each question (e.g., from healthcare to engineering). Therefore, the instructors felt that the questionnaire items were related to their academic areas. We categorized all healthcare colleges (Applied Medical Sciences, Dentistry, Medicine & Surgery, and Pharmacy) as one academic major. The total number of content instructors was 341. Table 2 shows the content of instructors' colleges. The Cronbach's alpha for content instructors' attitudes toward students in the EME policy classes was 0.95. In this survey, the instructors' attitudes towards EME were measured indirectly due to concerns about their willingness and ability to accurately report their attitudes in response to direct inquiries. This is a well-established approach in psychology, as implicit measures of attitudes are less susceptible to social desirability bias than explicit measures. In this case, the instructors' attitudes were measured indirectly through their perceptions of students' proficiency levels in English.

Table 2

Descriptive Statistics for the Content Instructors (n = 341)

Content Instructor Colleges	N (%)
1. Applied Medical Sciences (Healthcare)	41 (12%)
2. Computer College	42 (12%)
3. Dentistry (Healthcare)	24 (7%)
4. Engineering College	54 (16%)
5. Medicine & Surgery (Healthcare)	35 (10%)
6. Pharmacy (Healthcare)	34 (10%)
7. Science College	111 (33%)
Total	341 (100%)

The third data source was the current undergraduate questionnaire. The students' questionnaire consisted of three parts. The first part collects demographic information, including the students' gender and college. The second part consists of six-point scale items that measure three constructs adapted from Ajzen's theory of planned behavior (Ajzen, 1991). The researcher followed established guidelines (e.g., Ajzen, 2019; Francis et al., 2004) to create a valid and reliable survey to measure the TPB four constructs. The researcher also used previously published questionnaires that used the TPB as a theoretical framework in language-learning contexts (e.g., Alhamami, 2018) as a starting point for designing the final survey. The three items measuring attitude had a Cronbach's α of .93. In the context of this study, attitude refers to a student's positive or negative evaluation of learning content in EME undergraduate programs. The second set of three items measures the participants' self-efficacy; Cronbach's α = .92. In the context of this study, self-efficacy refers to students' perceptions of their ability to learn content in EME undergraduate programs. The last construct on the six-point scale was normative beliefs, with a Cronbach's α of .92. In the context of this study, normative beliefs refer to the belief that an important person or group of people will approve of and support learning content in EME undergraduate programs. Questionnaire items were presented in a non-systematic order in the survey to ensure reliability. In other words, the questions used to assess attitude were interspersed with questions to measure normative beliefs and self-efficacy beliefs.

The last part of the current students' questionnaire uses a two-point scale. Two items elicited students' opinions regarding their GPA and exam answers in relation to EME. The last question asked students directly about their preferred medium of education: Arabic or English. Four versions of the same questionnaire were designed and sent to target students. Each version mentioned the respective student's general academic major: healthcare, computers, engineering, and sciences. Therefore, the students felt more that the questionnaire addressed them specifically. The student questionnaire was posted online on the students' Blackboard site with assistance from the Deanship of E-Learning. For example, the engineering questionnaire was posted on the engineering students' Blackboard site, and the science questionnaire was posted on the science students' Blackboard site. A total of 1678 undergraduates responded to the questionnaire: 250 (15%) attending programs in the College of Computer, 301 (18%) attending undergraduate programs in the College of Engineering, 358 (21%) attending undergraduate programs in the healthcare colleges, and 769 (46%) attending undergraduate programs in the College of Sciences.

The researchers obtained ethical clearance from the university's ethics committee and permission from the university administration to conduct the study. They used an online consent form to inform the students and instructors that their participation was voluntary. The students' consent form was composed in Arabic, and the instructors' consent form was provided in both Arabic and English. All the data were collected from a public Saudi university located in the southern part of Saudi Arabia.
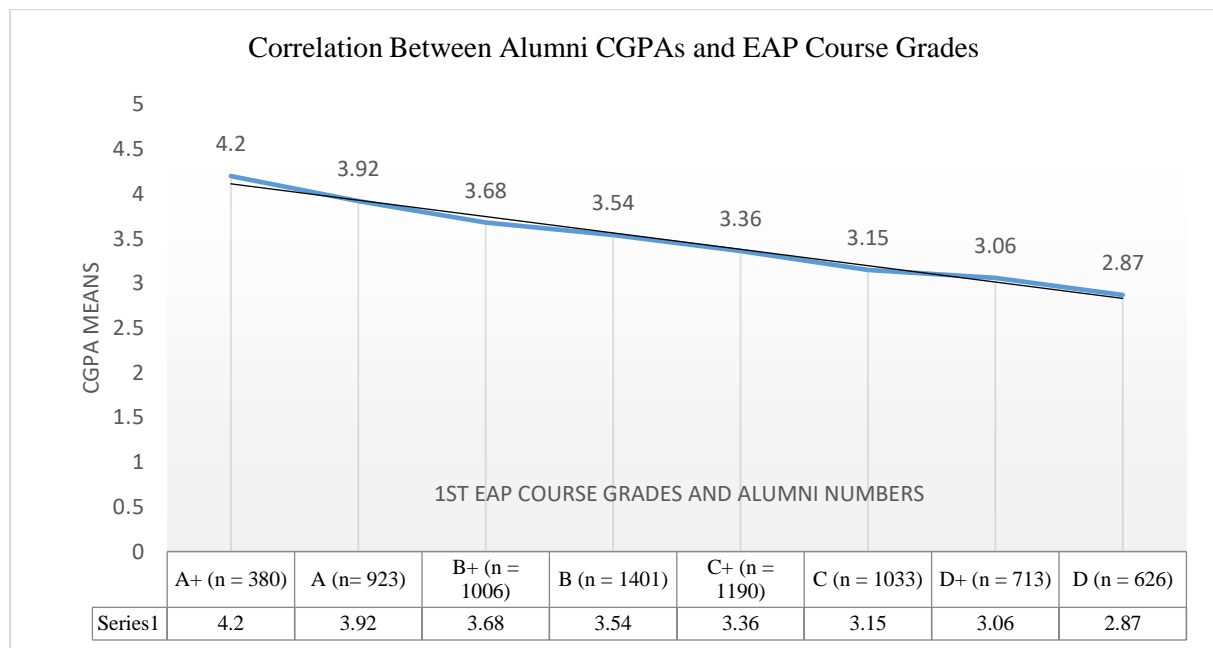
Results

The results of the three data sources can be classified into nine parts.

1. Correlation Between Alumni CGPA and EAP Grades

To determine the relationship between alumni English proficiency in the first year and their CGPA after finishing the undergraduate program, the alumni grades in the EAP course were converted to numerals using the university grading system. A correlation test was conducted. The correlation between the continuous variables, alumni CGPA, and EAP course grades was computed using Pearson's r. The two variables were correlated at $r(7269) = .473$, $p < .01$. The alumni CGPA ranged from 2 to 5 ($M = 3.45$, $SD = 0.73$, $n = 7272$), as did The EAP course grades ($M = 3.67$, $SD = 0.89$, $n = 7272$). Figure 1 illustrates the correlation between alumni English proficiency levels in the first year and their CGPA after finishing the program.

Figure 1

Correlation CGPA and EAP Course Grades

	A+ (n = 380)	A (n= 923)	B+ (n = 1006)	B (n = 1401)	C+ (n = 1190)	C (n = 1033)	D+ (n = 713)	D (n = 626)
Series1	4.2	3.92	3.68	3.54	3.36	3.15	3.06	2.87

2. Differences in CGPA Based on Alumni Gender

To determine any differences in CGPA based on alumni gender, a t-test was conducted. The t-test is a method that determines whether two populations are statistically different from each other. It investigates the differences in means and the spread of the distributions (i.e., variance) across groups. The data were analyzed using an independent sample t-test. The gender of the alumni was related to their CGPA, $t(7270) = 20.244$, $p = .001$, $d= 0.485$. Female

alumni CGPA was higher (m = 3.66, SD = 0.70, n = 2887) than male alumni CGPA (M = 3.32, SD = 0.71, n = 4385). The mean difference was 0.34, with a standard deviation of .0.02.

3. Differences in EAP Courses Grades Based on Alumni Gender

Next, a t-test was conducted to determine the differences in EAP courses scores based on alumni gender. There were no significant differences between the alumni EAP scores based on their gender. Table 3 illustrates the means and standardized deviations of alumni males and females based on their CGPA and EAP course grades.

Table 3

Males' and Females' Average CGPA and EAP Course Grades (n = 7272)

| CGPA		EAP Course Grades	
Female (n = 2887)	Male (n = 4385)	Female (n = 2887)	Male (n = 4385)
Mean (SD)			
Female	Male	Female	Male
3.66 (0.70)	3.32 (0.71)	3.66 (0.89)	3.68 (0.90)

4. Prediction of Alumni CGPA by Gender and EAP Course Grades

To predict alumni CGPA based on gender and English proficiency at the beginning of undergraduate programs, a multiple regression test was conducted. Multiple linear regression was calculated to predict the alumni's CGPA based on gender and their grade in their first intensive EAP course (n = 7227). A significant regression equation was found, $F_{(2, 7269)}$ = 1408.159, p < .001), with an R^2 of .28. The two variables considered together significantly predicted the alumni's CGPA. The gender variable is a significant predictor, with a slope of .35 (p = .001); 2.243 quantified the Y-intercept for our regression equation. EAP course grades are a significant predictor, with a slope of .39 (p = .001); 2.243 quantified the Y-intercept for our regression equation.

5. Content Instructors' Questionnaire Results

Figure 2 summarizes the content instructors' views on students' English proficiency in the classroom. The first part of the scale indicates positive views (strongly yes, somewhat yes, and slightly yes). The second part of the questionnaire scale indicates negative views (slightly no, somewhat no, and strongly no). Most content instructors showed positive views on all of the questions except question 6. The percentages of their positive views are as follows: Q1 (68%), Q2 (65%), Q3 (74%), Q4 (71%), Q5 (54%), and Q6 (44%). In other words, content instructors have a lower percentage of negative views regarding all questions except question 6 (56%), for which they expressed higher negative views.

Figure 2

Summary of Content Instructors' Views
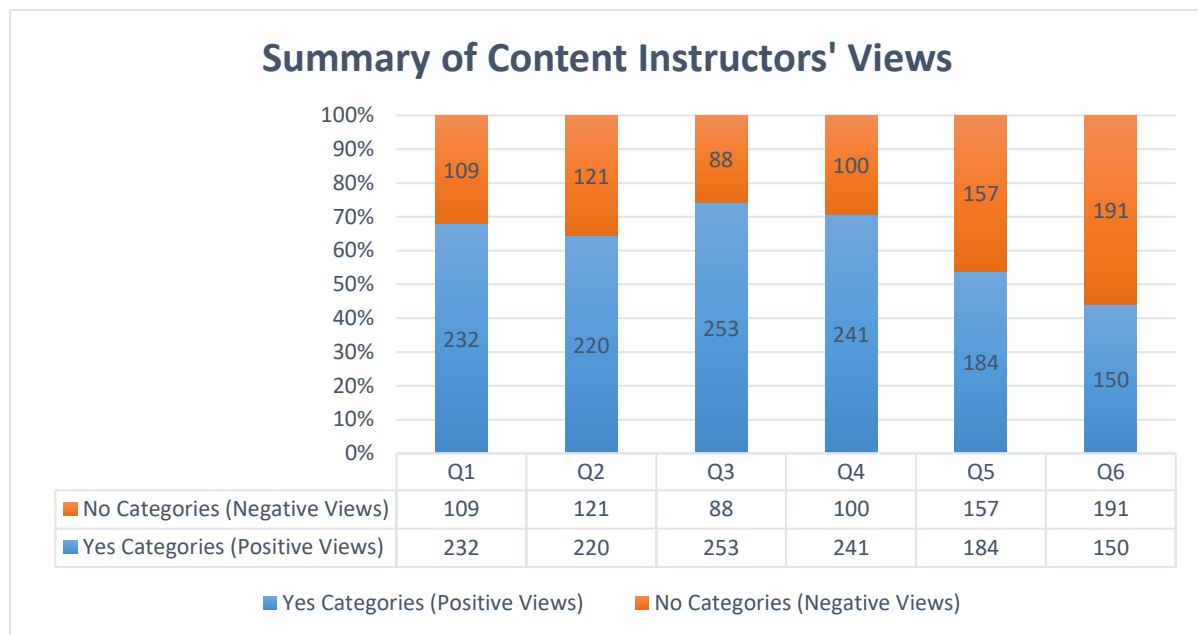
6. Six-Point Likert Scale Items: Current Student Questionnaire

The next section presents the correlation among three constructs: students' attitude toward the EME policy, students' normative beliefs, and students' self-efficacy beliefs. Using the mean of the three items that measure each construct, a Pearson product-moment correlation was conducted to examine the relationships among current students' attitudes toward EME (m = 4.25, SD = 1.73), self-efficacy (m = 4.21, SD = 1.68), and students' societal beliefs (M = 4.31, SD = 1.71). These three variables were significantly correlated. Students' attitude was significantly correlated with their self-efficacy, $r(1676) = .877$ $p = .001$, their self-efficacy was strongly positively related to their normative beliefs, $r(1676) = .854$, $p = .001$, and their attitude was strongly positively related to their normative beliefs, $r(1676) .885$, $p = 001$.

7. Two-Point Likert Scale Items: Students' Preferred Language of Education

The two-point Likert scale items infer students' preferred medium of education and views regarding their GPA. The first two-point Likert scale item asked the students if they think that their current GPA would be higher if they studied the subjects in their mother tongue, Arabic. In total, 1,213 (72%) chose yes, and 465 (28%) chose no. The next two-point Likert scale question asked the students if they have faced difficulties in understanding and answering exam questions in English; 1,473 (88%) chose yes, and 205 (12%) chose no. The last question asked the participants about their preferred medium of education in their academic major, for which 1,304 (78%) chose Arabic, and 374 (22%) chose English.

8. Gender and Current Students' Attitudes, Normative Beliefs, and Self-efficacy Beliefs

Only 1,125 participants in the questionnaire mentioned their gender. Therefore, in the following tests, the sample size decreased from 1,678 to 1,125. The means for attitude, normative beliefs, and Self-efficacy with standard deviations for each group are presented in Table 4. The one-way between-groups multivariate analysis revealed a significant overall effect, Wilks' $\Lambda = 0.966$ $f(1, 1123) = 13.132$ $p = .001$. There was a statistically significant interaction effect between gender and survey answers on dependent variables; female

participants showed a higher negative attitude toward the EME policy, as indicated by their higher means in all three constructs.

Table 4

Group Descriptive Statistics

	Gender	N	Mean	SD	SE
Attitude Mean	Female	652	4.608	1.727	0.068
	Male	475	4.160	1.725	0.079
Normative beliefs Mean	Female	652	4.810	1.621	0.063
	Male	475	4.289	1.713	0.079
Self-efficacy Mean	Female	652	4.704	1.632	0.064
	Male	475	4.131	1.703	0.078

9. EME and Current Students' Attitudes, Normative Beliefs, and Self-efficacy Beliefs

The means for attitude, normative beliefs, and self-efficacy with standard deviations for each group are presented in Table 5. The one-way between-groups multivariate analysis revealed a significant overall effect, Wilks' $\Lambda = 0.431$ $f(1, 1123) = 494.724$ $p = .001$. There was a statistically significant interaction effect between students' preferred medium of education and survey answers regarding the dependent variables: The participants who chose Arabic had more negative views toward the EME policy, as indicated by their higher means for all three constructs.

Table 5

Group Descriptive Statistics

	Group	N	Mean	SD	SE
Attitude Mean	in Arabic	912	5.046	1.222	0.040
	in English	215	1.760	0.890	0.061
Normative beliefs Mean	in Arabic	912	5.180	1.167	0.039
	in English	215	2.090	1.135	0.077
Self-efficacy Mean	in Arabic	912	5.030	1.263	0.042
	in English	215	2.057	0.984	0.067

Discussion

The results show interesting findings that contribute to our understanding of the impact of the EME policy on content learning, gender in EME undergraduate programs, and the views of content specialists. There was a significant positive correlation between the EME undergraduate alumni CGPA and their foundation year EAP course grades ($r = .47$). The findings demonstrate that the higher the grade undergraduates achieve in the foundation year English intensive course, the higher the GPA they will achieve after completing four- or five-year undergraduate programs. This finding demonstrates the importance of English proficiency in the achievement of program learning outcomes, as indicated by students' GPAs. The findings demonstrate the average expected GPA of alumni based on their foundation year EAP course grades. For example, the average CGPA of undergraduates who achieved an A+ in the EAP course was 4.20, and the average CGPA of undergraduates who achieved a D in the EAP course was 2.87. This supports Dimova's (2020) argument that EAP courses are better indicators of students' language proficiency in EME programs because they are designed

specifically to help students succeed in university and achieve better grades. These findings demonstrate that higher GPAs are positively associated with several cognitive and non-cognitive abilities (Qian & Yavorsky, 2021).

Alumni gender is an important factor that correlates with CGPA. The t-test results show that females achieved a higher GPA, with a mean of m = 3.66, than males, who had a mean of 3.32. In EME undergraduate programs, women achieved better learning outcomes than men. The results are in line with findings by other researchers (Macaro & Akincioglu, 2018; Pun & Jin, 2021) that gender is an important factor to be investigated because it influences students' performance. One factor might be gender segregation in Saudi education at all levels. However, there was no significant difference between males and females in language proficiency, as indicated by their EAP course grades. Surprisingly, females achieved a slightly lower mean grade (3.66) in the EAP course than males (m = 3.68). This might indicate that gender influences students' grades in the long term. Gender might not influence students' grades in a short-term program (e.g., a one-year EAP program) but might influence their overall grades in the four undergraduate programs. This finding supports Kamaşak et al.'s (2021) findings in the Japanese context. They found that gender was not clearly related to the challenges experienced by students in the EME context. Similar findings were reported by Kong and Wei (2019), who found that females scored almost the same as males.

Multiple regression test results show that undergraduate CGPA can be predicted by both students' grades in the EAP program and their genders. Both variables can explain 28% of the variation in the alumni CGPA. This shows that EAP course grades and genders play an important role in students' learning of content in EME programs. Policymakers can use both variables to explain specific outcomes in the learning environment, such as higher grades, students' participation, and students' performance in exams. Similarly, Tenney et al. (2020) found that English language scores correlate more strongly with academic performance than mathematics, chemistry, or Chinese language scores in the EME pharmacy program in Hong Kong. However, this finding contradicts Reus's (2020) showing that performance differences are primarily attributable to students' performance in previous courses, and language, gender, and attendance have limited influence that explains such performance differences. The findings of the current study show that language and gender explain significant differences in performance, as indicated by students' CGPA.

The content instructors' opinions were presented as methods, detailed views, and a summary. We can infer from the content instructors' summary that most have positive attitudes toward and experiences with EME undergraduate programs. Surprisingly, this contradicts Alhamami's (2015) findings. Alhamami (2015) found that most Arab scientists support the use of Arabic in undergraduate programs. One explanation for this is that the current questionnaire included non-Arabic content instructors and was in English, whereas Alhamami's (2015) questionnaire was limited to Arabic native-speaking scientists and was written in Arabic. In addition, the current questionnaire included content instructors from different academic disciplines, such as engineering, computers, medicine, and science. Alhamami's (2015) questionnaire was limited to the College of Science. Abouzeid (2021) concluded that the EME policy and curriculum design reconciled instructors' perceptions with the reality of their students' linguistic proficiency and learning needs. Research has also indicated that EME teachers need professional development to teach effectively (Macaro et al., 2020).

The three constructs of Ajzen's theory of planned behavior (attitude, normative beliefs, and self-efficacy correlate significantly with each other. Based on the students' attitude mean (m = 4.25), the students had a negative attitude toward learning content in EME undergraduate programs. The students also had negative Self-efficacy beliefs, as indicated by the mean of their Self-efficacy (m = 4.21). Interestingly, students believe that important people around them hold negative beliefs about the use of the EME policy to learn content, as indicated by the mean score of their normative beliefs construct (M = 4.31). Negative social pressure and the opinions of people around students influence their intention to learn content in EME programs and participate in class activities (Alhamami, 2020). In addition, negative Self-efficacy beliefs contribute to engagement inside the class. Thompson et al. (2019) stressed that students with weak self-efficacy beliefs will not put forth more effort.

The finding for the two-point Likert scale that measures students' preferred medium of education shows that students prefer to learn content in their mother tongue, Arabic. Seventy-two percent of the students believed that they would have better GPAs if they used Arabic as a medium of education. Moreover, 88% of the participants believed that English hindered their performance in exams and prevented them from understanding and answering questions. In addition, 78% of the participants chose to learn content in Arabic. The participants showed major concerns regarding their GPA and performance on exams. This shows that there are challenges posed by the transition from secondary education (K12) to university in relation to EME. Arabic is the medium of education for all subjects. This contradicts the findings by Rose et al. (2020), who found that Japanese students believed that the benefits they gained from the EME program were more important than their GPA.

There was a statistically significant interaction effect between gender and survey answers regarding dependent variables: Female participants showed higher negative attitude, normative beliefs, and Self-efficacy toward the EME policy, as indicated by their higher means in all three constructs. One explanation is that female students are concerned about their education and would like to achieve higher GPAs. Achieving higher GPAs will increase their opportunities to get a job because many Saudi government agencies take into consideration students' GPAs when they apply for a position. In addition, a higher GPA will increase their opportunities to join higher graduate programs. However, these findings contradict Kong and Wei (2019), who found positive attitudes toward the EME policy. The participants reported slightly favorable attitudes toward EME.

There was a statistically significant interaction effect between students' preferred medium of education and survey answers on dependent variables: Participants who chose Arabic had higher negative views toward the EME policy, as indicated by their higher means in all three of Ajzen's theory constructs. Students with higher negative beliefs regarding the EME policy preferred Arabic. However, content instructors held different perspectives than students (Alhamami & Almelhi, 2021). Content instructors' attitudes toward students' English proficiency in EME can explain different behaviors in EME classes, such as students' participation in class discussions and written answers in exam papers. The findings demonstrated the usefulness of Ajzen's theory of planned behavior in understanding the EME context. The three main constructs in Ajzen's theory, attitude, normative beliefs, and self-efficacy, proved to be useful in showing differences between students' genders and preferred

medium of education and their attitude, normative beliefs, and self-efficacy. Designing research tools based on Ajzen's theory will help EME researchers develop more valid and reliable research tools.

In EME programs, educators and policymakers should examine factors that influence students' achievement of program learning outcomes such as the medium of education. Policymakers should reduce the external factors that increase equality in the programs, such as proficiency in the medium of education, access to educational resources, and family financial status. For example, in Mathematics programs, administrators should ask whether the students earn a higher GPA because they have achieved the program's outcomes OR because the students speak English more fluently than others. It is recommended that program administrators should provide students with low English proficiency with more English learning courses before they enroll in EME programs. Having more English learning courses will allow students just and fair treatment once they enroll in EME programs.

Content instructors should be trained to differentiate between students' ability and their proficiency in English. For example, physics, mathematics, and engineering exams have given advantages to students who speak English fluently over those who have limited English proficiency. There should be an exam control committee that revises exams for validity and confirm whether these exams are influenced by external factors such as higher proficiency in English. It is recommended that content instructors in EME programs complete courses on assessment and evaluation. Having trained instructors on assessment and evaluation will increase students' opportunities for fair and just assessment. Content instructors are important stakeholders and their views should be elicited and considered while designing curriculums. Program administrators should conduct an analysis survey to elicit all content instructors' needs in EME programs.

The results of the students also suggest that EME program administrators need to consider students' genders, attitudes, self-efficacy, and social beliefs while designing new programs and updating current EME programs. Students are important stakeholders and their backgrounds should be considered while designing programs. Students with negative attitudes, low self-efficacy beliefs, and negative social beliefs toward English might not engage and enjoy learning in EME classes. Bilingual policy or providing two-track programs in English and in Arabic will give students the opportunity to choose their preferred medium of education. Teachers also can code-switch and use students' mother tongue to help them understand complex concepts and different terms. In addition, instructors might allow students to code-switch and use their mother tongue in EME programs if they cannot express themselves in English. Code-switching and bilingual policy will increase equal opportunities to learn and perform on exams.

Conclusion

This study investigated the impact of EME on students' academic performance and attitudes, as well as content instructors' perspectives. The findings revealed that alumni with higher English proficiency achieved better learning outcomes. Students face many challenges posed by the transition from secondary education (K12) to university in relation to EME, as indicated by their negative attitude, normative beliefs, and Self-efficacy beliefs. Students' gender is an important factor in the Saudi context in relation to CGPA and beliefs regarding

EME policy. Female alumni have higher CGPAs, and female current students have higher negative beliefs regarding the EME policy. The content instructors' survey indicated generally positive views of students' English language proficiency, indirectly reflecting favorable attitudes toward the EME policy.

EME in Saudi undergraduate programs is an emerging field of research. There is a need for further comparative research that compares the findings in different Saudi contexts, such as undergraduate and graduate programs, private and public universities, and international and local high schools. There is also a need to compare the views of content instructors and students' gender in Saudi universities with those of other countries. Comparing the two countries using the same instruments reveals interesting findings. Future studies might use qualitative methods to investigate in depth the resources for students' negative attitude, normative beliefs, and Self-efficacy in undergraduate Saudi programs.

The findings of this study demonstrate the substantial impact of the EME policy on content learning. Students with higher English proficiency achieved better learning outcomes. Contradicting views of the EME policy on content instructors' and students' questionnaires demonstrate the need for content instructors' training and awareness of challenges that students face in EME programs. The students' questionnaire shows that students face many challenges posed by the transition from secondary education (K12) to university in relation to EME, as indicated by their negative attitude, normative beliefs, and Self-efficacy beliefs. Students' gender is an important factor in the Saudi context in relation to CGPA and beliefs regarding EME policy. Female alumni have higher CGPAs, and female current students have higher negative beliefs regarding the EME policy.

The present study has the following limitations. First, it used homogenous sample where students speak the same native language (Arabic). Future studies may replicate the findings of this study with a heterogeneous sample of students coming from different backgrounds and speaking different mother tongues. Second, this study is limited to undergraduate programs. Future studies may compare the findings to postgraduate programs. Content instructors and students in Master's degree programs and Ph.D. programs might have different perspectives than undergraduate programs. Third, this study only considered single-sex EME programs, also known as gender-isolated education. In Saudi universities, males and females attend classes on separate campuses and are taught by the same gender. Male instructors are not allowed to enter female campuses. Future studies may replicate this study with mixed-gender classes where they are taught by both male and female instructors.

Bio
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