INVESTIGATING COLLEGE OF SCIENCE STUDENT ATTITUDES TOWARDS USING ENGLISH AS A MEDIUM OF INSTRUCTION

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Abstract.

This study investigates science students' attitudes towards using English as a medium of instruction (EMI). A questionnaire featuring 30 items with a 5-point Likert-scale response key, in addition to five open-ended questions, was distributed to 60 undergraduate College of Science students (30 males and 30 females) at a public university in the Sultanate of Oman. Findings indicate that, while a large number of participants accepted that English is the global language of science and technology, more than half stated a preference for Arabic-medium instruction in the College of Science. This preference was linked by participants to the existence of several issues associated with EMI in their science studies. However, despite these areas of concern, participants did not show negative attitudes towards EMI itself and reported both instrumental and integrative motives for their engagement with the English language. Moreover, respondents identified several ways in which the potentially negative impacts of EMI could be mitigated, including increasing the quantity and quality of their English language studies, using code-switching between English and Arabic in the classroom, and designing Oman-specific teaching materials.

Keywords: Science students, Attitudes, English medium subject courses (EMSC), English as a medium of instruction (EMI)

1. Introduction.

There is a wide consensus that English has become, as it were, the lingua franca of science, technology, economy, and travel, at least partly because of globalisation which has turned the world into a small village (Crystal, 2003). In fact, more than a quarter of the Earth's population can now communicate in English and the number of non-native speakers far exceeds the number of native English speakers. English's current position as the world's dominant lingua franca is unprecedented (Crytsal, 2003; Graddol, 1997), with a number of authors highlighting the variety of international domains the language dominates (Zhughoul, 2003), the privileges it assumes in relation to other languages (Coulmas, 1992), and even the sheer size of its geographical reach (Brumfit, 2004).

Accompanying this seemingly ever-increasing influence is a focus among a number of the world's tertiary institutions on courses where English is the medium of instruction (Marsh, 2006). This is a phenomenon that can be witnessed in outer and expanding circle nations, with, for instance, more and more institutions of higher education offering EMI in countries across Europe, sub-Saharan Africa, and East Asia (Kim, Son, & Sohn, 2009; Mutumba, 1999; Observatory on Borderless Higher Education, 2007). Narrowing the focus to the Arab world, the number of universities in the region that employ EMI either alongside Arabic-medium courses or exclusively for science-based majors is increasing (Bashir, 2007; Weber, 2011). In Oman, as in many other countries whose official and national language is Arabic, English has been an integral part of education policy since a modern education system was introduced following the ascension of the current ruler, Sultan Qaboos, to the throne in 1970. While English has remained a school subject in public schools in the sultanate, it has, nonetheless, been adopted as a medium of instruction for science-based subjects in Sultan Qaboos University – the country's first and until now only public university – since it opened its doors in 1986. Not surprisingly, this is a situation that has been replicated by a growing number of private universities that have appeared in the country over the past decade or so.

The research from the Arab Gulf and greater Muslim word investigating university students' attitudes toward English and/or EMI tends to report a complicated mix of positive and negative attitudes often based on cultural-religious and/or political concerns (see Al-Tamimi, 2009; Elyas, 2008; Karmani, 2010; Sinno, 2008). However, of these studies, only a handful have focused on the attitudes of science majors. These include Al-Ansari and Lori (1999) in Bahrain, Malallah (2000) in Kuwait, Abu-Ghazaleh and Hijazi (2011) in Jordan, and Mamun, Mostafizar Rahman, Rahman and Hossain (2012) in Bangladesh. Results from these studies generally suggest that science majors in EMI

courses tend to hold positive attitudes towards the English language and/or towards EMI itself. A common theme running through much of this research is that science students are acutely aware of the instrumental value of the language, especially as it relates to their current studies and future careers, even though attitudes towards the Western cultures associated with the language are typically more mixed. However, suggesting that the level of positive regard for English and EMI apparent in these investigations can be readily transferred to the Omani tertiary context is somewhat problematic, especially considering the raft of linguistic, cultural, historical, economic and political differences that can be readily summoned to distinguish the sultanate from not only non-Arab nations such as Bangladesh, but also from even its closest Arab Gulf neighbours (see Baker & Jones, 1998; Peterson 2004a, 2004b).

Moreover, while a small number of studies have specifically examined Omani university-level students' attitudes towards English (Fahmy & Bilton, 1992), these have generally focused on students of the humanities and not of science. This distinction is important because science students engaging with materials in their mother tongue often report problems with understanding terminology and scientific concepts, analysing information, and performing higher-level mathematics. However, if Saricoban's (2012) contention that EMI students will only gain a superficial understanding of the subject matter they are exposed to is, in fact, correct, then it stands to reason that science students' attitudes towards English and EMI will involve a greater variety of influences and issues than those of students studying in non-science English-medium courses.

In relation to the participants in the current research context, author 1 has frequently encountered complaints by College of Science students studying in EMI courses that they face difficulties interacting with their English-speaking instructors and in understanding the content of their textbooks. The low grades these students subsequently receive were also linked, in the author's experience, with increasing levels of negativity and even hostility towards the English language and EMI, and resulted in many students transferring to other colleges at the research site where the medium of instruction is Arabic.

As negative attitudes towards English and EMI are, therefore, closely linked to the intake of future students into the College of Science and to their retention and academic success, it is vital that the nature of these attitudes is explored. This study, therefore, examined the following research question: What are the attitudes of College of Science students towards EMI in their college? In doing so, it focused on the following sub-questions:

1. What are the reasons behind using EMI at university level in Oman?
2. What problems, if any, are associated with using EMI in the College of Science?
3. What are the educational changes that could to be implemented to overcome these problems?

In order to address these questions, a questionnaire featuring 30 items and utilising a 5-point Likert-scale response key, in addition to five open-ended questions, was employed.

2. Literature Review.

2.1 Attitudes.

Gardner's (1985) socio-educational model, and its accompanying battery of tests known as the Attitude/Motivation Test Battery, place a heavy emphasis on the ways in which attitudes influence second language learners. The socio-educational model moves beyond a restricted focus on individual learner factors to incorporate cultural and social influences. According to the model, if learners are satisfied culturally with a second language that they learn, they are more likely to achieve higher levels of proficiency in the language. On the other hand, if learners have negative attitudes and dislike the target culture, achieving high levels of proficiency in the second language may be difficult.

Perhaps the two best-known constructs associated with the socio-educational model are integrative motivation and instrumental motivation. Integrative motivation is said to be present in those students who learn a second or foreign language because they are interested in the culture/s associated with it, and perhaps because they desire to integrate into the target language culture. Learners with a high level of integrative motivation, therefore, will usually hold positive attitudes towards the target language and its associated cultural groups (Norris-Holt, 2001). Instrumental motivation relates to those learners who learn another language due to the material and/or social benefits that language can bring. High levels of instrumental motivation are also usually associated with positive attitudes towards the second or foreign language, although, unlike learners who possess high levels of integrative motivation, attitudes towards the cultural groups associated with the target language can range from positive to negative. This is especially true of learners in the Arab world (see Clarke, 2007; Sinno, 2008)

2.2 Muslim Students' Attitudes towards English and EMI.

2.2.1 Research from the Muslim World.

Research interest in the attitudes of Muslim learners to the spread of English within traditionally Muslim-dominated regions and countries enjoys a long tradition in many parts of the world. Notable pieces of work include Ozog's (1989) investigation of 50 undergraduate students in Malaysia, in which it was reported that 22 participants wanted Arabic to be given equal status with English as a compulsory tertiary-level subject, while the remaining respondents wanted EMI to be abandoned altogether due to English's links with Western ideas and practices that are fundamentally non-Islamic in nature.

Ozog (1989) followed this investigation by co-authoring a study of the attitudes of 570 Bruneian citizens towards the languages of English, Malay and Brunei Malay in the Sultanate of Brunei Darussalam (Jones, Martin, & Ozog, 1993). In relation to the English language, Jones et al. discovered what they describe as "domain promiscuity", witnessed in English's encroachment on other traditionally Malay and Brunei Malay spheres such as intra-cultural friendships, official government business and, most surprisingly, the home. In terms of the domestic sphere, the researchers claimed English usage was seen as a mixed blessing, with proficiency in the language viewed as both a marker of academic and material success and also as a way in which foreign values enter the traditional cultural, religious and social environment of the home.

Despite the evidence of somewhat negative attitudes towards English in these two studies, Dan, Haroon and Naysmith's (1996) investigation of Malaysian high school students found that, while respondents claimed they were aware of the Western cultural values encountered in their studies, overall they held a strong sense of belief in their abilities to recognise and reject these values when deemed incongruous with their cultural-religious identities. While attitudes towards the West were mixed, overall participants claimed access to English gave them opportunities for personal and spiritual development, and that the language was also associated with national development.

In Jordan, Abu-Ghazaleh and Hijazi (2011) investigated the relationship between attitudes towards learning English and the English language itself and the variables of gender, college and academic level of 200 undergraduate and post-graduate students at a university in the far northern Jordanian city of Irbid. The researchers used an adapted version of Malallah's (2000) instrument which employed 32 items across the three areas of "Attitudes towards English", "Attitudes towards Learning English" and "Purposes of Learning English".

Abu-Ghazaleh and Hijazi (2011) report almost entirely positive attitudes across all three areas. For instance, regarding participants' attitudes towards learning English, the researchers claim either positive or neutral responses to all items. For example, all participants express varying levels of disagreement to the statements that learning English "is against one's religion" (a mean of 4.12 with 1, for these following reverse scored items, representing strongly agree and 5 strongly disagree), "will harm the Arabic language" ($M = 3.88$), "means gaining habits that do not suit us Arabs" ($M = 3.74$), and "threatens Arab identity" ($M = 3.65$).

Similarly positive attitudes were also reported in the area of attitudes towards the English language, with slight-to-moderate levels of disagreement with the items that "If I use English, it means that I am less patriotic" ($M = 3.83$) and "I feel uncomfortable when I hear a Jordanian speaking to another in English" ($M = 3. 57$). In fact, the only suggestion of anything other than positive attitudes towards the English language is the overall neutral rating of the item that when using English "I do not feel that I am Jordanian any more" (an overall mean of 3.12 for this positively scored item, with 3 representing neutral and 5 strongly agree).

Abu-Ghazaleh and Hijazi (2011) interpret these findings as suggesting that there "is a definite degree of positiveness towards the English language in Jordan" (p. 632) − a conclusion they contribute to recognition within Jordanian society of the crucial role English plays in the country's education, politics and economics. Moreover, the researchers found almost no differences whatsoever in these attitudes based on the variables of gender, specialisation, and academic level. In fact, the only significant differences reported were that College of Science students displayed more positive attitudes towards learning English than their colleagues in the College of Arts, while post-graduate students tended to hold more positive attitudes to the English language than undergraduates.

Most recently, in Bangladesh, Mamun, Mostafizar Rahman, Rahman and Hossain (2012) investigated the attitudes towards English of 79 undergraduate students of the government-funded, English-medium Khulna University's Life Sciences School. Respondents were administered a 17-item 5-point Likert response key questionnaire adapted from previous studies. Possible responses ranged from strongly agree to strongly disagree with a middle option of neutral.

Mamun et al. (2012) reported almost universally positive attitudes towards the English language among participants. For example, around 97% of respondents either agreed or strongly agreed with the statement "I like speaking English". In addition, participants also displayed favourable attitudes towards speakers of the language, with more

than two thirds expressing some form of agreement with the items "When someone speaks English I think he is educated" (67.09%) and "When someone speaks English it creates a good impression for him" (69.62%). Moreover, more than 82% of participants either disagreed or strongly disagreed with the statement "I dislike people who speak to me in English".

Perhaps not surprisingly, given their status as students enrolled in the compulsory English language preparatory course of an English-medium university, Mamun et al. (2012) state that participants displayed a high level of awareness of the instrumental value of the English language at both personal and international levels. For instance, more than 96% of the life science undergraduates surveyed agreed that English is "an important lingua franca in globalization" and that "knowledge of English offers advantages in seeking good jobs".

However, unlike a number of the studies cited thus far in which respondents recognised the instrumental value of English though often attempted to limit the extent of its cultural influence on their lives, the Bangladeshi students studied by Mamun et al. (2012) stated a preference for increasing their encounters with English-language cultural products such as TV and radio programs (77.22% agreed they would like more exposure to these media in English) and magazines and newspapers (81.02%). Moreover, more than 86% of participants believed that all official documents should be produced in both English and Bangla, with around 75% also agreeing that "If an academic text is available in English and BM [Bangla], I will read the text in English".

Mamun et al. (2012) view the overwhelmingly positive nature of the attitudes suggested by these findings to argue that respondents "like the English language and they like those who speak English" (p. 207). The authors argue that much of this esteem is due to an acknowledgement of the advantages English offers in the age of globalisation, such as finding good jobs in an increasingly competitive local labour market and obtaining a higher social status. It is due to this awareness of the instrumental value of the language that Mamun et al. claim respondents would like English to be raised to the equivalent status as that of an official second language in Bangladesh, as evidenced in the number of participants who wished to see both Bangla and English used together in official communications, street signs, maps, the media and education.

2.2.2 Research from the Arab Gulf.
Despite being a focus of a growing body of research, studies about the attitudes of Arab Gulf citizens towards English are still relatively scarce (Karmani, 2010). One of the first to explicitly examine Gulf Arabs' attitudes towards English and its associated cultures is Fahmy and Bilton's (1992) investigation of 74 Omani English major student teachers conducted in Oman's only public university – the current research site. The researchers gauged participants' attitudes through the administration of a 5-point Arabic-language Likert-scale questionnaire based on items suggested by Gardner (1985) and Oller, Hudson and Liu (1977). Demographic details elicited included parental familiarity with English, time spent in Anglophone countries, gender, and language/s used at home.
Overall, respondents reported largely favourable attitudes towards the English language and its speakers. For instance, on items regarding the use of English in the Omani university where they were studying, Fahmy and Bilton (1992) report statements such as "At times I am afraid that by using English I will become like a foreigner" and, "When I use English, I do not feel that I am Omani any more", to receive strong to moderate levels of disagreement. Moreover, on items inquiring about reasons for learning English, the researchers claim participants found gaining a better understanding of English-speaking people and their way/s of life, alongside making foreign friends, to both be rated as "important" motivators. That is, these participants held fairly high levels of integrative motivation, and hence also held positive attitudes towards the target language and its speakers. These attitudes were unaffected by participants' demographic details.
In the island kingdom of Bahrain, Al-Ansari and Lori (1999) conducted a comparative study of 65 College of Arts Arabic- and English-majors looking at, among a number of different concerns, participant attitudes to the English language and British culture. The researchers' primary concern was a comparison of attitudes between the two majors, with the assumption that as freshmen engaged in a year of compulsory English-language studies before entering their colleges proper, extraneous variables affecting participant attitudes could be held to a minimum.

Al-Ansari and Lori (1999) report that the English-major participants had significantly more positive attitudes to both the English language and to British people than their Arabic-major counterparts. This study is therefore one of the first emanating from the Gulf to detail variations in attitudes based on future college of study. However, the real significance of this study to the current research lies beyond the strict confines of the comparison-bound methodology itself, and can be found in an area the researchers allude to – the nature of these attitudes themselves.

More specifically, participants in Al-Ansari and Lori's (1999) investigation were required to record responses to a series of questions regarding attitudes to learning English and foreign cultures on a five-point Likert-scale. Responses ranged from strongly agree to strongly disagree. In examining the scales in more detail, it becomes apparent the cut-off point between negative and positive attitudes for the "Attitude to Language" scale, for instance, is 15. However, on this scale the English majors reported a mean value of 14.51 (with a standard deviation of 3.09) and the Arabic majors of 12.41 ($SD = 3.33$). Moreover, the "Attitude to British Culture" scale reports a middle point of 10, with the former group's mean being 11.12 ($SD = 3.03$) and the Arabic majors' being 8.41 ($SD = 3.89$).

Although Al-Ansari and Lori (1999) do not examine these findings in any way that falls outside the realm of a direct comparison between college majors, the mean values reported here suggest that the ostensibly positive attitudes the English-majors have towards the English language and British people are only positive by comparison. That is, they are, when held against the scale on which they were measured, neutral (with means ranging from around 0.49 below the median value to 1.11 above) or very mildly positive at best. The Arabic-majors also hold fairly neutral attitudes, though these could also be interpreted as slightly negative views of English and its speakers.

In Kuwait, Malallah (2000) focused on the attitudes towards English of 409 undergraduate students. The predominantly female sample represented students enrolled in the English-medium College of Science and College of Arts and the Arabic-medium College of Arts and College of Law. Malallah's questionnaire, also based on the work of Gardner (1985) and Oller, Hudson and Liu (1977), consisted of 82 items with a five-point Likert-scale response key. Participants were compared across the variables of college and course of study, year of study, number of visits to, and time spent in, English speaking countries, and career intentions.

Across these variables, Malallah (2000) reports a number of significant differences in attitudes towards both the English language and its speakers. These include generally more favourable attitudes towards EMI and a stronger desire to learn English among College of Science and College of Arts students than those students in the College of Shari'a, and more positive attitudes towards Western people among participants who had made five or more visits to English-speaking countries. Moreover, those students who intended to use English for their future careers also held significantly more positive attitudes towards the language and towards Western native speakers than those that did not.

In the United Arab Emirates, Findlow (2006) conducted a qualitative investigation of student attitudes towards English in higher education across two predominantly English-medium, and one exclusively Arabic-medium, public universities. The researcher held semi-structured interviews in English or Arabic and engaged in correspondence with 66 students, teachers and administrators. This was complemented by the administration of a largely open-ended survey in both languages to 500 students.

Findlow (2006) reports mixed attitudes towards the use of English in Emirati universities, with 50% of respondents stating a preference for EMI and 22% for Arabic-medium instruction, while 28% preferred to receive their educations in both languages. Moreover, Findlow states participants tended to associate English with notions of modernity, internationalism, secularism and material success, although Arabic was more closely linked to "cultural authenticity", tradition and religion. The researcher notes that positive attitudes towards EMI were often associated with an awareness of the potential for academic achievement and career development through developed English-language skills among participants. However, preferences for Arabic-medium instruction were generally correlated with nationalistic, ideological sentiments of freeing the UAE from dependence on foreign labour and leanings towards pan-Arab nationalism.

Still within the United Arab Emirates, Clarke (2007) examined attitudes to the role of English within the country through a study of female student teachers enrolled in the English major strand of an English-medium university's Bachelor of Education program. Clarke notes this education program is marked by the two sub-strands of "personal language development", concerned with subjects including grammar and syntax, and "understanding language", with a focus on critical literacies including the social and political implications of English as an international language. A qualitative research design was employed, with focus group interviews and student-led online conversations recorded

and analysed over a two-year period. Clarke summarises his analysis of student responses to English as belonging to one of three main categories: 1) a naïve celebration of English, 2) nostalgia for Islamic-Arab purism, and 3) a pragmatic engagement with the language's socio-political implications.

Leaving the first response momentarily aside, response two encapsulates a view in which English and its concomitant cultural values are seen as a threat to Arab-Islamic identity. Participants who were deemed to hold attitudes associated with this response saw English as a purveyor of harmful foreign values. This appears the antithesis of response number one – the dominant response in the research – in which the student teachers accepted English in an unquestioning way. Finally, the third response of pragmatic engagement perhaps represents a space somewhere between these two responses, suggesting an understanding of the need for participants to apply critical analytical skills to their studies in the English language.

In Saudi Arabia, Elyas (2008) stated an intention to investigate the "actual impact and attitudes towards this new trend of more English culture and ideology" (p. 40) in Saudi Arabian classrooms. In doing so, he administered a 12-item questionnaire to 65 male English major teacher trainees at King Abdullah Aziz University, Jeddah. Of the 47 participants to complete the survey, about 49% either agreed or strongly agreed that their textbooks contain alien or taboo information. However, responses were almost perfectly divided about whether the "English culture" to which this taboo information is ascribed should be separated from language learning. Seemingly contradicting this disagreement, 74% of respondents believed it was vital for English majors to learn about Western cultures, while a clear majority saw no imperialistic purpose in English's place within the Saudi education system.

Elyas (2008) concluded that learning the English language and Western culture/s in Saudi Arabia does not appear to threaten students' Arabic and/or Islamic values. In support, he claims that Saudi students possess a strong enough sense of their own religious and cultural identities to resist any potentially negative influences encountered during their studies either of or in the language. For this reason, participants' attitudes towards English are reported as being mostly positive despite an acknowledgement of the existence of potentially taboo information in their language learning materials.

Finally, in Sharjah, Karmani (2010) investigated Arab Muslim students' attitudes towards EMI with a specific focus on its socialising effects. The researcher administered a 21-item Arabic-language questionnaire to 365 students from the University of Sharjah. These students represented four of the university's colleges – the Arabic-medium College of Law and College of Shari'a and Islamic Studies, and the English-medium College of Engineering and College of Business. Following analysis of questionnaire data, four semi-structured group interviews featuring six interviewees each were held. The sample Karmani drew, in spite of the particular demographics of the research site in which 65% of the student body were female, was entirely male.

Regarding the first of Karmani's (2010) research questions about the socialising effects of EMI in the UAE, the author reported overwhelming support to the statement "The Arabic language is the most suitable medium of instruction for Arab students at university-level education in the Arab world" (69.6% agreed or strongly agreed compared to 19.8% who disagreed or strongly disagreed). Despite initial appearances of very strong support, however, this finding is tempered by the 56.1% of respondents who stated English was the most suitable language of instruction for "modern" tertiary subjects including business studies and information technology. Moreover, when examining these two items in relation to participants' colleges of study, Karmani states almost half (49.4%) of English-medium students agreed Arabic should assume a primary role within the Arab world, while 89.6% of Arabic-medium respondents expressed some form of support with the statement.

Closely related to these themes, two items inquiring as to whether EMI was beneficial or harmful to Arab students appear to offer support for Findlow's (2006) claims of a widespread bifurcation of Emirati society. For instance, in response to the first of these items – "The expansion of the English language as a medium of instruction at Arab universities is ultimately beneficial to modern day Arab societies" – some 55.4% of respondents stated some form of agreement, with little more than a quarter (28.0%) disagreeing. In response to the second item about whether EMI was ultimately harmful, however, 45.6% agreed while about one third (33.1%) of participants disagreed. Karmani (2010) notes the occasionally heated expression of this apparent tension in group interviews, relating this to what he describes as a general feeling running through the group sessions that Arab societies were under threat from a "wide-scale cultural onslaught" (p. 86) of which English was but a single part.

Karmani (2010) also notes an almost even split (46.6% agree, 38.1% disagree) on the point of whether EMI makes learners more receptive to Western cultural values including notions of freedom, democracy and human rights. It is noteworthy here that the extent of this divide is also apparent when respondents' language of instruction is taken into account, with almost as many English-medium students (48.1%) agreeing with the statement as Arabic-medium learners (45.1%). Moreover, a little more than half of respondents (52.2%) agreed that the more Arab students are exposed to the English language, the more alienated they will be from Arab and Islamic cultural-religious traditions.

3. Data Collection and Analysis.

3.1 Research Questions.

Building upon this theoretical background, the current study sought to address the primary research question: What are the attitudes of Omani College of Science students towards EMI in their college? In doing so, it investigated the following sub-questions:

1. What are the reasons behind using EMI at university level in Oman?
2. What problems, if any, are associated with using EMI in the College of Science?
3. What are the educational changes that could to be implemented to overcome these problems?

3.2 Instrument.

A three-part questionnaire was employed. The questionnaire was in both Arabic and English, with each English-language item and instruction accompanied by an Arabic translation. The first part sought participants' demographical details. The second part included thirty items reflecting the main themes highlighted in the background of the study. This part of the questionnaire featured a five-point Likert response scale, with responses ranging from strongly agree to strongly disagree and with a neutral option. Items 1-3 were designed to investigate participants' attitudes towards the importance of EMI. The next two items (4-5) aimed to discover students' attitudes towards Arabic as a medium of instruction. Student concerns about English-medium courses were covered in the next four items (6-9). Students' understanding in classes using EMI was then covered (10-15), followed by the effects of English proficiency on students' achievement in (16-19). Matters such as instrumental motivation (20-24) and integrative motivation (25-26), the influence of teachers' and peers' levels of English proficiency (27-28), and the effects of EMI on learner identity (29-30) were also covered.

Finally, five open-ended questions enabled students to express their opinions about the following themes: their level of support for, or opposition to, EMI; whether participants believe there to be any problems associated with EMI in the College of Science at the research site and potential solutions to these problems; and the potential utility of code-switching in science lectures. Space was also provided for participants to furnish any general opinion or observation about EMI in the College of Science.

3.3 Participants.

Sixty students (30 males and 30 females) were recruited through a process of snowball sampling from different years of Sultan Qaboos University's English-medium College of Science. After the researchers identified potential candidates, theses students were approached and asked to volunteer. Those students who agreed to participate were then asked to identify one or two of their colleagues they thought would also be interested in participating. These newly identified potential respondents were then approached and asked if they were interested, with the process continuing in this manner. All potential participants were given a participant information sheet that described the nature of the research and outlined their right to refuse participation without suffering any negative academic or personal consequences. Moreover, those who did agree to participate were also reminded that they could withdraw from the study at any time.

Of the 60 participants, 13 were first year students, 21 second year, 13 third year, and 9 were fourth year. The final 4 participants had spent more than four years as students at the university. Participants were also asked to rate their level of English proficiency. According to these self-assessment, two students possessed excellent English language skills, 25 rated their English proficiency as very good, 22 rated their English as good, while the remaining 11 participants believed their English level to be fair.

3.4 Data Collection and Analysis.

The questionnaire was validated by two professors of linguistics at the research site before being piloted with a small group of College of Science students who did not take part in the main research. The piloting process resulted in the

modification of some questionnaire items, while other items were deleted due to issues of repetition and redundancy. Several new items were added to the questionnaire due to concerns about the lack of representation and concept coverage in certain categories. Finally, seventy copies of the questionnaires were distributed to potential participants who had been identified during the snowball sampling process described above and who had indicated a desire to participate. Of these, sixty questionnaires were complete and returned in the specified two-week data collection period.

The quantitative data obtained from the first 30 questionnaire items was analysed using descriptive statistics with a particular focus on item and sub-scale frequency counts and means. The qualitative data obtained from the five open-ended questions was analysed through a process of coding responses in relation to the theoretical concepts associated with attitudes outlined above, analysing the coded data, redefining the initial codes to more accurately account for nuances in the data, and then reapplying these new codes to the data to ensure they closely represented emergent themes and trends.

4. Results and Discussion.

Table 1 focuses on items related to students' perceptions about the importance of using EMI. 45.0% of participants agreed with item 1 that English is the dominant language of science and technology and that it is therefore important to study science through EMI. Surprisingly, opinions were perfectly divided (40.0% agreed and 40.0% disagreed) with the second item, "It is appropriate to use English as a medium of instruction at the College of Science". Moreover, 58.3% of students disagreed, compared to only 21.7% of participants who agreed, with item 3, "I feel that English should not be used as a medium of instruction in the first and second year at university level".

Table 1

The importance of using English as a medium of instruction

No.	Item	S A	A	N	D	S D	*M*
1	The English language is the language of science and technology, so it is important that I study science in English.	16.7%	28.3%	25.0%	18.3%	11.7%	2.80
2	It is appropriate to use English as a medium of instruction at the College of Science.	13.3%	26.7%	20.0%	30.0%	10.0%	2.97
3	I feel that English should not be used as a medium of instruction in the first and second year at university level.	11.7%	10.0%	20.0%	45.0%	13.3%	3.38

Note. Due to rounding, some rows may total to 0.1% higher or lower than 100%

Table 2 summarises respondent attitudes towards using Arabic as a medium of instruction. In response to item 4, more than half of participants (60.0%) preferred using Arabic as a medium of instruction in the College of Science, while only 23.3% did not want to use Arabic as the language of instruction. In addition, 56.7% of students agreed with item 5 − "Arabic is more effective as a medium of instruction for science than English" − while only 26.6% of respondents disagreed.

Table 2

Students' attitudes towards using Arabic as a medium of instruction

No.	Item	S A	A	N	D	S D	*M*
4	I prefer using Arabic as a medium of instruction at the College of Science.	28.3%	31.7%	16.7%	20.0%	3.3%	2.38
5	Arabic is more effective as a medium of instruction for science than English.	30.0%	26.7%	16.7%	23.3%	3.3%	2.43

Responses to statements regarding student concerns about courses using EMI are featured in Table 3. Item 6 reveals that 48.3% of students feel bored in their EMI courses, although 38.4% did not report experiencing such feelings. Moreover, in response to item 7, 60.0% of students stated that they avoided expressing opinions in class discussion because they were afraid of making mistakes. Responses to item 8 showed that, overall, 46.7% of students did not feel comfortable and confident in classes using EMI, although 35.0% reported the opposite opinion. In response to item 9, 40.0% of respondents claimed that they felt embarrassed when participating in classroom discussions using English, although another 40.0% did not experience such embarrassment.

Table 3

Students' concerns about courses that use English as a medium of instruction

No	Item	S A	A	N	D	S D	*M*
6	I feel bored in courses that use English as a medium of instruction.	13.3%	35.0%	13.3%	36.7%	1.7%	2.78
7	I avoid expressing opinions in class discussions in English medium classes because I am afraid of making mistakes.	28.3%	31.7%	6.7%	26.7%	6.7%	2.52
8	I never feel comfortable and confident in classes using English as a medium of instruction.	21.7%	25.0%	18.3%	26.7%	8.3%	2.75
9	I feel embarrassed to participate in subject classes using English as a medium of instruction.	18.3%	21.7%	20.0%	26.7%	13.3%	2.95

Table 4 presents students' understanding of content presented in classes using EMI. In response to item 10, 48.4% of participants reported having difficulty understanding classes which use EMI, while 36.3% of students reported having no difficulty at all. In addition, participants believe that studying science in the English language is time-consuming because if their instructors ask a question, they usually think in Arabic before answering. To illustrate, 71.6% of participants agreed with item 11 concerning this point, while only 23.3% disagreed. Item 12, "I can't answer questions that are written in English without asking my instructor", received mixed responses with 21.7% of participants showing some form of agreement, 31.7% remaining neutral, and 46.6% of students indicating disagreement. Sixty percent of students agreed, whereas 21.7% of students disagreed, with item 13, "When I read science textbooks in English, I can't understand quickly and easily". Around twenty-three percent of respondents reported neutral responses to item 14, "I face difficulty understanding the lecture due to my poor English proficiency", with only 28.3% agreeing and 48.4% expressing disagreement. In fact, 78.3% of respondents agreed with item 15, "I would spend less time to study the subject matter if it were taught in Arabic". Only 8.3% of the sample disagreed with this statement.

Table 4

No.	Item	S A	A	N	D	S D	*M*
10	It is hard to learn science in English.	16.7%	31.7%	15.0%	28.3%	8.3%	2.80
11	Studying science in English is time consuming because if my instructor	33.3%	38.3%	5.0%	20.0%	3.3%	2.22

	asks a question, I usually think in Arabic before answering in English.						
12	I can't answer questions that are written in English without asking my instructor.	10.0%	11.7%	31.7%	33.3%	13.3%	3.28
13	When I read science textbooks in English, I can't understand quickly and easily.	25.0%	35.0%	18.3%	16.7%	5.0%	2.42
14	I face difficulty understanding the lecture due to my poor English proficiency.	15.0%	13.3%	23.3%	26.7%	21.7%	3.27
15	I would spend less time to study the subject matter if it were taught in Arabic.	60.0%	18.3%	13.3%	5.0%	3.3%	1.73

Students' understanding in classes using English as a medium of instruction

Concerning the effect of language proficiency on students' achievement in English-medium subject courses presented in Table 5, 81.7% of participants agreed with item 16, "Having low English proficiency affects students' academic achievement", while only 3.4% disagreed. Item 17, "My GPA has deteriorated because the courses use English as a medium of instruction", received 48.3% of students' agreement and 30.0% disagreement. 46.6% percent of respondents agreed with item 18, "It is unfair to use English as a medium of instruction because students with higher English proficiency may score higher grades", while 31.7% disagreed. There were mixed responses regarding item 19, "It is necessary that I study science in English even if I get low grades". Thirty-five percent of participants agreed, 23.3% were neural and 41.6% disagreed.

Table 5
The effect of English proficiency on students' achievement

No.	Item	S A	A	N	D	S D	*M*
16	Having low English proficiency affect students' academic achievement.	50.0%	31.7%	15.0%	1.7%	1.7%	1.73
17	My GPA has deteriorated because the courses use English as a medium of instruction.	25.0%	23.3%	21.7%	23.3%	6.7%	2.63
18	It is unfair to use English as a medium of instruction because students with higher English proficiency may score higher grades.	33.3%	13.3%	21.7%	25.0%	6.7%	2.58
19	It is necessary that I study science in English even if I get low grades.	6.7%	28.3%	23.3%	23.3%	18.3%	3.18

Table 6 reports participants' levels of instrumental motivation to engage with EMI. Seventy-five percent of students agreed with item 20, "Studying Science in English is necessary to continue my postgraduate studies at a foreign university", while only 8.3% disagreed. In addition, 45.0% of students agreed with item 21 that it is prestigious to use English as a medium of instruction, while 18.3% of students disagreed and 36.7% were neutral. In response to

item 22, 41.7% of students agreed that studying science in English makes them feel more educated, while only 28.3% disagreed. The majority of students confirmed the importance of studying their courses in English to get a good job since 65.0% of participants agreed with item 23; however, 20.0% of students disagreed with this statement. Participants felt that their language proficiency has improved due to using EMI, as can be seen in the 71.6% of students that agreed with item 24, as opposed to the 13.3% that disagreed.

Table 6

Instrumental motivation for using English as a medium of instruction

No.	Item	S A	A	N	D	S D	*M*
20	Studying science in English is necessary to continue my postgraduate studies at a foreign university.	33.3%	41.7%	16.7%	5.0%	3.3%	2.03
21	I think it is prestigious to use English as a medium of instruction.	13.3%	31.7%	36.7%	8.3%	10.0%	2.70
22	Studying science in English makes me feel more educated.	11.7%	30.0%	30.0%	18.3%	10.0%	2.85
23	Studying my courses in English is important to get a good job.	18.3%	46.7%	15.0%	13.3%	6.7%	2.43
24	My English has improved because of my college's use of English as a medium of instruction.	23.3%	48.3%	15.0%	10.0%	3.3%	2.22

Contrary to the researchers' expectations about participants' levels of integrative motivation, respondents displayed positive attitudes towards English-speaking peoples and Western cultures as witnessed in Table 7. For example, item 25, "I believe that studying science in English will help me to understand English people and their lifestyle", received the agreement of more than half of the participants (53.3%), while 25.0% were neutral and 21.6% disagreed. Item 26 inquires about whether using EMI allows students to have more friends from abroad and to speak with English native speakers from different countries. This item received 71.6% of students' agreement, whereas only 15.0% of respondents expressed some form of disagreement.

Table 7

Integrative motivation for using English as a medium of instruction

No.	Item	S A	A	N	D	S D	*M*
25	I believe that studying science in English will help me to understand English people and their lifestyle.	15.0%	38.3%	25.0%	13.3%	8.3%	2.62
26	Using English as a medium of instruction allows me to have more friends from abroad and to speak with English native speakers from different countries.	18.3%	53.3%	13.3%	11.7%	3.3%	2.28

With regard to the influence of teachers' and peers' levels of English proficiency in determining or affecting students' attitudes, Table 8 indicates that there may be a cause and effect relationship between these elements of the environment and attitudes. This relationship is clear in participants' responses, as 56.6% of students revealed their

agreement with item 27, "Some of my teachers lack English proficiency and can't explain the lesson well which causes me to have negative attitudes towards using English as a medium of instruction", while only 23.3% of students disagreed. Regarding item number 28, 43.3% of students agreed that "My peers' low English proficiency causes me to have negative attitudes towards courses that use English as a medium of instruction", while 36.6% disagreed.

Table 8

The influence of teachers' and peers' English proficiency in determining students' attitudes

No	Item	S A	A	N	D	S D	*M*
27	Some of my teachers lack English proficiency and can't explain the lesson well which cause me to have negative attitudes towards using English as a medium of instruction.	8.3%	48.3%	20.0%	20.0%	3.3%	2.62
28	My peers' low English proficiency causes me to have negative attitudes towards courses that use English as a medium of instruction.	8.3%	35.0%	20.0%	33.3%	3.3%	2.88

Regarding the effect of EMI on student identity outlined in Table 9, 46.6% of students supported item 29, "Using English as a medium of instruction weakens my identity". On the other hand, 38.3% of students disagreed with this statement. In response to item 30 – "I feel that I am not patriotic when English is used as a medium of instruction" − 41.7% of students showed agreement, while 48.4% disagreed.

Table 9

The effect of using English as a medium of instruction on identity

No	Item	S A	A	N	D	S D	*M*
29	Using English as a medium of instruction weakens my identity.	23.3%	23.3%	15.0%	23.3%	15.0%	2.83
30	I feel that I am not patriotic when English is used as a medium of instruction.	25.0%	16.7%	10.0%	26.7%	21.7%	3.03

Moving to the open-ended section of the questionnaire, a number of surprising trends emerged. For example, the majority of respondents are against using EMI in the College of Science even though the policy of EMI has been implemented at the college since the university was established. Most students favour using Arabic as a medium of instruction since it is the language of the holy Qur'an, and because they believe it will help preserve their Arab Muslim identities. Moreover, participants justified their responses by pointing out that Arabic is easier to understand since it is their mother tongue and they believe that no nation can improve its status economically, politically, educationally and culturally unless it strives to maintain or improve the status of its mother tongue across all domains.

A number of participants illustrated this point by referring to Germany and Japan; both highly-developed nations that predominantly use their own languages in education. Also, respondents believe that it is not necessary to use EMI to guarantee successful learning since English is no more than a means of communication with foreign countries. On the other hand, a small number of students preferred using EMI because, as one participant claimed, "A human without English is like a computer without the internet". Results clearly indicate that, although many participants

struggle with the English language, they have no choice but study their majors using EMI. Despite these struggles, many participants were clearly aware of the importance of English as the language of science and technology and its utility in helping find a good job in the future. Due to this awareness, participants mostly held positive attitudes towards EMI, even though this level of positivity was strongly associated with a variety of practical, cultural and religious concerns.

Regarding the problems experienced due to EMI in the College of Science, participants stated that if the medium of instruction was Arabic, they would spend less time trying to come to terms with the subject matter and more time thinking creatively. In addition, a number of students highlighted how they often experienced difficulties in understanding their instructors because they were drawn from various nations and often used different English dialects. Therefore, participants suggested that all instructors should have at least some background in Arabic so that they can explain their lessons in that language whenever required.

In this way, a large number of students supported the idea of code-switching in their science classes. Participants believed that it would be a good way to help minimise some of the problems of understanding content in EMI courses. Code-switching, according to participants, would allow learners to understand more of the content they are expected to learn and to improve their English skills which, in turn, would also enable them to communicate with different people and complete their studies abroad. In addition, students stated that code-switching will enable those learners with low levels of English language proficiency to express their opinions during classroom discussions without encountering the barriers resulting from using EMI.

However, it is important to note that a small number of respondents did not support the concept of code-switching in their science studies because they believed it would confuse students. That is, these participants claim that code-switching may be harmful because students will lose the ability to communicate well in both languages, so it is far preferable to concentrate on one language. What is more, these participants suggested that using textbooks translated into Arabic is a waste of time because such translations do not encourage science students to understand and use science terminology correctly and also would discourage students from practising spelling English words correctly. These participants stated instead that it might be a good idea to establish an English language training centre for instructors who lack English proficiency to prepare them for teaching science in the language.

5. Findings.

This study investigated the attitudes of College of Science students towards using EMI. It sought to address the following sub-questions:

1. What are the reasons behind using EMI at university level in Oman?

Based on this study's results regarding the importance of EMI, around 45% of the sample maintained that English is the language of science and technology so it is important that they study science in English. In terms of instrumental motivation for using EMI, 75% of participants believe that studying science in English is necessary to continue their postgraduate studies at foreign universities. What is more, participants felt that their level of language proficiency has improved due to exposure to EMI. In addition, levels of integrative motivation were also high, as almost 72% of students believe that using English to learn science allows them to have more friends from abroad and to speak with native speakers of English from different countries.

2. What problems, if any, are associated with using EMI in the College of Science?

Regarding students' concerns about courses that use EMI, 60% avoided expressing their opinions in classroom discussions in English because they are afraid of making mistakes. This anxiety can be attributed to their low level of English-language proficiency. In terms of students' understanding in classes using EMI, students claimed difficulty in understanding the content of these classes. In fact, 60% of the entire sample confirmed that they would need less time to study subject matter if it were delivered in Arabic.

3. What are the educational changes that could to be implemented to overcome these problems?

A number of recommendations to limit the potentially negative impacts of EMI were offered by participants. These include:

- Offering a strong and sufficient English foundation programme to equip students with good English skills that enable them to keep pace with scientific concepts and developments.
- Including extra English for Specific Purposes credit courses in the College of Science's study plan.

- Designing in-house curriculum materials as alternatives to commercially-produced textbooks to more closely match students' English language levels.
- Using simplified language (adjusted input) through discussion in lectures and in examinations.
- Introducing Arabic as a language of instruction for 40-50% of the courses at science-based colleges.
- Writing the meaning of terminologies in Arabic in class to guarantee students' understanding and to save students' time.

6. Conclusion and Recommendation.

The study sought to gain an understanding of College of Science students' attitudes towards using EMI in an Omani university through the administration of a 35-item questionnaire. Findings indicate that the majority of participants were aware that English is the global language of science and technology. However, more than half reported that they would prefer to use Arabic as a medium of instruction in their studies. In addition, participants reported such problems in English-medium classes as feeling bored and avoiding expressing opinions in classroom discussions because of fear of making mistakes. Overall, participants agreed that it is hard to learn science through the English language. Despite these concerns, however, these learners displayed high levels of both instrumental and integrative motivation towards learning English. Although these findings offer a picture of the attitudes towards EMI of College of Science students at a public university in Oman, the exploratory nature of the research and the fact that the sample was not randomly-selected and that attitudes were not explored in relation to demographic variables such as age, year of study, academic achievement and so on, means further research is needed to more fully understand this area.

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