Students' attitudes towards using English as a medium of instruction in scientific disciplines: Challenges and solutions

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Abstract

This study aims at exploring the challenges faced by university EFL students and the solutions which they use to overcome these challenges. Therefore, this study investigated non-English major learners' attitudes towards the challenges associated with using English as a medium of instruction in scientific disciplines. Qualitative research methods were used involving the use of classroom observations, surveys and interviews to collect the required data. The results showed a positive perception with regard to the use of English as a medium of instruction (EMI) among the participants. In addition, based on the participants' results, the research highlights four themes as presenting the greatest challenges. Suggestions and recommendations are made for enhancing the successful use of EMI.

Keywords: challenges; English as a medium of instruction; scientific disciplines

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1. Introduction

In the last two decades, English Medium Instruction (EMI) has above all attracted applied linguists from around the world; in particular, in higher education institutes. Its use as an educational bridge between school education and university has grown rapidly. This has not been without problems and challenges, however (Cho, 2012). EMI refers to the use of English in university degree courses, instead of the native language of the country in question, such as the use of English in lieu of Arabic in Arabic-speaking countries. EMI has attracted the interest of researchers in applied linguistics and English Language Teaching (ELT), particularly in higher education. EMI has received increasing attention as internationalization makes it possible necessary for English to be adopted as the dominant language at universities across the globe (Dearden, 2014), with universities in Saudi Arabia (SA) being no exception.

The government of SA has devoted a great deal of energy to promoting the learning of English; the majority of private universities in SA, and most state universities, employ EMI, especially in scientific disciplines such as medicine, engineering, and technology (Rahman and Alhaisoni, 2013). Al-Seghayer (2014) asserted that English currently enjoys an eminent status in various sectors at all levels within SA for a number of reasons. In the first place, English is the only foreign language taught in SA public and private institutes. Secondly, English has also become the global lingua franca: an increasing number of Saudi higher education institutions have begun to employ EMI in the last two decades, increasing from 7 universities to over 40 state and private universities. Since it is beyond the scope of this paper to cover all aspects of EMI, one important dimension related to the challenges faced by university EMI learners is the focus of the investigation in this paper. This, in fact, has been the focus of many studies around the world.

Alenezi (2016) declared that little is known about teachers' and learners' perceptions and experience of learning science subjects through EMI. To the best of the researcher's knowledge, no study has ever examined EMI using classroom observations, interviews, and surveys in the context of SA., even though many higher education institutes have started employing EMI. Thus, the present research is timely, and highly relevant to contemporary challenges.

1.1. Theoretical Framework

Although EMI is well-accepted, a number of concerns raise serious forebodings for its main stakeholders: students. Several researchers (Al-Bakri, 2013; Chang, 2010; Dearden, 2014; Macaro, 2015; Floris, 2014; Cho, 2012) have found that many students express a strong preference for, and willingness to study, using EMI, despite low levels of self-efficacy and apprehension in terms of their overall language proficiency. This also holds true for teachers (Alfehaid, 2018). It is notable that, while teachers and students have an instrumental motivation for employing EMI such as wider job opportunities, they still demonstrate a preference for L1-medium instruction, or the combination of English and L1 (Belhiah & Elhami, 2015; Troudi, 2009). Although there is a positive correlation between attitude to the use of EMI and language achievement (Dearden, 2014), students' proficiency remains an obstacle for language and content teachers.

Yet the general view expressed by subject teachers is that students should either seek extra help from English teachers, or cultivate their English proficiency, either as a by-product of subject content study or through self-learning, rather than relying on their content teachers (Dearden, 2014; King, 2014). In the context of this study, the fundamental claim is that language experts should support all EMI courses offered by a university, and that the courses should be aligned with institutional language policies. Although the rapid growth of EMI Bachelor's programs is obvious, there is a need to assess the quality and quantity of the education provided in a balanced manner.

Nevertheless, students claim that some content teachers have serious limitations in terms of English language proficiency, which constitutes a barrier to their own English learning through EMI '..and to their

learning of subject content (Byun et al., 2011; Hamid, 2011; Wilkinson, 2012). This suggests that there is a need for teachers to possess language awareness as well as subject knowledge (Hoare, 2003). In addition, teachers who are linguistically proficient may suffer from poor pedagogical competency and/or subject knowedge (Almakrob and Al-Ahdal, 2020; Barnard, 2015). In this study we conduct classroom observations, and examine this point among others. Teachers' language proficiency and pedagogic abilities obviously make classes more enjoyable and interactive, as a result of which more learning occurs.

Several studies have nevertheless identified a positive correlation between students' language acquisition and EMI. Students were found to have developed language proficiency after attending EMI classes for four years (Byun et al., 2011; Rogier, 2012). However, contrary conclusions have been presented by other studies (Lei and Hu, 2014). Logically speaking, language proficiency development can be presumed after students attend EMI for a considerable period of time. However, the extent of the improvement, and whether it is significant for the majority of students, remains unclear.

Alfarwan (in press) found that students who received EMI for four months did not improve equally linguistically. This is in line with King's (2014) finding that students' language proficiency improves through EMI, but is unfortunately still not sufficient. It seems that students and teachers fall back on their L1 whenever possible for more accurate comprehension (Doiz et al., 2012). For instance, Vinke (1995) reported that, in contrast with their counterparts who received instruction in L1, participants who received EMI had difficulty comprehending lectures and completing assignments. As a result, their L1 was significantly utilized. Thus, EMI learners may encounter academically-challenging situations when it comes to understanding jargon, comprehending L2 materials, and analyzing complex situations (Chang, 2010; Chapple, 2015).

1.2. Research Problem

A challenge for students may come from the institution's content lecturers or from EMI policies. However, conflicting research findings have been obtained across the world, which suggest the importance of other variables such as the methodology employed in such studies, learners' natures and learning habits, and teachers' competencies and teaching styles. This also suggests that EMI is case-sensitive and context-driven. In this regard, in this study we attempt to identify the challenges inherent in EMI in the Saudi context, and offer possible remedies that can benefit both SA and the rest of the EFL world when employing EMI. We thus examine the challenges encountered by students, as well as the coping strategies they employ.

1.3. Purpose of the Study

The purpose of this study is to investigate the challenges faced by EFL learners studying in scientific higher education colleges, and how they can attempt to overcome these challenges.

1.4. Research Questions

The current study tries to answer the following research questions:

1- What are the EFL students' attitudes towards English as a medium of instruction and why?

2- What challenges do EFL students face when learning science subjects through the medium of English instruction, and how can students overcome these challenges?

2. Method and Materials

2.1. Data Collection tools

Qualitative data were collected using three instruments: open-survey, semi-structured interviews and classroom observations. The open-ended survey gathered the perceptions and challenges students faced

when learning science subjects taught in English. The survey included four main questions: 1) What is your attitude with regard to using English instead of Arabic, and why? 2) What sort of challenges do you encounter in using English? Please list as many challenges and difficulties as possible. 3) What do you do to overcome these challenges? 4) Do students think that their English ability is sufficient for studying effectively? In what ways do students think English as medium of learning should be developed?

The results of the interview were used in parallel with the survey to further understand the learners' responses, mainly in connection with the challenges. The interviews were recorded, and took between 15 and 20 minutes each. The notes taken from the classroom observations and transcripts of the interviews were carefully read, line-by-line, and used to support the arguments raised in the Discussion section, where appropriate, so as to substantiate the survey results. Relevant materials, such as power point lecture presentations, classroom handouts, and sample test papers, were also examined to obtain extra supporting information and evidence, where appropriate, about the use and challenges of EMI.

2.2. Participants

The sample of this study comprised 85 non-English major Saudi students, studying at various colleges at Majmaah University. These colleges were Engineering, Medicine, Applied Health Sciences, and Computer Sciences. All participants' English scores were above IELTS 5, and all attended the Common First Year program prior to their Bachelor program. Table (1) shows details of the participants in terms of their college:

Table 1

Participant distribution

College	Number of Students
College of Medicine	18
Applied Health Sciences	21
Engineering	19
Computer Sciences	27

The participants' average age was 21. They were recruited from the four colleges based on a purposive sampling method. All the colleges employ English as the medium of instruction.

2.3. Pilot Study

A pilot study was conducted with ten students who did not participate in the main study. The purpose of this was to ensure the suitability of the tools to be used and to obtain comments and suggestions which could be taken into account in the main study.

2.4. Ethical Considerations

Consent from the students involved was obtained prior to the commencement of the study. Participation in the study was optional.

2.5. Procedure

The students selected for this study were of high and low proficiency levels according to their teachers' evaluations. The aim of this was to gather various types of views and experiences regarding EMI challenges, though proficiency level is not a variable examined in this paper. All the students had undertaken the Common First Year program resulting in different proficiency levels. According to their college official reports, some had obtained the minimum IELTS score of 4, while others, although few in number, had scored 6 to 6.5. All students were Saudi nationals, and were in essence the products of the Saudi state educational system, with a common Saudi cultural background. As such, they may be regarded in the context of this study as typical specimens of learners across S.A.

The researcher attended the instruction of lectures in all four courses. He wrote classroom observation notes based on the students' interactions with their teachers. After the classes, the participants were asked to fill in the open-ended questionnaire. In addition, they were twenty of them were invited to participate in the interviews, either face-to-face, or by telephone.

It should be mentioned that the focus of this study was on the search for any new information from the interviews and observations to complement the survey data. Therefore, all students who voluntarily agreed to participate in the study from the colleges mentioned above were included. The interviews with the students were used to further elaborate on the challenges they highlighted in the surveys, and any others they might subsequently think of.

2.6. Data Analysis

The data compiled from all the instruments were subject to several steps for thematic coding. For the initial step, after statements written in the participants' mother-tongue were translated into English, all statements were listed to facilitate an exploration of salient common themes. In the second step of the analysis, the author consolidated the salient themes around central concepts. At this stage, the author initially identified eight themes relevant to the challenges faced by the participants associated with the use of EMI. By repeating the reading, editing, and revising of the data with another rater, the set was reduced to five major themes, representing an 83% level of inter-rater reliability.

3. Results and Discussion

The analysis in this section is based on the research findings obtained from our data collection tools. The results are guided by the research questions.

What are the EFL students' attitudes towards English as a medium of instruction and why?

The majority of students demonstrated positive attitudes and perceptions with regard to EML, which is in congruence with what other researchers have found (see Section 2). There also seemed to be a general agreement among students regarding the importance of EMI from various perspectives. For instance, one student stated, "EML is very important not only for job opportunities but also for communicating with foreign experts in my field of specialty." Another student responded, "Medicine as a major is taught in English, and all communication in the field is in English, whether in Saudi Arabia or abroad. Everything in medicine is, in fact, in English, so I do not think there is any better alternative."

Nevertheless, some students had differing views. For instance, one student commented, "Why is medicine not taught via Arabic, instead of English? Other countries, like France, learn about medicine in their home languages. Also, in Syria, there is a good model of teaching medicine in Arabic through the Arabization of materials." However, when this student's teacher, who is Syrian, was asked about such an idea, he stated that it is not worthwhile to convert materials into Arabic, as it requires a huge effort that is just as time-as studying medicine in English. The reasons for students' positive consuming perceptions of EMI, nevertheless, centered on the major themes that are well-documented in the literature: career opportunities, a rich array of learning resources, and prestige.

What challenges do EFL students face when learning science subjects through the medium of English instruction and how can students overcome these challenges?

Analyses of the qualitative data from the surveys, observations notes, and interviews with the learners allowed the researcher to identify four major themes in response to the research question stated above: (1) language considerations, (2) learning considerations, (3) coping strategies, (4), and curricula and materials.

3.1. **Language considerations**

Language considerations basically refer to language proficiency concerns as raised by the participants. Language proficiency challenges, as well as complaints from students, are well-documented in the EML literature (see Section 2). In this study, teachers voiced major concerns about their students' inadequate level of English proficiency, which was the cause of most EMI problems. Although all students passed their one-year English foundation course, serious issues were still present in terms of their proficiency.

During classroom observations, the researcher noted that a considerable number of students require a more advanced level of English than they actually possessed. This was the general view, supported by a number of high-proficiency (HP) and low-proficiency (LP) learners, though it was most frequently reported by the latter. For instance, both types of students echoed the general statement that "We know that our language proficiency is not sufficient, and this is a real problem which should be solved," though some HP students showed no problems with regard to proficiency.

During the classroom observations, this problem was observed and recorded; sometimes communication in the classroom broke down to a farcical extent. This suggests that a high cognitive and language competency is required along with a good level of language proficiency. On the one hand, students claimed that some teachers have poor English proficiency and unclear pronunciation. Another student interviewee was of the opinion that his teacher's English was not adequate, and did not sound professional. The teacher mispronounced vocabulary, made grammatical mistakes, and had a strong Egyptian English accent. A similar finding was obtained by Sultana (2014). This was supported by some of the classroom observations.

This made several students place more focus on knowledge content, disregarding language proficiency and accuracy. One student interviewee stated, "I focus much more on content knowledge than on the language improvement that I'm marked for on the exam, and this is accepted by my teacher." This suggests that the teachers are often very tolerant with students' language issues, as revealed by this student's focus on the acquisition of subject knowledge.

However, this may suggest that students receive incomplete knowledge and benefit from insufficient language improvement, which may also have an effect on their specialist knowledge. For instance, in the survey, the students clearly expressed that the specialist vocabulary of their discipline in many situations does not enable them to produce full, meaningful sentences, constituting a serious problem. As one student interviewee sharply stated, "I have a problem with the large amount of medical terminology. Sometimes there are non-English, maybe Greek, new words or terms that I did not study in my EMI, and that I sometimes cannot even pronounce well." This was observed in the case of several batches of students in the classroom, although other students, who practiced often, were more successful in pronouncing specialist vocabulary correctly. Several teachers were observed either not correcting students' English, ignoring their language mistakes, or getting the gist of their meaning and just replying or ignoring the whole situation and continuing the session.

This highlights another point which affects the students' success in EMI: their session comprehension is insufficient. They often only grasp the general idea of a topic, or partially understand specific points. As one student commented, "In fact, I cannot follow the teacher, because of my English language proficiency […], but I revise unknown vocabulary words when I go home, in my own time, without any pressure."

Nevertheless, some students claimed that their English speaking, reading, writing, and listening proficiency greatly improved because of EMI, in addition to the extra effort they made. This is in line with the findings of some other researchers (Belhiah and Elhami, 2014; Byun et al., 2011; Rogier, 2012), but is in contrast with other streams of research (Lei & Hu, 2014). The conflicting results may be context-sensitive, and may be affected by other factors such as motivation, or the nature of some disciplines (such as physics) which

require a limited language repertoire, whereas medicine requires wider terminology and the incorporation of more sensitive language.

3.2. Learning considerations

Students encountered challenges which were either due to their teachers' instructional methods or to their own learning approaches.

The students reported that their comprehension was affected by the complexity and intensity of the content material, as well as by the teacher's poor pedagogical performance. For instance, in the survey, the students reported clearly that some teachers merely read from slides or books, and made little effort to explain the content in depth. A view expressed by both high and low proficiency interviewees is captured in the following quotation:

> "Some teachers have considerable knowledge and good reputations here at the university, but in fact they mostly teach through quickly reading from slides, and pay little attention to whether we understand the material. They may expect that we already know the content or have prepared well for the session. Even so, we might not have completely understood what we studied, and it is the teacher's role to make sure we comprehend the lesson."

This was supported by observations in three classes. When the researcher asked one teacher about this issue, his response was, "Students are expected to have prepared very well for lessons before coming to class. I am overloaded with work, and cannot explain everything, as I have a long syllabus I have to stick to and finish on time, so the students should depend more on themselves." This suggests that some teachers can be knowledgeable enough in their discipline, yet often lack pedagogical competence.

From this brief discussion, one might conclude that the judicious use of L1 could be a supportive instructional strategy when teachers feel that students' comprehension is so poor that no possible gains can be achieved. However, such strategies may hinder students from learning, and could make them more dependent on their teachers, requiring them to simplify the content materials by translating terms when students feel challenged. One high proficiency student said in the interview:

> "My teacher just translates the material into Arabic in the classroom, either because his English is not good enough, or because he just wants to finish as soon as possible. This does not create a challenge for all the students, and makes me feel less motivated to prepare and study harder for his course. To be honest, as a student, I feel it is unfair that we prepare and learn new vocabulary and terminologies, and others just record the translation."

This is in line with Bensen and Cavusglu (2013), who claimed that code switching should not be used with HP learners. This raises the issue of multiple levels of language proficiency in one classroom, and the minimum required exit score (5 in IELTS) from intensive English courses to undergraduate programs, an aspect which we will discuss below. In contrast, some students stated that they put a good deal of effort into preparation for classes with teachers who are very strict and who never use Arabic in the classroom, or even in office hours, and that they noted an improvement in their language proficiency and subject knowledge; however, they admitted that there were a considerable number of dropouts from such teachers' classes. Empirical research in SA reported by Al-Adnani and Elyas (2016) found that the grades of university students whose teachers did not use code switching were higher than those of students whose teachers did code switch. However, the students had a positive attitude with regard to their teachers' code switching.

3.3. Coping strategy considerations

Coping strategies are actions or techniques used consciously by students to solve certain problems or cope

with certain situations. Students reported several coping strategies in this study.

For instance, several students reported in the interview that they rely on translation. While some students use translation extensively, others use it moderately and only when necessary, such as when their comprehension is insufficient. Both teachers and students, then, use translation as a coping strategy: while some use it as a facilitative tool, others use it as a walking stick. When students were asked why they use translation from English into Arabic, they said that they do so in order to keep up with the teacher, understand new words, and save time and effort because of the large volume of data and materials included in lectures.

However, the extensive use of translation has seemingly become a negative habit. Some students have been reported to either copy from texts online, or use Google translate to complete assignments, posters, and presentations. This implies that some students' presentations are not as useful as they might be. It might be a sign that these students lack necessary language skills and effective language learning strategies, which add to the challenges associated with the use of EMI.

The classroom observations produced interesting evidence in terms of some students' coping strategies. One example was that some students asked their HP peers to explain the session in question, or parts of it, in Arabic. This is an unsuitable strategy if relied upon extensively, as reported by some students. This is problematic because it does not activate the students' mental engagement and working memory to construct knowledge.

Some students claimed that they do not participate or ask the teacher questions in class; instead, they visit the teacher in his office, where he then explains the content to them in Arabic. This was reported to be condoned by the older teachers. One student stated, "Attending lectures is mandatory, but sometimes I avoid participating and interacting with the teacher when the lecture is very tense, and the teacher is just speaking for a long time […] instead, I just play with my mobile phone."

3.4. Curricula and materials

Curricula and materials constitute two more facets of the challenges encountered by students. This is a particular difficulty for medical students, for instance, when they take their end-of-year unified exams. They claimed that the handouts and slide information were not sufficient to cover some of the more detailed questions in the unified exams.

According to some student interviewees, some teachers stick to the details of a certain textbook, and go into depth without any simplifications; this was also reported in the survey, and noticed in the classroom observations, in which slides were heavily detailed, and sessions were full of material and information. In such teachers' classrooms, slides and handouts were packed with information, material, and questions to answer, some of which were beyond the students' abilities. This, therefore, creates a possible challenge for students involved in EMI.

Some students justified their dependence on the slides, handouts, and short notes given by their teachers by the expense of the reference materials and books for some courses, few of which are available in the university library. This reflects the gravity of the problem that the students at all the colleges experience. In addition, several students claimed that they were sometimes compelled to buy textbooks written by their teachers, which are more expensive than international textbooks.

Some students, on the other hand, expressed the view that on many occasions there was a mismatch between lecture content and the final exam. According to these students, "Some teachers are not serious enough when it comes to carrying out their job professionally. They just deliver the easy points without enough coverage of the focal topic." Indeed, in the classroom observation, the researcher noticed some evidence to support these students' claims.

4. Conclusion

The overall findings of the current study suggest that there is a positive preference for the use of EMI in the university context on the part of students. This, nevertheless, is accompanied with reports of numerous types of challenges including language considerations, learning considerations, coping strategies, curricula and materials, and assessment considerations. At root, students' inadequate proficiency in the language of instruction seems to be a common vital factor behind such disparate issues.

Although students employ various types of coping strategies to deal with these challenges, this has a detrimental effect on the quality of delivery and the amount of both teaching and learning that occurs in EMI programs. The result is sometimes an implausible tendency towards the use of EMI. Students nitpick the teachers' delivery in EMI. Students are particularly in need of more training in English language skills and development, which suggests that the IELTS band 5 as a minimum exit score from the PYP should be reconsidered, and increased to band 6, as is the case in many English-speaking countries' educational institutes. This is supported by the view expressed by several students that a reason behind some challenges stemmed from the intensive English course in the Common First Year program, which did not prepare them sufficiency to read in EMI.

Some students were of the opinion that not all teachers possess the levels of English language proficiency required to deliver EMI courses in a linguistically- and pedagogically-effective fashion. This suggests that there is a need for teachers to possess greater language ability as well as subject knowledge (Hoare, 2003). For instance, where possible, colleges of education should take part in this affair, and help design a training course in pedagogy for university EMI teachers, both so that they become more sensitive to their students' needs, and as a means of personal growth and professional development. English language centers should also provide students with extracurricular activities and English for Specific Purposes (ESP) to increase their language proficiency.

ELT should be strengthened and redirected for both students and for EMI purposes. The levels of students' English must be measured before and after EMI. In addition, ELT must be continuously provided and integrated into EMI classes to address weaknesses. In other words, a more systematic ELT approach must be constructed and implemented for EMI purposes.

Code switching was apparent in EMI, an aspect which is in need of reconsideration by teachers in particular. They should be advised that it should only be used judiciously, because the researcher noticed that some teachers used it at length; they should also limit the students' frequent use of it, as it obviously impedes the process of language learning and development if used intensively (Sert, 2008; Tarone, 1997). Alternatively, students should be trained in language learning strategies (LLS) to cope with challenging language situations; for instance, using dictionary strategies when difficult or unknown vocabulary is encountered, instead of immediately seeking a translation. The data also revealed that some students experience a challenge in EMI because of their teachers' use of materials such as handouts and PowerPoint presentations; it was noticed in the classroom observation that these resources included intensive amount of condensed information. This takes us to the above-mentioned need on the teachers' part to introduce modern pedagogical strategies in order to ease the information burden for their students, and the role of colleges of education in such an affair is crucial. O'Dowd in Gröblinger (2017:5) advocates developing "specific language policy documents and programs […] which are intended to guide the implementation of teaching through English". Furthermore, the limited quantity of relevant resources in the university main library, complained of by students, should be addressed. This can be done by increasing the provision of study materials and textbook copies, and investing in subscriptions to international online databases.

The phenomenal growth of EMI in SA higher education institutes obviously calls for greater attention on the part of relevant stakeholders such as researchers and policymakers, to the construction of an EMI

knowledge society, which takes into account the challenges faced in EMI settings. One way of doing so is through research-based studies, not only similar to the current study, but also covering other factors such as the evaluation of intensive English courses in PYP, which prepare students for specialty major study programs conducted in EMI. Shohamy (2013: 203) argues that it is vital to "examine empirically the cost and benefits of the use of EMI at HEIs; the main goal being how much language is being gained by such programs as well as how much academic content is being achieved".

This study has limitations in terms of the constraints associated with using a pure qualitative research paradigm to gather information. Future studies would benefit from collecting larger datasets via the use of Likert scale questionnaires to gain a better understanding of challenges in the EMI classroom. For example, while our study only produced information regarding the types of challenges encountered by the participants in EMI, questionnaires could be deployed to reveal the frequency with which such challenges are encountered by students. In spite of such limitations, as suggested above, the findings of our study have wider implications which can contribute to a better implementation of EMI on the part of the participants.

5. Acknowledgement

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