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STUDENTS' PERCEPTIONS OF ENGLISH LANGUAGE VERSUS TURKISH LANGUAGE USED AS THE MEDIUM OF INSTRUCTION IN HIGHER EDUCATION IN TURKEY*

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ABSTRACT

The quality and effectiveness of English-as-a-foreign-language instruction versus native language instruction in higher education worldwide is an issue of concern for language policy and planning (LPP) scholars. This study investigates the perceptions of two comparable groups of final-year engineering students at a Turkish institution of higher education**:** one has received Turkish medium of instruction (TMI), and the other English medium of instruction (EMI). Final-year students responded to a questionnaire, which aimed to elicit their perceptions of benefits and any perceived challenges to learning disciplinary knowledge, what disciplinary knowledge meant to them, the impact of the language used as the medium of instruction on their learning, and their preference for the language used as the medium of instruction. Focus-group interviews were held with those students who volunteered to participate. An additional source of data was obtained from examination papers, and grades received in the two comparable courses. While several commonalities between the two groups were identified, EMI students' detailed acquisition of disciplinary knowledge was found to be largely ineffective, while TMI students were largely successful. Implications of the findings for further LPP in-practice for teaching in institutions of higher education are discussed.

Key Words: acquisition of disciplinary knowledge, English as medium of instruction (EMI), Turkish as medium of instruction (TMI), her education, medium of instruction (MI)

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*__Bu makale Crosscheck sistemi tarafından taranmış ve bu sistem sonuçlarına göre orijinal bir makale olduğu tespit edilmiştir.__

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ÖĞRENCİLERİN TÜRK YÜKSEK ÖĞRETİMİNDE EĞİTİM DİLİ OLARAK TÜRKÇE KULLANIMINA KARŞI İNGİLİZCE KULLANIMINA DAİR ALGILARI

ÖZET

Yüksek öğretimde eğitim dili olarak İngilizcenin kullanımının anadil kullanımı karşısındaki kalite ve etkinliği, dil politikası ve planlaması ile ilgilenen bilim adamları için merak konusu olmuştur. Bu çalışmada bir Türk yüksek öğretim kurumunda Mühendislik eğitimini anadilde alan ve aynı eğitimi İngilizce alan iki farklı gruptaki son sınıf öğrencilerinin algıları incelenmiştir. Söz konusu öğrencilere, alan bilgisini öğrenmenin önemi ve bu aşamada karşılaşılan zorluklara dair algılarının, alan bilgisinin ifade ettiği anlam, eğitim dilinin öğrenmeleri üzerindeki etkisi ile eğitim dili tercihlerinin öğrenilmesinin amaçlandığı bir anket uygulanmıştır. Görüşmeler, çalışmaya gönüllü olarak katılan hedef grup öğrencileri ile yapılmıştır. Her iki derste kullanılan sınav kağıtları ile bu sınavlar sonunda alınan başarı puanlarından elde edilen değerler, çalışmada ayrıca bir veri kaynağı olarak kullanılmıştır. İki grup arasında ortak özellikler olduğu görülse de eğitim dili olarak İngilizcenin kullanıldığı grupta bulunan öğrencilerin ayrıntılı alan bilgisi ediniminin önemli ölçüde yetersizlik gösterdiği; anadilde eğitim gören grupta yer alan öğrencilerin ise büyük ölçüde başarılı olduğu sonucuna ulaşılmıştır. Bulguların ileride yüksek öğretim kurumlarında Dil Politikası ve Planlamasının öğretimi üzerine etkileri ele alınmıştır.

Anahtar Kelimeler: alan bilgisi edinimi, eğitim dili olarak İngilizce, eğitim dili olarak Türkçe, yüksek öğretim, eğitim dili

INTRODUCTION

At a time when teaching and learning in higher education have become the focus of increasing attention (Skelton, 2005), high priority is being accorded to the attainment of disciplinary knowledge among graduates. As countries progressively move towards knowledge-based economies, there is an increasing demand for basic knowledge and for highly skilled people. In this respect, higher education institutions, particularly universities, traditionally have an educative role, in particular, training an increasing number of students to achieve high-quality qualifications (Hall & Rosenberg, 2010). Within the development process, universities are fundamental entities in contributing to the international competitiveness and economic well-being of a country by helping the undergraduates --the nation's prospective researchers, scientists and businessmen --to acquire disciplinary knowledge effectively.

In the mission statements of universities, high priority is accorded to the attainment of excellence in teaching (Downer, 2007). While teaching excellence is firmly on the higher education agenda, there is growing support among policy makers for a commitment to attain high-level disciplinary knowledge among graduates. Thus, the relation between the acquisition of knowledge and university education gains significance.

Given that universities play a significant role as source of knowledge, it becomes important to investigate perceptions of the students' acquisition of disciplinary knowledge, in the medium of

the native languages versus a foreign language, as related to the actual enactment of macro-language policy at micro-level before students leave higher education.

The article reviews the relevant literature on English as the medium of instruction as well as foreign language policy and planning in the Turkish context. A discussion of the methods used to obtain the research data is followed by a detailed analysis of data collected from three main sources. Finally, the question of learning and the role of the university are revisited to argue for a more effective characterization of learning in higher education.

Theoretical Considerations

During the past two decades, there has been a significant increase in English-medium university teaching, particularly in Expanding Circle countries[1] in Europe (Coleman, 2006) and in East Asia (Chang, 2006) in which English has traditionally been learned as a foreign language for international communication. The growth in the use of English as the medium of instruction (EMI) in such contexts has been an inevitable consequence of the increasing globalization and internationalization of higher education (Healey, 2008) coupled with the emergence of English as the leading language of science and technology (Ammon, 2001).

The trend to use English as a medium of instruction, while offering several instrumental benefits such as higher-paid jobs (Kırkgöz, 2005), has often been criticized in some quarters for undermining the quality and effectiveness of university teaching and learning, as revealed by a growing body of evidence, which suggests that EFL students experience considerable difficulties in coping with the demands of English-medium university studies. Leibowitz (2005) investigated the influence of students' language experiences on their academic writing at a South African university where the language of instruction was mainly English. The study indicated that EMI had a negative effect on students' interpersonal communication, their ability to follow lectures, and essay writing, resulting in low academic achievement. Several studies (see, for instance, Balla & Penning, 1996; Bruce, 1990) which examined students' perceptions of EMI in Hong Kong suggests that students generally preferred dual-medium instruction, or all-Chinese mode for instructional material, and they had far more difficulty in understanding such material when English rather than Cantonese was the medium of instruction[2].

Whilst Japanese universities, have striven to become internationally competitive, Tsuneyoshi (2005) reports that English-medium programs created dilemmas for those Japanese students involved. In a recent study, Hashimoto, (2013b) argues that the status of English as the medium of instruction (MI) in educational policy documents has not yet been explicitly formalized although the MI has been one of the most crucial decision-making issues in Japanese language policies in internationalizing education. She interprets the 'English-only' initiative in Japanese context "as a tactic to facilitate the co-existence of the national language and English" (Hashimoto, 2013a: 16). She points out that the national language is promoted within foreign language policy through the Japanisation of English language education.

Hengsadeekul *et al*, (2012) identified both positive and negative aspects in their study on students' perceptions of English-medium instruction in Thai higher education. Thai students' positive-oriented perceptions included enhancing English language proficiency and communication skills, gaining social prestige and better employment prospects. On the negative-side, English created too great a burden on the students' comprehension of their English lessons.

Foreign Language Policy and Planning (LPP) and EMI in the Turkish Context

As in many other non-English–speaking countries, the global role of English as the world's *lingua franca* in science, technology, and business has had an impact on foreign language policy in

Turkey. An 'expanding circle country' (Kachru, 1992), and located in a strategically important pivotal zone, the intersection of Europe and Asia, Turkey has responded to the global influence of English in its higher education system through systematic foreign LPP by adopting English as the medium of instruction (MI) with the establishment of the first English-medium university in 1956. The Higher Education Act of 1984 laid the foundations of foreign language teaching in higher education, and it marked the beginning of the macro policy regulations on the teaching of English (Higher Education Council [*Yüksek Öğretim Kurumu, YOK*], 1984).

Similar to the countries mentioned earlier, rapid development of EMI in Turkish higher education since the late 1980s has inevitably been accompanied by increasing concern among policymakers and researchers about the difficulties many undergraduates experience when studying in EFL. The issue of MI and the questions related to effective learning of one's disciplinary knowledge constitute an important part of the current debates in Turkey. Kılıçkaya (2006) reports the perceptions of the Turkish instructors teaching content courses in EMI with regard to the use of English as a MI. The results of the survey administered to instructors in eight universities offering EMI showed that the majority of the instructors preferred TMI over EMI on the grounds that EMI makes subject learning more difficult for students. Similarly, teaching in EMI for native speakers of Turkish lecturers was found difficult. Sert (2008) surveyed student and lecturer perceptions of the effectiveness of the use of English/Turkish in the acquisition of disciplinary knowledge in three Turkish universities offering EMI. Although EMI is found to be effective in language skill development, the research suggests that EMI fails to convey the academic content effectively. In another study, Collins (2010) investigated students' and instructors' attitudes towards EMI at a private university in Turkey. Her findings revealed that, while most instructors favored EMI, only 41% of the students agreed that English should be used as the MI. Concerning the impact of EMI on students' learning, most students contended that studying in English lowered their success rate. Likewise, most instructors strongly agreed that EMI decreased students' creativity, detrimentally affecting their self-confidence.

In addition to studies on MI, a number of studies have been conducted in Turkish context investigating the perceptions of participants. Gökyer and Özer (2014) carried out a study with the teacher candidates to assess their perception of the competencies in relation to classroom management issues. In another study, Tunçel (2014) tried to find out the extent of the anxiety of foreign language and its effects on learning Turkish. 108 students participated to the study. It was found that anxiety can have an impact upon success, and a positive correlation exists between the achievement of learning a foreign language and speaking a foreign language. Coşkun *et al,* (2014) investigated reading comprehension skills of about 90 pre-service teachers from the three language teaching departments; Turkish, English and German. The study revealed that the comprehension scores of pre-service teachers of Turkish were much higher than those of others at the level of basic and deep understanding categories. However, pre-service teachers of English received the highest scores at the deep understanding category.

Although most research on the impact of EMI on students' learning experience is based on the perceptions of university students and lecturers, systematic studies comparing the perceptions of students receiving higher education in their native languages versus foreign languages have not been carried out. This article presents a systematic comparative study that investigates undergraduate engineering students' perceptions of EMI versus TMI in a Turkish institution of higher education. While acknowledging that this study is contextual it has the potential to fill an important gap in LPP research and add to the growing literature characterizing MI initiatives not only in Turkey, but also in different contexts across the globe.

The Research Context

The present study was conducted at a state university in Turkey where disciplinary knowledge is delivered both through Turkish-as the medium of instruction (TMI) and English-as the medium of instruction (EMI). Included within the scope of the present study are four academic disciplines, of which two have chosen EMI: the Mechanical Engineering (ME) and the Electrical-Electronic Engineering (EEE), offering all their courses exclusively in English; and the Departments of Computer Engineering (CompE), and Civil Engineering (CivilE), offering all their courses in Turkish.

At the macro-level, the official policy of YOK states the purpose of higher education as:

…. to educate people within a system of contemporary educational and training principles to meet the needs of the country. It provides high-level specialized education in various fields for students who have completed secondary education (YOK, 2006: 1. Author translated).

The YOK policy, from which this brief quotation is taken, also contains a statement underlying purpose of teaching in higher education, clearly stated as "to educate people who are highly specialized in their discipline." Also implicit in the policy is, in fact, the need for the acquisition of a comprehensive body of knowledge and skills, both theoretical and practical, in one's respective discipline to enable an individual to contribute to society as a full-fledged professional. The expectation is that students will attain this goal during their undergraduate education at the university.

Acquisition of knowledge within an academic discipline can be conceptualized as "a process of acquiring the capacity to participate in the specialist discourse of a knowledge community" (Northedge, 2003: 171). To receive one's undergraduate in an EMI or TMI context requires that students have the shared frames of reference to enable them to participate in the specialist discourse of a knowledge community. That is to say**,** students need to have the ability to share frames of reference in conversation with lecturers, and to frame and generate specialist meaning in their writings to the extent that these are shared and accepted by experts in their academic community i.e., lecturers and to share meanings with authors of the texts on the topics of their specialist discipline enabling them to engage in discourse with the authors. It is largely through sharing in meaning making with speakers of the specialist discourse that students come to internalize the frames of reference relevant to their disciplinary knowledge (Northedge, 2003).

The study is guided by the following research questions:

1 What are the final-year undergraduate engineering students' perceptions of the benefits of the language used as the medium of instruction --EMI or TMI-- on their acquisition of disciplinary knowledge?

2. What challenges, if any, does the language used as the medium of instruction --EMI or TMI-- pose for the final-year undergraduate engineering students' acquisition of disciplinary knowledge?

3. What are the final-year undergraduate engineering students' perceptions of the disciplinary knowledge, and how do those perceptions relate to the impact of the language used as the medium of instruction on their acquisition of disciplinary knowledge?

METHOD

The study reported here forms part of an ongoing study of the micro-level enactment of the higher education language policy related to undergraduate engineering students' acquisition of

disciplinary knowledge in EMI or TMI. The study is based on a survey, follow-up interviews, and an analysis of examination papers at a state university in Turkey.

Participants

The four groups of students participating in this study were from four different academic disciplines at the same university. A total of 130 final-year engineering students (66 TMI and 64 EMI) were the participants. Of the 64 EMI students, 34 were in the ME department, 30 were in the EEE department; of the 66 TMI students, 34 were in CivilE department, and 32 were in the CompE department.

No significant differences were found between students across TMI and EMI in age, and in average family income. As for the students' prior experience of learning English, a large percentage of EMI students (97%) had concluded one-year of study in the English language preparatory programme gaining the intermediate level of language proficiency in English prior to starting their university education.

Procedure

Initially, a questionnaire, specifically designed for the purpose of this study, was used to obtain demographics on the students, and the open-ended part of the questionnaire elicited: (1) a qualitative picture of the undergraduate engineering students' perception of the benefits, (2) any perceived challenges to acquisition of their disciplinary knowledge in EMI or TMI, (3) what disciplinary knowledge meant to them, and (4) what impact the medium of instruction (English or Turkish) had on their learning.

The questionnaire was administered in Turkish between April and May, towards the end of the 2012-2013 academic year during regular class time. The rationale for involving final-year students in the study was to explore their cumulative learning experiences in higher education. Shortly after the week in which the questionnaire was administered, 12 semi-structured focus-group interviews were held with a sampling of interviewees, representative of each academic discipline. The interviews, each lasting 10 to 15 minutes, were designed to explore in greater depth issues raised in the questionnaire. A final focus-group interview with students from each academic discipline was held to serve as a 'member check' (Lincoln & Guba, 1985) using a first draft of the findings reported in this paper to confirm the data analyses. Both the questionnaire and interviews were conducted in Turkish with all students, without concern for whether they had been exposed to EMI or TMI, in order to establish standardized conditions for both groups.

Examination provides one way to measure students' learning outcomes in terms of their mastery level of disciplinary knowledge. Since assessment is used in practice to test students' acquisition of knowledge, students' grade point average represents a summary of their learning outcomes. Thus, the research was supplemented by an analysis of 37 examination papers, obtained from the end-of-year average examination scores (a total of the midterm and final examinations). *The Computer Architecture* was the only course for which a comparable source of data could be obtained. The course was taught by the same subject-lecturer in TMI to the students of CompE, and in EMI to the students of EEE.

Data Analysis

The interviews, conducted in Turkish, were tape-recorded, transcribed and then translated into English by the researcher to ensure that a comprehensive record of the discussions was available for future reference. Both interviews and the data from the questionnaires were analyzed qualitatively. Following the strategy of analytic induction (Goetz & LeCompte, 1984), the completed questionnaires were carefully read to identify and note salient comments regarding

students' responses to each question. At the end of this process of reading, some preliminary ideas for developing a coding system emerged; the coding system was used to develop the starting description of categories to approximate "an accurate description and interpretation of the phenomenon" (Wiersma & Jurs, 2005: 206). The subsequent data were coded according to the major categories identified.

A three-stage data analysis was performed. In the first stage, data from TMI were analyzed. Tally charts were used to produce a list of responses to each item in the questionnaire to find recurrent themes. Based on the qualitative analysis of the responses given to each question, data reduction was achieved. Once the analysis of the data from the questionnaires and interviews for each academic discipline receiving TMI was completed, a cross-sectional analysis was performed across the two academic disciplines in the TMI group, and that cross-sectional analysis led to generalizations about the responses given to each question.

In the next stage, a similar process was carried out for the EMI group. As a final step, a cross-sectional analysis was performed across the TMI and EMI groups to provide generalizations about the responses to each question across the two groups. Findings are reported as EMI and TMI students' perceptions, as a whole. Quotations from questionnaire respondents and interviews were attributed to students' academic disciplines.

FINDINGS

In this section, the findings are discussed based on the research questions.

EMI Students' Perceptions of the Benefits of the Language Used as the Medium of Instruction on Their Acquisition of Disciplinary Knowledge

Four major categories emerged from the most frequent responses given by EMI students to the question concerning the benefits of the language used as the medium of instruction on their acquisition of disciplinary knowledge. Each category is discussed in the following sections.

Enhancing English language skills

Many final-year EMI students thought that, due to continuous exposure to English, they were able to improve their English language, translation skills, and vocabulary knowledge:

- I've improved my English language skills (ME).
- My knowledge of vocabulary increased and I've also developed my translation skills (EEE).

Access to primary sources in English

EMI students reported that most publications in engineering are available in English, and terminology is almost entirely English; thus, receiving their higher education in EMI enabled them to study from primary sources in their field, and to research subjects from a wide range of sources, e.g. the Internet and other written texts:

- I can read texts from its original sources without translation (ME).
- Receiving my lessons in English enabled me to access a wide range of sources while doing a research (EEE).

Concepts form an important component of disciplinary knowledge, and a close relationship exists between knowledge and concepts because concepts are elements of knowledge and they package information (Kintsch, 1974). Students across the two disciplines stated that EMI enabled them to learn the disciplinary concepts of English speakers, as illustrated below:

- I'm learning engineering terms in English (EEE).
- I find it easier to learn concepts in my discipline in English (ME).

Better employment prospects

Many students thought that acquiring a degree from an EMI program was likely to give them a greater advantage over their competitors graduating from TMI programs because EMI programs are likely to offer them the prospect of getting higher paid jobs at home and abroad, as noted below:

- I'd have priority over my counterparts attending a Turkish-language medium university in getting a better job (ME).
- Considering the circumstances of the current job market in Turkey, EMI'll enable me to find a higher-paid job, and easily adapt myself to working in an international company. In the globalized world, EMI will enable me to find a good job in a wide range of sectors both in Turkey and abroad (EEE).

Keeping up with global developments

Some students stated that an engineer needs to keep abreast of new *technological developments*, and EMI enables this to be achieved, as reported in the following statements:

> Technology is of foreign origin and English is the language of technology. Technology is developing globally and English has a crucial role in this development.
> EMI helps us keep up with the world-wide technological developments and become a global engineer and compete in the globalized world (EEE).

Additionally, students thought that EMI would enable them to communicate with fellow professionals:

> English is the *lingua franca* spoken by many people in the world. EMI'll enable us to communicate with our foreign engineering counterparts (ME).

TMI Students' Perceptions of the Benefits of the Language Used as the Medium of Instruction on Their Acquisition of Disciplinary Knowledge

Four categories emerged from the most frequent responses given by TMI students on the benefits of the language used as the medium of instruction on their acquisition of disciplinary knowledge.

Easy comprehension of disciplinary knowledge

- A majority of TMI students across the two disciplines reported that Turkish enabled them to understand the disciplinary knowledge more easily and in a shorter period of time, as demonstrated by the following students' comments:
- I've been able to understand subjects and disciplinary concepts better and grasp details in a short period of time. Most importantly we've learned the basic logic of the subject-matter (CivilE).
- Taking my courses in Turkish enabled me to learn concepts in a comprehensible way. As I learn subjects in my own language, I can comprehend and assimilate knowledge better (CompE).

Detailed acquisition of disciplinary knowledge

Most students stated that due to TMI, they were able to acquire details of their disciplinary knowledge, as demonstrated by the following students' comments:

- I've been able to learn a large part of my disciplinary knowledge. If I had to learn it in another language I'd have to translate everything into my own language. With Turkish language medium of instruction I haven't had such a problem because it's much easier to learn in one's own language (CivilE).
- I've grasped the logic of many subjects and the meaning of concepts. I definitely think that I've learned my disciplinary knowledge effectively and in detail. I've had a good mastery of disciplinary knowledge (CompE).

Longer retention of knowledge

Unlike EMI students who reported that their disciplinary knowledge remains in their short-term memory, TMI students stated that they were able to retain disciplinary knowledge longer in their memory, as highlighted by a student, below:

- We've learned our disciplinary knowledge far from memorization. We've been able to learn the details ... and also internalize knowledge ... therefore what we learn remains longer in our mind (CivilE).

Productivity in written and spoken modes of communication

TMI students frequently referred to the benefit of having easy communication with the lecturers in lessons, commenting and expressing themselves better in oral and written assignments: I can understand the subjects easily and express myself better. It's much easier to understand and comment upon professional issues (CivilE).

- During lessons I can easily communicate with the lecturers. Also, I've become productive. I can express myself clearly and comment on topics easily (CompE).

Challenges Posed by the Language Used as the Medium of Instruction on EMI Students' Acquisition of Disciplinary Knowledge

While EMI students thought that acquiring a degree from an EMI program offered several benefits, a significant majority of the students acknowledged that studying in EMI posed four categories of challenges.

The difficulty in understanding disciplinary knowledge

Most final-year students, particularly those who perceived that their English proficiency was limited, mentioned that EMI reduced their ability to understand disciplinary knowledge. Students reported that they experienced difficulties particularly in understanding lectures, disciplinary concepts, and sometimes written texts. Concerning their understanding of the lectures, students stated that they generally had acquired a general framework of the ideas, not the details:

- It's almost impossible to learn subjects in the lesson because of the difficulty of the subject-matter. Added to this is the difficulty of following fast-speaking lecturers (ME).
- Although receiving our courses in English is essential for us as electrical-electronics engineering students, for many of us it turns out to be a torture, particularly when we cannot understand what's being taught in the lessons and remain unable to ask questions. As a result, we cannot have interactive lessons (EEE).

Another source of difficulty was located in the inability to understand concepts, particularly associating vocabulary with corresponding concepts, as observed by an ME student:

- It's not easy to grasp many concepts thoroughly. I cannot exactly conceptualize them in my mind.

The difficulty in understanding specific details

EMI students were not learning details well enough; therefore, they had an incomplete understanding rather than a full mastery of disciplinary knowledge. Students' comments indicated that EMI reduced their ability to understand important details, as indicated by the following interview extracts:

- I can understand the general framework of the subjects but it's not possible to say so for the details. Many things in my mind remain incomplete. There're many points missing. I haven't learned many important subjects in great depth and detail (EEE).
- Looking at my friends receiving their education in Turkish, I can see that their learning's much deeper compared to us (ME).

EMI students agreed that many of their lecturers did not go into sufficient details. As a result, the students were disappointed that they would graduate having an insufficient level of disciplinary knowledge, as expressed by an ME student:

- It's off-putting for us when the lecturer continues teaching even though we haven't understood crucial points. We cannot ask questions because we don't understand the lessons. We move on to a new topic without having a complete mastery of the previous subject.

Similar to comments made about the discourse structure of the lecture, students frequently made reference to difficulties in framing meaning in specialized written discourse:

- Though most of our courses are numerical we're learning most courses through memorization. Thus what we learn tends to be short lived in memory (ME).
- Let alone understanding most of what has been taught in Turkish, we're inevitably having problems in the foreign language medium education (EEE).

While talking about the challenges experienced, EMI students explicitly referred to memorization, leading to superficial learning of the disciplinary knowledge. Students stated that they resorted to memorization due to the lack of understanding disciplinary knowledge to achieve short-term objectives:

- It's not like learning it in the native language. What's taught in EMI remains less in our mind. I don't think I'm learning disciplinary knowledge well enough. One of the reasons is lack of communication in lessons. Establishing teacher-student communication link in English is hard (ME).
- Not only do we have an inadequate understanding of some courses we're tending to memorize them. This's unfortunately a great handicap for us as engineers who are expected to be creative (EEE).

Students admitted that what they memorized remained in their short-term memory and was likely to be forgotten soon.

Time consuming nature of EMI

Students made frequent reference to the issue of time when discussing learning their disciplinary knowledge in EMI. Interview comments confirmed questionnaire data in that learning through English is much more time consuming compared to learning in TMI:

- EMI increases our study time twice and even three times as much as we would learn these subjects in Turkish language-medium education. Sometimes, to have an adequate understanding, first, we study from Turkish sources and then translate into English. We mostly study from Turkish sources to understand topics, which double our study time. Studying from both Turkish and English sources is a waste of time for us (ME).

Understanding examination questions

EMI students reported having experienced difficulties in understanding examination questions, adversely affecting their performance, as observed by one student:

- Several times I couldn't answer exam questions correctly because I misunderstood the questions. My answer was wrong so I got low marks and had to repeat the course (ME).

Challenges Posed by the Language Used as the Medium of Instruction on TMI Students' Acquisition of Disciplinary Knowledge

TMI students stated that they experienced no major problems in terms of acquisition of disciplinary knowledge, but, they did note three concerns.

The difficulty in understanding English texts

Those students whose English proficiency was limited stated that they experienced difficulty in understanding English publications:

- It's hard to understand books that are not translated from English (CompE).

Future concern over finding jobs

Some students worried that limited English proficiency might be a disadvantage because proficiency in English is a determining factor in finding a good job in some sectors:

- Some jobs require high proficiency in English. For those of our friends with limited English proficiency this may be a problem. Also, working in foreign companies might be a problem for us.

The difficulty in coping with technical terms

Only a few CompE students mentioned that Computer Engineering is a relatively recent discipline in Turkey, computer-related terms are largely derived from English, and that Turkish equivalent of some technical terms is rather unclear.

Students' Perception of Disciplinary Knowledge and How it Relates to the Impact of the Language Used as the Medium of Instruction on Their Acquisition of Disciplinary Knowledge

Both TMI and EMI students' definitions of knowledge comprised familiarity with disciplinary concepts and technical terms. The following statement is typical in reflecting the vast majority of the TMI and EMI students' perceptions of what disciplinary knowledge is:

- An accumulation of a body of theoretical and practical knowledge and skills that one has acquired during the period of one's university education, which one can then transfer to one's professional life.

Students see concepts forming an important component of disciplinary knowledge. Similarly, Kintsch (1974) notes the existence of a close relationship between knowledge and concepts because concepts are elements of knowledge that package information. While admitting that learning continues after leaving the university**,** most students considered it essential to be fully-equipped with the necessary knowledge and skills in one's disciplinary knowledge on completing the university education. Acquisition of disciplinary knowledge, as perceived by the students, should be 'complete' so that they experience no difficulties or inadequacies in their future jobs, namely, to be work-ready graduates, as reported in this student comment:

- Upon completing my department I need to have a complete mastery of knowledge and be fully-equipped with the requisite knowledge and skills in my discipline so that I can feel ready to start my job (ME).

In addition, they associated disciplinary knowledge with 'practical' and 'effective' learning:

- …A fully knowledgeable person about one's field of specialism. This can be acquired receiving an education that's free from memorization that focuses on intellectual growth and practice (EEE).

As for the students' perceptions concerning the effect of the language used as the medium of instruction on their perceived acquisition of disciplinary knowledge, with the exception of a few EMI students (n = 8) who stated that the language of instruction would have no effect on learning, majority of the EMI students (92%) agreed that the language of instruction definitely had a significant impact on their learning of disciplinary knowledge, and that learning disciplinary knowledge effectively in EMI remains largely incomplete. The same students were particularly anxious that they had not reached sufficient understanding of disciplinary knowledge:

- I can say that we've been able to learn partly. Not to a large extent. To learn a subject in detail, English language medium education is not that beneficial. No matter how hard you study, you cannot learn fully. Your knowledge remains incomplete (ME).
- I feel that I have an inadequate knowledge in many fundamental subjects. I'm now in the final-year and compared with my Turkish counterparts I cannot see myself adequate. They've a much higher mastery of knowledge than me. I haven't had a full mastery of the subjects. It doesn't mean that I've learned nothing. It means I've not learned adequately (EEE).

Similar to EMI students, TMI students agreed (90%) on the impact of the language used as the medium of instruction on their acquisition of disciplinary knowledge. They reported having achieved a virtually complete understanding of the disciplinary knowledge, as illustrated by the following excerpts:

- I can understand the subjects easily and much better in Turkish. I've learned the logic of many subjects and the meaning of concepts thoroughly. It's much easier to understand, comment upon professional issues and express myself in my own language. I can assimilate my disciplinary knowledge better (CivilE).

- We're learning disciplinary concepts and details easily. Rather than memorizing knowledge we learn through logic. Throughout my university education I've understood and learned many subjects in sufficient detail (CompE).

The end-of-year average examination scores were obtained for *The Computer Architecture course*, part of which is taught through the medium of Turkish language to CompE students and part of which is taught through the medium of the English language to EEE students. The end-of-year cumulative grade point average score of the CompE students of CompE was 49.92 whilst the end-of-year average score of the EEE students was 31.86. The students CompE outperformed those of EEE by 56.66% in their performance for the same course.

The examination comprised five questions, of which the first asked students to state their knowledge based on their comprehension of subject matter, i.e. to state five properties of the server computer. The second question required students to explain a set of instructions and to describe how these instructions are executed in updating the program counter. Hence, the question required the students to apply their disciplinary knowledge to a given situation. Question three asked students to analyze the given situation using the disciplinary knowledge gained from the course. Similar to question one, question four asked the subjects to describe disciplinary concepts. The fifth question asked students "to draw a block diagram of the single-cycle implementation and show the necessary data path and control signals to execute the instruction". The lecturer's comments on the examination performance of EEE students revealed that they tended to avoid responding to questions that required detailed explanations (questions 5 and 3 above) and instead to favor those questions requiring brief definitions of concepts.

Another problem frequently encountered by EMI students reflected a misunderstanding of the examination questions; consequently, students provided a related response not directly responding to the question asked. Reading of the examination papers indicated that the results were diametrically different in the case of TMI students who provided detailed explanations.

Discussion

The present study has investigated commonalities and differences in the perceptions of students receiving their higher education using EMI versus TMI. The positive-oriented perceptions of EMI students included enhancing English language skills, gaining access to primary sources in English and keeping up with global developments in their disciplines. Furthermore, students anticipated instrumental benefits EMI would offer upon graduation i.e., getting higher-paid jobs. On the other hand, TMI students reported comprehending disciplinary knowledge more easily, learning in detail, and achieving long-lasting retention.

EMI students reported experiencing difficulties in understanding, particularly regarding the details of their disciplinary knowledge. As a consequence, they tended to memorize disciplinary knowledge to achieve short-term objectives e.g., passing examinations, admitting that they adopted superficial rather than effective learning**.** Also, EMI students explained that the material they had memorized was likely to be quickly forgotten. This confirms the argument put forward by Haggis (2003) that memorization may allow students to pass examinations, but it is quantity learning without quality. In contrast, a majority of the TMI students (86%) agreed that they had a better grasp of disciplinary knowledge, understood it in greater detail, retained it longer, and achieved a higher level of learning.

EMI students' lack of understanding can be attributed to the fact that they have not internalized sufficient frames of reference that would enable them to acquire disciplinary knowledge and grasp details effectively, whereas TMI students' acquisition of sufficient frames of reference facilitated their more effective acquisition of disciplinary knowledge. To illustrate, EMI

students could not participate in the lecture discussion because they could not frame meanings sufficiently well to ask and answer the questions, nor could they place the lecture discourse within the implicit frames of reference, as could TMI students. While EMI students, in general, participated in the specialist discourse at a superficial level, TMI students' participation in the specialist discourse of their discipline was at a more sophisticated level since they had build up more detailed frames of reference (Northedge, 2003). Unlike TMI students, who claimed that they could learn disciplinary knowledge in a shorter period of time, EMI students complained of the time consuming nature of learning, and the difficulties in understanding examination questions.

TMI students, while not experiencing any specific problems in the acquisition of disciplinary knowledge, expressed concerns that might arise from TMI. For those whose English proficiency was limited, studying from English sources posed difficulties. Additionally, students expressed concerns over the prospects of getting jobs requiring high level English proficiency.

Both TMI and EMI students' definition of disciplinary knowledge corresponds to scholarly conceptions in that they tend to see concepts forming an important component of disciplinary knowledge. Most students perceived that learning disciplinary knowledge should be complete to enable them to be work-ready graduates.

Regarding the impact of the language used as the medium of instruction on students' acquisition of disciplinary knowledge, the majority of TMI and EMI students agreed that the language of instruction had a significant impact on learning. TMI students' ability to engage in meaning making with disciplinary discourse more effectively suggests that the language of instruction is an important factor in internalizing the required disciplinary frames of references. When the TMI profile was compared with that of the EMI profile, it was observed that TMI students had internalized sufficient disciplinary frames of reference to allow them to acquire disciplinary knowledge effectively as they progressed through the final-year, and far more than the EMI students, they had reached an adequate level of disciplinary knowledge.

The present study confirms earlier research suggesting that EMI is effective in terms of language skills development but it is rather ineffective in the acquisition of disciplinary knowledge (Sert, 2008; Collins, 2010; Hengsadeekul, *et al.* 2012)**,** while extending the earlier findings (Balla & Penning, 1996; Bruce, 1990) that the language used as the medium of instruction has an impact upon students' acquisition of their disciplinary knowledge effectively in higher education.

CONCLUSIONS AND IMPLICATIONS FOR FURTHER STUDIES

This in-depth qualitative study has investigated the perceptions of two comparable groups of final-year engineering students enrolled in a Turkish institution of higher education regarding their acquisition of disciplinary knowledge in EMI versus TMI. As revealed by research findings, the potential discrepancy exists between higher education's aim 'to educate those who are highly specialized in their discipline' with its implication to detailed and meaning-oriented acquisition of disciplinary knowledge, and the reality in-practice which appears to generate relatively ineffective learning in EMI's preparation of undergraduates. Thus, the findings present a cause for concern in programs where the medium of instruction is in English.

There is no doubt that in the contemporary globalised world, English-language proficiency is perceived to be linked with the overall economic development of a country, a desirable attribute for national governments to promote. Institutions of higher education are assumed to be responsible for incalculating the desired outcomes in students, including the ability to communicate in English through courses offered in their English language programmes and/or EMI courses. In relation to Malaysia's response to globalization in terms of medium of instruction policies, Ali (2013) reports a shift where the EMI classroom is being re-positioned by policy makers as a tool for English

language learning, reflecting a changing paradigm for language planning hoping that this could promote students' English language development. Undoubtedly, EMI classrooms could provide opportunities for students to strengthen their mastery of English through content learning since language proficiency is one of the crucial factors determining successful policy implementation (Baldauf, 2012).

The study also raises potential implications at the level of the classroom. If English-medium universities are to educate students who are to become suitably qualified professionals, students should be helped to achieve more effective learning of disciplinary knowledge, a desirable goal in higher education policy. Winberg (2008) suggests that instructional practices can be enhanced by lecturers, key players in implementing macro policy decisions in-practice at the micro level. One way to achieve this would be through exploring ways to balance lecturers' engineering and educational identities engaging more with a learning-oriented approach, not constrained by the discipline they may teach. Lecturers need to consider how knowledge in their discipline can be made more accessible to students through acts of teaching considering the complexity of content knowledge and the fact that it is to be transmitted in the medium of a foreign language. In this way, students would be helped to acquire the capacity to frame meanings that would enable them to engage more effectively with a disciplinary discourse. Thus, further research on lecturers' way of delivering disciplinary knowledge would help clarify the way EMI programs are delivered.

This particular research focuses on one institute of higher education in Turkey. Further research with students from different universities in similar subject areas might allow for a more context-free interpretation of the present findings. Additionally, there is some advantage to be gained from a more qualitative engagement with individual students over a longer time period in which the process of EMI programs are incorporated.

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Notes

1. Kachru (1985) devised the classification of nations into three groups as Inner, Outer, and Expanding circles in the context of language use. The inner circle represents countries such as the United Kingdom, the United States, and Australia where English language norms are developed. The outer circle includes such countries as South Africa, India, Nigeria, Pakistan, Malaysia, Tanzania, Kenya where English is not the native language, but plays a part as an official language in institutions. The expanding circle comprises those countries such as China, Japan, most of Europe, Korea where English is used as a foreign language or lingua franca. Some of the objections to that classification are raised; however, the model continues to serve as a short-hand for English worldwide.

2. The official language of China (PRC) is Mandarin. Hong Kong has used Cantonese throughout the period of British government.