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THE IMPACT OF ONLINE TECHNOLOGIES AND ENGLISH MEDIUM INSTRUCTION ON UNIVERSITY LECTURES IN INTERNATIONAL LEARNING CONTEXTS: A SYSTEMATIC REVIEW

Abstract

This paper addresses how the university lecture is evolving in response to new realities in international higher education driven by two important trends: innovative online instructional technologies and the rise of English Medium Instruction (EMI). Following a brief review of the lecture as the core instructional channel in universities, we offer a detailed overview of the new technology-driven lecture formats that are now available to learners worldwide. We then shift the focus to the role of EMI, with particular attention to understanding how both instructors and students view this relatively new approach to learning. This was accomplished through a systematic review of EMI-related literature available in scholarly databases. Findings showed that most research has focused on the language-related issues of learners, and little attention has been paid to the crucial issue of lecture comprehension, which is mainly caused by the low level of proficiency of students/instructors and domain-specific vocabulary. Moreover, studies have almost exclusively addressed face-to-face settings, indicating a need to expand EMI research to include online lecture settings that are increasingly frequent in international higher education. This paper contributes to the body of knowledge relating to new trends in how lectures are experienced and perceived in international educational settings.

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Key words

international students, EMI, lecture formats, technology-driven lectures, lecture comprehension.

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1. INTRODUCTION

In today's increasingly globalised academic world, it is crucial for universities to keep pace with two key trends that are changing the nature of higher education: (a) the ongoing technological evolution in how instruction is delivered (with particular reference to the university lecture experience), and (b) the diffusion and popularity of English Medium Instruction (EMI) to both attract and accommodate growing numbers of international students. In this paper, we trace the development of these trends, while providing an overview of the current state of related research and practice. Thus, the objective of the study is twofold. Firstly, we review current lecturing formats that reflect some of the innovative features of the university as an open and international institution. Secondly, we provide an overview of the views and perceptions of the main stakeholders of EMI (content instructors and students) relating to the EMI experience, with particular attention to the comprehension of lectures given in English. To meet this second objective, we have formulated two research questions:

RQ 1. Which topics have been the focus of previous studies on EMI in the context of university lectures?

RQ 2. What does the literature reveal about students' lecture comprehension in EMI?

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The remainder of the paper is structured as follows: in Section 2, we begin with an overview of the communicative setting to which the review refers, namely, the university lecture as the primary instructional channel in higher education, with special attention to how it is changing thanks to a number of new technology-driven formats that have emerged (and are continuing to do so). We complete the section with the introduction to the rising phenomenon of EMI in this educational context. Section 3 presents the methodology followed to answer the research questions. We offer a systematic review of up-to-date studies on instructors' and students' perceptions, attitudes, or beliefs in relation to EMI, and discuss EMI implications for lecture comprehension among L2 learners. Findings are presented in Section 4. The paper concludes with a summary of the main results of the research and suggests prospects for future research focusing specifically on EMI in technology-driven university lecture settings.

2. LECTURES: OVERVIEW AND NEW TRENDS

As a teaching method, the lecture has always been the cornerstone of higher education. Despite coming under criticism as being less effective than more interactional and student-centred approaches (DiPiro, 2009; Huba & Freed, 2000; Meltzer & Manivannan, 2002), lectures remain solidly in place as the most

practical way to teach classes with large numbers of students, which are pervasive in today's academic world where few universities can afford the luxury of offering small classes exclusively (deWinstanley & Bjork, 2002; Parini, 2004). Yet beyond the issue of practicality, some unique pedagogical advantages have also been identified in the lecture method. For example, according to Penson (2012), when lecturers assemble information from different sources and then present it to students in a synthetic and orderly fashion, this can serve as a model for them to adapt to their own experiences to engage with knowledge in a meaningful and discerning way. On an interpersonal level, the lecture provides students with the opportunity to be exposed to lecturers' attitudes and values in relation to the conceptual knowledge that they are presenting, and thus encourage students to develop their own critical reflections towards that knowledge (Lee, 2009). Similarly, Charlton (2006) highlighted the socially-situated nature of lectures, which can be fruitfully exploited by lecturers on a psychological level to foster learning.

Empirical research focusing on the efficacy of the lecture as a teaching method has not always produced consistent results. For example, Hunt, Haidet, Coverdale, and Richards (2003) found that students performed better with team-learning methods than with a lecture-based approach, while Barnes and Blevins's (2003) study indicated that more interactive discussion-based methods are inferior to the traditional teacher-fronted lecture. De Caprariis, Barman, and Magee (2001) suggested that lectures are more suitable for factual recall, whereas discussion favours a deeper level of understanding. In terms of student perceptions, lectures have been shown to be popular among students (Clay & Breslow, 2006). Qualters (2001) found that students preferred lectures over active learning methods which they viewed as overly time consuming, leading to the risk of not covering all required course content. In contrast, Casado (2000) determined that students preferred more interactive approaches, such as lectures supplemented with discussions, oral presentations and applied projects. Thus, there appears to be no clear consensus on the effectiveness of lectures as a teaching method in higher education. However, because lectures are likely to remain the primary instructional channel in universities, perhaps it is more helpful to shift the focus towards how to make them more effective and, therefore, more successful. As aptly pointed out by deWinstanley and Bjork (2002: 19), "an effective lecture – one that induces effective processing in one's students – can be a successful method of teaching".

While the success of a lecture clearly hinges upon the individual lecturer's scientific competence, instructional skills, and personal capacity to engage and inspire students (Copeland, Longworth, Hewson, & Stoller, 2000), technology can also enhance the effectiveness of lectures. One needs only think of technology-driven classroom resources including (a) the Internet as a massive source of specialised information that brings the world to the class and allows students to interact with it, (b) specialised software to enhance engagement in large classes

and also in small ones, and (c) the use of PowerPoint or other electronic documents, just to mention a few of them. With particular reference to the latter, PowerPoint is now firmly established in university classrooms and widely perceived as contributing to lectures in a positive way in order to highlight main points and assist during note-taking (James, Burke, & Hutchins, 2006). In particular, research conducted by Roehling and Trent-Brown (2011) found that most students reported an enabling effect of PowerPoint slides to take more and better notes. Similarly, Winer and Cooperstock's (2002: 263) survey revealed that the majority of students appreciated having information before class so that they would not be in "copy mode" and were liberated to focus more on content.

Over the last two decades, the use of instructional technology designed to improve the effectiveness and efficiency of learning has only continued to grow. Today's students can take advantage of an ever-increasing variety of web-based resources to integrate and support the traditional classroom lecture, such as those available on learning management systems (e.g. Moodle, Blackboard), but also on digital platforms that host OpenCourseWare (OCW) and Massive Open Online Courses (MOOCs), which have exponentially expanded access to lectures in higher education settings. OCW was a pioneering initiative of the Massachusetts Institute of Technology in 2002 that aimed to provide free access to high-quality educational materials to anyone who desired to learn. OCW is always accessible, without assessment or accreditation, and designed for an individual learning experience. MOOCs instead emerged around 2010 and are typically offered by educational companies (e.g. Coursera, Udacity) that often partner with universities (Martinez, 2014). MOOCs are usually accessible only during the duration of the course itself, include assessment, offer credits, and have a collaborative format for participants who also usually incur some costs. Furthermore, in MOOCs we find the presence of tutors, curators or other learning facilitators. Both OCW and MOOCs are viewed as Open Education Resources (OER), defined by the UNESCO (2012: 1) as:

"teaching, learning and research materials in any medium, digital or otherwise, that reside in the public domain or have been released under an open license that permits no-cost access, use, adaptation and redistribution by others with no or limited restrictions. Open licensing is built within the existing framework of intellectual property rights as defined by relevant international conventions and respects the authorship of the work."

The nature of "openness" in MOOCs, however, is different. They may be considered open in the sense that they are "free to try" and in terms of the learner's role (Cormier & Siemens, 2010), but unlike OER, MOOCs do not always have open licenses that authorise the use and re-use of content. Reusability is enhanced in OER, which implies that the content is "technologically accessible and it is sufficiently open for use, re-use, re-mix, adapt and re-distribute" (Piedra, Chicaiza, López, & Tovar, 2014: 173). The OER movement has grown dramatically in recent years and large numbers of video-recorded lectures are now freely

available from various platforms, including the OCW websites of universities around the world, iTunes U, and the Open Education Consortium portal which provides a searchable database of courses and materials,¹ to name just a few.

The key role of technology in OER settings is further evident in the wide range of materials that are available to students who take part in these courses, including syllabi, resource lists, outlines of lecture topics covered in each session and corresponding notes, audio and/or video recorded lectures, transcripts of recorded lectures, links to access free materials or to purchase textbooks, downloadable textual materials, quizzes/exams, assignments/exercises, and even post-course student feedback surveys (Crawford Camiciottoli, 2018). Indeed, technology appears to be transforming the classroom lecture to exploit the affordances of digital environments, offering students much more than what is typically used in the classroom lecture (e.g. handouts, PowerPoint slides, and/or audiovisuals).

Moreover, the online delivery formats of lectures in OCW and MOOCs also guarantee a high level of autonomy and personalization among students, who can access lectures according to their own schedules and select among the myriad of resources available, according to their own needs and preferred learning styles. In this way, thanks to technology, the traditional instructor-centred lecture seems to be taking on more learner-centred features, as students make choices about how to interact with the various digital materials made available to them on OCW and MOOC platforms. In OCW, learners find video recordings of face-to-face lectures given to an immediate audience in a traditional classroom setting. It seems that, in general, in OCW lectures there are no discursive features that show instructors' awareness of or concerns about prospective virtual audiences. However, educational videos in MOOCs are addressed to virtual learners, since there is not an immediate audience while they are being recorded. Guo, Kim, and Rubin's (2014) study on how video production affects learners' engagement revealed that videos in MOOCs are mainly lectures or tutorials and that video length is the most important indicator of engagement. Currently, MOOCs developers tend to follow the recommendation of these authors – to “[i]nvest heavily in pre-production lesson planning to segment videos into chunks shorter than 6 minutes” (Guo et al., 2014: 42).

Synchronous video-conferencing lectures (SVL) is another online teaching format that is being increasingly used at universities. Martin, Ahlgrim-Delzell, and Budhrani's (2017: 3) definition of synchronous online learning describes the main features of this type of delivery as follows “(a) permanent separation (of place) of learner and instructor during planned learning events where (b) instruction occur[s] in real time such that (c) students [are] able to communicate with other students and the instructor through text-, audio-, and/or video-based communication of two-way media that facilitate[s] dialogue and interaction”.

¹ <http://www.oecconsortium.org/>

Despite the most obvious difference between SVLs and face-to-face lectures, i.e. instructors' and learners' virtual or physical presence, they share the immediacy of feedback, as both take place in real time. However, Computer Mediated Communication (CMC) is a double-edged sword in SVLs. In large groups, this virtual teaching environment only allows for a few learners to occasionally communicate through audio or video, thus communication is actually mostly instructor video-based and learner text-based. Therefore, though interaction in SVLs is immediate, in large lectures the only information about the students that the instructor receives is what they decide to share on the text chat. Instructors "do not have an immediate perception of the learners' comprehension as in face-to-face lectures, unless they make it explicit on the chat, which necessarily demands a stronger commitment on the learners' part" (Querol-Julián & Arteaga-Martínez, 2019: 298). "Clickers", or CRS (Classroom Response Systems), are a form of classroom technology employed to enhance interaction (mainly in large groups) by collecting instantaneous students' responses to questions that can be immediately displayed and shared with the whole class (Caldwell, 2007). Clickers or quiz apps can be very useful in this virtual instructional context to check learners' comprehension. Furthermore, video-conferencing for teaching purposes can take place at a distance and in situations that combine distant participants with those who are face-to-face (Shephard & Knightbridge, 2011). The type of synchronous online technology that is commonly used includes Elluminate, Blackboard Collaborate, Skype, or Adobe Connect. Moreover, these live virtual lectures are generally video recorded, so that they also become asynchronous lectures.

Users of asynchronous lectures in formal and non-formal settings benefit from watching video recordings of lectures (partially or totally) at their own pace, whenever they can and as many times as they need. This may support conceptual and/or linguistic understanding of lectures, which will be of special interest for international students. However, unlike face-to-face and SVLs, in asynchronous lectures immediate interaction that could clarify content or help to construct knowledge is not possible. Moreover, in relation to virtual lectures, a significant difference between courses that integrate asynchronous video lectures (AVLs) and those that include video-recorded lectures in OCW is that the former generally provide learners with asynchronous written communication tools that facilitate interaction with the instructor and classmates. Regarding MOOCs, three pedagogical types are distinguished: cognitive behavioural MOOCs (xMOOCs), connectivist MOOCs (cMOOCs), and more recently, social constructivist MOOCs (sMOOCs).² The "social" component of sMOOCs is highlighted since the learning experience they provide is defined by social interactions and participation (Miyazoe & Anderson, 2013). However, we question whether high student-teacher

² xMOOCs use a cognitive behavioural pedagogical model. cMOOCs are based on the learning theory of connectivism, creating networked connections among students, teachers and content. sMOOCs follow a social constructivist theory, stressing interactions, discussion and collaborative creation of knowledge.

interaction is actually possible when the course is authentically massive. In this same vein, Miyazoe and Anderson (2013: para. 32) commented that “teachers tend to find that teaching sMOOCs is challenging and time-consuming”. Thus, when reflecting on MOOCs, we cannot consider them to be all the same. In sMOOCs, teacher presence as both subject matter expert and facilitator of learning is also expected.

The similarities and differences among the lecture formats delivered in physical and virtual contexts can be characterised by five features: learning setting, delivery, mode of interaction, and types and channels of communication (see Figure 1). Face-to-face communication actually defines lectures in physical contexts; however, apart from that, the five features of virtual lectures listed above can render them more adaptable to the reality of many learners nowadays. We find them in “formal settings” (lectures that are officially part of undergraduate and graduate courses) and in “non-formal settings” (other lectures that students use to complete their training but that are not part of official courses). They are delivered live and/or are video recorded; thus, interaction among participants can be synchronous and/or asynchronous. Communication in virtual contexts can be two-way or one-way, and is technology mediated through text, audio, and/or video. Yet, the use of clickers seems to be an option in both settings, physical and virtual (Querol-Julián, in press).

| Context | | Physical | Virtual | |
|----------------------|----------|--------------|--|----------------|
| Learning setting | | | Formal | Non-formal |
| Delivery | | | Live | Video-recorded |
| Modes of interaction | | | Synchronous | Asynchronous |
| Communication | types | | Two-way | One-way |
| | channels | Face-to-face | <i>Technology mediated (e.g. clickers)</i> | |
| | | | <i>Text-based communication</i> | |
| | | | <i>Audio-, video-based communication</i> | |

Figure 1. Distinctive features of university lectures in physical and virtual contexts

Face-to-face, synchronous, and asynchronous teaching that includes the lecture as one instructional method have been compared according to learners’ and instructors’ perceptions. Results have shown that the asynchronous format is appreciated by students as it allows them to view lectures at their own pace, and at a time and place of their choosing (Kunin, Julliard, & Rodriguez, 2014). Synchronous interactive online instruction (SIOI) and asynchronous online formats have been rated higher than face-to-face format in terms of access (Ward,

Peters, & Shelley, 2010). However, with reference to interaction, findings are contradictory. Ward et al. (2010) revealed that instructors in SIOI were satisfied in general with the nature of the student-instructor and student-student interaction in these classes. Kunin et al.'s (2014) study, on the contrary, found that learners did not place much value on the ability to ask a live presenter questions during the lecture, both in face-to-face lectures and in SVLs.

The proliferation of OCW, MOOCs, and other online forms of learning in higher education means that a growing number of students from all over the world can access lectures via the Internet. This trend runs parallel to an ongoing process of internationalization in higher education in which English is increasingly used as the lingua franca of instruction and helps universities to attract significant numbers of foreign students (Coleman, 2006; Wächter & Maiworm, 2014). Indeed, EMI is on the rise and more than half of international students attending universities globally are taught in English (Graddol, 2006); accordingly, researchers have explored different aspects of EMI (for an overview see monographs by Doiz, Lasagabaster, & Sierra (2013); Fenton-Smith, Humphreys, & Walkinshaw (2017); Fortanet-Gómez (2013); Macaro (2018); Moore, Rubio-Alcalá, & Pavón Vázquez (2018); Murata (2018); Ruiz de Zarobe & Lyster (2018); or Smit & Dafouz (2012) among others). Moreover, the increasing availability of digital lectures delivered in English by lecturers from prestigious universities around the world has only expanded educational opportunities for international students. Yet, despite the rapid development of EMI, researchers have found that, in general, instructors and students are cautious in its implementation (Macaro, Curle, Pun, An, & Dearden, 2018). These authors also concluded that the research conducted to date does not provide sufficient evidence either that EMI improves language proficiency or that it impairs content learning. Furthermore, it seems there is also a lack of research on classroom discourse in EMI settings, which could provide evidence of good practices for effective learning. However, it is well known that learners who are not native speakers of English (hereafter L2/FL learners) experience significant challenges in comprehending lecture discourse.³ This also has implications for lecturers (particularly novice ones) who need to be aware of such special needs, whether they teach in the physical classrooms or in online environments. In addition, when the instructors who deliver the lectures in English are also non-native speakers themselves, they should be prepared and supported in this type of teaching (Klaassen, 2008).

In an effort to address the lack of research on practice-oriented aspects of EMI, we provide a systematic overview of the views and perceptions of EMI stakeholders (i.e. content instructors and students) relating to their EMI experiences, with particular attention to the comprehension of lectures given in English. In the next two sections, we first present the methodology followed to

³ For an extensive overview of the phonological, lexico-syntactic, structural, visual, cultural, and pragmatic challenges of lecture comprehension for L2/FL learners, see Crawford Camiciottoli and Querol-Julián (2016).

conduct the systematic review of the relevant literature to answer the previously formulated research questions. Then, with reference to the findings, we reveal which EMI issues have been explored while taking into account instructors' and/or students' perceptions, attitudes, or beliefs, as well as what these EMI stakeholders have said about lecture comprehension.

3. METHODOLOGY

The methodology used was a systematic review of up-to-date studies on EMI that were available on the Web of Science in the databases: Social Sciences Citation Index (1956-September 2018), Book Citation Index – Social Sciences & Humanities (BKCI-SSH) (2005-September 2018), and Emerging Sources Citation Index (ESCI) (2015-September 2018). Table 1 presents the search keywords used, which were adapted from those employed by Macaro et al. (2018).

| |
|---|
| “English Medium Instruction” OR “EMI” OR “Content and Language Integrated Learning” OR “CLIL” OR “ICLHE” OR “Integrating Content and Language in Higher Education” OR “bilingual education” OR “multilingual education” |
| AND “Tertiary Education” OR “Tertiary” OR “Higher Education” OR “university*” OR “college” OR “graduate” OR “undergraduate” OR “postgraduate” OR “master*” |
| NOT “pre-primary” OR “pre-school” OR “nursery” OR “kindergarten” OR “day care” OR “early childhood” OR “pre-K” OR “playgroup” OR “primary school*” OR “elementary school*” OR “elementary education” OR “primary education” OR “K1” OR “K2” OR “school” OR “secondary” OR “junior school” OR “high school” OR “middle school” OR “vocational training” |

Table 1. Search keywords

The first section in the table refers to the type of educational programme. In general, the terms EMI (English Medium Instruction) and CLIL (Content and Language Integrated Learning) are used. However, methodologically speaking, there is a significant difference between them, so a word of explanation is in order here. CLIL programmes explicitly promote both content and language learning, unlike EMI programmes that focus only on content. When EMI is implemented in higher education, it is assumed that attention to language is not required because students presumably possess adequate proficiency in English. In many cases, however, researchers and practitioners refer to EMI programmes as CLIL. Nonetheless, CLIL programmes in higher education still remain in an exploratory stage (Coyle, Hood, & Marsh, 2010). Aguilar (2017) contributed to shedding some light on this aspect by surveying engineering lecturers' views on CLIL and EMI. Her study reported that EMI was the only modality they followed. They did not

embrace CLIL mainly because they refuse to teach English (Airey, 2012: 11) or assess it, since “their perceived teaching duties are content specific and language free”. In contrast, the term ICLHE (Integrating Content and Language in Higher Education), which also appears in the table, has been adopted in order to differentiate itself from CLIL, which generally refers to programmes that are implemented in other educational levels (Smit & Dafouz, 2012). Integration in this educational context is understood as:

dovetailing the structure and sequence of subjects and curricula; joint lessons, team-teaching and shared classroom materials; the design and marking of joint assessment tasks; collaborative partnerships between language and content lecturers; as well as collaboration across disciplines and contexts (such as the academy and the workplace). (Gustafsson & Jacobs, 2013: iv)

As Schmidt-Unterberger (2018) advocated, a full ILCHE programme thus poses a serious challenge for many universities regarding resources and teaching staff participation. As the approach entails students’ mastery of content as well as development of language skills, she notes that it requires high involvement of language specialists in curriculum design and programme development. Consequently, this author argues that “a combination of EMI courses and explicit ESP and EAP instruction is the more realistic model for the implementation of English-medium programmes at most higher education institutions” (Schmidt-Unterberger, 2018: 535). The other two sections in Table 1 aim at narrowing the educational context of the studies to those conducted at university level.

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The search process using the terms described above led to the retrieval of 178 publications. The two criteria followed to ensure conformity with the objectives of the study were that publications had to (1) employ the paradigm of survey research written in English, including explicit and reproducible methodology, and (2) consider EMI instructors’ (that is, content teachers who use English as the language of instruction) and/or students’ voices as the main source, or one of the sources, of information to conduct the investigation. In many cases, this information was found in the abstracts; however, in some cases the technique of scanning the methodology section was necessary. After this procedure, the final dataset of our research consisted of 61 studies that satisfied the pre-established criteria.

We analysed the research questions or objectives described in these publications. As expected, in general, research questions were not presented in the abstract, but rather in the introductory section or when presenting the empirical study; moreover, some of the publications did not design research questions but only objectives. Afterwards, we closely read the methodology section, and in some cases the results section, to find out which research questions/objectives had been answered or achieved taking into account EMI instructors’ and/or students’ views. The reason for doing this was that some studies considered observation of lectures or analysis of written documents to integrate information collected through

questionnaires/surveys, interviews and/or focus groups, while others used this data type (which does not consider content instructors' or students' opinions) exclusively to answer some questions or to meet some objectives. In addition, those publications that only considered the perspective of participants other than content instructors and students were judged as beyond the scope of the present analysis. This was the case of the analysis conducted by Woźniak (2017) that explored the views of ESP teachers who were also tutors for content instructors in a CLIL context (as described by the author of the article), and Fenton-Smith and Humphreys's (2015) research on language specialists' views. However, the studies that considered other stakeholders' views in addition to those of EMI instructors and students, i.e. programme heads and office staff (Hou, Morse, Chiang, & Chen, 2013), administrative personnel (Doiz, Lasagabaster, & Sierra, 2014), program administrators (Corrales, Paba Rey, & Santiago Escamilla, 2016), and university leaders at different levels (Duong & Chua, 2016) were maintained as part of our dataset. The two authors of the paper reviewed each publication and when any disagreement relating to the interpretation of the publications' content occurred, the issue was discussed until consensus was achieved.

4. FINDINGS

Notwithstanding the variety of different lecture formats that international students have nowadays at their disposal, the results of the systematic review revealed that the studies examined by researchers were carried out exclusively in face-to-face university bilingual/multilingual teaching-learning contexts. Only ten of them referred to CLIL programmes and none of them used the term ICLHE. Because we cannot verify whether those "CLIL" studies followed a CLIL approach or they were indeed instances of EMI, for practical reasons and with the risk of being mistaken in some cases, in the following sections we continue to refer to the programmes as EMI.

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4.1. Topics of previous studies on EMI

A total of 111 research questions/objectives have focused attention on instructors' and/or students' perceptions, attitudes, or beliefs. Instructors and students were asked about a wide range of aspects that affect their academic lives in the context of EMI lectures. The complete list of the 61 publications analysed in the systematic review, along with the description of their research questions/objectives, main

topics, and participants involved is presented in the Appendix.⁴ We have classified the topics of research as follows:

- a) CLIL/EMI/ESP: instructors' awareness of the modality they follow (i.e. CLIL or EMI); the focus of EMI and ESP, and the influence of ESP in learning through EMI.
- b) Instructors' methodological training in both pre- and post-service programmes: attention paid to perceptions of the development of different skills, level of effectiveness and outcomes of training, challenges, influence on teachers' performance afterwards, and willingness to be trained.
- c) General views on: EMI implementation; attitudes towards and perceptions of EMI experience, as well as of EMI policy regarding challenges, effectiveness, support, and outcomes.
- d) Language-related issues that refer to instructors and/or students: use of and tolerance of/attitude towards the use of the local language/L1; preferences for the language/s of instruction; the roles/conceptualization of English and local language/s; influence of L1 in attitudes towards learning English; English proficiency and improvement; lexical proficiency and language skills; language practices and interaction; ideologies about English and EMI; L2 motivational self system; strategies used to learn English; students' anxiety/confidence and difficulties when speaking English; influence of previous English learning opportunities; language management; linguistically responsive instruction (LRI) techniques; students' preferences for native English-speaking teachers or non-native English-speaking teachers.
- e) Content and language: formal assessment; disciplinary knowledge and vocabulary use; learning and relationship between content and language; linguistic and academic skills.
- f) Comprehension of lectures: influences of EMI; comprehension problems; listening comprehension strategies; relation with students' English proficiency.
- g) Other issues related to students: motivation; development of international and intercultural competences, mobility, employability, and professional career; learning challenges, difficulties, benefits and satisfaction; transition to EMI contexts.
- h) Other issues related to instructors: academic duties, construction of professional identities, learning, job satisfaction, challenges and difficulties.

Interestingly, the most frequent topics of research were those related to language (36.7%) in studies that openly claimed to involve EMI contexts. Moreover, only

⁴ The Appendix provides information for accessing this complete list which is provided in the form of online supplementary material. Throughout the list, we have maintained the term CLIL when used by the authors.

two of the four research questions that were concerned with content and language seem to have been addressed in “CLIL” programmes. General views on EMI and EMI policy also captured some researchers’ attention (28.4%), followed by other issues related to students (12.8%) and to instructors (6.4%). Less attention was dedicated to perceptions and attitudes towards instructors’ training (5.5%) and lecture comprehension (3.7%). This last issue, however, is central to guarantee the effectiveness of bilingual/multilingual learning in higher education.

4.2. Lecture comprehension in EMI

Regarding the second research question, namely, “What does literature reveal about students’ perception of lecture comprehension in EMI?”, the analysis of the dataset of publications showed that to date a relatively small number of studies have measured how learners perceive their level of comprehension during EMI lectures. These studies have implemented different designs via questionnaires, structured interviews, or students’ journals, and have explored a variety of sample sizes within diverse learning contexts. Table 2 summarises the most remarkable aspects of each study and its findings.

| STUDY | COUNTRY | UNIVERSITIES/STUDIES /FACULTIES | STUDENTS | LECTURE COMPREHENSION |
|----------------------------|-------------------------|---|--|--|
| Hellekjær (2010) | Norway | 3 universities Several faculties | 346 undergraduates and 45 graduates | A large number had comprehension problems |
| Joe & Lee (2013) | South Korea | 1 university Medicine | 61 undergraduates | 23% had comprehension problems, 50% were neutral |
| Belhiah & Elhami (2015) | United Arab Emirates | 6 universities Several faculties | 500 undergraduates | 17% had comprehension problems |
| Macaro & Akincioglu (2018) | Turkey | 18 universities Several faculties | 472 undergraduates | Students responded 3.71 (overall mean in a Likert scale from 1 [low] to 5 [high]) to having comprehension problems |
| Soruç & Griffiths (2018) | Turkey | 1 university International Relationship and Psychology | 39 undergraduates | Most of them had comprehension problems |
| Wang, Yu, & Shao (2018) | China | 1 university Not described | Undergraduates | Most of them had comprehension problems |

Table 2. Previous studies on students’ comprehension of EMI lectures

With the exception of Belhiah and Elhami's (2015) research set in the UAE, the majority of students admitted to having comprehension problems in EMI lectures or expressed a neutral opinion. It should be noted that, due to the peculiar demographics of the UAE with its majority population of foreigners and consequent widespread use of English as a lingua franca in everyday life, these students also have constant exposure to and practice with English outside the classroom (Crawford Camiciottoli, 2013). This experience likely contributed to the high confidence levels expressed by the students in this study, who attributed this positive perception in relation to comprehension to a number of factors, including their high proficiency in English, ample opportunity to practice English across all subjects, and seeing teachers as providers of simplified and accessible language. It is interesting to note that students were aware of and valued instructors' discourse adaptation. Thøgersen and Airey (2011) also found that instructors engaged in adaptation as regards speech rate and rhetorical style. Yet, Bartik, Maerten, Tudor, and Valcke (2010) noted that students did not express negative perceptions in relation to whether the instructor was a native speaker or not; however, they indicated that the teacher's rate of speech was a crucial factor, "students generally struggled when the teacher spoke too fast" (Bartik et al., 2010: 14). Though further research is needed, it seems that adaptation of teachers' discourse for international audiences helps to improve comprehension. It is not possible to know if the adaptations that these students referred to were spontaneous or planned by the instructors, but we align with Dafouz Milne and Sánchez García (2013: 145) in their claiming that

awareness of teacher discourse is essential since the large majority of teachers working in EMI contexts [...] are not language experts, and thus need to be trained to be attentive to their own discourse in the classroom and to realise that language can be used as a supporting strategy for student learning.

Students further expressed two main causes for their lack of comprehension of EMI lectures: language proficiency and specific vocabulary. Regarding the former, students acknowledged their own low level of English (Soruç & Griffiths, 2018; Wang, Yu, & Shao, 2018), but also found problematic the low level of English of some of the teachers (Soruç & Griffiths, 2018). Much in line with this, Dearden (2014: 2) stated "there is a shortage of linguistically qualified teachers" in EMI contexts. This is a worrying issue because one of the most dominant reasons for introducing EMI programmes – apart from attracting international students and raising university rankings – is to equip domestic students with the necessary skills, including linguistic ones, for the international market (Wilkinson, 2013). Therefore, EMI is considered a means to learn English where instructors play a central role as the primary source of oral input and pave the way for learning contents in English. Klaassen's (2001) findings suggested that student-centred lecturing in EMI was a much more influential factor in successful learning results than the lecturer's language competence. In contrast, Dimova and Kling's (2018)

recent study, based on an oral English certification test for university EMI lecturers, was not conclusive regarding whether a good pedagogy compensates for the lack of language skills. However, lecturers participating in Ball and Lindsay's (2013) research on language demands in EMI stated that their main concerns were related to pronunciation; however, interestingly, instructors also stated that in order to be an effective practitioner in EMI programmes, what really matters is methodological awareness.

Additionally, it has been observed that EMI instructors who are non-native speakers of English try to create a more "democratic atmosphere" (Dafouz, Núñez, & Sancho, 2007), where the traditionally hierarchical roles found in tertiary educational contexts are blurred "as teachers often (need to) negotiate foreign language terms and expressions with students and use these as language informants" (Dafouz Milne & Sánchez García, 2013: 145). This observation relates to the second cause of lack of comprehension perceived by students in our dataset, namely, specific vocabulary (Hellekjær, 2010; Soruç & Griffiths, 2018). EMI students involved in ESP courses perceive improvements in subject-specific vocabulary and listening comprehension, as well as in pronunciation (Dafouz & Núñez, 2009). ESP courses can serve to develop the academic literacies that EMI settings demand, although their design should "challenge stereotypical views by focusing on specialized discipline content and meeting specific needs" (Arnó-Macià & Mancho-Barés, 2015: 72). In this respect, Yang (2016: 60) highlighted the implementation of ESP courses in Taiwan that "are delivered using a CLIL-oriented approach". On this point, collaboration between content and ESP lecturers has been claimed by scholars to successfully develop EMI programmes (Lasagabaster, 2018), addressing the language needs of both students and lecturers. However, Dimova and Kling's (2018) findings, also based on perceptions, suggested that instructors' problems lie in the general vocabulary needed to explain new and/or complex disciplinary content rather than in the domain-specific vocabulary associated with different varieties of ESP. As these authors stated, these findings "challenge the traditional assumptions that EMI lecturer language support must be grounded in ESP" (Dimova & Kling, 2018: 634).

Finally, Soruç, Dinler, and Griffiths (2018) studied listening comprehension strategies used by EMI students. Strategies related to three topics: preparation before and after the class, note taking, and focusing on the lecturer while listening. Though not mentioned in the last category, there is evidence that semiotic resources, such as gestures and facial cues, influence L2 learners' listening comprehension (Sueyoshi & Hardison, 2005); however, research is needed to confirm these findings in EMI at university. Finally, Soruç et al. (2018) found that audio recording the lecturer was another common strategy among learners. This confirms our assumption that asynchronous lectures in virtual learning contexts can support listening comprehension, as students can watch the lecture (partially or totally) as many times as needed.

5. DISCUSSION AND CONCLUSIONS

The present paper provides insights into two distinctive characteristics of university level instruction that serve to promote internationalization: technology-driven lectures and EMI. Moreover, the increasing presence of virtual lecture formats suggests that university academic offerings will increasingly implement such combinations of tradition and innovation.

We began with a discussion of the role of the university lecture (in both traditional and technology-driven formats). Both physical and virtual teaching contexts have been characterised, revealing the particular strengths of the latter as regards learning setting, type of delivery, modes of interaction, and types and channels of communication. Online teaching formats have a multiplier effect in terms of access, since international students can virtually attend SVLs from all over the world, also taking advantage of the bilingual policy of many universities that adopt EMI and use English as the international language of instruction. Furthermore, AVLs could facilitate lecture comprehension of non-native English-speaking students, since they can watch lectures at their own pace to suit their needs.

The second part of the paper presented a systematic review focused on EMI from the perspective of instructors and students in order to shed some light on the topics of study of previous literature, as well as the examination of comprehension in EMI. The analysis of the topics of research indicated that those related to language were the most frequent (36.7%), with the main issues being the use of L1, preferences for L1/English as language of instruction, roles of L1/English, language proficiency level and improvement, or anxiety and difficulties when speaking in English. Contrary to EMI instructors' reluctance to consider language as part of their duties, it seems that researchers are instead concerned about language and are in line with more recent perspectives that advocate for the need to "integrate" content and language learning in higher education. Indeed, research on lecture comprehension has revealed large numbers of students expressing problems in understanding EMI lectures, and has identified low language proficiency of students and teachers and domain-specific vocabulary as the primary causes that hinder comprehension. Hence, when EMI is implemented at university, we cannot assume students' language proficiency is adequate to follow the instructional sessions. Some students may need EMI lecturers to adapt their discourse and use different strategies to make content comprehensible, including non-verbal semiotic resources such as different types of gestures. These issues should be central in EMI training courses. Instructors have to be aware of the relevance of ensuring comprehension to facilitate learning and engagement, and to check comprehension during the sessions (for example, using clickers in large classes), which is even more important in SVLs when eye contact is not possible. Lastly, we recommend that ESP courses coordinate with EMI courses and focus on specific needs of discipline content.

The supplementary material compiled for this review (see the Appendix) can make an outstanding contribution to the research community on EMI. It provides detailed information about the publications and research questions/objectives and topics (according to the data-driven taxonomy proposed in Section 4.1), which informs scholars interested in how teachers and learners see different issues related to the implementation of EMI. This systematic review may also establish a basis for a meta-analysis of the empirical literature from the perspective of the main stakeholders in EMI at university. Moreover, it revealed a lack of research of EMI in the context of virtual teaching environments as an increasingly important learning format in higher education. Thus, another key area for further research would be EMI lecture comprehension in online contexts.

To conclude, our results should be interpreted with caution because we have limited the systematic review to some specific databases and to studies on perceptions, attitudes, or beliefs. It should also be pointed out that perceptions can be subjective and may not accurately reflect actual practice. Thus, it would be worthwhile to conduct research that actually measures the level of students' lecture comprehension. This could shed more light on the overall discouraging panorama that we have found where, generally speaking, students have either expressed having problems understanding EMI lectures or have manifested a neutral stance.

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Appendix

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.17632/gnp4wz2xxr.1>