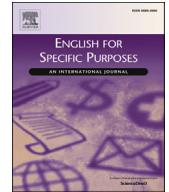


Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

English for Specific Purposes

journal homepage: <http://ees.elsevier.com/esp/default.asp>

Content adaptations in English-medium instruction: Comparing L1 and English-medium lectures

Beatrice Zuaro

The Open University, School of Languages & Applied Linguistics, Walton Hall, Milton Keynes, MK7 6AA, UK



ARTICLE INFO

Article history:
Available online 22 February 2023

Keywords:
English-medium instruction
English
Italy
Lecture observation
Academic discourse
Higher education

ABSTRACT

While lecturers' teaching practices continue to be a focal point of English-medium Instruction (EMI) research, contrastive studies between EMI and L1 lectures remain extremely scarce. The present study addresses this research gap by analyzing five sets of matching L1 and English-medium lectures given in different disciplines at three Italian universities. Each set of lectures is given by the same lecturer, about the same topic. Thus, the study, closely examines the lectures' content in order to investigate which changes, if any, accompany the linguistic shift from L1 to English-medium teaching. The investigation focuses mainly on quantity and organization of content; nonetheless, other variables (such as speech rate, questions, language alternation), which can play a relevant role towards the organization of the lecture, are also considered. The analysis reveals a high correspondence of the core topics addressed in the lectures; however, significant differences in the way such knowledge is conveyed are also observed. Such differences are grouped into three categories: differences in content quantity, differences in content selection and differences in rhetorical devices used.

© 2023 The Author. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

1. Introduction

The momentum enjoyed in recent years by English-medium Instruction (EMI) in global Higher Education (HE) has brought to the fore the need for a detailed understanding of the phenomenon. In particular, previous research has pointed out the need to diversify EMI depending on the context (e.g., Airey et al., 2017; Costa, 2017; Helm, 2020) and the collaborative role played by language proficiency and communicative ability towards a successful EMI pedagogy (e.g., Björkman, 2010; Denver et al., 2016; Rose et al., 2019). The classroom, hence, represents a coveted site of investigation, presenting itself as the setting where the interplay of context, discourse and practice becomes especially evident. The lecture, in particular, continues to be one of the main ways of delivering education at the university level (e.g., Björkman, 2010; Siegel, 2020), fulfilling important pedagogical functions, such as transmission of lecturers' evaluation of the content (Lee, 2009) and mediated introduction to specialized terminology. This makes lectures an important object of study, and especially so in the EMI class, which features the specific complexity of learning through an L2 (Milne and García, 2019). Thus, the literature has often called for close analyses of L2-medium lectures (e.g., Milne and García, 2019; Dalton-Puffer, 2011; Hu & Li, 2017) aimed at complementing with direct observation the already available perception-based findings.

Previous empirical research on EMI lectures has tended to focus on communication strategies (e.g., Björkman, 2010; Costa, 2012; Costa & Mariotti, 2021), often devoting particular attention to metadiscourse (e.g., Brogгинi & Murphy, 2017; Doiz &

E-mail address: beatrice.zuaro@open.ac.uk.

<https://doi.org/10.1016/j.esp.2023.01.005>

0889-4906/© 2023 The Author. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

Lasagabaster, 2022; Ibrahim & Ahmad, 2020; Molino, 2018) and questions (e.g., Chang, 2012; Milne and García, 2019; Genc & Yuksel, 2021; Hu & Li, 2017; Johnson & Picciuolo, 2020). However, contrastive studies comparing L1 and EMI lectures are still extremely scarce (Arévalo, 2017; Arkin & Osam, 2015; Costa & Mariotti, 2017; Dafouz Milne & Núñez Perucha, 2010; Sánchez-García, 2018, 2020; Thøgersen and Airey, 2011; see also the seminal works of Crawford Camiciottoli, 2005; Vinke, 1995) and can vary in terms of analytical angle and criteria for data selection. Furthermore, the predominant focus on communicative practices has resulted in the role played by content being somewhat overlooked. Nevertheless, the relationship between language and content has been argued to possess an inextricable quality (see Airey, 2016; Hüttner, 2019), making it potentially difficult to investigate one without factoring in the other. In this paper, I address this aforementioned research gap, introducing an additional element of rigor to the contrastive analysis of L1 and EMI lectures, namely a close examination of the content.

The main aim of the present study is, therefore, to identify and analyze differences and similarities that accompany the shift from the L1 to EMI lecture, in the delivery of the same content, by the same lecturer. The main investigative focus is placed here on the quantity and organization of content; however, in line with the literature (see e.g., Crawford Camiciottoli, 2005), various potentially relevant variables are examined, including speech rate, language alternation and questions. The present study employs data collected in Italy, a context where, at the time of writing, only one other contrastive study has been conducted (Costa & Mariotti, 2017). Until very recently, Italy has been characterized by a dearth of EMI research, nonetheless some complex discussions around the phenomenon have been taking place in this context (e.g., Bowles, 2017; Costa, 2017; Pulcini & Campagna, 2015; Santulli, 2015; see also Murphy & Zuaro, 2021). The present paper builds on previous research to shed further light on the crucial, but overall still under-researched, topic of EMI lectures.

2. Review of literature

EMI is generally understood to feature English as a Lingua Franca (ELF) interactions, in which participants resort to a non-native language, namely English, as a shared communication tool. ELF literature has identified a propensity for self-regulatory behaviors in this type of communication (e.g., Mauranen, 2003, 2006), aimed at increasing the chances of positive communication outcomes. However, this does not always translate in the adoption of strategic communicative choices in EMI. In a study on Swedish HE, Björkman (2010) showed that lecturers made modest use of pragmatic strategies, a finding echoed across different contexts: lecture observations in Malaysia (Ibrahim & Ahmad, 2020) and Italy (Broggini & Murphy, 2017), for example, found a tendency among lecturers to rely on a narrow variety of metadiscursive strategies, possibly caused by the demands of teaching in an L2. In addition, previous research on EMI lectures also identified lower speech rate (Airey, 2010) and decreased interaction (Airey & Linder, 2006); similarly, Hu and Li (2017) reported that even when interaction does occur in the EMI class, it is characterized by cognitively lower-order questions and responses. This body of research clearly indicates a need to include specific provisions in EMI, to counter-balance the challenges of the L2 medium of instruction.

Depending on the context, EMI implementation may not entail an actual transposition of a L1 course into ELF. Nonetheless, comparative research investigating the contexts where that is the case can provide valuable insight into the potential additional operations carried out by lecturers when teaching in a L2 and in international courses. Thus, one way to understand which adaptations may be necessary in the EMI class is to look at the behavioral differences that arise naturally in comparison to the L1 class. To that end, a number of studies have been conducted for comparative purposes. Arkin and Osam (2015) asked a lecturer to include some Turkish-medium lectures into his EMI course, finding that, in the face of his considerable communicative effort, the EMI lectures took longer on average, causing the lecturer to cut on the content delivered, on examples, and questions. Costa and Mariotti (2017) analyzed one EMI and one Italian-medium lecture given by the same lecturer: in this case, the lecturer reported no significant differences in the content covered. However, the language shift seemed to cause a change in rhetorical style, the speech in the EMI lecture appearing slower, more redundant, as well as employing more signposting. In a study also based on naturally occurring data, Dafouz Milne and Núñez Perucha (2010) reported contrasting findings, identifying more explicitness in transition signaling in the Spanish-medium lectures, as well as more metadiscursive variety and specificity. Similarly, contrastive research on question use seems to suggest that the language switch affects the use of questions: frequency, type and purpose of questions all varied in various constellations in the shift between EMI and L1 classes (Arévalo, 2017; Sánchez-García, 2018, 2020), pointing at a significant role played by the context. Certainly, another potential influencing factor behind certain discursive choices could lie in the nature of the content; however, this aspect has received only modest attention in the literature. An analysis based on closely matching content was offered in Thøgersen and Airey (2011), revealing that the EMI delivery took significantly more time and featured more repetitions; nevertheless, in this case, only a number of segments from lectures delivered by a single lecturer were analyzed.

Other than the role played by content in shaping discursive choices, another aspect that could benefit from further investigation in EMI research is the influence of the social context in the learning process. While there have been remarks in the literature about the relevance of local cultural elements in EMI (e.g., Bowles, 2017; Degano & Zuaro, 2019; Hu & Li, 2017; Huang, 2011; Zuaro, 2022), how exactly these affect lecturers' teaching remains to be investigated. The notion that different cultures can exhibit specific learning styles, which can be influenced by changes in the surrounding environments, is well-established (Hyland, 1994). Similarly, students and faculty are only partially responsible for the characterization of the context of learning, as this is also influenced by the broader institutional and social setting (Tiberius & Billson, 1991). Education research has variously analyzed the influence of the social context on learning at different levels of education: pre-existing boundaries and national culture (e.g., Cho & Lee, 2008), identity and community perceptions (e.g., Bliuc et al.,

2011), and instructional behavior (e.g., [Perlman, 2013](#)) have all shown to be determining factors. Such research, however, has so far not been extended to the EMI class, which by its own nature is likely to feature specific complexities in this regard. The present analysis addresses this research gap by devoting attention to the role played by the social context in EMI teaching, to identify potential adaptations made by lecturers.

It might also be worth mentioning some of the specificities of the Italian lecturing style, which may pose challenges and/or undergo adaptation in the different context of the EMI class. Italian pedagogical approaches generally rely on transmission model practices and are characterized by a formal student/lecturer relationship (e.g., [Fedeli, 2018](#)). Teaching is predominantly content-centric, often resulting in densely concentrated lectures and complex delivery (e.g., [Fedeli & Taylor, 2016](#)). Lecturers thus have great control over what is discussed in the classroom and how, which has been argued to relegate students' personal experiences to the background ([Fedeli & Taylor, 2016](#)). It should also be noted that Italian HE can in some respects represent a fairly homogenous environment, with only 5% of the student population holding a foreign citizenship in 2019 according to the Ministry of Education registry. In this kind of context, a shift towards a potentially more international HE such as EMI might require significant adaptations. The importance of an "international competence" among lecturers has been stressed before in the literature, pointing to the fact that in international learning environments, next to the role of content specialists, lecturers must also act as cultural mediators (e.g., [Cozart & Gregersen-Hermans, 2021](#)). In the next sections of this article, I explore which changes, if any, occur in lecturers' content delivery in their L1 and EMI classes.

3. Material and methods

The present paper is informed by Vygotskijian views of sociocultural learning ([1987](#)), according to which it is via social experiences that humans learn to engage their intellectual capability to understand and create knowledge. As the "prototypical mediating device" and "primary tool for organizing cognition" ([Holland & Valsiner, 1988](#), p. 251) language plays a central role in this process.

Indeed, language is the device through which learners internalize the mentor's cognitive tools and symbols, in doing so learning specific associations made in the given socio-cultural context ([Vygotskii, 1986, 1987](#)).

Sociocultural cognitive theory has relevant implications for EMI. From this perspective, EMI is a type of education that features two critical specificities: the dissemination of knowledge through a different language than the local one; the communication with an audience of usually not exclusively domestic students. Considering the intimate connection between language and socio-cultural context mentioned above, switching the medium of instruction in a context of learning cannot simply be assumed to be inconsequential. Overall, the social context in which EMI learning occurs is different from the one in which L1 learning occurs. While an argument could be made that every single classroom will be different from the next (every single interactive situation, even), there are nonetheless core differences between teaching an almost entirely domestic audience through one's L1 and teaching a culturally diverse audience through an L2. Among these differences are, for example, the academic and cultural backgrounds of the participants, their level of comfort with the medium of instruction, their expectations as to the role of lecturers and students. Therefore, it is reasonable to assume that the knowledge generated in such different contexts (even in the event of a similarity of the notions being discussed) will also be, to some extent, different. In the present article, such difference is investigated in the form of potential variations in lecturers' discourse in five sets of lectures at three Italian universities.

3.1. Sampling and participants

Each set of this dataset comprises two versions of the same lecture taught by the same lecturer: one L1 (Italian, for all of the participants) and one EMI. All lectures were taught at MA programs and cover different disciplinary areas, in line with the well-documented need for EMI research to broaden its scope beyond STEM disciplines (see [Zuaro, 2022](#)). Participants included four women and one man, all in tenured positions, with multiple years of teaching experience. [Table 1](#) provides further information about the participants.

In selecting the participants, I adopted purposeful ([Creswell & Plano-Clark, 2011](#)) and variation sampling ([Dörnyei, 2007](#)), aiming for individuals involved in L1 and EMI teaching, although with different areas of expertise. It should be noted that none of the participants received specific training from their institution for lecturing in English and/or to an international audience.

Table 1
Participants' information.

Set reference	Discipline	Years of Teaching	Years of EMI Teaching	Languages
#1	Applied Statistics	10	8	IT, ENG
#2	Gastroenterology	10	8	IT, ENG
#3	International Economics	25	3	IT, FR, DE, PT
#4	History of Architecture	11+	3	IT, ENG, DE, FR
#5	Art History	7	1	IT, ENG, FR

3.2. Instruments and data collection

After having obtained the appropriate authorization by the Faculty/Department and informed consent by the lecturers, all lectures were video and audio recorded, maintaining a fixed focus on the lecturers, as to protect the students' identity. To reap the benefits of a more ethnographic approach to the richness of the data (see Chaudron, 2000; Watson-Gegeo, 1997), in addition to filming the lectures I joined them and made notes on the environment and my preliminary observations, to return to this material during the analysis stage (as recommended also in Graneheim et al., 2017). In the lecture hall, I attempted to minimize the intrusion by using small recording devices, as well as blending in with the students. In that regard, it should be noted that attendance varied greatly among different sets of lectures, ranging approximately from a dozen to over a hundred students.¹

I selected the relevant lectures on the basis of the lecturers' indication, by virtue of their role as content specialists. Recorded material was subsequently transcribed and manually analyzed via a qualitative content analysis (Altheide, 1996; Kohlbacher, 2006), which supports a quantification of certain aspects of the data, while still maintaining a qualitative focus (Vaismoradi & Snelgrove, 2019).

3.3. Data analysis

The analysis proceeded in a two-step fashion, firstly identifying macro-units of meaning in each lecture and later comparing the units among the two lectures in each set. Thus, after a preliminary assessment of matching units involving some quantification of specific features (such as length, delivery rate, instances of questions), the comparison moved inside the matching units, for an even closer, "narrow and thick" (Broggini & Murphy, 2017, p. 330), analysis of observed phenomena. Macro-units identified in the first step are informed by the notion of information unit (IU), firstly formulated by Halliday (1961), and introduced in EMI research by Siegel et al. (2020). Anderson defines the IU as "the smallest unit of knowledge that can stand as a separate assertion" (2014, p. 104). In the present paper, such small IUs are grouped together to identify macro-units, understood as conveying knowledge about the same topic. In this way, the identification of macro-units does not rely on previously identified patterns, such as Young's (1994) macro-phases, characterized by their communicative function and envisioned as interspersed in the discourse. Rather, it is data-driven, relying on the way meaning is naturally grouped in coherent macro-units by lecturers. The shift from one macro-unit to the next is marked by typical shift markers and the introduction of a new keyword, generally within the structure of a topic-sentence (e.g., #3emi "There's a very simple way to have a sense, to have a measure, of technological progress. And this procedure is linked to the name of Robert Solow. And, effectively, this procedure is called the Solow residual."; #3ita "Un modo per quantificare nei dati il progresso tecnologico è quello che si chiama *il residuo di Solow*, dal nome appunto di Solow" [*One way to quantify technological progress in data is what we call the Solow residual, indeed named after Solow*]²). The accuracy of the categorization was ensured via a follow-up with the lecturers, who evaluated it based on their technical expertise of the subject matter. To further ground the analysis, the lecturers were also asked about some of their discursive choices in the sample lectures; in order to minimize recall interference, this procedure did not include video stimulated recall, but only access to transcripts (cf. Martinez et al., 2021). All lecture recordings, totaling 15 and a half hours, were transcribed. For the purposes of initial quantifications, only the lecturing time starting from the first matching macro-unit to the last was considered, to increase the reliability of the comparison, hence based on actual matching content. Having thus laid the grounding principles of the methodology adopted in the study on hand, I turn to describing its application in detail in the next section.

3.3.1. Procedure

The procedure of dividing each lecture into macro-units was carried out consistently among the various sets following the criteria described in 3.3. Having located all macro-units in common among the Italian and EMI lecture, a high degree of consistency became apparent in the content progression of the lectures for all sets but one. The lectures in set #1 (Applied Statistics) touched upon some similar topics, however from very different methodological perspectives, in one case focusing on manual analysis, and in the other, on software-supported procedures. This difference made it effectively impossible to find a match in the respective macro-units in the two lectures. Thus, for this segment of the data, it must be concluded that the nature of the content delivered was tailored to the specific audience and aims of each degree program to the point of no longer being comparable. As a result of this finding, I excluded set #1 from further investigation.

For the remaining four sets, I conducted preliminary quantifications on the matching units, measuring the total length, as well as the average speech rate of the lecturer and the number of questions by the students. These data hold no statistical relevance and are presented in this paper purely as contextual clues to the lecturers' delivery. The speech rate was obtained via manual calculation of words uttered per minute (wpm): the final rate averaged the wpm values registered at two different points, approximately after the first 20 min and at the last 20 min mark of the delivery. Regarding the question count, a question has previously been defined as "a speech act that is either an inquiry [...], an interrogative expression, that is, an

¹ All fieldwork for the present study took place before the outbreak of the SARS-CoV-2 pandemic, with no infringement of the safety protocols subsequently introduced.

² My translation. Henceforth, I will continue to introduce all of my translations for Italian excerpts in italics, between square brackets. This is with the exception of translations for excerpts (5) and (6) which, due to their length, are provided in the Appendix.

utterance that would be followed by a question mark in print, or both” (Graesser & Person, 1994, p. 109). Nonetheless, for the purposes of the present analysis, I clustered utterances that were repeated bringing no additional complexity to the communication, into one question (e.g., the same question being repeated because it had gone unheard or misheard). The macro-units also featured various cases of linguistic alternation, of which I quantified every instance. Regarding alternation, vis-à-vis other terminology such as codeswitching or translanguaging, I subscribe to the position of relative neutrality of the term posited by Costa (2021). Alternation is here intended to cover a range of behaviors interpretable as leaning in either conceptual direction, but nonetheless relevant in general for the purposes of the present paper.

As the second step to my analysis, I achieved the microscopic matching of different sections of the macro-units via multiple rounds of close reading and manual coding (an example from the coded data is shown in Figure 1).

The coding procedure allowed to track variations in the information delivered. I present the results of this analysis in the next section.

4. Results

The analytical procedures described in the methodology allowed for the identification of five to eight matching macro-units per set. The difference in number should not be regarded as indicative, as macro-units are not standardized units of measure and vary in length according to the speaker’s communicative choices. The lecturers’ content organization generally proceeded in a linear fashion, one macro-unit giving way to the next in the same order in both versions of the lectures. In the coming sections I will present the results of the qualitative analysis and introduce the quantifications of potentially relevant variables.

4.1. Qualitative analysis

As noted, the matching macro-units showed a high degree of correspondence of the topics addressed by the lecturers; this reinforced the aforementioned sense of linearity and was possibly a result of the lecturers’ own planning for the lectures. Nevertheless, the microscopic analysis revealed some differences as to how knowledge around such topics was selected and conveyed. Such differences can be grouped into three categories: differences in content quantity, differences in content selection, and differences in rhetorical devices used.

Table with 2 columns: Scuderie (Italian) and Stables (EMI). The table contains two columns of text with matching content highlighted in yellow, green, and blue. The Italian text discusses the Scuderie building and its architectural details, while the English text discusses the Stables building and its historical context.

Figure 1. Excerpt from a macro-unit contained in set #5, showing the Italian (left) and EMI (right) version compared. Matching colors indicate matching content. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

4.1.1. Differences in content quantity

The lecturers in this dataset adopted an off-the-cuff lecturing style, allowing them some flexibility in their discourse organization. As a result, the space devoted to explaining specific concepts varied, presumably according to the lecturer's reading of the room and assessment of the students' needs. In some cases, this translated into a greater information load in the EMI class, vis-à-vis more succinct, or completely omitted, explanations to the Italian class. Example (1) shows one such case, where the mathematical conversion between the international standard and the Italian standard of one unit of measure is explained in detail in the EMI lecture, while being completely absent in the Italian version.

(1) #2emi

The HOMA index is given by the ratio between glycemia per insulin, on this coefficient, 22.5, when glycemia is expressed in millimole/litre, so it's expressed according to the international standard. Anyway, for example, in Italy, glycemia usually is expressed in milligram/litre so we have to convert milligram/litre on millimole/litre. So we have to divide the glycemia value expressed in millimole/litre for 18. So if we multiply 18 for 22.5, we obtain 405. So 18 is the number for the conversion from millimole/litre to milligram/litre. So if we had the glycemia expressed in milligram/litre, we have to divide for 405. So is glycemia per insulin on 405.

Something similar can occur with brief, contextualizing, remarks which added pieces of information omitted in the Italian version.

(2) #4

Questa è una soluzione che ha una fonte antica, extra romana diciamo: viene dall'anfiteatro di Pola, dove troviamo proprio in antico, il doppio piedistallo

[This is an ancient and let's say not straightforwardly roman solution: it comes from the Pola amphitheater, where we'd find, in ancient times, a double pedestal]

There are some specific roman... architectures that present the double pedestal: for example, one is in the... can still be seen in Pola, in Croatia, what is now Croatia, it is the anfiteatro, amphitheater of Pola, where there was double pedestals. It's something sort of a weird... that's not, as far as I know, visible in Rome.

While in the Italian version students are provided with cues to locate the source of the architectural solution discussed (it is ancient, “antica”, and not straightforwardly roman, “extra romana diciamo”), in the EMI version the foreignness of the building is made explicit via the addition of its actual geographical location (“can still be seen in Pola, in Croatia, what is now Croatia”).

In the same macro-unit, another example (3) can be found of the lecturer devoting more time, in the EMI lecture, to a concept mentioned only in passing in the Italian version.

(3) #4

Un livello inferiore scandito da paraste binate, con, su alti basamenti, reggenti un ordine dorico che riprende, che regge appunto una, una trabeazione con il fregio liscio come avviene per esempio nel Colosseo, dove il dorico, il fregio del dorico non è scandito dai triglifi, ma è un fregio liscio.

[A lower level punctuated by paired pilasters, with, on high pedestals, which hold a Doric order continuing, actually supporting a trabeation with the smooth frieze just as is the case, for example, in the Colosseum, where the Doric, the Doric frieze is not punctuated by triglyphs, but it is a smooth frieze.]

And what is interesting is to consider the classical language applied to this façade you see the façade is entirely articulated by vertical elements, doubled, so vertical. Flat columns, what we call the lesene eh? Pilasters, with a sort of Doric order on the ground floor - Vitruvius in his treaty, De Architectura, says that the Doric order is the simplest and so could be used for... to represent simple functions.

While the notion of a simple style is present in the Italian version (“il fregio del dorico non è scandito dai triglifi, ma è un fregio liscio”), in the EMI version additional information to its use and a historical source are also mentioned (“Vitruvius in his treaty, De Architectura, says that the dorico order is the simplest and so could be used for... to represent simple functions”). It is also noteworthy that in the Italian version, part of the information is communicated through a simple reference to architectural elements indicated in the technical terminology (“Un livello inferiore scandito da paraste binate”), while the nature of the architectural elements is unpacked more by the lecturer in the EMI version (“you see the façade is entirely articulated by vertical elements, doubled, so vertical. Flat columns, what we call the lesene eh? Pilasters, with a sort of dorico order on the ground floor”). These instances may seem subtle; however, their frequent occurrence throughout the dataset appears significant.

There are some instances of additional information in the Italian version respect to the EMI one in the data; in those cases, further space is generally devoted to technical details or complementary data. This is the case in set #5 with the notion of *lumeggiature* and how they can be obtained.

(4) #5

Però lumeggiature possono essere eseguite anche in materiali molto più nobili del carbonato basico di piombo, no? Che veniva ottenuto tramite diciamo la corrosione da parte di varie soluzioni acide come anche l'aceto del piombo e ottenendo un materiale poi mescolato ad acqua, insomma liquido, per quindi

lumeggiare utilizzando il pennello. Sono tecniche più rare in oro e argento prese in prestito dalla tecnica della miniatura, solitamente usate anche per il loro valore economico, questi materiali, per fogli più finiti o fogli di presentazione con un alto, con un alto valore decorativo, come questi due che qui vedete.

[However highlights can also be achieved with much nobler materials than basic lead carbonate, right? This was obtained, let's say, through corrosion caused by many acid solutions, such as lead acetate, and obtaining a material which was mixed with water, basically a fluid, in order to then highlight with a brush. Gold and silver represent rarer techniques, borrowed from the technique of illumination, usually adopted also for their economic value, these materials, for more complete sheets or presentation sheets with a high, with a high decorative value, such as these two that you can see here.]

In the example above, the Italian explanation elaborates on the chemistry behind the composition and use of basic lead carbonate (“carbonato basico di piombo”); this information is omitted in the EMI lecture, where the salt is only mentioned in passing, referred to as “white lead, biacca”, before moving to the discussion of precious metals.

4.1.2. Differences in content selection

In addition to variations in the quantity of content, EMI and Italian lectures can also differ in terms of the type of content lecturers choose to include. This is especially clear in the examples provided by the lecturers to the students, which can differ, despite fulfilling a similar function.

(5) #5

Lo abbiamo visto già in età, già nel Trecento, in età tardo gotica, 300 o 400, con Giovannino de Grassi, i suoi studi di animali e di dame cortesi, ma va avanti anche con Dürer, no?, come abbiamo visto nei fogli rivisti oggi e esaminati l'altra volta. A volte nei colori stesi a pennello non c'è una vera e propria ragione funzionale, cioè di desiderio di prefigurare e visualizzare l'opera finita ai colori dell'opera finita, c'è una semplice scelta estetica affine al gusto proprio dell'artista che la produce nella scelta dei colori. Come in questo caso o come abbiamo visto per esempio con Giovanni De Vecchi altro artista attivo nel tardo Cinquecento, primo 6, volte vanno utilizzati anche acquerelli violetti verdi gialli su una traccia magari come in questo caso a matita nera poi in qualche caso rinforzati con la biacca anche se solitamente il d'inchiostro più utilizzato il tono di colore più utilizzato è quello marrone. Sia che si tratti di un inchiostro ferro gallico di cui abbiamo già parlato sia che si tratti di un bistro o altri tipi di inchiostro. Qui vedete un disegno di questo Pietro Sordi, che forse non avete mai sentito nominare, ma che è un artista toscano senese attivo nel tardo Cinquecento primo Seicento. E questo è un altro Giovanni De Vecchi originario di Borgo Sansepolcro di cui abbiamo già parlato, che esegue questo studio di composizione utilizzando, acquerellando, no?, con questo acquerello violetto.

Maybe if you could remember some paintings. Of this typology. This is a typical so-called genre-scene, scena di genere. This is a particular genre of painting, of work of art, that we can find out in Italy during the 17th century. But it was very typical of northern artist, also artist active in Italy, and in Rome especially, in the first moment. This is by Flemish painting- painter. And here obviously he would- he wants to... to talk, to tell... about the normal life in these places, restaurants or other places. And colors are very important to give this- to realize that materialistic view of the normal life. And so using watercolors and also tempera colors could... uh, could, could give us very autonomous works, very finished works. And we've got a very subtle limit the painting. And in following centuries, we find a very intricate expressiveness of- in the using of polychrome watercolors, especially by some artists, northern artists English, French, artists such as Turner, Goya, Delacroix and more. But especially in the 18th and 19th centuries.

Example (5) shows the lecturer describing the use of watercolours as a painting technique, associating examples of artists who made use of it. While in the Italian lecture this leads to listing mostly Italian artists (De Grassi, De Vecchi, Sordi) from the Renaissance, in the EMI version an international pool of more recent artists (Turner, Goya, Delacroix) is mentioned instead. The content is, in this case, altered to suit two different audiences; in the outcome, the Italian class is exposed to rarer and potentially unfamiliar examples (“Pietro Sordi, che forse non avete mai sentito nominare”), while the same is avoided for the EMI class.

Nonetheless, the differentiation of information is not limited to examples. In some cases, the discussion of the same concept gives rise to different considerations in the two lectures. In set #2, for example, the introduction of a dietary intervention for anti-inflammatory purposes branches out into two different directions:

(6) #2

Dopo 15 giorni, quindi stretta dieta, dieta standard con cioccolato, i parametri dell'infiammazione interleuchina 1RA, interleuchina 1-alpha 1-beta si sono modulati a ribasso, è aumentata la capacità antiossidante totale e contemporaneamente è aumentato il valore delle HDL. [...] Allora per rispondere alla domanda della collega qui abbiamo la risposta: abbiamo sottoposto ad un test psicometrico le donne normopeso obese (sempre con i confronti con le altre), in questo caso abbiamo fatto... al tempo c'era l'[ED12], c'era un test che ci permetteva di capire se i soggetti avevano un disturbo del comportamento alimentare e quindi si andava a testare la risposta ad una serie di domande che profilavano il soggetto come rispetto alla percezione di sé, alla tendenza alla bulimia, alla tendenza alla asocialità, alla tendenza alla anaffettività, e anche alla tendenza di vedersi particolar- alla non accettazione della propria immagine corporea. Quello che abbiamo osservato è che la risposta delle donne normopeso obese, soprattutto per quello che era la non accettazione dell'immagine corporea, era molto prossima sia a quella dei

So we discovered, for example, that a NWO has more level of oxidative stress, so the stress, the respect- metabolically stressed respect to MONW and in the same range of obesity. So we need to give them more antioxidants compound into the diet. Ok? For example, just to finish, the finish for the morning, and then we continue in the afternoon. If we eat more chocolate, more dark chocolate. That chocolate contain a lot of antioxidants compound. Do you know which? [...] If we use Lactose, ok. In milk. What do we have into milk, milk is a solution, is an emulsion and is a suspension, from a chemical physical point of view. Water, fat, proteins and sugar, vitamins, endocannabinoids, there are some casein that are the same effect of opium. So, there are peptides that- so there are some protein. What is the effect of the protein of the milk when we are add into with- and we mix it with coca that contains polyphenols? OK, there are the class of- OK, we take the protein of the milk and we add to antioxidant compound. There is the denaturation. So the effective activity, cioè the activity of polyphenols is less because we have a duration of

sogetti obesi ma sicuramente non avevano una tendenza all'anoressia o disturbi del comportamento alimentare.

Quindi queste donne sono sane dal punto di vista del loro profilo diciamo psicologico, non hanno un disturbo del comportamento alimentare ma si sentono obese, quindi non accettano la propria immagine corporea. E questo viene poi stato messo in relazione con la loro composizione corporea da cui si evince che tutte quelle che dimostravano questa insoddisfazione erano poi realmente obese per percentuale di massa grassa e potevano classificarsi o normopeso obese od obese, le ho risposto?

polyphenols, because they are the inside- blocked by protein. OK? So if you eat milk chocolate, you don't make...nutraceutical foot, because the activity of antioxidants, is lower respect to dark chocolate, so-

In the Italian version, after having illustrated the beneficial effects of dark chocolate for the purposes discussed, the lecturer is able to address an earlier question she had deferred until this moment in the lecture. In the EMI version, notions regarding the psychological state of patients are not included, as the lecturer instead goes into the specifics of the chemical processes that make dark chocolate beneficial vis-à-vis other types of chocolate. Both these discussions only occur in their respective versions, making this not a case of different quantity of content, but rather of a differentiation of information conveyed.

Other examples feature this differentiation as an opportunity for revisions of background knowledge. This is the case in example (7):

(7) #4

Agostino Chigi, banchiere ricchissimo che, figlio di un banchiere, a sua volta, di un banchiere senese, una famiglia molto ricca, potente. E le fortune di Agostino decollano in maniera - cioè, già appunto ben avviate - ottengono un'ulteriore spinta, grazie all'acquisizione del monopolio della commercializzazione dell'allume.

Forse già lo dicevamo durante il primo modulo, lo ricordavamo, questo sale minerale usato per fissare i colori nei tessuti. E quindi Agostino Chigi ottiene dal Papa il monopolio e la commercializzazione di questo indispensabile materiale, e questo gli permette appunto di consolidare ancora di più la sua fortuna. E Agostino è un grandissimo promotore artistico, diciamo così, culturale, e il centro di questa sua vita artistica e culturale diventa la villa che progetta per lui Baldassarre Peruzzi, senese, allievo di Francesco di Giorgio, pittore e architetto, che tra 1505/1506 progetta questa villa, questo palazzo, villa suburbana, lungo via della Lungara.

[*Agostino Chigi, extremely rich banker who, himself son of a banker, a Siennese banker, a very rich family, powerful. And Agostino's fortunes will really take off in a way - I mean, fortunes that were already good - they get additional momentum, thanks to the acquisition of the alum monopoly. We may have already mentioned this last term, we repeated it, this mineral salt, used to fix color on cloth. And so Agostino Chigi obtains this monopoly and the ability to sell this essential material from the Pope, and this allows him to consolidate even more his fortune. And Agostino is a very active artistic and cultural promoter, let's say, and the center of this artistic and cultural life is the villa built for him by Baldassarre Peruzzi, Siennese, pupil of Francesco di Giorgio, painter and architect, whom between 1505/1506 designs this villa, this palace, suburban villa, along via della Lungara.*]

Agostino Chigi, you already know, I repeat it, came from Siena, and he was a Tuscan banker. He was born in Siena in 1466, from, he came from a family of bankers, his father, Mariano Chigi, was also a very important member of the Senese political community, he was also a public official, many times, and he had two sons: Agostino, the eldest, and Sigismondo. And Sigismondo made a very important marriage with the daughter of the... signore de facto... or the... ehm... let's say the most important citizen of Siena in the second half of the 15th century, coming from the Petrucci family, so a leading, a leader of the Senese community, and so this branch, Sigismondo's branch of the family became also very important and influential. Agostino- But Sigismondo spent the most part of his life in Siena himself, while Agostino, quite early, moved to, moved to Rome and in 1487, he started to work with other, another important... senese banker, Spannocchi, from the Spannocchi family, and this was a very good move because in 1492, the new pope, Alexander VI decided to trust the Vatican, the administration of the Vatican finance, not to the Medici as before, but to the Spannocchi, to the bank of the Spannocchi. And so Agostino Chigi was there, was in Rome, working in that very bank and he - as, as an agent - he came in contact with papal court and later on he was involved at the beginning of the 16th century, in 1502 if I recall correctly, he was able to open a banca Chigi, so his own Chigi bank, under his own name and in the name of his father Mariano Chigi, in Rome. And this bank was settled in the area that we have defined as the... Wallstreet of Renaissance Rome, that is the Canale di Ponte now, the road called Banco di Santo Spirito which is just in front of... the Ponte Sant'Angelo, where we met for the first time at the beginning of the course.

In the EMI version, most of the space is devoted to revising biographical notes of Chigi and his family; in the Italian version, on the other hand, the biographical focus remains more general, making space for information about *allume* and Peruzzi, the architect who designed Chigi's villa. As a result, in example (7) there is indeed a difference of devoted space, but also a difference in the selection of content taught by the lecturer.

4.1.3. Differences in rhetorical devices

In addition to quantity and type of content, the present dataset also showcased different choices in rhetorical devices in the two versions of the lectures. These may occur contextually to differences in the length or type of information provided; however, what is also different in the cases here discussed is the actual strategy adopted to vehiculate information.

One of the devices that found more frequent use in EMI lectures is repetition, as can be seen, for instance, in Example (8):

(8) #3

Qui, abbiamo detto noi, oggi guarderemo al progresso tecnologico. Innanzitutto, il progresso tecnologico è inteso in senso ampio quindi che comprende sia nuove scoperte sia nuovi... nuove tecniche, nuovi metodi di produzione, sia nuovi prodotti... prodotti che prima non esistevano, una maggiore varietà degli stessi prodotti, una maggiore quantità degli

So today, we are going to try to understand the role of technological progress for growth. Just to start with, what is technological progress? We have a broad definition of what is technological progress, not the development of new products or the development of new ideas, but also new techniques to improve the means of production. So, we... also new

stessi prodotti, diversa qualità. Quindi il progresso tecnologico lo vediamo declinato in tante in tante forme.

[Here, we said, today we'll look at technological progress. First of all, technological progress is meant in a broad sense, including new discoveries as well as new... new techniques, new production methods, new products... products that did not exist before, a broader range of those same products, a better quality of those same products, different quality. So technological progress can take many different shapes.]

management strategies that a new organization, better organization, of the work inside the firm. So, we can call many... many things can be called technical progress.

And essentially the effective of technical progress on production has also many dimensions. So, the first dimension is the product dimension. So, with the same input, when there's technological progress, we can get higher output. So, the first dimension of technological progress is that we get more output from power from our inputs. So more products. Also, the quality of this product changes because of technological progress. Imagine, just compare the quality of your cell phone today and the quality of the cell phone ten years ago, completely different things. So, more products, but also for the products of better quality, also the creation of new products. So something that simply did not exist before. Cell phone did not exist 30 years ago, 40 years ago, I guess. Computers did not exist 50 years ago. So, the creation of brand-new products. And a further dimension is also a larger variety of products. So, the same product come in many different varieties, in many different types. And this is also an aspect of technological progress.

In this example from set #3, the overarching topic of the lecture is introduced similarly in both versions; however, the Italian introduction concisely lists the various nuances to the main topic before moving on. In the EMI introduction, on the other hand, the discourse organization is not as linear, with some notions being repeated (e.g., “*We have a broad definition of what is technological progress*”, “*many things can be called technical progress*”) or paraphrased (“*So, with the same input, when there's technological progress, we can get higher output. So, the first dimension of technological progress is that we get more output from power from our inputs.*”). In addition, this excerpt also represents another instance of different quantity of information (already seen in 4.2.1), as the EMI lecture presents examples (cell phones and computers) not included in the Italian lecture. As a result of this different organization, the EMI version ends up taking noticeably more space.

Another device that appeared to be used differently depending on the context was that of linguistic alternation. There was a remarkably clear distribution of alternations among the lectures, most often caused by use of names or technical terminology tied to a specific disciplinary tradition. This linguistic behavior was not monodirectional and often resources from multiple languages were included in the lectures. I provide an exact quantification of linguistic alternation instances in [Table 2](#); nonetheless, the qualitative analysis helped shed some light on how this device was used by the lecturers.

(9) #2

Allora nel frattempo che trovo la diapositiva giusta, vi racconto come siamo arrivati ad identificare la normal-weight obesity syndrome.
[So in the meantime, while I find the right slide, I'll tell you how we came to the identification of normal-weight obesity syndrome]

In the example above (9), the technical term remained in its English original in the Italian class; this reflects the challenge of finding a suitable equivalent for a concept of recent coinage, which has mostly been discussed in English language literature.

In some cases, linguistic alternation is accompanied by a strategic use of periphrasis or by language-related episodes ([Swain & Lapkin, 1998](#)).

(10) #4

La cosa interessante è appunto che questa- questa idea appunto, di inserire nella lunetta terminale questa finestra, cioè, di includere la finestra, che ovviamente pre-esisteva, in questa struttura a serliana che poi si prolunga in profondità, di nuovo a dare il senso dello spessore della parete, appunto un'idea, nello spessore della parete; è un'idea che abbiamo già, già visto, che abbiamo già incontrato in Bramante.

[The interesting thing is in fact that this- this idea, I mean of placing this window in the last lunetta, I mean, of incorporating the window, which was pre-existing obviously, in this serliana structure which extends deeply, again, to convey a sense of the thickness of the wall; this is an idea that we have already seen, already encountered in Bramante.]

He transforms the window into something you should... you should already recognize, it is what we call- in Italian we call it a serliana, but in English it's called the palladian window. It's this kind of window, which is composed of three openings, one in the centre, which is rounded, flanked by two rectangular openings and it was kind of window, very elegant window, that Bramante had introduced in Rome, Bramante, again, in Rome... and you have seen. [...] Perfect window for the lunette, because there is a taller element in the middle and then two lower parts flanking, it's almost perfect for the lunette.

In example (10), the use of Italian technical terminology (“*lunetta*”, “*serliana*”) is mediated in the EMI class by the lecturer via additional clarifications (“*It's this kind of window, which is composed of three openings, one in the centre, which is rounded*”) and reference to an English equivalent (“*in Italian we call it a serliana, but in English it's called the palladian window*”), which is not included in the Italian lecture.

(11) #3

-Quindi diciamo la fertilità del processo di ricerca e sviluppo che a sua volta dipende dalla qualità delle persone che la fanno, dalla qualità delle dotazioni strumentali e così via. Ma dipende anche dalla appropriabilità dei risultati della ricerca. La capacità di appropriarsi, appropriabilità <ride> non si può

sentire. La capacità di appropriarsi... dei risultati della ricerca-

-Appropriazione forse?

-Appropriazione, sì, meglio.

[*-So let's say the fertility of the research and development process which in itself depends on the quality of the people generating it, the quality of the tools, and so on. However it also depends on the appropriability of the results of research. The ability to appropriate, appropriabilità <laughing> sounds really bad. The ability to appropriate... the results of research-*

-Appropriazione perhaps?

-Appropriazione, yes that's better.]

Example (11) shows a negotiation of terminology between lecturer and students in the Italian class. This linguistic episode is not present in the EMI version, where the term “appropriability” is used smoothly in the communication. In this case, however, the lecturer second-guesses the Italian equivalent (“*appropriabilità*”), possibly interpreting it as a non-standard calque from English. The term appears equally unfamiliar to the students, who suggest an alternative solution in Italian which is accepted (“*appropriazione*”). In reality, appropriability, which has a Latin etymology, finds a direct translation in *appropriabilità* in Italian; the lecturer's familiarity with the English tradition of Economics may be interfering, in this episode, with her terminological choices, leading her to assume an untranslatability of the term appropriability.

The present dataset features several other instances of alternation, sometimes translated (e.g. #3ita “*Questo è un esempio, come dire, un po' tranchant*”; #5emi “*called also body color, a corpo, said by Baldinucci*”; #4emi “*because the liaison, the connection, between the house and the river*”); some instances are also visible in previously mentioned examples (see 2, 3, 6, 7). Nevertheless, there appears to be a clear directionality in most of these episodes, with the majority of alternation occurring in those lectures that use as their medium of instruction a language that is more removed from the disciplinary tradition being taught. Sets #2 and #3, including scientific disciplines that appear to draw more from an English tradition, feature more alternation in the Italian class; the opposite is true for sets #4 and #5, which appear to draw more from an Italian tradition of the arts.

Finally, another device whose use is modulated differently in the two versions of the lectures is references to shared knowledge. This is less common throughout the dataset, but still significant in its use. An instance of such device was already visible in example (7) above, where the lecturer made sure to place on the map the architectures that were being discussed in a way that would be easily understandable for the students (“*that is the Canale di Ponte now, the road called Banco di Santo Spirito which is just in front of... the Ponte Sant'Angelo, where we met for the first time at the beginning of the course.*”).

In Italian lectures, however, lecturers may choose to draw not only from knowledge shared among the lecturer and the students specifically, but also from inside knowledge, derived from a shared cultural understanding at large.

(12) #5

Il procedimento chimico che invece rende trasparenti le carte grazie all'olio lo vediamo anche noi tutti i giorni - anche se magari non in questa maniera efficace, scientifica - basta che vi si sporchi la carta della pizza o del pane e vedrete come assume- diventa trasparente, no?

[*The chemical process which, on the other hand, turns paper see-through thanks to oil, we can see it ourselves every day - even though maybe not in such an effective, scientific fashion - when the pizza or bread paper gets dirty and you'll see that it gets- it turns see-through, right?*]

The explanation of a chemical process in the Italian version features an analogy with what happens with a typical paper traditionally used to wrap pizza in Italy. This analogy is not offered to the EMI class, presumably because it would not be able to rely on shared knowledge of this particular experience.

4.2. Complementary quantifications

As previously mentioned, speech rate, questions and language alternation were regarded as potentially relevant variables and, therefore, identified, and quantified. In all sets but one, the EMI delivery showed to require more time than the Italian one; while there appeared to be no correlation with number of questions received, it should be noted that the lecturers' speech rate was consistently lower in the EMI lectures (See [Table 2](#)).

In addition, a precise quantification of instances of language alternation, already discussed in more qualitative terms in 4.1.3, helped identifying the divide even more clearly. Indeed, the phenomena of language alternation show a remarkably clear distribution, a pattern which is repeated consistently across sets.

5. Discussion and conclusions

As shown in the previous section, various adaptations accompany the switch from the L1 to the EMI lecture. In general, the present study corroborates the findings of previous EMI research from a variety of contexts ([Airey, 2010](#); [Airey & Linder, 2006](#); [Arkin & Osam, 2015](#); [Costa & Mariotti, 2017](#); [Thøgersen & Airey, 2011](#)), that consistently reports longer lectures, slower speech rates and more repetitions in EMI. Nevertheless, no clear increasing or decreasing of students' questions was visible (cf. [Airey](#)

Table 2
Preliminary quantifications for each lecture.

Set reference	Length	Delivery rate (wpm)	Questions	Instances of alternation
#2ita	70"	116.0	4	44
#2emi	78"	88.5	13	2
#3ita	80"	121.0	24	47
#3emi	92"	103.0	12	6
#4ita	51"	93.0	0	2
#4emi	80"	87.5	0	83
#5ita	88"	140.0	1	9
#5emi	70"	72.0	0	46

& Linder, 2006). In terms of content, within matching macro-units, both versions of the lectures mostly showed to touch on the same core topics and usually in a similar linear order. However, the microscopic analysis also revealed variations in essentially every aspect of how information around such topics was selected and conveyed by the lecturers: the omission or addition of specific information, the examples selected, the efforts to contextualize or revise information, use of the technical terminology, linguistic alternation, and references to shared knowledge were all elements subject to adaptation. Thøgersen and Airey (2011), who had previously conducted a detailed investigation of EMI and L1 lectures based on matching content, had already identified differences in the lecturer's rhetorical style. The present analysis, in turn, contributed to this branch of research by shedding some light on how such differences affect the content delivered. The notion that content adaptations accompany the linguistic shift has relevant implications for EMI implementations in HE, which I outline next.

As mentioned, partially drawing from the Vygotskian perspective, this study paid special attention to the role of context and language in knowledge construction and delivery. There is indeed evidence in these data that the building and transmission of knowledge is influenced by contextual factors such as the target audience and the medium of instruction. As mentioned in Section 2, in this context, shifts in medium of instruction and audience composition appear to be intertwined and, thus, so is their influence on the lecturers' delivery. It may be possible in particular contexts to investigate further how L1 content delivery changes when teaching local students versus a more culturally diverse audience. This, however, might be difficult to achieve in Italian HE, where the overwhelming majority of L1-medium teaching is indeed aimed at local students.

For this dataset, the analysis pointed out that, either deliberately or less so, the discursive choices of the lecturers varied in multiple respects between the two versions of the lectures. This, in turn, means that the two groups of students were exposed to somewhat different tools and symbols and, ultimately, different knowledge. An extreme example of this is represented by the Applied Statistics set (#1) in this dataset, where knowledge around similar topics was delivered (and, in turn, learnt) in a completely different fashion. This highlights that, because of the contextual changes it introduces, EMI creates the very need for an adaptation of content and communication; however, this adaptation can in itself go in a direction of further removing the knowledge conveyed from its L1 counterpart. The present study does not seek to make a qualitative judgement on the adaptation initiatives identified. Their existence is intrinsically relevant, in that it points to the need for specific communicative efforts to overcome linguistic and cultural barriers.

Indeed, deliberate or not, the adaptive behaviors displayed by the lecturers presented a specific inner coherence. For example, as noted in 4.1.3, linguistic alternations featured an evident directionality. This phenomenon may be further investigated in EMI research in the future; nonetheless, the analysis of the present dataset already shed some light on a possible pattern of its occurrence. Similarly, other types of adaptations also showed to occur with a specific ratio: the removal or substitution of obscure, very technical or very culturally connotated information lets an additional preoccupation for the ease of the EMI students transpire. Thus, the aforementioned effort to bridge the many different asymmetries among the two audiences seems to move in a direction of lightening the load for the international class, as also directly confirmed by some of the lecturers in the follow-up interviews. This type of behavior suggests a slightly different pedagogical approach to EMI compared to the traditional Italian one, which, as mentioned in Section 2, can be seen as more focused on the delivery of large amounts of complex content, rather than on the audience's comfort with its assimilation.

It might be argued that these changes have the potential to be beneficial for the students, but the question of how to carry them out without compromising complexity remains, especially considering that EMI lectures already appear to take consistently more time. With an eye to the specificities of the HE system here investigated, it has already been remarked how the number of notions routinely taught in Italian lectures can differ from other academic contexts. Additionally, it should perhaps be noted that the amount of content delivered in each single lecture is not strictly regulated; this may afford the lecturers the possibility to modulate flexibly on which parts of the course to invest or save up time. Nevertheless, the present study mainly revealed where and how adaptation occurs, rather than what the necessary resources (e.g., time and effort) to carry out such process are taken away from. Further research is needed to investigate longitudinally the possible effects of adaptation on entire courses.

Ultimately, the core question is hardly how close to identical the two versions can be made; rather, it may be which adaptations can allow the pursuit of the set learning aims with the same level of sophistication. Evidence indicates that sometimes this is achieved through a decrease of the content taught (e.g., Arkin & Osam, 2015), which, however, does not seem a viable solution to the problem. Similarly, an excessive 'sanitization' of the lecture from its contextual and culturally connotated elements appears equally undesirable. EMI is often framed as an internationalization strategy: if its aim is to

afford access to knowledge and experiences that would otherwise remain out of reach, the local component that shapes that knowledge and experience should not be framed as a hindrance. Further research may in the future investigate how adaptation processes can promote the integration of local knowledge into international curricula, as well as which additional resources will be required to complete such efforts in EMI courses.

Overall, as its main contribution to the field, the present study points to the fact that EMI does not simply represent a change in the medium of instruction vis-à-vis L1 lecturing, but, rather, it necessarily entails specific adaptations. Furthermore, the study indicates that these adaptations impact the quantity and type of content taught, as well as the rhetorical tools chosen for its delivery. Awareness of such need for adaptation may in the future inform EMI curriculum design, as well as lecturer training.

Funding

This work was supported by the Helge Ax:son Johnson Foundation, which partially funded its data collection [application n. F19-0443].

Declaration of competing interest

None

Acknowledgements

The author would like to thank Beyza Björkman Nylén and Josep Soler for the helpful feedback they have provided to the present study.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.esp.2023.01.005>.

References

- Airey, J. (2010). The ability of students to explain science concepts in two languages. *Hermes: Journal of Language and Communication Studies*, 45, 35–49.
- Airey, J. (2016). EAP, EMI or CLIL? In K. Hyland, & P. Shaw (Eds.), *The Routledge handbook of English for academic purposes* (pp. 71–83) Routledge. <https://doi.org/10.4324/9781315657455.ch06>.
- Airey, J., Lauridsen, K. M., Räsänen, A., Salö, L., & Schwach, V. (2017). The expansion of English-medium instruction in the Nordic countries: Can top-down university language policies encourage bottom-up disciplinary literacy goals? *Higher Education*, 73(4), 561–576.
- Airey, J., & Linder, C. (2006). Language and the experience of learning university physics in Sweden. *European Journal of Physics*, 27(3), 553–560.
- Altheide, D. L. (1996). *Qualitative media analysis*. Sage Publications.
- Anderson, J. (2014). *Cognitive psychology and its implications* (8th ed.). Worth.
- Arévalo, C. M. (2017). Questions in English as a medium of instruction versus non-English as a medium of instruction lectures. *Education and Learning Research Journal*, 14, 6–31.
- Arkin, E., & Osam, N. (2015). English-medium higher education: A case study in a Turkish university context. In S. Dimova, A. K. Hultgren, & C. Jensen (Eds.), *English-medium instruction in European higher education* (pp. 177–199). De Gruyter Mouton.
- Björkman, B. (2010). So you think you can ELF: English as a lingua franca as the medium of instruction. *HERMES - Journal of Language and Communication Studies*, 23(45), 77–96. <https://doi.org/10.7146/hjicb.v23i45.97348>.
- Bliuc, A. M., Ellis, R. A., Goodyear, P., & Muntele Hendres, D. (2011). Understanding student learning in context: Relationships between university students' social identity, approaches to learning, and academic performance. *European Journal of Psychology of Education*, 26, 417–433. <https://doi.org/10.1007/s10212-011-0065-6>.
- Bowles, H. (2017). Immunologically speaking: Oral examinations, elf and emi. *Lingue e Linguaggi Lingue Linguaggi*, 24, 185–201. <https://doi.org/10.1285/i22390359v24p185>.
- Broggini, S., & Murphy, A. C. (2017). Metadiscourse in EMI lectures: Reflections on a small corpus of spoken academic discourse. *L'analisi linguistica e letteraria*, XXV, 325–340.
- Chang, Y.-Y. (2012). The use of questions by professors in lectures given in English: Influences of disciplinary cultures. *English for Specific Purposes*, 31(2), 103–116.
- Chaudron, C. (2000). Contrasting approaches to classroom research: Qualitative and quantitative analysis of language use and learning. *Second Language Studies*, 19(1), 1–56.
- Cho, H., & Lee, J.-S. (2008). Collaborative information seeking in intercultural computer-mediated communication groups: Testing the influence of social context using social network analysis. *Communication Research*, 35(4), 548–573. <https://doi.org/10.1177/0093650208315982>.
- Costa, F. (2012). Focus on form in ICLHE lectures. Evidence from English-medium science lectures by native speakers of Italian. *AILA Review*, 25(1), 30–47.
- Costa, F. (2017). English-Medium instruction in Italian universities: "If we're gonna do it do it right - right?". In K. Ackerley, M. Guarda, & F. Helm (Eds.), *Sharing perspectives on English-medium instruction* (pp. 77–93). Peter Lang.
- Costa, F. (2021). *Alternation between L1 (Italian) and L2 (English) in three CLIL and EMI contexts*. Cambridge Scholars Publishing.
- Costa, F., & Mariotti, C. (2017). Differences in content presentation and learning outcomes in English-medium instruction (EMI) vs. Italian-medium instruction (IMI) contexts. In J. Valcke, & R. Wilkinson (Eds.), *Integrating content and language in higher education* (pp. 187–204). Peter Lang D.
- Costa, F., & Mariotti, C. (2021). Strategies to enhance comprehension in EMI lectures: Examples from the Italian context. In D. Lasagabaster, & A. Doiz (Eds.), *Language use in English-medium instruction at university* (pp. 80–99). Routledge.
- Cozart, S. M., & Gregersen-Hermans, J. (2021). An international competence profile for educational developers. In J. Gregersen-Hermans, & K. M. Lauridsen (Eds.), *Internationalising programmes in higher education: An educational development perspective* (pp. 37–81). Routledge.
- Crawford Camiciottoli, B. (2005). Adjusting a business lecture for an international audience. A case study. *English for Specific Purposes*, 24(2), 183–199.
- Cheswell, J. W., & Plano-Clark, V. L. (2011). *Designing and conducting mixed method research* (2nd ed.). Sage.
- Dafouz Milne, E., & Núñez Perucha, B. (2010). Metadiscursive devices in university lectures. In C. Dalton-Puffer, T. Nikula, & U. Smit (Eds.), *Language use and language learning in CLIL classrooms* (pp. 213–230). John Benjamins Publishing.

- Dalton-Puffer, C. (2011). Content and language integrated learning: From practice to principles? *Annual Review of Applied Linguistics*, 31, 182–204.
- Degano, C., & Zuaro, B. (2019). Oral examinations in EMI: A focus on pragmatic competence. *Textus*, 32(1), 141–162.
- Denver, L., Jensen, C., Mees, I., & Werther, C. (2016). Good enough to teach? A study of EMI lecturers' language skills and metadiscourse. *Moderna Språk*, 110(2), 46–72.
- Doiz, A., & Lasagabaster, D. (2022). Looking into English-medium instruction teachers' metadiscourse: An ELF perspective. *System*, 105, 102730. <https://doi.org/10.1016/j.system.2022.102730>.
- Dörnyei, Z. (2007). *Research methods in applied linguistics*. Oxford University Press.
- Fedeli, M. (2018). The student voice in higher education and the implications of promoting faculty development. In V. Boffo, & M. Fedeli (Eds.), *Employability and competences. Innovative curricula for new professions* (pp. 25–37). Firenze University Press.
- Fedeli, M., & Taylor, E. (2016). Exploring the impact of a teacher study group in an Italian university. *Formazione & Insegnamento*, 14(3), 167–177.
- Genc, E., & Yuksel, D. (2021). Teacher questions in English medium instruction classrooms in a Turkish higher education setting. *Linguistics and Education*, 66, 100992. <https://doi.org/10.1016/j.linged.2021.100992>.
- Graesser, A. C., & Person, N. K. (1994). Question asking during tutoring. *American Educational Research Journal*, 31(1), 104–137. <https://doi.org/10.3102/00028312031001104>.
- Graneheim, U. H., Lindgren, B. M., & Lundman, B. (2017). Methodological challenges in qualitative content analysis: A discussion paper. *Nurse Education Today*, 56, 29–34. <https://doi.org/10.1016/j.nedt.2017.06.002>.
- Halliday, M. A. K. (1961). Categories of the theory of grammar. *Word*, 17(3), 241–292.
- Helm, F. (2020). EMI, internationalisation, and the digital. *International Journal of Bilingual Education and Bilingualism*, 23(3), 314–325. <https://doi.org/10.1080/13670050.2019.1643823>.
- Holland, D. C., & Valsiner, J. (1988). Cognition, symbols, and Vygotsky's developmental psychology. *Ethos*, 16(3), 247–272.
- Huang, Y. P. (2011). English-medium instruction (EMI) content-area teachers' (CATS') pedagogical content knowledge of scaffoldings: A Vygotskian perspective. *Taiwan Journal of TESOL*, 8(1), 35–66.
- Hu, G., & Li, X. (2017). Asking and answering questions in English-medium instruction classrooms: What is the cognitive and syntactic complexity level?. In *English-medium instruction in Chinese universities* (pp. 184–203) Routledge.
- Hüttner, J. (2019). Occupying a new space: Oral skills within the disciplines in English-medium instruction. In B. Loranc-Paszyk (Ed.), *Rethinking directions in language learning and teaching at university level* (pp. 5–26). Research-publishing.net.
- Hyland, K. (1994). The learning styles of Japanese students. *JALT Journal*, 16(1), 55–74.
- Ibrahim, N. M., & Ahmad, U. K. (2020). Content-organizing metadiscourse in Malaysian undergraduate engineering lectures: Towards improvement of lecture delivery. *LSP International Journal*, 7(2), 89–105. <https://doi.org/10.11113/lspi.v7i2.16347>.
- Johnson, J. H., & Picciuolo, M. (2020). Interaction in spoken academic discourse in an EMI context: The use of questions. In *International conference on higher education advances*. Valencia, Spain (pp. 211–219). <https://doi.org/10.4995/HEAd20.2020.11018>.
- Kohlbacher, F. (2006). The use of qualitative content analysis in case study research. *Forum Qualitative Sozialforschung/Forum for Qualitative Social Research*, 7(1), 1–30.
- Lee, J. (2009). Size matters: An exploratory comparison of small- and large-class university lecture introductions. *English for Specific Purposes*, 28(1), 42–57.
- Martinez, R., Machado, P., & Palma, C. (2021). An exploratory analysis of language related episodes (LREs) in a Brazilian EMI context: Lecturers' and students' perspectives. In D. Lasagabaster, & A. Doiz (Eds.), *Language use in English-medium instruction at university* (pp. 11–33). Routledge.
- Mauranen, A. (2003). The corpus of English as lingua franca in academic settings. *Tesol Quarterly*, 37(3), 513–527.
- Mauranen, A. (2006). Signalling and preventing misunderstanding in English as lingua franca communication. *International Journal of the Sociology of Language*, 177, 123–150.
- Milne, Dafouz, & García, D. Sánchez (2019). Does everybody understand? Teacher questions across disciplines in English-mediated university lectures: An exploratory study. *Language Value*, 5(1). <https://doi.org/10.6035/LanguageV.2013.5.7>.
- Molino, A. (2018). 'What I'm speaking is almost English...': A corpus-based study of metadiscourse in English-medium lectures at an Italian university. *Educational Sciences: Theory and Practice*, 18(4), 935–956.
- Murphy, A. C., & Zuaro, B. (2021). Internationalization versus englishization in Italian higher education: Reframing the issue. In R. Wilkinson, & R. Gabriels (Eds.), *Englishization of higher education in Europe*. Amsterdam University Press.
- Perlman, D. (2013). The influence of the social context on students in-class physical activity. *Journal of Teaching in Physical Education*, 32(1), 46–60.
- Pulcini, V., & Campagna, S. (2015). Internationalisation and the EMI controversy in Italian higher education. In S. Dimova, A. K. Hultgren, & C. Jensen (Eds.), *Volume 3 English-medium instruction in European higher education* (pp. 89–114). De Gruyter Mouton.
- Rose, H., Curle, S., Aizawa, I., & Thompson, G. (2019). What drives success in English medium taught courses? The interplay between language proficiency, academic skills, and motivation. *Studies in Higher Education*, 45(11), 2149–2161. <https://doi.org/10.1080/03075079.2019.1590690>.
- Sánchez-García, D. (2018). Teacher questioning: Exploring student interaction and cognitive engagement in Spanish and EMI university lectures. *Porta Linguarum: revista internacional de didáctica de las lenguas extranjeras*, 3, 103–120.
- Sánchez-García, D. (2020). Mapping lecturer questions and their pedagogical goals in Spanish-and English-medium instruction. *Journal of Immersion and Content-Based Language Education*, 8(1), 28–52.
- Santulli, F. (2015). English in Italian universities: The language policy of PoliMi from theory to practice. In S. Dimova, A. K. Hultgren, & C. Jensen (Eds.), *Volume 3 English-medium instruction in European higher education* (pp. 269–290). De Gruyter Mouton.
- Siegel, J. (2020). Comprehension in English Medium Instruction (EMI) lectures: On the impact of lecturer L2 English use. *Language Learning in Higher Education*, 10(1), 73–91. <https://doi.org/10.1515/cercles-2020-2005>.
- Siegel, J., Crawford, M. J., Ducker, N., Madarbakus-Ring, N., & Lawson, A. (2020). Measuring the importance of information in student notes: An initial venture. *Journal of English for Academic Purposes*, 43, 1–10.
- Swain, M., & Lapkin, S. (1998). Interaction and second language learning: Two adolescent French immersion students working together. *The Modern Language Journal*, 82, 320–337.
- Thøgersen, J., & Airey, J. (2011). Lecturing undergraduate science in Danish and in English: A comparison of speaking rate and rhetorical style. *English for Specific Purposes*, 30(3), 209–221.
- Tiberius, R. G., & Billson, J. M. (1991). The social context of teaching and learning. *New Directions for Teaching and Learning*, 1991(45), 67–86.
- Vaismoradi, M., & Snelgrove, S. (2019). Theme in qualitative content analysis and thematic analysis. *Forum Qualitative Sozialforschung/Forum for Qualitative Social Research*, 20(3). <https://doi.org/10.17169/fqs-20.3.3376>.
- Vinke, A. A. (1995). *English as the medium of instruction in Dutch engineering education* [Doctoral dissertation, Technische Universiteit Delft].
- Vygotskii, L. S. (1986). *Thought and language*. MIT Press.
- Vygotskij, L. S. (1987). In *The collected Works of L. S. Vygotsky* [Robert W. Rieber & Aaron S. Carton. Eds.] (vol. 1) Springer.
- Watson-Gegeo, K. A. (1997). Classroom ethnography. In *Encyclopedia of language and education* (pp. 135–144). Springer.
- Young, L. (1994). University lectures-macro-structure and micro-features. In J. Flowerdew, & L. Miller (Eds.), *Academic listening: Research perspectives* (pp. 159–176). Cambridge University Press.
- Zuaro, B. (2022). English-medium Instruction through the lens of discipline and culture: Lecturers' beliefs and reported practices. *Apples-Journal of Applied Language Studies*, 16(1), 113–131.

Beatrice Zuaro has a PhD in English Linguistics from Stockholm University. She is currently a Post-doctoral research associate in the “English as a Medium of Instruction in European Higher Education - ELEMENTAL” project. Her main research interests encompass language policy and language ideologies, EMI and academic discourse in general.