

ELT Research Papers 19.07

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Ernesto Macaro, Jessica Briggs Baffoe-Djan, Heath Rose,
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Executive summary

This report details the background, methodology and initial findings of the first study to investigate content and language integrated learning (CLIL) and English medium instruction (EMI) in the same country. Through vocabulary tests, interviews with students and recordings of classes/lectures, we identify the challenges faced and strategies applied by learners in L2-medium education in Italy in the secondary and tertiary educational phases. Specifically, we focus on 1) students in the last year of upper secondary school (aged 17–18) who are studying subjects through the medium of English (via CLIL), and 2) EMI students in their first year of undergraduate programmes. The study investigated:

- students' English vocabulary knowledge
- the potential gap between learning a subject through a school CLIL context and subjects taught through EMI at university
- the nature of classroom interaction in the two settings
- students' general approaches to their learning and listening strategies.

One hundred and forty-eight secondary students completed a vocabulary test, yielding estimates of knowledge of English words at different frequency levels and of academic vocabulary. Twelve CLIL classes were recorded and transcribed, and the lexical content of the classes categorised by frequency and type of vocabulary used. Twelve EMI lectures were recorded and transcribed and analysed against the CLIL classes to determine the differences in classroom vocabulary and interaction by educational phase. A questionnaire probing approaches to learning and learner strategy use was administered to 156 EMI students, and a further 15 EMI students participated in stimulated recall interviews, the stimuli for which were the video recordings of the EMI lectures they had attended.

Findings indicate that, on the basis of their lexical knowledge alone, CLIL students will very likely experience difficulties in comprehending their classes – difficulties which are highly likely to impact on their content knowledge development. Indeed, from a vocabulary use perspective alone, the CLIL classes analysed were found to be more complex than the EMI classes. Teacher talk dominated the interaction in both educational phases, but particularly in the tertiary phase, with the questionnaire data revealing either that students did not feel confident to interrupt the teacher/lecturer in class and ask questions or that this practice is implicitly discouraged. Where greater interaction was present, this coincided with a shift from a teacher-centred pedagogy to one where students were given preliminary tasks to undertake. Although in the interviews EMI students reported relatively few linguistic difficulties in understanding course content, this may be attributable to the self-selecting nature of the EMI courses, as well as to (for some) previous study abroad experience in an anglophone country. Note-taking and categorising words by type emerged as prevalent EMI strategies.

We discuss our findings in light of the potential challenges of transitioning from secondary CLIL to tertiary EMI, raising important issues for teachers and policymakers alike.

1

Introduction

Globally we are witnessing a major shift in how second language (L2) education is perceived, conceived, organised and delivered.

In the early 1990s, there were four general scenarios as to how the L2 was taught in schools and universities:

1. where the L2 was learnt by students for whom it was a foreign language (not spoken by the majority of the population), in order for them to communicate with people who speak the L2, referred to as foreign language learning (FLL) or modern foreign language learning (MFL) or, specifically, English as a foreign language learning (EFL)
2. where students from different ethnic and language backgrounds were living in an English-speaking country and needed the L2 to access the general education curriculum, referred to as English as a second language (ESL) or English as an additional language (EAL) education
3. where the L2 was taught through learning the content of academic subjects, for example in Canada where children in the English-speaking community attended a school which taught subjects through the medium of French, in an 'immersion' scenario
4. where university students studying academic subjects in English as their L2 had lessons in English focusing on academic writing, or language for specific subjects like business or engineering, known as English for Academic Purposes (EAP) or English for Specific Purposes (ESP).

Although they still exist, these four educational settings from the early 1990s have, by the second decade of the 21st century, been absorbed, fused or remodelled, in some educational settings, into what we will in this report call content and language integrated learning (CLIL) and English medium instruction (EMI). By absorbing, fusing or remodelling, we mean that the aims, educational structures and pedagogical practices of some or all of the scenarios have been adopted in part or in whole in what most researchers, commentators, teachers and policymakers are now labelling CLIL and/or EMI.

1.1 Content and language integrated learning

Defining CLIL continues to be a difficult undertaking because, as Ball, Kelly and Clegg (2015: 5) observe, it 'is a term that encompasses a wide range of educational practices'. CLIL was first conceived and developed in Europe (Marsh, 2002) but has been tentatively adopted in other parts of the world. According to Coyle, Hood and Marsh (2010: 1), CLIL is 'a dual-focused educational approach in which an additional language is used for the learning and teaching of both content and language'. In this definition, there does not appear to be a strong emphasis on the two aims of content and language learning having the same weight or importance. On the other hand, according to Dafouz, Camacho and Urquia (2014: 224), 'the acronym CLIL has been used extensively mostly across Europe (but also beyond) to refer to a dual educational approach where equal attention is paid to both content and language objectives'. So, definitions (and their discussion) tend to vary as to the importance attributed to the balance between learning content (academic subjects) and learning the L2.

We should also note that, in definitions of CLIL in Europe, the L2 in question is never specified, and this is for the laudable reason of not giving greater value to one L2 over another, especially in the context of the plurilingual aspirations of the European Union (EU). Yet we might be doing a disservice to European plurilingualism if we pretend that English is not the L2 most often adopted in CLIL classrooms. In other words, it is important for there to be an ongoing discussion as to how justifiable it is for English to be the L2 adopted by European governments or local jurisdictions when setting up CLIL programmes. In a report on both language learning and CLIL in Europe, Eurydice (2012) states that 73 per cent of pupils in primary schools were learning English as the first foreign language, and 90 per cent were learning English in secondary schools. We have been unable to find reliable data on the numbers of CLIL classrooms in the EU which use languages *other than* English as an L2.

Another important question is ‘who teaches the CLIL programme?’ Is it a given (as it appears to be in the majority of instances) that it should be the content teacher, for example the teacher that hitherto has been teaching their subject through the medium of the first language (L1)? The question which then arises is whether the content teacher, who is almost certainly highly qualified in their academic subject, has the language proficiency necessary to teach it through the medium of an L2. They are unlikely to have had the kind of pre-service or in-service teacher education to teach a language. Conversely, if the CLIL programme were to be taught by language specialists, would they have the necessary content knowledge and pedagogical content knowledge that, say, a science specialist would have? The third option, some kind of team-teaching approach or collaboration in planning (Lo, 2014), might be the best option, but of course that option is resource heavy.

One further issue in CLIL, and one central to the focus of this report, is when it should be introduced. Is there research evidence suggesting an optimal age for young people to begin learning some of their academic subjects through the medium of an L2? We would propose that evidence for ‘the younger the better’ argument for language learning in general is by no means conclusive (Pfenninger and Singleton, 2017). Even less conclusive (apart from the Canadian immersion context) is the evidence that children can successfully be taught ‘content’ of some sort in primary school through the medium of an L2 (Owu-Ewie & Eshun, 2015).

The CLIL part of our study, based in Italy, is centred on upper secondary schools. In theory, therefore, students undertaking a CLIL programme at this age will have a) developed sufficient cognitive abilities in Italian (the L1 of the majority of the students) in relation to content learning and b) experienced at least eight years of EFL or other MFL learning, thus being in a position to be able to participate in CLIL lessons. One of the aims of our study was to ascertain whether the preceding statement is the case. A second aim was to identify whether ‘transition issues’ exist between upper secondary school CLIL and university EMI programmes.

1.2 English medium instruction in higher education

Like CLIL in secondary education, EMI in universities has witnessed a dramatic increase over the past two decades (for a review see Macaro et al., 2018). Unlike CLIL, the term EMI makes no concessions to the possibility of other L2s being adopted to teach content. This is because a generally accepted definition (although not a totally uncontested one) of EMI is:

The use of the English language to teach academic subjects (other than English itself) in countries or jurisdictions where the first language of the majority of the population is not English (Macaro, 2018: 1).

This definition is not totally uncontested mainly because some commentators have objected to the criterion of the ‘majority of the population is not English’. For example, Pecorari and Malmström (2018) contend that EMI should not exclude countries where the majority population is English on the basis that some classrooms within those countries may have a majority of students who do not have English as their L1.

Issues related to students making a transition from school to university are not exclusive to CLIL and EMI. In general the two environments differ in at least the following ways for teaching academic subjects:

- class sizes tend to be smaller in secondary schools than in universities
- there are more opportunities for interaction in secondary schools
- teachers in universities are less likely to know their students as well as schoolteachers do, and they will have spent fewer years teaching them, and/or students in secondary schools will have become used to their teacher’s way of teaching
- in universities greater autonomy of learning is generally expected than in secondary schools.

These are broad generalisations, but we believe that these are the kinds of differences between the two environments that might impede a smooth transition. If we then add another layer – teaching through the L2 in both contexts – we can see that transition problems might become multiplied. Research into transition from secondary to university against the backdrop of CLIL/EMI is scarce, and the challenges students face in making the transition to university may not necessarily depend on the amount of institutional support that they receive.

For example, in Hong Kong, Evans and Morrison (2011: 206) found that ‘participants managed to overcome the linguistic, cognitive and cultural challenges posed by the school–university transition’. In Hong Kong, there is no transition provision, although once at university students get support via EAP- or ESP-type classes.

McMullen (2014) reports, in the Saudi Arabian context, that students have the opportunity to enrol on a ‘preparatory year’, a kind of English language bridging course between high school and university. Yet students contend that secondary schools do not provide them with the level of English proficiency needed for undergraduate university study and, despite the preparatory year and excellent grades in high school English classes, many students find they are ‘suddenly shocked to find themselves struggling just to pass’ (p. 137) in university.

Similarly, in Turkey, Kirkgöz (2009) describes students’ linguistic needs that a preparatory or bridging course is expected to satisfy. Yet students reported considerable transition issues between the two phases of education, particularly in the key areas of following the lectures, reading publications and writing assignments. One student expressed it as follows: ‘I was shocked by the amount of reading we were asked to do. If I had studied my major-related subjects before the transition into my university, class would have been less problematic’ (p. 89).

In Bangladesh, Sultana (2014) raises an additional complication to the transition issue. Her study found that students from Bangla-medium schools (those in the public/state sector) were confronted with greater linguistic problems than those students from private/fee-paying secondary schools that taught academic subjects through the medium of English. It also found that their comparative lack of English language proficiency led to a kind of marginalisation on EMI university campuses, with the negative impact that this might have on identity and self-image.

Macaro (2018) has argued that there are strong two-way effects between secondary and tertiary education in terms of adopting EMI/CLIL and that, in addition, there is a strong pressure on state-funded secondary schools to increase the number of courses taught through the medium of English because of the competition from private fee-paying schools. While the latter pressure is likely to be minimal in Italy (because there are relatively few

private secondary schools), the former is mounting as Italian universities increase their English-taught programmes and these in turn are facilitated by ministerial regulations regarding CLIL in secondary schools (see Section 1.3 below). Thus, it is essential not to observe CLIL and EMI in isolation from one another. They are increasingly interlinked and as Shohamy (2013: 196–213) argues:

The teaching of EMI at universities cannot be detached from broader settings where medium of instruction approaches are implemented ... [and] there are major lessons that can be learned from each of the settings that may have an impact on the others.

1.3 The Italian education system

In Italy young people generally attend school from the age of six to the age of 18. This covers five years of primary school (*istruzione primaria*), three years of lower secondary school (*scuola secondaria di primo grado*) and five years of upper secondary school (*scuola secondaria di secondo grado*). Compulsory education, however, is only until the age of 16. Primary education starts at the age of six, and lower secondary education starts at the age of 11. At the end of lower secondary education, students must pass a state examination in order to proceed to the second cycle of secondary education, which begins at age 14, when students can choose one of two options: attend upper secondary school or the regional training system. The upper secondary system offers general educational programmes (lyceums) and vocational training programmes (technical and vocational institutes). Both study courses last five years, although compulsory education is only to age 16. Those who complete the full five years receive a leaving certificate enabling access to higher education.

The regionally organised training system offers three- or four-year courses organised by accredited training agencies or by upper secondary schools. These courses grant access to second-level regional vocational courses or, under certain conditions, short-cycle courses at the higher education level. Higher education is provided by universities and polytechnics, institutes of art, music and dance, schools for language mediators and technical institutes (for further information, in English, on the Italian education system see: https://eacea.ec.europa.eu/national-policies/eurydice/content/italy_en).

1.3.1 CLIL in Italy: the law

Reform Law 53 of 28 March 2003 granted the Italian government the power to define the general framework and essential levels of services in the field of education and vocational training. The teaching of English became compulsory from the first year of primary school. Throughout the three years of lower secondary education a second foreign language is introduced. The second most studied foreign language in Italy is French.

In 2010, the implementing regulations (*regolamenti attuativi*) introduced the teaching of CLIL, making it compulsory in the last year (fifth year) of teaching in lyceums and technical institutes. In the specific case of *'licei linguistici'* (lyceums in which three foreign languages are taught) CLIL is implemented from the third year.

Law 107 of 2015 defines CLIL's main educational objectives as the promotion and strengthening of language competencies with specific reference to

Italian, English and the other languages belonging to the EU, through the use of methodologies including CLIL. In 2017, Law 107 (known as the *Buona Scuola* law) states the objective of increasing language competencies of English and other EU languages (including Italian). Among these objectives CLIL methodologies are expected to play a part. (For more information on Law 107, in Italian, see: <https://www.gazzettaufficiale.it/eli/id/2015/07/15/15G00122/sg>)

As for Italian students' competence in foreign language(s), a Eurobarometer survey was carried out among young people between the ages of 15 and 30 in all 28 Member States of the EU. In the Italy factsheet, under Section III of the survey, entitled 'Languages in the European Education Area', question DX9 is of particular interest: 'In how many languages can you read and write? This includes your mother tongue, meaning the first language(s) you learnt as a child.' The percentages that emerge are shown in Table 1.

Table 1: Language in which people aged 15–30 can read and write (adapted from Eurobarometer June 2018)

Europe average		Italy	
Can read and write in only one language	20%	Can read and write in only one language	10%
Can read and write in two languages	43%	Can read and write in two languages	49%
Can read and write in three languages	27%	Can read and write in three languages	31%
Can read and write in more than three languages	10%	Can read and write in more than three languages	10%

It would therefore appear that a higher percentage of Italian young people are able to read and write in other languages when compared, on average, to their European peers, at least according to their own self-estimations.

1.3.2 CLIL professional development in Italy

The professional development of CLIL teachers covers both linguistic and methodological aspects and is provided only by universities (*decreto MIUR 30/09/2011*). Initially, CLIL teachers were expected to possess a C1 level in the foreign language; however, the Common European Framework of Reference for Languages (CEFR) level was lowered to B2 during the first phase of implementation (*decreto direttoriale n. 89 del 20/11/2013*).

In 2003, Law 53 excluded language teachers from CLIL teaching and from CLIL training. In the provisional regulations of 25 July 2014, the Ministry of Education attempted to modify this situation by providing guidelines for CLIL activities based on collaboration between content and language teachers.

The 2016–19 national teacher training plan (*Piano Nazionale per la Formazione dei Docenti/PNF*) further underlines the importance of CLIL methodology in order to implement the 2010 regulations and increase the educational offer by means of content subjects taught through a foreign language in all classes of primary school and upper and lower secondary school (see: www.istruzione.it/allegati/2016/Piano_Formazione_3ott.pdf).

Although a school's headteacher is obliged to implement a minimum number of CLIL classes, they do not designate who should teach CLIL or what subjects should be taught through CLIL; such decisions are taken by the school board (*Consiglio di Classe*) on availability of CLIL-qualified staff and their willingness to participate.

Research on CLIL's effectiveness in Italy from a teacher's perspective has been carried out by Aiello, Di Martino, and Di Sabato (2015), who found a disparity between the teachers' self-evaluated proficiency in the L2 and their actual language performance in the classroom. However, the teachers were anxious to receive professional development in CLIL methodology, a finding also reported in Coonan (2017). Mezzadri (2019 in press) argues for more systematic measurements of teacher competencies before and after CLIL teacher professional development in order to guarantee a vision of CLIL that is more grounded in research. Moreover, there appears to be a research gap with regard to actual student performance resulting from the experience of learning through CLIL.

1.3.3 English medium instruction in Italian higher education

Although EMI teaching is now relatively common in Italian higher education, it is not supported by any national laws or regulations. No official data are currently available as to why universities opt for EMI; appeal to foreign students and additional funding are doubtless among the possible motivations. According to the university rectors' website (Conferenza dei Rettori delle Università Italiane), 81 universities were offering EMI programmes at least at the master's and doctoral level in 2016. The *University* website is updated annually and monitors the number of universities offering EMI courses. In 2018, there were 35 universities offering courses at the undergraduate level taught in English. Appendix B provides the most up-to-date information we could gather on EMI courses in Italian universities.

Research on EMI in Italy is limited. In a survey of EMI developments in Italy, Costa and Coleman (2013) suggest that Italian universities' low-ranking position in international league tables can be attributed to tertiary institutions' reluctance to internationalise through EMI. In 2014 the Politecnico di Milano's senior management attempted to introduce EMI in all of its courses, and this was met with strong resistance from students and staff. Guarda (2019 in press) conducted a study of student perceptions in one Italian university and found that, although generally students had a positive attitude to 'bilingual education' practices, they reported concerns about the depth of understanding of content taught through the medium of English.

1.4 Vocabulary knowledge in CLIL and EMI

1.4.1 Lexical coverage

The importance of vocabulary breadth and depth in learning and using an L2 is well documented (Milton, 2013). The relationship between vocabulary and text comprehension has also been well researched, and it is generally accepted that vocabulary is one of the main predictors of text comprehension (Nation, 2006). The question is: how much vocabulary and what kind of vocabulary does one need for adequate comprehension of a text?

Researchers working in the field of vocabulary acquisition have for some time now considered that the vocabulary of the English language can be divided up into word frequency bands. That is, according to analysis of various corpora of spoken or written English (e.g. the British National Corpus (BNC); the Corpus of Contemporary American English), they can be divided into the first thousand most frequent words in the language, the second thousand most frequent words, the third thousand, and so on.

In addition, Coxhead (2000) initiated and later refined the Academic Word List (AWL), the word families most frequently found in academic written texts. However, the true picture is not so simple. As Coxhead (2013: 127) observes, ‘everyday words with specialised meanings could present some difficulties for teachers as learners struggle to learn new meanings and concepts for words that are already established in their lexicon’. This is further complicated by the fact that the above corpora are based on L1 speakers of English whereas the majority of CLIL/EMI teachers (as in the case of our study) are L2 speakers of English. This situation has begun to be rectified by the ELFA corpus (English as Lingua Franca in Academic Settings; see Mauranen, 2006) where the majority of the texts are taken from L2 speakers of English. Additionally, specialised word lists have been devised by Wang et al. (2008), who composed a medical word list, Ward (2009), who has provided a list of engineering technical words, and Simpson-Vlach and Ellis (2010), who offer a list of formulaic speech used in academic contexts (the Academic Formulas List).

Despite the additional complications when considering lexical coverage in CLIL/EMI settings, we can use the approach to reasonably establish whether students in content classes have the necessary vocabulary knowledge to adequately understand what the teacher is saying. Thus if, for example, 20 per cent of the vocabulary of an EMI lecture consists of words from the AWL, then if a student had secure knowledge of the AWL (some 570-word families), those academic words would be covered. A study by Hu and Nation (2000) concluded that a conservative estimate of the lexical coverage needed for adequate understanding of a text was 98 per cent.

A number of studies in relation to CLIL or EMI have been carried out to ascertain the level of vocabulary that students have. Uchihara and Harada (2018) investigated the relationship between vocabulary knowledge and Japanese undergraduate students’ self-perceptions of their four language skills. Not surprisingly they found that students with larger vocabularies were more confident with speaking. However, there appeared to be no correlation between vocabulary knowledge and course grades, suggesting that other factors come into play in order to overcome a lack of vocabulary knowledge. Researchers have attempted to show that learners can compensate for deficiencies in linguistic knowledge by deploying a number of approaches and strategies to learning. It is these to which we now turn.

1.5 Students’ approaches to learning and learner strategies in CLIL/EMI contexts

For over 40 years, researchers have been exploring the actions taken by language learners when confronted with the challenge of learning an L2. Language learning strategies are defined as ‘conscious, learner-regulated thoughts and actions for developing specific skills and general proficiency’ (Oxford & Gkonou, 2018: 406). Research in the late 1990s and early 2000s saw the emergence of strategies linked to specific language learning skills, such as those used for listening (Vandergrift et al., 2006), reading (Mokharti & Sheorey, 2002) and vocabulary learning (Schmitt, 1997; Gu & Johnson, 1996), and ‘[r]esearchers nowadays are more concerned with the intricacies of how learners make use of strategies in more finely focused areas of the learning process, rather than making broad assumptions of strategy use across a range of functions, skills and contexts’ (Rose, 2015: 423). Strategy researchers now widely accept that strategy use varies according to the individual and according to the needs of the language learning context. Thus, the strategies used for understanding content-specific vocabulary when listening in EMI classroom contexts likely differ to more general listening and vocabulary strategies observed in EFL classrooms.

1.5.1 Approaches to learning and students’ strategies in CLIL/EMI

Research on learner strategies in CLIL/EMI contexts has begun to emerge. An investigation into the challenges faced by Taiwanese university-level students in EMI classrooms was carried out by Chou (2018), who explored students’ speaking anxiety and compared the strategies used by students in ‘partial EMI’ (described as courses that were taught bilingually) and ‘full EMI’ (described as courses taught in English only). Students in full EMI courses experienced less anxiety about speaking in English and this was likely due to their more frequent use of rehearsal and paraphrasing strategies. Wilkinson and Gabriëls (2017) carried out an exploratory study investigating Dutch students’ perceived effects of EMI on their learning strategies. They found that the types of strategies adopted, as one would expect, partly depended on the students’ varying English language proficiency. Strategy choice, however, also depended on the level of autonomy the student had reached, a factor that is relevant in one of the themes of our study as students transition from upper school to university.

Soruç and Griffiths' (2017) study in Turkey identified the challenges EMI university students were facing and the strategies they used to deal with them. The challenges included understanding vocabulary and inferring unknown words from context, understanding 'the heavy accent of other international students' (p. 5), and understanding the English that the teacher was using in class. They also reported that some teachers read only from their slides. The strategies that some students reported using were asking the teacher questions, using their prior experience and looking for main ideas. Specifically related to vocabulary, they reported guessing from context, using a dictionary and translating words into Turkish. The authors, however, conclude that although the students were 'often brimming over with good intentions' (such as aiming to work hard), 'they had no idea of the enormity of the task' and often became 'discouraged and demotivated' (p. 46).

Although students have been asked in interviews and surveys about their experience of learning content through English, the above are, to our knowledge, the only studies to date that have attempted to tap into 'learner-internal' behaviours – what they actually do

to help themselves learn in challenging situations such as CLIL/EMI. Furthermore, the theoretical underpinnings of research into CLIL/EMI strategies need to be determined before such investigations can be carried out.

An important consideration when theorising about the possible approaches and strategies that CLIL/EMI students might adopt is whether students entering a CLIL or EMI classroom have more content-dominant learning objectives or more language-dominant learning objectives. Theoretically, if we accept the continuum shown in Figure 1, we could assume that CLIL students' objectives would be equally or almost as equally strong to improve their language as to learn the content. In the same figure, theoretically, we could imagine that EFL/MFL students would be right at the language-dominant end of the continuum and EMI at the content-dominant end. However, it is important to survey students' personal perceptions of these goals, as these may influence how they prepare for CLIL/EMI lessons, how they listen and interact with the teacher, and how they deal with specific problems of vocabulary or instances of communication breakdown.

Figure 1: A continuum of teaching and learning objectives in English classrooms



Strategies research has also focused on the impact of prior knowledge of a topic on the relative success of the learner to understand a spoken or written text. The more prior knowledge learners have, the more they will be able to infer meaning from the general context. However, prior knowledge of a topic in a content learning situation is likely to be radically different from prior knowledge of a topic in a language learning class. In the latter, topics are usually chosen, by the teacher, so as to be familiar to the majority of the learners. In a content classroom the topic comprises the collection of concepts needed for the teacher to deliver the curriculum. Therefore, prior knowledge in a content class will vary according to whether the topic is new. The only other possibility in a content class is that the students have done some prior research on that topic. We included this question in the part of the questionnaire which dealt with previewing material.

Vocabulary, we have established, has been regarded as one of the components of linguistic knowledge (e.g. Graham et al., 2010) that students bring to a learning task in which an L2 is involved (other components being grammatical knowledge, phonemic knowledge, sociolinguistic knowledge and discourse knowledge). Together these components of linguistic knowledge are utilised, in combination with strategies, in order to meet the challenges posed by complex L2 talk. Thus, the lower the level of linguistic knowledge (and particularly vocabulary) that a student has, the greater the strategic effort that they will have to deploy in order to make up for that linguistic deficit. This might include making notes of what the teacher says are keywords, identifying the types of words encountered (technical or general academic, or other) or noting explanations given by the teacher. Students might also interact with the teacher when they don't understand something.

Additionally, to overcome the challenges, students might try, *during* the lesson, to recognise the way the teacher is organising their ideas and see the relationships between what they are saying and what they are presenting on the slides. Other strategies might include actions which students take *after* a lesson such as reviewing materials and memorising the definitions of technical terms. We investigated these issues, and others, in our approaches and strategies questionnaire.

1.6 Interaction in CLIL and EMI

The importance of teacher–student interaction has been repeatedly stated in L2 learner research (Gass, 1997) and in research on the teaching and learning of other academic subjects, especially in the field of science education (Mortimer and Scott, 2003). Many commentators in the CLIL and EMI field have been trying to promote greater classroom interaction as a vehicle for helping students meet the additional challenges of learning content through an L2. Nobody doubts the importance of teacher input (e.g. Dalton-Puffer 2007: 91) both for promoting content knowledge and developing language, but when this is not balanced with interaction, it is argued, the teaching can become so ‘monologic’ as to make it difficult for the teacher to know whether the students have understood either the concept or some of the language used in the explanation of that concept, or both. Making the input more comprehensible by modifying it has made the transfer fairly easily from second language acquisition (SLA) literature to CLIL/EMI literature: ‘Be careful with your choice of words; speak more slowly; insert more and longer pauses; stress certain words more than others.’ However, the SLA notion of ‘meaning negotiation’ (checking comprehension, encouraging students to ask for clarification) takes on the additional dimension in CLIL/EMI in that the ‘negotiation’ of language is inextricably linked to the negotiation of the meaning of a concept in the mathematics, science or history curriculum, not the meaning of a word or phrase. Nevertheless, the ability to make the input comprehensible to a large class of learners and to involve those learners in meaning negotiation (or ‘scaffolding’) is dictated to a great extent by the characteristics of those types of classrooms. Scaffolded learning, therefore, requires learners to speak – not just to ask the teacher to repeat or clarify, but to show their understanding of a concept through language, in our case an L2. Encouraging students to speak, and particularly to say something which they are not sure is correct, is a *sine qua non* of a teacher being able to give feedback. Thus, many educationalists (e.g. Mercer et al., 2004) would claim that the development of cognitive abilities occurs through interaction and through a process of focused reasoning with someone else, particularly, but not exclusively, the teacher. This is often labelled a ‘constructivist’ approach to teaching.

A useful initiative was undertaken by de Graaf et al. (2007) in their creation of an observational tool for quality interaction in CLIL classes which included the kinds of teacher–learner interaction features we have been discussing. Building on their work we could say that good-quality interaction in CLIL/EMI classrooms might additionally involve some of the following features:

1. *Extended Initiation-Response-Feedback (I-R-F) sequences* instead of rigid ones: these extended I-R-Fs (e.g. I-R-F-I-R-F with the same student) allow for further probing by the teacher to establish in-depth understanding of a concept and its associated language.
2. *Teacher question types* that require high-level cognitive responses from learners, not low-level demonstrations of knowledge already shared. Teacher question types have been comprehensively explored in the education literature generally and now increasingly in the CLIL/EMI literature (Yip and Tsang, 2007; Dalton-Puffer, 2007).
3. *Long student turns* instead of short ones to allow the student to express these higher level concepts: these longer turns should particularly include the use of verbs (rather than just nouns) because verbs demonstrate an understanding of ‘processes’ which are prevalent in most academic subjects and especially science subjects.
4. *Sufficient ‘wait time’* to allow the thinking processes necessitated by the items above to occur prior, during and after the student turn (adapted from Macaro, 2018: 196–197).

While these are quality interaction features in L1 medium of instruction (MOI) classrooms, we need to understand whether they become more or less evident in CLIL/EMI. Additionally we need to explore whether there is a difference in the interaction found in CLIL secondary school classrooms to that found in EMI university ones. Dafouz et al. (2007: 660) raise a similar issue in one of their concluding statements: ‘The use of a FL as vehicle of instruction may act as a catalyst to balance the highly asymmetrical roles performed by teachers and students in some conservative university communities.’ Put differently, will EMI in (some more traditional) universities force teachers to be less monologic and more dialogic like secondary school teachers are?

Thus, a comparison of the interaction between CLIL teachers in secondary schools and EMI tertiary teachers was another area we investigated in our study.

1.7 Research questions

Our study aimed to answer the following research questions:

1. What is the vocabulary knowledge of students in their last year of secondary education who are studying an academic subject in an Italian CLIL context, and what level of lexical coverage does this knowledge provide?
2. What is the gap between the vocabulary used by teachers in classes at schools taught through CLIL and that of lectures at university taught through EMI?
3. Are there differences in the patterns and nature of interaction between CLIL and EMI classes?
4. What general approaches to their learning and listening strategies in particular do university EMI students adopt for comprehending classes/lectures, and do they report having to adapt these as a result of the change in educational context?

2

Methodology

To answer our research questions, we set up a research project in two locations in Italy – one in the south (the region of Campania) and one in the north (the region of Veneto) – and collected the following data:

- Twelve videos of CLIL lessons. Lessons consisted of the following subjects: science (nine), maths (two) and history (one). All lessons were taught by Italian nationals, i.e. L2 speakers of English.
- Twelve videos of EMI lessons/lectures. Lessons/lectures consisted of the following subjects: maths (three), science (seven), business administration (two). All lectures were taught by Italian nationals, i.e. L2 speakers of English.
- One hundred and forty-eight tests of CLIL students' vocabulary.
- Fifteen stimulated recall interviews with students of EMI lessons/lectures.
- One hundred and fifty-six questionnaires of EMI students' approaches to learning and their strategies.

All participants gave informed consent according to a protocol scrutinised by the University of Oxford Research Ethics Committee.

All video recordings were carefully transcribed, including any words or phrases which were in Italian.

The vocabulary test involved an adapted form of the vocabulary levels test (VLT: Nation, 1990; Schmitt, Schmitt and Clapham, 2001), which was developed on the premise that learners are likely to know more high-frequency words than low-frequency words. The VLT tests receptive knowledge of vocabulary extracted from the BNC at four frequency levels (2,000, 3,000, 5,000 and 10,000) plus knowledge of the AWL (Coxhead, 2000). Thirty target words (nouns, verbs and adjectives at a ratio of 3:2:1) were tested at each level, presented in ten item clusters. Each item cluster contained three definitions to which the respondent matched three of a possible six presented words (three of the presented words function as distractors).

The stimulated recall interviews used segments from each lecture where new content was introduced. After listening back to each segment, students commented on how they were listening and detailed any strategies they used to understand the content of the EMI lectures. Interviews were carried out in Italian or English according to the preference of the respondents.

A questionnaire was devised which aimed to tap into university students' approaches to learning and the strategies they used. The questionnaire also asked them to self-estimate their current level of English proficiency, further sub-divided by 'general English' and 'academic English'. The questionnaire drew from a number of sources in the fields of both SLA and education more broadly (Alexander and Judy, 1988; Alexander, Graham & Harris, 1998; Briggs, 2016; and Soruç and Griffiths, 2017).

2.1 Data analysis

2.1.1 Analysis of vocabulary knowledge

The sum of the correct responses was calculated for each secondary student at each level of vocabulary in the VLT: the 2,000 most frequent English words, the 3,000 most frequent, the 5,000, the 10,000 and the academic words. A mean score for the sample at each level was then transformed into a percentage value in order to estimate the extent to which the secondary students had mastered vocabulary knowledge at each level.

2.1.2 Lexical coverage

Nation and Heatley's (1994) RANGE programme was used to analyse the secondary and tertiary lesson transcripts against three sets of word lists. RANGE allows the user to upload wordlists against which it will classify the vocabulary in a corpus (in our case, the lesson transcript texts). In other words, RANGE reveals how many, what proportion of and which words in a corpus occur in any wordlist uploaded to the software. We classified the vocabulary in the secondary and tertiary lesson transcripts against three sets of wordlists. Firstly, we used the AWL (Coxhead, 2000) to determine the proportion of

words used in the secondary and tertiary classes that are general academic words. To facilitate this analysis we also uploaded to RANGE the first 2,000 and 3,000 most frequent words in West's (1953) General Service List (GSL). This is because the AWL by design did not include any of the most frequent non-academic word families in English as determined by the GSL, and therefore using the GSL and AWL together allows for calculation of the percentage of academic words (i.e. AWL words) in a corpus over and above the most frequent non-academic words (i.e. the GSL words). We further classified the vocabulary in the secondary and tertiary lesson transcripts against word families that appear in the first 14 frequency levels (1,000 to 14,000) of the BNC. The 14 BNC wordlists enable a fine-grained analysis of the vocabulary in the transcripts, permitting us to show the specific 1,000 frequency level at which the words in the transcripts appear and thereby the vocabulary frequency levels a learner would need to have mastered in order to reach comprehension of a given percentage of words used in the secondary and tertiary classes.

2.1.3 Analysis of students' approaches to learning and learner strategies

The 156 university students' questionnaire responses were entered onto SPSS and analysed for their self-rating of proficiency in English, whether they currently were attending or had attended general English and ESP classes, and their responses to their general approaches to learning and learning strategies in their EMI context.

The stimulated recall interviews were analysed thematically, following the traditional procedures of thematic qualitative content analysis. Interviews were transcribed and then coded in NVivo 12, using both inductive and deductive categorisations. These categories were based on codes derived from the vocabulary learning strategies questionnaire, as well as those which emerged from the data. As Kuckartz (2014: 6) states, 'in most cases, a multi-stage process of categorising and coding is used; completely inductively or completely deductively are rarely found in research practice'.

We should note that in the sample of 156 students there were some (27) who did not consider their first language to be Italian (for example: Bengali, Turkish and Uzbek).

3

Findings

3.1 Students' vocabulary knowledge

3.1.1 Students' vocabulary size

Table 2 shows the descriptive statistics for the secondary school pupils' VLT scores on each individual frequency level in the test.

Table 2: Descriptive statistics of vocabulary test scores

Measure	N	M	SD	Min	Max	%
2,000 (/30)	148	23.41	6.10	5	30	78.03
3,000 (/30)	148	23.13	7.10	6	30	77.10
AWL (/30)	148	22.16	5.51	4	27	73.90
5,000 (/30)	148	20.16	7.60	1	30	67.20
10,000 (/30)	148	15.67	7.51	0	30	52.23

The vocabulary test data clearly indicate the vocabulary frequency levels which have not yet been adequately mastered by the secondary school students as a whole and at which targeted vocabulary instruction would usefully be directed. Nation (1983) suggests that if mastery of a particular frequency level falls below 66 per cent, then words from that level require further study. A higher mastery target of 87 per cent was proposed by Schmitt, Schmitt and Clapham (2001), a figure later revised by Schmitt to 80 per cent (Xing and Fulcher, 2007). Webb, Sasao and Ballance (2017) posit that the cut-off point for mastery should depend on the frequency level, with a higher mastery target (97 per cent) for higher frequency word families (i.e. at the 2,000 and 3,000 levels because these most frequent word families provide greater coverage of English) and a more conservative mastery cut-off (80 per cent) for less frequent word families (i.e. at the 5,000 and 10,000 levels). Taking these (largely arbitrary) guidelines into account, the least conservative cut-off point of 66 per cent indicates that the secondary students have not mastered the 5,000 and 10,000 vocabulary levels. Taking the more conservative (yet more widely propounded) estimate of 80 per cent or higher, the test results suggest that the secondary students have not sufficiently mastered *any* of the five vocabulary frequency levels.

3.1.2 Lexical coverage

Table 3 shows the cumulative coverage of the first 14,000 BNC word families in the secondary and tertiary corpora, and the further coverage provided by words not in the BNC lists (e.g. Italian words and proper nouns). Table 3 indicates that mastery of the first 9,000 word families provides 95 per cent coverage of the secondary transcripts, whereas knowledge of only the first 6,000 families provides the same coverage in the tertiary corpus. This indicates that *on the basis of the frequency of the vocabulary used alone*, the tertiary lectures are more comprehensible than the secondary classes.

To reach 98 per cent coverage of both corpora, a learner would additionally require knowledge of at least some of the words not in the BNC lists (e.g. Italian words, marginal words and proper nouns), which together cover just over four per cent of the secondary corpus and just under three per cent of the tertiary corpus. The most frequently used proper names refer to nationality and country (e.g. Spaniard and America) and to people (e.g. Einstein and Planck). The most frequent marginal word (i.e. vocabulary items that are only marginally categorised as a word such as 'uh-uh') was 'oh', which appeared over three times more frequently than any other marginal word. Most of the vocabulary classified as 'not in the lists' constituted Italian words and discipline-specific technical words (e.g. metagenetic).

Table 3: Cumulative coverage of secondary and tertiary corpora by BNC level

	Secondary	Tertiary
Level	CumToken%	CumToken%
1k	84.04	85.40
2k	89.74	90.99
3k	91.24	92.14
4k	92.50	93.45
5k	93.53	94.67
6k	94.06	95.18*
7k	94.32	95.42
8k	94.74	95.65
9k	95.14*	96.24
10k	95.33	96.74
11k	95.49	96.84
12k	95.69	97.06
13k	95.86	97.13
14k	95.93	97.23
Not in the lists	100**	100**
TOKENS	25,893	66,805

*95 per cent coverage is reached

**98 per cent coverage is reached

Comparing the secondary corpus data in Table 3 against the vocabulary test data in Table 1, it is evident that the sample do not have the requisite vocabulary knowledge to reach even 95 per cent coverage of the text, thus suggesting that on the basis of L2 vocabulary knowledge alone they are unable to comprehend adequately their secondary CLIL classes.

Table 4 shows the distribution of the AWL in the secondary and tertiary corpora. The first 1,000 GSL words accounted for 80.94 per cent of the tokens in the secondary corpus and 81.14 per cent of the tokens in the tertiary corpus. The second 1,000 GSL words accounted for 4.04 per cent of the secondary

corpus and 3.64 of the tertiary corpus, and the AWL words accounted for an additional four per cent and 5.13 per cent of the secondary and tertiary corpora respectively. Eleven per cent and 10.1 per cent of the corpora were in neither the first 2,000 GSL words nor the AWL. This finding indicates a higher usage of AWL word families in the tertiary lectures as compared with the secondary classes. A test of absolute frequencies of AWL frequency by corpus yielded a log-likelihood (LL) statistic of 51.04 with a large effect size (Bayes factor >10), indicating a highly significant difference between the corpora. In other words, the tertiary lecturers used a statistically significant greater number of AWL word families than did the secondary teachers.

Table 4: Coverage of secondary and tertiary corpora by GSL and AWL (%)

Corpus	GSL		AWL	Not in the lists
	1,000	2,000		
Secondary	80.94	4.04	4.00	11.01
Tertiary	81.14	3.64	5.13	10.09

All but the most lenient lexical mastery targets as outlined in Section 3.1 indicate that the secondary sample have not yet mastered the AWL words. Thus, the sample are unlikely to be able to adequately comprehend the four per cent of the secondary corpus that is comprised of academic words.

The corpus data indicate that knowledge of a smaller number of more frequent English words provides greater coverage of the tertiary corpus than the secondary corpus. This suggests that, on the basis of the vocabulary used by the teachers alone, the tertiary EMI lectures are easier to comprehend than the secondary CLIL lessons. In addition, the corpus analyses reveal that general academic word families (e.g. ‘compute’ and ‘detect’) make up a significantly greater proportion of the tertiary corpus than the secondary corpus. The vocabulary test and corpus analysis findings combined suggest that

the secondary students in the present study do not have sufficient mastery of a wide enough range of L2 English lexis to adequately comprehend either the general or academic English spoken lexis used in their secondary classes.

3.2 Findings from EMI students’ reported approaches to learning and the strategies used

We begin this section by reporting on how university students (in their first year of EMI) self-rated their level of general and academic English on a scale of one to ten. As we can see from Table 5, although very few students indeed felt they had complete mastery of both types of English, the majority fell into what we might call the ‘fairly confident’ categories of six, seven and eight; none placed themselves in the very low categories.

Table 5: Students’ self-reported levels of English (1 = very low; 10 = very high)

Rating	General level of English		Academic English	
	Frequency	%	Frequency	%
5	0	0	1	1.4
6	1	1.4	3	4.2
7	20	27.8	36	50
8	33	45.8	26	36.1
9	13	18.1	5	6.9
10	5	6.9	1	1.4
Total	72	100	72	100

We should note the following from Table 6:

- most students in the sample were not currently attending general English classes to support their EMI learning context
- about half had taken private general English classes
- just over half were taking ESP classes to support their EMI learning context
- nearly 40 per cent said they had studied abroad in an English-speaking country.

Table 6: Students' experiences learning English

	Yes		No	
	Frequency	%	Frequency	%
Do you currently attend general English/EFL classes?	47	30.1	109	69.9
Do you currently attend general English/EFL classes?	79	50.6	77	49.4
Have you ever studied abroad in an English speaking country?	62	39.7	94	60.3
Do you currently attend classes of English for Specific Purposes?	80	51.3	76	48.7
Have you in the past attended classes of English for Specific Purposes?	68	43.6	88	56.4

These data help to provide a more general picture of the learning situation than the vocabulary findings alone. We also wanted to find out what these students' aims and aspirations were for attending an EMI class by asking them what their focus was when

they entered the EMI classroom: the content or the language? As we can see from Table 7, the majority of students reported that their focus was much more on content learning than on language learning, with more than 84 per cent falling into categories 1–5.

Table 7: When you enter an EMI class do you focus more on the subject or improving English? (1 = subject; 10 = improving English)

Response	Frequency	%
1	24	15.4
2	18	11.5
3	28	17.9
4	29	18.6
5	33	21.2
6	11	7.1
7	9	5.8
8	3	1.9
9	0	0.0
10	1	0.6
Total	156	100

In order to situate students' approaches to learning in the EMI context, we asked them to describe the approach to teaching that they were experiencing. We can see from Table 8 that responses here were quite divided; the practice of providing notes or slides before the lesson was not uniform.

Table 8: Does the teacher give you notes or slides before the lesson?
(1 = no, never; 5 = yes, always)

Response	Frequency	%
1	26	16.7
2	28	17.9
3	59	37.8
4	36	23.1
5	7	4.5
Total	156	100

In response to what the students do before, during and after the lesson, the following are some of the indications they gave:

Strategies which scored high (they said this is 'true or very true of me'):

1. DURING the lesson I make notes of the keywords used by the teacher.
2. DURING the lesson I make notes of the explanations given by the teacher.
3. DURING the lesson I am aware of the difference between the types of vocabulary I hear.
4. DURING the lesson I try to infer (guess) the meaning of an English word I don't know from the context.
5. AFTER the lesson I review the materials I have been given.
6. AFTER the lesson I review the notes I have made.

Strategies which scored low (they said 'not very true or not at all true of me'):

1. BEFORE the lesson I preview any notes I am given.
2. BEFORE the lesson I preview the topics that are coming up (in books or on the internet).
3. BEFORE the lesson I preview any vocabulary that is likely to come up in the next class.
4. BEFORE the lesson I listen to lectures on the topic to be dealt with, in English, on the internet (e.g. massive open online courses and YouTube).
5. DURING the lesson I ask the teacher to explain individual English words or short phrases.

6. DURING the lesson I ask the teacher for an explanation of technical words.
7. DURING the lesson ask the teacher for an explanation of general academic words.
8. DURING the lesson I ask the teacher for an explanation of everyday words.
9. DURING the lesson I ask the teacher for an Italian equivalent of an English word I have not understood.
10. DURING the lesson when I don't understand something the teacher has pronounced, I ask him/her to repeat it.
11. DURING the lesson when I haven't understood a concept in the subject I ask the teacher, in Italian, for clarification.
12. DURING the lesson I prefer the teacher to clarify in Italian something I haven't understood in English.

What we notice from the approaches and strategies that scored high is that during the lesson students were quite active in taking notes and trying to overcome the challenges of listening to the content of the lesson, and some were following this up with taking action after the lesson. In contrast there was very little pre-lesson preparation. We do not know if this was because students were not aware of the kind of material and topics that were coming up or whether they felt it was the role of the teacher to initiate a new topic. Perhaps of greater concern is that the students reported that they very rarely interrupted the teacher in order to ensure that they eventually understood something.

We then investigated whether two aspects of a student's background made a difference to their responses to the strategies questions. First, having noted that quite a large percentage of students said they had studied in an anglophone country, we conducted an independent samples t-test to ascertain whether they rated their general English proficiency or their academic English proficiency higher than students who did not report having studied in an anglophone country. We found no statistical differences between the two groups. The possible reason for this finding is that study experience in an anglophone country may have comprised of just short-term language courses. We also investigated differences between the two groups regarding the strategies they used and found very few statistically significant differences between these two groups;¹ however, there was some suggestion that students who had studied abroad may have been slightly more proactive with respect to the following items:

1. BEFORE the lesson I preview the topics that are coming up (in books or on the internet).
2. DURING the lesson I make a written note of words which are very similar in English and Italian (e.g. classify/classificare).

When we carried out correlations between the students' self-reported level of English proficiency and the strategies they used, few statistically significant correlations emerged. We did find that the higher students rated their level of academic English, the more likely they were to look up words in a dictionary during the lesson ($r=.311$). This could be due to a smaller number of novel words to deal with while listening, making it easier to single out unfamiliar lexis. We found that the lower they rated their level of academic English, the more likely they were to ask the teacher for an explanation of technical words ($r=-.227$).

In summary for this section we can say that respondents rarely attempted to interact with the teacher when they did not understand but tried alternative ways of overcoming the challenges that they were facing.

3.3 Findings from EMI student interviews

3.3.1 Background of the students

Of the 15 students in the stimulated recall sessions, only two had studied a CLIL subject in high school, although one student had substantial study abroad experience in anglophone countries, which included the learning of content subjects through English. Three further students had studied English abroad in short-term language courses but had not previously engaged in content learning. All students had formally studied English in primary school, with an age range of six to ten of initial onset of English language learning. Most students had attended a scientific high school. The self-selection of these students for the interviews should be kept in mind when considering their responses.

3.3.2 Motivations to study EMI

The main motivation to study through EMI for the students in the stimulated recall interviews was in order to take advantage of smaller class sizes compared to the Italian medium classes. One student observed:

I started the Italian course for just one month, but we were 400 people ... there wasn't a direct contact with the professor and ... it was difficult to even communicate with other people because we were too much. Instead, in the course of English, we are just 20 people, so it was one of the reasons why I chose the course in English because of the fact that you could have a greater touch with the professor (Student 5).

Another motivating factor, voiced by three of the students, was the perceived benefits of both improving English language proficiency and developing content knowledge through EMI. For these students, they saw EMI as a language learning opportunity, alongside the study of their subject specialisation. Further to this, three students saw an EMI degree as a way to foster future opportunities to work internationally after graduation, as illustrated by the following quote: 'My aim is one day to go abroad, so I can practise the profession in another country' (Student 3). Two further students stated an intrinsic interest in using English for study and to be able to study alongside international students.

1. Even these disappeared after we applied a Bonferroni correction.

3.3.3 Challenges

Emerging from the stimulated recall interviews was a clear message from all 15 students that they did not experience substantive difficulties in learning through English. When prompted further about the challenges of learning technical vocabulary in English for their EMI courses, the students were predominantly dismissive, explaining that they were 'quite familiar with the words' (Student 10) and that key terms were 'very similar to Italian terminology' (Student 6). One student summed up the cohort's sentiments by explaining that they encountered 'no more difficulties than studying it in Italian because really it's just about remembering things in one language rather than the other' (Student 12).

When challenges were raised, the source of the difficulty was often attributed to either the teaching methods or the difficulty of the content matter. Illustrative of this was one student's comment: 'I don't understand one or two words because of the fact that the professor's voice is too low' (Student 9). Some students explained that misunderstanding of the content was mostly related to the pedagogy of the lecturer, rather than difficulties related to the use of English:

I believe that there are differences even from each professor here, in university; for one professor you have some struggles that you don't have with another professor. It really depends on the person rather than the way things are taught (Student 12).

Other students gave credit to their professors for enhancing understanding and diminishing the challenges they might otherwise have faced, such as noting their professor always used 'very clear and simple language' (Student 3) or used their slides and blackboard effectively to draw attention to new terminology and important concepts.

Difficulties surrounding the lecturers' accents were raised by six participants. One student was quite critical of a previous lecturer, stating that if they failed to understand something, it was usually due to the teacher's accent, and commenting that the teacher 'really didn't know any English' (Student 15). Four further students stated a desire to have more L1 English lecturers, which they linked to providing an enhanced learning environment. Contrary to this opinion, one student commented that their Italian-accented lecturer was actually easier to understand than L1 English lecturers: 'Understanding an Italian speaking in English is actually easier than understanding an English person who speaks in English' (Student 9).

Many students observed that the teaching styles of many of their professors helped facilitate their content learning. One student commented that one of his best professors:

tries to go more in depth sometimes with the things he says, and tries to broaden the topic and make it more clear than what it's actually on the slides, because the slides are very synthetic ... very short and right to the point, so when he talks, he explains everything a little bit better and goes more in depth (Student 12).

Speaking of a different professor, another student commented that the professor facilitated understanding via use of the blackboard: 'The way he explains on the blackboard can get you in the subject, where you can follow the process. I like it very much' (Student 4).

3.3.4 Vocabulary learning strategies

The most prominent strategy emerging from the stimulated recall data involved the use of the lecture slides and other visual aides to facilitate understanding of lecture content and new vocabulary. The use of slides as a source of understanding was referenced 11 times by eight participants. One student summed up their strategic use of the slides in the following way:

Well, I tend to look at the slides before he starts talking about it. I tend to give a quick look at the slides to see the topic in general and I then have the slides printed. Also, I listen to what he says before and after; visual effects, any pictures or anything on the slides can make me connect it all together (Student 13).

Many of the students stated that they always came to the lecture with the slides printed out so they could integrate their own notes with the slides during the lecture.

Note-taking as a vocabulary learning strategy was mentioned on nine separate occasions by six of the participants. Many mentioned taking notes in conjunction with the slides provided by the lecturer, adding information to them to 'compensate between the slides and what the teacher says' (Student 1). Others noted that when new terminology was introduced, they would copy it exactly from the slides or blackboard to ensure they got the spelling right, so they could review it later. Some of the students equated the detail of their note-taking with the difficulty of the course: that is, the more difficult the course, the more notes they would take.

This relationship is illustrated by the following from Student 7: ‘Since I’m not that good at physics, I try to take more notes than I can; also, I concentrate on the explanations so that I can catch more informations at once.’

The third most widely mentioned strategy in the stimulated recall data involved guessing the meaning of vocabulary from context, which was mentioned on five occasions by four students. For example, Student 13 tried to listen to what the lecturer said before and after new terminology was introduced to try to guess the word. All students seemed to agree that guessing from context was generally sufficient for understanding all new words. One student explained that even if the lecturer ‘uses some words I don’t know ... when he talks I can get to the meaning of the word, so it’s fine’ (Student 3). One student mentioned that some of their lecturers gave verbal clues to highlight important vocabulary such as repeating it a number of times, which helped them to notice that the terms were important.

When students could not guess the meaning of the word from the context, a further strategy (mentioned by three students) was to directly ask the lecturer for an explanation, even though questionnaire data indicated few students did this. One student explained:

For example, there was a word which in Italian means ‘bobina’ and I didn’t know how to explain it actually, and I asked the professor ... and he helped me with that, so if there is a problem in language, the professors help you (Student 9).

Another student commented that this was an advantage of having an Italian-speaking EMI lecturer, explaining they could easily raise their hand and ask: ‘Sorry, what does this word mean in Italian?’ (Student 10).

Finally, translation of technical vocabulary was mentioned by three students as a strategy which was used only when the content became very difficult to grasp, as illustrated by the following excerpt:

I’ve never studied before physics in English, so I have to try to translate my technical vocabulary from Italian to English at the beginning of the course because, I mean, I’ve never tried to hear a lecture in physics in English, so I had a couple of problems (Student 8).

This strategy was similar to Student 6, who stated that if they didn’t understand a particular term very well, they tried to translate it in their mind in Italian, but if the content was easy, they tended to process the content in English. For another student, the content of their EMI university course overlapped somewhat with the content they had learned in high school in Italian, so they sometimes ensured they could match up the English terms with their Italian counterparts, which they had already learned.

3.4 Analysis of classroom interaction

Space does not allow a detailed presentation of the analysis of classroom interaction. However, we make the following observations:

1. There was more interaction in the secondary CLIL classes than the university EMI classes, but not an enormous amount more.
2. In both contexts student talk was typically quite minimal, usually one- or two-word answers. Teacher talk dominated lessons. There were, however, a few notable exceptions (see an example below).
3. All the teachers in the sample were judged to have a high level of proficiency in English, both in terms of general English and academic English. We could see no evidence of teachers struggling with what they wanted to say. Moreover, very little Italian was used by teachers.
4. However, with regard to point 3, we felt that a lot of the teacher talk had been previously ‘scripted’ in order perhaps to feel more confident and to gain a degree of fluency.
5. Teacher talk was almost always supplemented with some kind of visual material aimed at assisting comprehension.
6. Questioning was generally of the lower-order type: checking that students knew the name of a concept or could supply a limited amount of information.
7. Checking for understanding of more extended pieces of teacher talk was very infrequent. There were occasional interruptions by students where they asked for clarification.

The following examples illustrate the findings we have concluded from the transcribed data.

3.4.1 Example of a CLIL lesson (chemistry): high level of interaction resulting in a medium level of student talk with, in the main, lower-order questions

Teacher: *Do you know the meaning of the rate of reaction? How, how could you explain the meaning of rate of reaction?*

Students: *How fast ... the reaction.*

Teacher: *Perfect, er, what's the difference between [gestures at slide] the red curve and the black curve? Which, which, which reaction is faster?*

Student: *The red one.*

Teacher: *The red one, everyone everybody agrees?*

Students: *Yes.*

Teacher: *Er, what's the difference [gestures at slide] between them? How do you call this line?*

Student: *The energy.*

Teacher: *Yes, the, the activation? Energy, okay? That means what is the activation energy?*

Student: *Is the energy.*

Teacher: *The energy?*

Students: *[Various answers called out; phrase fragments.]*

Teacher: *Er, Deni?*

Student: *Is the energy.*

3.4.2 Example of EMI university lesson (human biochemistry) with low-level interaction with lower-order questions

Teacher: *Now, this very artistic picture makes me introduce the real lesson of today. And of course I didn't make this, because my sense of art none, but you can see here the eye, so you can see through the vision, but then you can hear from the ear, smell through the nose, or touch through the hand. Through these things there has peculiar way of transmission, even though there are common points which are very interesting, and I will today explain why we eat and need candy and we feel cold or we eat the chili pepper and we feel hot, okay? This is why I like this lesson because of this painting warm and [inaudible]. Let's start with vision, vision means that we have to have an apparatus that is able to get the light in a particular part of the spectrum, here is the physical part that corresponds to the vision or light, that goes from 200 or 400 to 700 nanometres.*

And this is something that in medicine is very important, because the X-ray, the gamma-ray, many of the therapy are done the X-ray, in medicine, in this part of the spectrum ... Now, why do we remember the pentose phosphate pathway? For two reasons, this is an oxidative catabolic pathway of the glucose.

Student: *To make NADPH.*

Teacher: *Very good.*

3.4.3 Example of EMI university lesson (economics and business administration) with mid-level interaction and lower-order questioning

Teacher: *So, the convention says, and why I wanna, I say convention, means you have to do it, OK, because everyone does it this way. Debit effect on the left side, credit effect on the right side, always; don't do the other way round, otherwise you will find up with a balance sheet that is, ehm, ehm, different from what, the one you have seen. So, on the debit side, we have every transaction that, ehm, that implies an increased, an increase in assets, and an increase in expenses, a decrease in liabilities, a decrease in equity, and a decrease in income. And ... here you have credit effects, every time you have exactly the opposite [inaudible] a decrease in assets, a decrease in expenses, an increase in liabilities, equity, or income, OK. ... So, this, must be here, OK, always. So, now let's see how we can record, classify every transaction without making every time a new balance sheet or a new income statement, er, ragionieri [accountants], be patient, OK? We will do it very slowly, OK? So, a cash sale, what, what is it? It's a transaction, it must have at least two effects, a double effect, ehm, which categories, ehm, does it impact? Hi.*

Student: *Assets.*

Teacher: *Assets, for what?*

Students: *Cash.*

Teacher: *Cash. So, and here I open a 't' account, I do.*

Student: *[Inaudible short answer.]*

Teacher: *OK, a 't' account, like this, OK? I put the name here, of the account, 'cash', is an assets account, OK? Is a debit, ehm, factor or a credit factor?*

3.4.4 Example of a CLIL class (physics) with high level of interaction, some of which contained spontaneous high-level contributions from students

Note: In the following case, prior to the lesson the teacher had subdivided the class into five groups and requested that the spokesperson for each group present their activity to the rest of the class. We should also note that this is one of the few examples of a teacher providing some language focus/pointers (e.g. 'if it begins with 'an'').

Teacher: Yes, does anybody remember the difference between frequency and wavelength?

Student: Frequency is the amount of oscillations in a second, so we use a hertz; by wavelength we mean the, we mean the distance between the start of a wave and the one next to it ... [student hesitates] We have ...

Teacher: [Teacher prompts] what do you mean by the start of a wave?

Student: For example, at the start of the first wave, you can see how it goes, and then we can point to the start of the next wave.

Teacher: Yes.

Student: [Draws diagram on board] and we can see the distance between this point and then this point.

Teacher: Yes, OK.

Student: [Continues reading] is a ratio of the source frequency, are characterised by an – [student waits for classmates to provide the missing term].

Teacher: If it begins with 'an' we have to look for something beginning with a ...

Student: That fits, the only one that would fit is uh ...

Teacher: Yes?

Student: Is either amplitude or oscillatory.

Teacher: Good, let's choose between the two of them.

Student: I think amplitude.

Teacher: Yes.

4

Discussion, conclusions and implications

Our data reinforce previous concerns that CLIL encompasses a wide range of teaching and learning practices. The upper secondary school CLIL classrooms in our sample provide only occasional evidence of teachers attempting to integrate language learning with content learning. The lessons observed and recorded were typically at the content end of the continuum posited earlier. Indeed, some CLIL lessons did not differ significantly in character from EMI lessons in the university sample, a setting in which there is no stated expectation that language learning is to be integrated with content learning. The finding of teacher-dominated classroom talk has to be combined with a clear finding from the strategies part of the research: either students did not feel confident to interrupt the teacher and ask questions or this practice is implicitly discouraged. Although the interview data indicated that a small sample of students felt able to deploy this strategy, it was not reported as frequently used in the questionnaire data. Whilst this situation may be attenuated in a classroom where the students' L1 is being used, it is important to continue to ask the question of whether it can be acceptable in an EMI situation and, as we have seen, even in a school CLIL situation.

Although overall we found that the level of interaction was low and student talk was minimal, in those cases where greater interaction was present this coincided with a shift from a teacher-centred pedagogy to one where, for example, students were given tasks to do and then reported on their discussion, commented on the task or reacted to some kind of different input such as watching a video. Such findings highlight the need for a different pedagogy, certainly in CLIL and possibly also in EMI, where tasks and interaction become more educationally meaningful. On this point we should also note that in the recorded data, higher-order questions, where students might demonstrate deeper understandings of concepts and processes, were rare. We might also posit that in providing responses to higher-order questions, students would potentially be using longer turns and more complex English language structures, thereby promoting their language proficiency.

The finding that teacher talk dominated the interaction also has implications for our finding on students' vocabulary knowledge. Our study provides evidence that CLIL students' level of vocabulary at the various frequency levels is not sufficient to understand adequately the teacher talk. We have seen that the language of content classrooms involved technical, general academic and vernacular vocabulary types. Teachers when preparing a lesson may feel confident about technical and general vocabulary (or what we might group together as content vocabulary), whereas the students lack this content vocabulary but, because of their background in EFL lessons and other sources (e.g. media and social media) prior to CLIL, they may be more confident with general English vocabulary.

Vocabulary knowledge is not the only component of comprehension, hence our focus on approaches to learning and on learning strategies. An interesting finding is that students did say that they tried to focus on keywords in the lesson and/or the teacher talk. However, from a student's perspective we need to establish further which are the keywords that they are focusing on. Do they mean the words that best represent the topic or topics of the lesson? Do they mean learning the technical words which are the labels given to the concepts they are being taught? These kinds of discussions would benefit from greater collaboration between content specialists and English language specialists, as has been observed in a study by Costa and Pladevall-Ballester (2019 in press) comparing CLIL in Spain and Italy.

A lack of content vocabulary knowledge was not as evident in EMI lessons in university settings according to students' self-reports of proficiency and confidence. The interviews we conducted also suggested EMI university students encountered relatively few linguistic difficulties in understanding course content. These findings are supported by our corpus data, which suggest that the EMI lectures sampled were less lexically challenging than the CLIL classes.

We would signal a note of caution here, though. Some of this difference may be attributed to the self-selecting nature of the EMI courses, as interviews with students revealed many of them had elected to take EMI courses due to language-external factors such as access to smaller class sizes, which they believed might enrich their learning experiences. Moreover, our questionnaire revealed that a considerable proportion of university students had taken part in study in an anglophone country. If that is the case then the issue of a non-egalitarian education system might come into play. Although in theory in Italy no student can be barred from enrolling on a (potentially prestigious) EMI university programme, their own perception of language proficiency might make self-selection a reality. We should also note that the sample of students who took part in interviews was a self-selecting one and, although they were all given the option of responding in Italian, a number opted to do the interview in English, as some said, in order to take the opportunity to practise their English. In other words, it is possible that the interview sample consisted of students who were highly confident with their level of English.

Lastly, we should note that many academic words in English are cognates of Italian. This may well facilitate higher levels of vocabulary knowledge (and therefore comprehension) in the Italian context, but such an advantage would not be transferable to contexts where the L1 and the L2 are typologically very different.

In terms of transition from school to university, we have to take into account that whereas at least in theory (as proposed by CLIL professional development) teachers accept some responsibility for developing the language competencies of their students, in EMI universities no such responsibility is taken on board by teachers/lecturers. This may well contribute to transition problems that students will experience if that gap in curriculum objectives is not addressed. While it is unlikely that universities will adopt integrated language objectives, university teachers should nevertheless have some awareness of the linguistic challenges the students are facing when they transition from a CLIL environment to an EMI one. What limited interaction was found in the last year of CLIL teaching should certainly carry over to the first years of EMI teaching, otherwise the gap between the two phases of education becomes too large – especially for those students whose English is not at the level of adequate comprehension.

What is also important for both CLIL and EMI is that when interaction does occur, it is used to facilitate higher-order questioning. The interaction should embody a clear pedagogical contribution to the development of knowledge.

To our knowledge this is the first study to have attempted an investigation into both CLIL and EMI in the same country. Although we are not claiming that it is a longitudinal study (we did not follow the same students from secondary school to university), we would nevertheless suggest that this ‘cross-sectional’ approach has brought to light important issues that policymakers and teachers alike need to take on board.

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Appendices

Appendix A: Further initiatives and plans implemented by the Italian Ministry of Education

- In-service teacher training for content teachers (*Docenti di Disciplina Non Linguistica – DNL*) for the acquisition of language and methodological competences: *Nota 240 del 16 gennaio 2013* describes the prerequisites for CLIL teachers and *Nota 4969 del 25 luglio 2014* provides a summary of the regulations concerning the teaching of a content subject in an FL and the prerequisites that teachers must possess.

Appendix B: Italian universities offering academic courses taught through English

EMI in Italian higher education	
35 undergraduate degree courses (three years) Entry requirement: high school diploma	
University of Bologna	<ul style="list-style-type: none"> • Genomics • Business and economics • Economics and finance
University of Camerino	<ul style="list-style-type: none"> • Biosciences and biotechnology • Geological sciences
University Bocconi (Milano)	<ul style="list-style-type: none"> • Business • International economics and management • Economics and social sciences • Economics, management and computer science • International economics and finance • International politics and government
University Cattolica (Milano)	<ul style="list-style-type: none"> • Economics and management
University Cattolica (Piacenza)	<ul style="list-style-type: none"> • Sustainable agriculture
University Vanvitelli (Caserta)	<ul style="list-style-type: none"> • Data analytics • Nursing
University of Padova	<ul style="list-style-type: none"> • Psychological science • Animal care
University of Pisa	<ul style="list-style-type: none"> • Management for business and economics
University La Sapienza Roma	<ul style="list-style-type: none"> • Bioinformatics • Sustainable building engineering • Nursing
University Tor Vergata Roma	<ul style="list-style-type: none"> • Engineering sciences • Global governance • Business administration and economics

Appendix B: Italian universities offering academic courses taught through English

University LUISS Roma	<ul style="list-style-type: none"> • Management and computer science • Economics and business
University Link Campus Roma	<ul style="list-style-type: none"> • Media and performing arts • International business administration • Innovative technologies for digital communication
University of Turin	<ul style="list-style-type: none"> • Global law and transnational legal studies • Business and management • Electronic and communications engineering
University of Trento	<ul style="list-style-type: none"> • Comparative, European and international legal studies
University of Venice	<ul style="list-style-type: none"> • Philosophy • International and economic studies • Digital management
345 postgraduate degree courses (two years)	
Entry requirement: undergraduate degree	
16 single cycle degree courses (five or six years)	
University of Bari	<ul style="list-style-type: none"> • Medicine and surgery (six years) • Pharmacy (five years)
University of Bologna	<ul style="list-style-type: none"> • Medicine and surgery (six years)
University of Messina	<ul style="list-style-type: none"> • Medicine and surgery (six years)
University of Milano	<ul style="list-style-type: none"> • Medicine and surgery (six years)
University of Milano Bicocca	<ul style="list-style-type: none"> • Medicine and surgery (six years)
University of Bergamo	<ul style="list-style-type: none"> • Medicine and surgery (six years)
University Cattolica Roma	<ul style="list-style-type: none"> • Medicine and surgery (six years)
University Humanitas Milano	<ul style="list-style-type: none"> • Medicine and surgery (six years)
University of Turin	<ul style="list-style-type: none"> • Medicine and surgery (six years)
University Tor Vergata Roma	<ul style="list-style-type: none"> • Medicine and surgery (six years)
University La Sapienza Roma	<ul style="list-style-type: none"> • Medicine and surgery (six years)
University of Pavia	<ul style="list-style-type: none"> • Medicine and surgery (six years)
University Vanvitelli (Caserta)	<ul style="list-style-type: none"> • Medicine and surgery (six years)
University Federico II	<ul style="list-style-type: none"> • Medicine and surgery (six years)
University of Siena	<ul style="list-style-type: none"> • Dentistry and dental prosthodontics (five years)

Source: https://www.universitaly.it/index.php/cercacorsi/universita?lingua_corso=en

Appendix C: Other documents that may be of interest

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