Doing CLIL in the Science Classroom: a Critical Sociolinguistic Ethnography in La Mancha Secondary Schools

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Abstract: This study examines CLIL (Content and Language Integrated Learning) science education in two bilingual (Spanish/English) schools in Castilla-La Mancha (Spain), a region which has recently implemented «Bilingual or Plurilingual Projects» under the provisions of the new «Integral Plan of Foreign Language Teaching in Castilla-La Mancha». By taking a critical sociolinguistic ethnographic perspective, the article explores how CLIL is understood and accomplished in an actual science classroom through English as the medium of instruction. This empirical approach serves as the framework to reflect upon the pedagogical transformation of traditional core areas, such as science, and the ideologies circulating among science teachers regarding their own practice. By looking into interactional events in situated classroom practices, the analysis sheds light on three key issues: 1) the role of language(s) in the process of meaning-making negotiation; 2) the way content is organised, taught and acquired through English; and 3) how teachers and students construct both academic and linguistic knowledge. From a CLIL perspective, the study examines daily teaching and learning practices and how teachers struggle to appropriate this methodology to integrate content and language while facing multiple institutional, pedagogical, logistics and behavioural challenges in the science classroom. Data comprise CLIL science interactions in two 1st grade of compulsory secondary education (CSE) classrooms at two state-funded private bi/plurilingual schools in La Mancha City (pseudonym), as well as semi-structured interviews carried out with the science teachers involved in the bilingual programme. For this purpose, the CSE lens contributes to better understand how CLIL science education works by establishing links between language policies, teachers' ideologies and situated practices in relation to wider social processes.

Keywords: CLIL; critical sociolinguistic ethnography; language ideologies; meaning-making; classroom practice.

1. Introduction: Background, Objectives and Research Questions

The introduction of English as the medium of instruction has transformed the teaching practice and learning experience in many bilingual schools in Spain. Despite

the vast research on CLIL, teachers' daily practice involving multiple institutional, pedagogical, logistics and behavioural challenges in the CLIL classroom have hardly been analysed. According to Pérez-Cañado (2013), there needs to be «solid empirical groundwork [which] can guide CLIL implementation» (p. 20). Therefore, this study addresses CLIL in two secondary science classrooms by taking a critical sociolinguistic stance (Copland & Creese, 2015; Heller, 2006, 2011; Heller & Martin-Jones, 2001; Martin-Jones, 2007; Martín Rojo, 2010; Patiño-Santos, 2012, 2016; Pérez-Milans, 2013; Rampton, 2006) towards the actual teaching-learning process with a focus on talk-in-interaction (Goffman, 1981; Gumperz, 1982; Rymes, 2009). The research questions that this study focuses on are the following: (a) how is CLIL interpreted and accomplished in the science classroom?; (b) how is science knowledge and science teacher discourse co-constructed within the two focal bilingual schools?; (c) what linguistic ideologies mediate interaction in the CLIL science classroom? In so doing, the paper proposes a close-up analytical model of identifying and examining the language resources employed in the classroom and how these function, as well as the wider processes characterising the integration of content and language in a non-linguistic curricular subject, such as science.

CLIL, for 'content and language integrated learning' (i.e., the use of a second language in non-language subject teaching), has become a growing phenomenon in Spain after following different European initiatives promoting plurilingualism and linguistic diversity (Council of Europe, 2014), in an attempt to meet the requirements of the European Union that all citizens master two other languages in addition to their mother tongue (European Commission, 2012). In the autonomous community of Castilla-La Mancha (CLM, hereafter), bilingual education has undergone a significant transformation due to the urgent implementation of different «CLIL-type bilingual programmes» in public (i.e. state-run) and semi-private (i.e. state-funded private) schools in the last two decades. Among the five provinces comprising the whole region, nearly 600 bilingual programmes have been implemented and developed by incorporating a foreign language as the medium of instruction within the curriculum (English being the most common second language; then, French, German and Italian). The proliferation of these type of «bilingual programmes» in primary and secondary schools has become a rather contentious issue in the social arena underpinning political and economic interests serving the global market demands.

In this paper, I shall address science classes taught through English as «CLIL-type science classes» due to the lack of CLIL awareness in the regional education system. The aim of the paper is to examine teachers' attempts to implement a content-based language pedagogy in light of the demands of EU mandates on foreign language education. Teachers and coordinators of those bilingual programmes are nowadays struggling to implement a pedagogy in which they have not been previously trained. CLIL, as a token for innovation, has been re-signified in the foreign language teaching field to combat the lack of language proficiency (Cenoz, Genesee & Gorter, 2014), like in some regions of Spain (the Basque Country and Catalonia). Nevertheless, in the case of CLM, it was not until 2017 that the Spanish equivalent term for CLIL, «AICLE» (*Aprendizaje Integrado de Contenidos y Lengua Extranjera*), was first mentioned in the new 'Integral Plan of Foreign Language

Teaching in Castilla-La Mancha', as an attempt to establish more standardised guidelines for all bilingual schools. Among these schools, fourteen (seven primary and seven secondary) were involved in the Bilingual Schools Project of the 'MEC/ British Council agreement' (former Ministry of Education, Culture and Sports) signed in 1996, which only involves public schools and establishes science as one of the core CLIL subjects within the bilingual curriculum. It is not the case for state-funded private schools, which select CLIL subjects according to the availability of teachers accredited with a B2 (intermediate) or C1 (advanced) level of English according to the Common European Framework of Reference for Language Learning (CEFR, 2001).

This paper is organised into six different sections. In the following section, a critical sociolinguistic ethnography perspective on CLIL science education is introduced through a general review of the most relevant critical sociolinguistic ethnographies carried out in educational settings: (1) a description of the socio-historical context of science as a field of knowledge in Spain; (2) an overview of CLIL and science research in Spain. In section 3, I will provide a summary of my fieldwork, data collection methods and a description of the focal school sites where science is one of the core CLIL subjects, including some information about their distinctive bilingual programme. Section 4 will focus on the analysis of interactional and interview data from both schools regarding the co-construction of language and knowledge in the CLIL science classroom. Section 5 will discuss the results of the data analysis by comparing the teaching and learning practices in both focal institutional spaces. The last section will include the conclusions and implications of this type of critical approach on multilingual educational settings from an interactional perspective.

The importance of this study stems from a micro-analysis of naturally occurring data which provides a framework to understand how language functions in these educational contexts where students and teachers are engaged in day-to-day conversation. It is through interaction that participants problematise and negotiate language and content, address different challenges and struggle to find ways of solving potential problems in the classroom. Zooming out, the analysis will shed light on how talk-in-interaction reflects the sequential organisation of local activities, how content is organised, and science knowledge co-constructed, transferred and comprehended through English as the medium of instruction. From a CLIL perspective, this analysis provides the necessary tools to explore teaching practices in science classes and how teachers struggle to appropriate CLIL-type practices into the bilingual curricular subject, thus trying to integrate content and language, and bringing into play science knowledge and linguistic knowledge.

2. A Critical Sociolinguistic Ethnography Perspective on CLIL Science Education

Building on the tradition of ethnographic research in educational settings being reconfigured by globalisation and neoliberal forces (Codó & Patiño Santos, 2014; Copland & Creese, 2015; Heller, 2006; Pérez-Milans, 2013; Rampton, 2006), this study approaches CLIL science education from the position of a Critical Sociolinguistic

Ethnography (CSE, hereafter) (Copland & Creese, 2015; Heller, 2006, 2011; Heller & Martin-Jones, 2001; Martin-Jones, 2007; Martín Rojo, 2010; Patiño-Santos, 2012, 2016; Pérez-Milans, 2013; Rampton, 2006; Poveda, Relaño-Pastor, this issue). This research was carried out in two secondary schools which hold traditional prestige in the local area, thus interpreting multilingual classroom practices as situated interactional events. Drawing on Heller (2007), a critical social perspective on the concept of bilingualism understood as ideology and practice under the conditions of the political economy governing the globe serves as the frame for this investigation. Building upon this idea, the paper reflects on the pedagogical transformation of traditional core areas, such as science, and on the ideologies circulating among teachers in CLIL contexts regarding the way the teaching and learning of science is done through English, and the value that belonging to a bilingual «science community» has in the current society. In addition, Heller (2011) explains that ethnography allows us to «discover how language works as situated social practice» (p. 10). On the one hand, «a political economy perspective» provides the lens to understand «how material conditions constrain how we make sense of things» (p.10). On the other hand, engaging in «critique» means «describing, understanding, and explaining the relations of social difference and social inequality that shape our world» (p. 34). Even though this study is not deeply focused on social organisation and categorisation processes, it brings to the fore what other processes of negotiation, participation frameworks and knowledge construction take place in the CLIL classroom, as well as the social implications of this type of bilingual education in these particular educational sites. Beyond CSE, this study also draws on conversation analysis from an interactionist perspective to examine classroom interactions at a micro level (Goffman, 1981; Gumperz, 1982; Rymes, 2009). This perspective serves to identify recurrent patterns of action in order to better understand how these CLIL-type bilingual programmes are being implemented, as well as the consequences within the classroom dynamics, and the social and institutional order under the current socio-linguistic, political and economic circumstances.

Within the frame of neoliberalism, being part of the «bilingualism movement» (Fernández Barrera, 2019) entails a set of beliefs, attitudes and even a specific status attributed not only to the added value the English language embodies in these institutional settings (i.e. proficiency means better access to the labour market) (Fernández Barrera, 2017), but also to the membership in «imagined» bilingual communities of practice (Anderson, 1991; Pavlenko & Norton, 2007). An ethnographic lens contributes to looking for patterns and systematicity within social practice, thus allowing us to explain how people make sense of the things they do in situated events (Heller, 2014). Likewise, everyday situated practices are key to understand the intricacies of social interaction in institutional spaces in relation to social, historical, political and economic conditions under which interaction occurs (Copland & Creese, 2015; Patiño-Santos, 2016).

Before going deeper into the existing literature about CLIL science research in Europe and Spain, I shall describe and explain the situation of science as a field of knowledge in the Spanish context.

3. Science as a Field of Knowledge in Spain

Science, as a field of knowledge, has traditionally been regarded as really complex and also a guarantor of prestige and success in current societies. Living in the 21st century, it seems the world is ruled by technology and scientific advances that make our lives easier and more comfortable, from one spot of the Earth to the other, and that is precisely what globalisation stands for. Science can also be considered as a trend or a lifestyle; however, societies conceptualise this field as being the key for a better future, accessing the labour market more easily and sometimes entailing a higher social status.

Particularly in Spain, the dichotomy established in the education system between the Arts and Humanities track, on the one hand, and the Science, on the other, has given rise to two opposing positions in which students (and teachers) are placed - just by selecting one option or the other in their higher secondary education (*Bachillerato*). This choice will determine their future career as they will have to study specific areas of each track and then take a final exam after finishing their two academic years only if they are determined to access university studies. Nevertheless, students are somehow pre-selected in their last academic year in secondary education (4th grade), as they must choose among different optional subjects that will prepare them for more specific areas in the next two years. The reality behind this fact is that students – and teachers – are unanimously categorised and tagged under two completely opposing labels: the brilliant, well-behaved bilingual students, and the lazy, badly behaved non-bilingual students. The controversial issue in these terms is that the Arts and Humanities track is often regarded as a «mishmash»; that is, an option for the least brilliant students or those who misbehave. Taking this for granted, parents' preferences for their children is to move towards the science track, with the hope that they will perform better, which would allow them to learn as much as possible along with their peers. This «good-bad» dichotomy has broadened from the distinction between Arts/Humanities and Science, being nowadays applied to «bilingual» and «non-bilingual» curricular tracks. Science being one of the most common CLIL subjects included in the bilingual programmes in CLM, the contrast between «good» and «bad» has significantly intensified. Students belonging to the CLIL science subject are supposed to be the most academically successful, which is not a *sine qua non* condition for being respectful and disciplined, as teachers may expect.

4. An Overview of CLIL and Science Research

Over the last two decades, CLIL research both in Europe and Spain has consolidated (Cenoz, Genesee & Gorter, 2014; Dooley & Masats, 2015; Lasagabaster & Ruiz de Zarobe, 2010; Pérez-Cañado, 2012; Ruiz de Zarobe, 2013) and CLIL has been highly praised by the European Commission and the Council of Europe as a distinctive methodology combining the learning of academic content with the learning and use of an additional language (Coyle, Hood & Marsh, 2010). In the European context, it is widely assumed that any additional language can be used as

the medium of instruction; however, CLIL is mostly associated with English in most European countries including Spain.

Despite the vast amount of CLIL research in the European context (see Coonan, 2005; Coyle, Hood & Marsh, 2010; Dalton-Puffer & Nikula, 2006; Marsh, 2002; Lorenzo *et al.*, 2007; Smit, 2007), there is a scarcity of sociolinguistic, ethnographic studies that address the complexity of these type of bilingual programmes, particularly in the science classroom (see Pérez Cañado, 2013). In the Spanish context, some exceptions examining CLIL classroom interactions and stakeholders' views about CLIL as situated linguistic practices are Labajos Miguel and Martín Rojo (2011), Martín Rojo (2013), Pérez-Milans and Patiño-Santos (2014), Relaño Pastor (2015, 2018a, 2018b), and Codó and Patiño (2017). More critical studies towards CLIL include the need of content-subject materials designed in the language of instruction, insufficient teacher training, and the lack of assessment criteria according to CLIL parameters (Banegas, 2012; Pavón & Rubio, 2010). In addition, existing critical research has shed light on the tensions emerging between subject-specialists and language teachers (Costa & Pladevall-Ballester, in press), and other authors have analysed teachers' narratives on what being bilingual means and on their own CLIL teaching practice in neoliberal educational settings (Relaño Pastor, 2018b; Relaño Pastor & Fernández Barrera, 2018). In the case of CLM, teachers involved in bilingual programmes find themselves under prepared for implementing CLIL pedagogies in their daily teaching practice. This means facing multiple challenges at macro (institutional and language policy) and micro levels (teachers, students, classrooms). The data analysis provided further below will attempt to account for the complexities in the CLIL classroom that mirror the way regional language policies are being interpreted, appropriated and implemented in each focal school depending on each school's material, linguistic and human resources.

In terms of CLIL science research, there seems to be an increasing interest - but still scarce qualitative research -, as it is one of the most common subjects selected to be part of the bilingual curriculum (Spanish/English). Some authors have analysed how knowledge is constructed in CLIL science classrooms from an interactional perspective at different educational levels. Some studies have examined teachers' negotiation of language, content and membership in the CLIL science classroom at a multilingual university (Moore & Dooly, 2010), and other authors have focused on knowledge construction through meaning-making processes (Evnitskaya & Morton, 2011). Furthermore, CLIL learning has been examined through tasks to measure fluency and lexical repertoire (Escobar Urmeneta & Sánchez Sola, 2009), and it has also taken a dialogic perspective on teacher-led discussions in the CLIL classroom (Escobar Urmeneta & Evnitskaya, 2014). The novelty of the current study relies on a combination of methods and analytical tools in elucidating the importance of ethnography for a more comprehensible account of what is going on in the CLIL science classroom and at which costs bilingual programmes are being implemented in CLM.

5. Fieldwork, Data Collection and School Sites

The data analysed comprises teacher interviews and classroom interactions gathered in CLIL science lessons (1st grade of compulsory secondary education) in two state-funded private schools in CLM: San Marcos and San Teo. Both lessons belong to a larger corpus of recorded classroom data collected in the fieldwork from 2014 to 2017 as part of a critical sociolinguistic ethnography of bilingual programmes in CLM exploring social difference and inequalities. Ethnographic data include long-term participant observations, audiotaped recordings of focus group discussions with bilingual students, classroom interactions in content subjects taught in English, as well as and field notes and semi-structured interviews with teachers, students, bilingual programme coordinators, language policy makers and educational inspectors. Other ethnographic artefacts consist of pictures of the physical spaces and teaching material, institutional documents of the language-in-education policies implemented in the region of CLM since 2014, when these bilingual programmes were urged to be implemented in all CLM schools by 2018 (Plurilingualism Decree, 2014/2017).

By offering a fine-grained analysis of transcript data selected from two different secondary science classrooms and educational contexts but with the same contextual factors (e.g., participants' age; pedagogical approach; demographics; and multilingual ecology), this paper aims to illuminate how CLIL is appropriated, interpreted and accomplished in the science classroom. In so doing, it is important to know about the context of each educational site and the bilingual programme they have implemented.

6. The Bilingual Schools: San Marcos and San Teo

San Marcos (religious) and San Teo (lay) belong to the «imagined»community of bilingual schools that stand out among the rest of educational sites due to their unique and distinctive bilingual programme (see Fernández Barrera, 2017 for a full explanation of this concept applied to CLM bilingual schools). Regarded as two of the best bilingual schools in the local area, both include science in the bilingual curriculum (i.e. taught in English).

On the one hand, San Marcos' Trilingual Programme is the only one in the local area including a second additional language, French, in history and geography in the 3rd grade of compulsory secondary education. Every year, the school hires what stakeholders in bilingual schools like San Marcos call «a native English assistant». These language assistants usually come from the U.K., Ireland or USA to teach in the English classes, and their role is mainly to linguistically support the English language teacher. This school is also one of the Cambridge English examination centres in the city and offers foreign exchange programmes (France) and one-week school trips (Great Britain), as well as extracurricular English classes to train those bi/trilingual students.

On the other hand, San Teo has traditionally boasted about its enviable reputation in terms of top-quality education, strict standards and a top bilingual programme, unique in town due to the native teachers hired every year to teach

CLIL curricular subjects. These teachers are maintained by those families whose children are enrolled in the bilingual curriculum thanks to an extra monthly fee. The native teachers at San Teo are supposed to co-teach with the content subject specialists, who must be present at all times in the classroom as a support and, in some instances, they are also responsible for providing students with extra academic support (in Spanish) out of the ordinary classroom. San Teo currently belongs to the Cambridge National Schools Project, providing English assessment and Cambridge English official certification. In addition, it has recently implemented the International Baccalaureate programme (academic year 2016-17), which provides students with the possibility of obtaining the Dual High School Diploma (U.S.A and Spain).

7. Data analysis: The Co-construction of Language and Knowledge in the CLIL Science Classroom

In the analysis presented in this paper, teachers and students are considered active participants in classroom interaction, in which they collaboratively engage in the construction and acquisition of linguistic and non-linguistic knowledge. All participants have their own expectations on what roles they play, and which participation frameworks are established in the classroom. CLIL science teachers appropriate academic discourse (science-related) in order to make it comprehensible for their students. According to Lemke (1990), «learning science means learning to talk science» (p. 16). This statement refers to learning to use specialised conceptual language in the development of different learning skills as well as to communicate while accomplishing classroom activities. It is through meaning-making processes that students make sense of science knowledge and other linguistic and metalinguistic aspects. These situated classroom practices are analysed in relation to language policies and wider social and political processes where English and science play a fundamental role.

The micro-level conversation analysis that follows sheds light on how talk-in-interaction is organized and what processes of negotiation of meaning-making occur in the construction of science knowledge. The classroom interaction excerpts are presented sequentially for a full understanding of the development of the lesson. The excerpts are included in the original language(s) in which the interaction took place and English/Spanish translations are also provided. For a full understanding of the transcription conventions, see Appendix I.

8. Science Events at San Marcos

The participants are twenty-six students aged 11-12 and a science teacher (Juan Luis) accredited with a B2 level of English (i.e. independent user), according to the Common European Framework of Reference for Language Learning (CEFR). As the teacher indicates in one of the interviews, he started implementing CLIL in his science classroom about eight years ago, after the school administration decided to adjust to EU demands on foreign language teaching and learning.

The excerpt analysed belongs to a CLIL science lesson dealing with 'the tilted axis of rotation' implemented as part of a unit on 'the seasons'. During this science

event, the textbook is used along with photocopies of activities in English. First, the teacher explains the difficult concepts, such as «the tilt of the axis» (in Spanish, «la inclinación del eje»), thus anticipating potential problems. Afterwards, students are required to put the knowledge acquired into practice by solving problems related to the angle and specific degrees at which that the Earth's axis is tilted.

Excerpt 1. «We put this at the beginning in the key words». [Science class, 1st grade of CSE, 13/05/2015. Juan Luis (JL), the science teacher; Roberto (R), María (M), Pablo (P) and Carlos (C), students; undetermined students (Ss)].

1	JL:	do you need an explanation?
2	Ss:	ye:s (0.3)
3	JL:	°hasta qué lado está la altura de la° (undetermined) a ver (.) shh (.) Earth orbits
		°*to which side it is the height of the*° *well*
4		the sun on a tilted axis (.) Do you remember what's a tilted axis?
5	R:	yes
6	M:	si
		yes
7	JL:	the <u>tilt</u> of the axis?
8	Ss:	la inclinación=
		the tilt=
9	R:	=la inclinación
		=the tilt=
10	JL:	esto lo pusimos al principio in the key words (.) tilt (.) inclinación and a tilting axis
		we put this at the beginning *tilt*
11		(undetermined) ing (.) quiere decir inclinado. (0.3) do you know how many degrees:?
		it means tilted
12	P:	thirty three=
13	JL:	=thirty three (.) point five ((writes on blackboard the earth and its parts)) (1.2) SHH
14	C:	AHÍ VA: (.) DIBUJAS BIEN (0.3) °hay que hacer la pelota a los profesores° (.) si no::
		WOW: (.) YOU DRAW WELL (0.3) °we must suck up to the teachers°, otherwise::

As the interaction shows, Juan Luis (JL), the science teacher, is using both Spanish and English to explain what a «tilted axis» is, a specific concept that may cause some trouble understanding. That is precisely one of the key words they will be asked for in the exam. In fact, in the development of every content unit, the teacher requires students write down key terms on their notebooks with the corresponding translation in Spanish. According to the current language policy, CLIL subjects must be completely taught in English, and content is prioritised over language, which should not be penalised in assessment. However, JL is very much concerned about an accurate understanding of the concept itself regardless of the language repertoire he selects for that purpose.

After reading a text in English about the concept, he asks them whether they need an explanation, replied by an expected affirmation (line 2). After a small attempt to explain in Spanish, he then switches to English to address the whole class a 'yes/no' interrogative (lines 3-4), functioning as a remediation sequence, thus checking previous knowledge (it is notable the grammatically wrong structure of the question without the corresponding inversion in the question). Despite the students' positive answers in both languages (Spanish and English), he then simplifies the question by rephrasing the expression into «the tilt of the axis», changing the adjective «tilted» by the noun «tilt», which he assumes everybody knows. The teacher then switches to Spanish to clarify that this concept was supposed to be noted down in the key words list. Providing translations for both «tilt» and «tilting axis», with a special emphasis on the spelling of the «-ing» suffix to explain a grammar point about how adjectives are formed, then he switches back to English to ask another 'yes/no' question. It is noteworthy how one of the students jokes about his teacher's way of drawing on the blackboard. It appears to be a flattering comment which unfolds another pragmatic purpose. The student quietly confesses to me that they must «suck up to the teachers», implicitly stating that they would not succeed in the class otherwise. However, these students are portrayed as «brilliant» compared to those non-bilingual students, which implies a set of expectations for both teachers and students in the bilingual programme.

This analysis helps us to better grasp the co-construction of science knowledge and science teacher discourse in the course of implementing CLIL from the teachers' own understanding of what this term implies (related to goals (a) and (b)). In the case of JL, the most common discourse strategy to make himself understandable is repeating sentences or expressions with little grammar variation, sometimes rephrasing, or using Spanish to translate or clarify ideas. Furthermore, in his daily struggle to teach linguistic knowledge, he sometimes includes grammatical explanations, as the following excerpt illustrates.

Excerpt 2. «It's a false friend» [Science class, 1st grade of CSE, 13/05/2015. Juan Luis (JL), the science teacher; Roberto (R), Manuel (M), and Carlos (C), students; undetermined students (Ss)].

1	JL:	I repeat (.) the movement (.) of the earth around the su:n is called revolution (.)
2		not translation (.) os acordáis de esto? (.) que translation no es traslación (.) es
		do you remember this? (.) that translation is not revolution (.) it
3		<u>traducción</u> (.3) it's a false friend
		is <u>translation</u> (.3)
4	C:	ah eso lo estamos dando
		oh we are studying that
5	JL:	el qué? los [false friends?]
		what? the [false friends?]
6	C:	[false friends]
7	JL:	pues eso (.) que se parece pero no es (.) >entonces claro< traslación translation

		so that's it (.) it is similar but not the same (.) >so then< revolution translation
8		(.) no (.) REVOLUTION (.) y si alguien quiere ((writes on blackboard)) saber el
		and if someone wants to know the
9		ve:rbo (.3) to revo:lve (.) so the earth revo:lves around the sun↑ (.) ok? rotates
		ve:rb
10		around its axis but <u>revo:lves</u> around the sun↓ (.) yes?
11	R:	yes
12	JL:	se traslada: alrededor del sol (.) me estáis escuchando todos? (.3) entonces to
		it revo:lves around the sun (.) are you all listening to me? (.3) so
13		revolve es <u>trasladarse</u> (.) to revolve (.) the name revolution, yes? ok so I repeat
14		(.) earth seasons are the result of the tilt of earth axis (.) the axis of rotation hits
15		its tilt along the whole movement of revolution (.3) do you understand?
16	Ss:	yes
17	M:	yes
18	JL:	os habéis fijado el dibujo que tenéis vosotros↑ (.) page ninety-three. (.) page ninety-three
		have you noticed the drawing you have↑ (.)
19		of your textbook. (.3) yes? this picture similar to this one↑ (.3) yes?
20	M:	what page?
21	JL:	ninety-three: (.3). esto lo voy a decir en español porque quiero que os quede
		I am going to say this in Spanish because I want it to be clear
22		clarito como el agua […]
		as water

JL initiates the sequence by using the present tense in «I repeat» (line 1), which is followed by a literal explanation which they have already read in their textbooks. He then anticipates a linguistic related problem with the Spanish word «traslación» and its English equivalent «revolution» (not «translation»), thus avoiding a common mistake that Spanish students tend to make with this «false friend» (or false cognate). He repeats and clarifies again the meaning of this «false friend» in Spanish. Along the teacher-led discourse, students are provided with little space to contribute to the conversation. It is when the teacher mentions the word «false friend» that one of them openly states in his L1 that they have already studied that in their English classes, anchoring the term into his linguistic knowledge. In this moment, JL answers back in Spanish and tries to engage this student into the conversation by asking an already known answer. After repeating for the third time the difference between «translation» and «revolution», he provides the corresponding verb («to revolve»), that he immediately introduces in the next sentence (lines 9-10), which ends with a very common discourse marker to check understanding. Not giving much time for them to process all this information or receiving a positive answer as a signal of understanding, he then reformulates the previous utterance by adding a new term («rotate») which might be easier to associate for the students as it is a cognate –Latin term– in their L1 (English «rotate» vs. Spanish «rotar»).

This way, JL attempts to explain the difference between two concepts related to the topic of this unit: «to rotate around the axis» and «to revolve around the sun», thus constructing a semantic network belonging to the academic domain. Once more, he checks students' understanding, which becomes successful this time, but he still reinforces the concept by translating the whole expression (line 12). Yet he changes his conversational tone to a more authoritative one by requesting their attention. After a significant pause, he assumes they are listening to him but he does not seem very sure about it, that is why he repeats again the translation of «revolve» and provides its corresponding noun form «revolution» (it is noticeable how he confuses «noun» with «name»). Followed by two conversation markers («yes», «ok») in the interrogative form, he then initiates another sequence by repeating again «I repeat», this time retaking the initial statement containing the problematic terms as a trigger for his previous explanation (lines 13-15). After a unanimous «yes» to confirm understanding, his initiation sequence shows a change of activity, in a tone which might be interpreted as satisfaction for accurate understanding. With a subtle 'yes/no' question, he is trying to make them focus on a meaningful picture in their textbook which condenses the content of his previous explanation. This implies another pedagogical strategy to ensure satisfactory comprehension, but he is still doubtful about the proper assimilation of that knowledge. Switching back to Spanish, he justifies his own use of the L1 to make a fully comprehensible explanation (lines 21-22). It is important to highlight how his utterances reflect a more relaxed attitude in the use of colloquial language, as he incorporates a fixed expression meaning «clear as water». This analysis shows that teachers' linguistic ideologies mediate interaction in the CLIL science classroom (related to goal (C)) by attributing certain values to specific languages. In this case, JL is valuing Spanish over English for comprehension and clarification purposes.

In retrospect, JL narrates in an interview how he was involuntarily involved in CLIL science at the beginning of the bilingual programme. Having received scarce CLIL teacher training, he was requested by the head of the school to join the bilingual programme due to his B2 English level accreditation (minimum language level required to teach in the bilingual programme). The school administration suggested the progressive introduction of English to teach some of the contents. The following excerpt illustrates the organisation of the content in his CLIL science classes.

Excerpt 3. «I decided what I considered» [Interview with Juan Luis (JL), the science teacher, and José Julio (JJ), the maths teacher in San Marcos; Alicia (AL), researcher].

1	JL:	exactamente (.) yo decidía que:: (.) lo que a mí me parecía que podía: (.) entrar
2		en esquema
		exactly (.) I decided tha::t (.) what I considered that cou:ld () enter the diagram
3	AL:	uhm uh
4	JL:	que resumiera los conceptos que estaba explicando y tal y que a ellos les fuese
5		(.5) sonando y que digo que ya sabéis que hoy en día hh si buscas información
6		por ahí vais a encontrarla en inglés (.) [entonces]

		that I could summarise the concepts I was explaining and so and that they were ringing a bell to them and I tell them you already know that nowadays hh if you look for information you are going to find it in English (.) [so]
7	AL:	[uhm uh] =
8	JL:	=que entendáis las palabras (.5) que encontráis (.) entonces fue a raíz de eso (.)
9		de las key words (.) [un]
		=that you understand the words (.5) that you find (.) so as a result of that (.) of the key words (.) [a]
10	AL:	[uhm uh] =
11	JL:	=esquema: (.5) que sintetizaba las ideas de lo que era el tema (.) y cosas así
		=diagra:m (.5) that synthesised the ideas of the unit (.) and things like that
12	AL:	uhm uh
13	JL:	y ya pues el año pasado y el anterior empezamos a buscar información (.) a
14		hacer texto y:: buscar hh actividades (.5) cómo dar esto para que:
		and then last year and the year before we started looking for information (.) doing the text a::nd looking hh for activities (.5) about how to teach this so as to::
15	AL:	uhm uh
16	JL:	fuera en plan bilingüe
		be like bilingual

When asked about why the bilingual programme started to be implemented in San Marcos and under which circumstances, JL openly states that he had to decide himself what materials and how to teach science concepts in English (lines 1-2). What really mattered was that students could become familiar with some English terms; that is why he started using the key words list, which synthesises the main ideas of each content unit. This key word list is prepared by the teacher and written down by the students in their own notebook parallel to the development of each content unit. A year after he was first involved in the bilingual programme, he began preparing his own material and English activities under the belief that his teaching practice would become «like bilingual» (lines 13-16). Further in his interview, he claims that the bilingual track implies «an extra difficulty» apart from the second language factor, as this subject is «much more complicated» because of all the specific vocabulary it entails. For him, if students only know the English term, «they are losing things in their lives». That serves as a justification for his preference to teach first the basic concepts in Spanish and then in English, so that the students can accurately understand the concept and then relate the Spanish terms with their equivalent in English. Nevertheless, the language policy in force establishes the use of the L2 at 100% of the whole CLIL teaching practice. As the following excerpt shows, JL is aware of his own teaching practice. He critically thinks about traditional pedagogies not working properly in bilingual settings. Likewise, he believes it is not enough to teach in a traditional way with an English text and make students memorise it.

Excerpt 4. «The mistake? To me? Frankly? The level of English» [Interview with Juan Luis (JL), the science teacher, and José Julio (JJ), the maths teacher in San Marcos; Alicia (AL), researcher].

1	JL:	no les puedes dar de forma clásica con un texto en inglés [y::]
		you cannot teach in a classical way with an English text [a::nd]
2	AL:	[claro] =
		[sure]]=
3	JL:	=y empóllatelo (.) entonces claro (no determinado) las otras maneras (.)
		=and cram (.) so well (undetermined) the other ways
4		[...]
5	JL:	yo creo para mí ese es el fallo (.) el fallo? (.) yo para mí? (.) sinceramente? (.)
6		el nivel de inglés
		I think that to me that is the mistake (.) the mistake? (.) to me? (.) frankly? (.)
		the level of English

From a critical stance, when discussing the heterogeneous group that he has to deal with in his bilingual subject, JL truly considers that CLIL education fails because of the low level of English of most students enrolled in the bilingual track. That is why, further in the interview, he declares he has to adapt the contents, thus lowering the level of difficulty so that they can all perform accordingly. The truth is that the regional government does not allow bilingual schools to test and select students to be enrolled in the bilingual track; therefore, parents decide whether their children receive bilingual education or not, which is usually a biased decision –rather linked to their own linguistic ideologies– due to the social hierarchisation of students («bilingual» students are labelled as «the best»; «non-bilingual» are considered as «the worst». Under these circumstances, JL struggles to deliver his science lessons in English as the medium of instruction. In so doing, he appropriates a CLIL-type model of education in his daily practice focused on reading and underlying the main ideas on their textbook just «to simplify the explanations», as he claimed further in the interview.

From this data analysis, three key issues are noticeable regarding how CLIL science education is being implemented in this particular bilingual school in CLM: (a) how CLIL teachers are engaged in the bilingual co-construction of science knowledge through the use of both languages (Spanish/English); (b) a teachers' misaligned approach at implementing CLIL due to the lack of CLIL teacher training and the linguistic barrier; (c) the rationale for pedagogical decisions made in the CLIL science classroom, which provides evidence of how this particular teacher (JL) understands CLIL and how he struggles to implement it in his daily practice.

In the next subsection, an analysis of CLIL science classes in San Teo is provided in order to establish links between the two educational sites under study with the aim to better understand the intricacies in this CLIL subject and the implications it has in these imagined bilingual communities. One of the most noticeable differences is the way science teaching is managed in teacher partnerships in San Teo and the crucial role of the native teacher in this particular bilingual school.

9. Science events at San Teo

Unlike San Marcos' students, San Teo's are believed to have a higher level of English mainly due to the native teachers involved in the bilingual curriculum. The participants are two teachers and twenty-one students aged 11-12. One of the teachers is Sandra, native speaker of English coming from the U.K., and Antonio is the subject specialist with no English accreditation whatsoever. Both must be in the same classroom but it is actually Sandra who deals with the whole organisation of the bilingual subjects. The specialists' role consists of assisting her and the students when necessary, with exceptional cases of non-bilingual students who are taken out of the ordinary classroom to receive extra academic support while their peers are attending English-medium instruction. Sandra is not an expert in the science field or the other CLIL subjects she teaches at this school (Arts and Crafts, Technology, Philosophy or Biology, depending on the school's choice). Even though she is aware of her lack of content expertise in most areas, after more than ten years at this school (first, as a native language assistant), she is satisfied with the freedom she is given to prepare and organise her classes and with the high level of English her students obtain when they finish their secondary studies (up to a B2).

The following excerpts belong to a CLIL science classroom dealing with «the male and female reproductive systems» (i.e. «fertilisation», «gamets»). Sandra's teaching practice is usually based on following the textbook, writing key terms and drawing diagrams/outlines on the blackboard that students must copy at the end of the lesson. In Excerpt 5, Sandra is explaining the reproduction process after having read one paragraph in their textbook. There are two particular students who stand out from the rest as being completely opposed to. Jaime is a very active, talkative boy, typically stereotyped as «the clown». He is usually curious about science and keeps participating in the class –sometimes without permission–. On the other hand, Federico, is portrayed by Sandra as one of the best students in the class, properly participating in the class but very demanding sometimes.

Excerpt 5. «In Spanish fecundación, and not fertilización» [Science class, 1st grade of CSE, 09/10/2015. Sandra (S), the English native teacher; Jaime (J), Federico (F), María (M), Tomás (T), Luisa (L), and Víctor (V), students; undetermined students (Ss)].

1	S:	a female and a male (.) for sexual reproduction:n↑ they need (.) a female (.) and
2		a male (.) The female produces female gamets↑ (.) the male produces male
3		gamets↑ (.) and when a female gamet and a male gamet uni:te (.) it forms a::
4	J:	[baby]
5	F:	[a new] individual
6	S:	a ver (.) a baby *come on*
7	J:	((@@))
8	F:	a new individual?
9	S:	a new individual↓.

[…]

10	S:	e::h (0.3) what is the name of when they unite and form the cygot? (0.3) fertili::=
11	Ss:	=sation=
12	S:	=sation (.) <fertilisation>(.) in Spanish?
13	Ss:	fertilación
14	J:	fertilación
15	T:	fertilación
16	L:	[fertilización]
17	V:	[fertlización]=
18	S:	=fertilización
19	J:	fertilisation
20	S:	fertilación?
21	J:	fecundación (.) lo he dicho mal ((@@))
		I have said it wrong
22	M:	ºfecundationº
23	S:	vale:? (.) fertilisatio:n is when (.) a >male gamet and female gamet> uni:te (.)
24		ok? (.) and it forms the cygot >in Spanish> fecundación (.) and not fertilización
25	Ss:	((@@))

By using specific terms to explain how new individuals are formed («male», «female» and «gamets»), Sandra, the teacher, leaves the utterance incomplete expecting the students to fill in the gap with the accurate answer («a new individual»), but Jaime immediately answers with a more concrete noun («baby»), which is closer to his experience. Almost at the same time, Federico answers accurately but Sandra does not realise. She switches to Spanish to emphasise that «baby» is not exactly the accurate word and that is when Federico interrupts to provide the right expression (line 8). Sandra's subsequent turn corroborates and continues constructing knowledge by asking a 'yes/no' question about a very specific term, which is properly provided by students and immediately checked by Sandra. After that, Sandra keeps constructing semantic network related to the reproduction process, thus engaging students into the conversation. By requiring students to answer an open question, as a way to recall what they have previously studied, after a short pause, she utters the beginning of the word as a support («fertili-»). Students, following Sandra's request, start competing among themselves attempting to provide the correct term. It is noteworthy how students can fill in the gap with the accurate word ending («-sation»). Just then, she anticipates a potential translation problem by requesting the accurate Spanish translation. After a few attempts («fertilación», «fertilización») followed by Sandra's repetition of the word in a not very convincing tone, Jaime eventually takes the floor by uttering the accurate word («fecundación»), and excusing himself for having mispronounced «fertilisation» (lines 19-22). Even María seems to play with both languages as she utters the Spanish accurate term with an English made-up word ending in «-ation», with the corresponding English pronunciation (line 22).

This excerpt makes evident how students apply common grammar rules to form nouns from Spanish to English and vice versa, co-constructing –while playing– new academic and linguistic knowledge. In fact, most English words ending in «-ation» have their Spanish equivalent ending in –«ación» (English «fertilisation»; Spanish «fecundación/fertilización»). Taking the floor again, Sandra initiates the sequence to check understanding («vale»), which is one of the most recurrent Spanish words she incorporates in her discourse for this particular purpose. This marker changes the debate into a clarification in English, providing the accurate translation in Spanish and negating the word «fertilización». However, this word does exist but it applies to the plant kingdom. As a non-Spanish-native teacher, she may not know how to solve this confusion, but she eventually solves the problem, triggering students' laughing.

As Sandra claimed in an interview, students «learn a lot more vocabulary than they would ever learn in a normal English class». Despite having some freedom in her teaching practice, the contents the students learn are constrained to those in their textbooks and Sandra's daily use of the blackboard as a support. Sandra's case, being hired as the «native teacher» lacking content expertise, provides insightful accounts of how CLIL is understood and adjusted by the school's administration, as well as the way CLIL is played out in the classroom depending on the human and linguistic resources available at this school.

The following excerpt shows Sandra's opinion on students' learning of both linguistic and academic knowledge, which for her is achieved thanks to a more relaxed and dynamic development of her classes compared to previous years.

Excerpt 6. «Now like their English is a lot better» [Interview with Sandra (S), the English native teacher; Alicia (A), researcher].

1	S:	eh: (2.5) yeah↑ I start… yeah because the whole (1.5) class is just a completely
2		different dynamic in the class now (.) like before like I said it was (.) very
3		much (.) just make them understand what was in the book
		[…]
4		the kids were really like really concentrated to understand and
5		understand (.) now like their English is a lot better (.) they (.) I just need to talk
6		really (.) when they don't understand they tell me but it's a lot more a lot more
7		relaxed [I think]

According to Sandra, what the students need is just her talking instead of just being very concentrated on understanding what is in the book (lines 4-6). She also compares her students' language competence and claims that now «their English is a lot better». In this case, Sandra's practice in the classroom seems rather traditional although she stated in an interview that she would like to have more time to do experiments, for example, in her science classes. This lack of time is emphasised in an interview conducted with her regarding the occasions in which she switches to Spanish to explain some concepts because «it's just easier […] and quicker». She is really confident about her teaching practice and what CLIL science teaching means for her. As the following excerpt illustrates, according to her, «it is not only an English

class», thus prioritising the understanding of concepts rather than language learning. In this sense, the learning process takes place no matter the language used in the classroom. Therefore, Sandra's interpretation of bilingual education relies on the need to use Spanish in her science classroom for very limited and specific purposes.

Excerpt 7. «It is not only an English class. It is a biology class». [Interview with Sandra (S), the English native teacher; Alicia (A), researcher].

1	S:	I don't think it matters (.) we sometimes >I< explain things in Spanish
2		because at the end of the day it is NOT only an English class (.) it IS (.) a biology
3		[class]
4	A:	[uhm uh]=
5	S:	=so you can (.8) you know (.) there can't be the situation they are not
6		learning because it's in English
7		[…]
8	S:	=sometimes they'll ask a rea:lly specific question that you know you need to
9		talk for (.) some time about in >it's just ea:sier< [and]
10	A:	[yeah]=
11	S:	=quicker=
12	A:	=and quicker=
13	S:	to explain in Spanish and say >(you understand?)< right (.) ok? (.) and then
14		go back to English

In fact, when these demanding students request a more complicated explanation, there seems to be a compartmentalised use of languages in the classroom which she is aware of and accustomed to doing it. Even though she seems to advocate for the flexible use of language(s), from a critical perspective as a native teacher, Sandra seems to resist compartmentalising the two languages. She is also resisting and challenging the top-down mandate that CLIL needs to be implemented only in the target language (English in this case). Her interpretation of this type of bilingual education might serve to validate her own teaching practice given her inadequacies to implement total immersion.

The next classroom interaction is an example of the struggles she has to face when dealing with those situations where students keep interrupting to ask questions that seem to be meaningful for a teenage student, Jaime, who is curious about concepts closer to his own experience.

Excerpt 8. «Was it a stupid question?» [Science class, 1st grade of CSE, 09/10/2015. Sandra (S), the English native teacher; Antonio (A), the science specialist; Jaime (J), Tomás (T), Pedro (P) and María (M), students; undetermined students (Ss)].

1   S: another disadvantage of sexual reproduction that is not in the book is that it's very slow (-) vale? (.) think of humans (.) nine mo:nths for one baby no? (.) mmm pandas is longer (.) the gestation for pandas is one year and something (.) no? they take a very lo:ng time to have the babies (.) the bigger the animal (.) the longer the period of gestation (.) so e::h (.8) it's very difficult to create a lot of descendants (.) asexual living thi:ngs can create millions of descendants in a very short ti:me (.) sexual no (.) sexual living things e::h don't (.) it's ve:ry very slow (.) ok? (.) any questions?=

2   J: =no

3   S: do you understand the difference between sexual and asexual?

4   J: teacher (.) if you can't…? ((@@)) bueno na::
          well nothing

5   S: tell me

6   T: a ver lo que ibas a decir
          let's see what you were going to say

7   S: was it a stupid question?

8   P: de ti no me fio Jaime
          I don't trust you Jaime

9   J: si no sabes lo que voy a decir
          you don't know what I am going to say

10 S: venga (.) sorpréndeme
          ok (.) surprise me

11   ((@@))
          [...]

12 A: a ver (.) Jaime (.) no he entendido tu pregunta
          well (.) Jaime (.) I don't understand your question

13 J: a ver (.) que si por ejemplo (.) tu novia está embarazada
          So (.) if for example (.) your girlfriend is pregnant

14 M: hala::
          come o::n

15 J: y tú tienes tres hijos (.) si tú tienes tres hijos y cada hijo han sido nueve meses
          and you have three children (.) if you have three children and each child has been nine months

16 A: pues veintisiete meses
          so twenty-seven months

17 J: pues ya está (.) y cuántos años?
          that's it and how many years?

18 A: pues dos años y: tres meses

		two years and three months
10	J:	venga ya está (.) ya hemos salido de::
		ok well then we have already cleared u::p
20	C:	lo que hace la experiencia
		what experience does
21	J:	ya hemos salido de dudas
		we have already cleared up our doubts
22	A:	shh (.) ya hemos (.) conclusión ((background noise)) dos años y (tres meses) (.)
23		esa era la conclusión (.) no? (.) pasar los meses a años (.) venga seguimos
		shh (.) we have already (.) conclusion ((background noise)) two years and (three months) (.) that was the conclusion (.) right? changing months into years (.) come on let's continue

In this case, after a long monologue explaining the disadvantages of sexual reproduction in terms of the gestation period and giving the concrete examples of sexual living things (e.g. «humans» and «pandas»), Jaime takes the floor to answer Sandra's question about whether they have any doubts. Then, after Sandra's 'yes/no' question to check understanding, he solicits Sandra's attention to request specific information. Using a conditional negative clause and the pronoun «you» as the subject, he stops and laughs, and backs out as if he were regretting or ashamed of requesting apparently personal information; or maybe because it is a very complicated structure to be addressed in English. Sandra, after insisting with a command («tell me»), does not leave the floor to Jaime and immediately silences him with a negative comment about his question (as being «stupid»). Not only is Sandra suspicious of Jaime's purpose, but also his peers (lines 7 and 10). Suddenly, Sandra intervenes in Spanish ironically changing the conversational tone from the academic domain to a more colloquial, relaxed style (line 10), which triggers students' laughing. It is in the middle of chaos when Antonio, the science specialist, initiates a turn to catch their attention and indirectly requesting Jaime to repeat his question (line 12). Then, Jaime retakes the initial statement with a Spanish marker («a ver», in English «well») and continues in the same language with another if-clause in the affirmative form, but including a concrete example from the hypothetical personal life of his teacher (having a pregnant girlfriend). This intimate question triggers students' exaggerated reaction as being rude or inappropriate in that context. Jaime, then, justifies his question by building the initial hypothesis into a longer question about the years it takes to have three children if each one needs nine months to be born. As Antonio's answer does not completely clear up his doubt («twenty-seven months»), he is willing to know more specifically how many years it takes as a whole process makes him inquire again (lines 16-17). It is noteworthy how Jaime incorporates the first-person plural form when solving the problem («we have already cleared up our doubts»), as if that were a general concern for most of his peers. By including the whole group into his request, Jaime is legitimising his role in the classroom the same way Antonio, who plays a secondary role while Sandra is explaining, legitimises his participation in the conversation as a mediator for appropriate understanding and

knowledge construction, but also for keeping the group under control. In fact, in line 23, by using the plural form («seguimos», in English «let's continue»), he is not only implicitly instructing students to be quiet and soliciting Sandra's turn to continue with the development of the lesson, but also including himself as a legitimate participant in the process of teaching-learning.

This excerpt illustrates the kind of teacher partnerships occurring in San Teo. In this case, it seems that the content teacher feels threatened by the students in some ways; therefore, he needs to reassert his authority given the unbalanced conditions for both teachers in the same classroom.

10. Results and discussion

The data analysis presented in this article has provided preliminary findings as an attempt to show a holistic and comprehensive account of interactional processes through which CLIL is accomplished in science classes, and how linguistic and academic knowledge is co-constructed, negotiated, or disputed by teachers and students. In addition, the analysis offers a glimpse of what CLIL science teaching means and how teachers appropriate this methodological concept into their daily practice despite the logistics, pedagogical or linguistic constraints.

In general terms, both teachers struggle to accomplish the science subject syllabus while incorporating an additional language. These efforts may concentrate on making students understand the main contents of the textbook, which is sometimes reduced to a rather authoritative teacher-led discussion, lacking the students' voice which would contribute to a more dynamic interaction and to the learning process itself. Having received scarce or no CLIL teacher training, Sandra and JL conceive the bilingual programme of each school and its efficiency in terms of memorising key words from each content unit with the corresponding L1 translation, and an accurate understanding of the main contents. Given that one of the most arduous tasks for science teachers is to transform abstract concepts into understandable pedagogical explanations, the use of both Spanish and English provides Sandra and JL with tools to transfer science knowledge and relate new terms, as well as to build bridges between L1 and L2. While Sandra –as a native speaker of English– considers the use of Spanish as a tool to quickly solve complex doubts, JL, on the other hand, believes that teaching in English is an «extra difficulty» apart from having to deal with challenging science concepts. In this regard, there seems to be a compartmentalised use of languages in both classrooms, which is sometimes apparently resisted, such as in Sandra's case.

In San Teo, the Spanish language is represented by the specialist teacher who just intervenes in very few occasions. As the analysis has shown, he functions as a linguistic mediator when chaos occurs in the classroom or when Sandra finds difficulties when solving a problem. In the case of JL, the compartmentalised use of languages is highly remarkable. His English is reduced to simple structures, instructions, 'yes/no' questions to check understanding or to revise concepts in a reflective way, expecting answers that are sometimes silenced with subsequent questions or explanations. In addition, his way of constructing knowledge is based on repeating sentences with definitions, reformulating explanations from the textbook

or to construct semantic networks related to the main concepts. However, Spanish is used as a support when dealing with complex explanations implying complicated grammar structures or specific vocabulary with the aim to clarify previous comments. It is noteworthy –unlike San Teo– how Spanish is also used for colloquial expressions that may ease a quite limited use of English constrained to the academic domain.

In this sense, San Marcos and San Teo have appropriated a CLIL-type bilingual education programme into their own terms taking into account the school's mandates, resources and availability of teachers accredited with the minimum language level required to teach in one of these programmes. In the case of JL, he conceives his experience of teaching science as a first step for his students to become familiar with English terms. Nevertheless, Sandra's way of constructing science knowledge is based on reading the textbook and reformulating with her own words to make it simpler. In both cases, there seems to be resistance to fully implementing CLIL and scarce space for interaction among students, or between them and the teacher, which would otherwise contribute to co-constructing knowledge in the target language within the linguistic-scientific community of practice.

11. Conclusions and Implications

Ethnography has contributed empirically to a better understanding of the intricacies of these multilingual educational contexts where CLIL is mostly accomplished in the science classroom and appropriated differently by teachers. In addition, the interactional perspective along with a critical stance provide a different angle from which CLIL science education is analysed, focusing on how participants make sense of the world around them, negotiating, resisting, disputing or aligning with the ideologies circulating among teachers. By looking into the experiences and interactional data, this paper has aimed at nudging CLIL forward, thus opening new windows into the many possibilities that CLIL can offer for language teaching and learning at all educational levels.

Data analysis has illustrated the multiple struggles that CLIL teachers have to face to co-construct both language and knowledge. This controversial issue has emerged in the interactional analysis regarding how teachers struggle and manage their teaching practice on their own terms, with their own (linguistic and material) resources; including their own and personal and professional investment. In both cases (JL and Sandra), this situation tends to lead to a limited participation and interaction among students in the classroom. From a critical perspective, evidence has shown why this type of bilingual education does not align with pure CLIL premises; however, the «CLIL-type» bilingual education programmes implemented in these two focal schools is not a pedagogically orchestrated bilingual education per se. On the one hand, the proliferation of these bilingual programmes in CLM provides students with better opportunities in the labour market. Nevertheless, the lack of teacher training along with scarce human, material, and economic resources mean a significant challenge for those teachers involved in the bilingual programme willing to comply with the regional/national/EU demands on foreign language teaching and learning.

Further steps need to be taken in this regard in order to better elucidate the cost of implementing these bilingual programmes in this region. Even though the goal of the former regional administration was «to make every school bilingual by 2018» (Plan of Plurilingualism, 2014), the complexities emerging in these bilingual schools have given rise to unexpected tensions, obstacles and challenges that need to be addressed so that teachers, students, families and regional authorities can come up to their expectations in terms of what being bilingual means and what is at stake in these bilingual schools. More importantly, this type of analysis can serve as a turning point in the bilingual education system to reflect upon the extent to which the science subject is the most/least appropriate to teach in a second language in order to comply with the teachers' needs, which would imply certain amendments regarding the language-in-education policies. The CSE adopted in this paper would hopefully serve to advocate for systematic and more effective in-service CLIL professional-teacher development in CLM and Spain.

12. References

Anderson, B. (Ed.). (1991). *Imagined communities. Reflections on the origin and spread of nationalism*. London: Verso.

Banegas, D.L. (2012). CLIL teacher development: Challenges and experiences. *Latin American Journal of Content & Language Integrated Learning, 5*(1), 46-56.

Cenoz, J., Genesee, F., & Gorter, D. (2014). Critical analysis of CLIL: Taking stock and looking forward. *Applied linguistics, 35*(3), 243-262.

Codó, E., & Patiño-Santos, A. (2014). Beyond language: Class, social categorisation and academic achievement in a Catalan high school. *Linguistics and Education,* 25, 51-63.

Codó, E., & Patiño-Santos, A. (2017). CLIL, unequal working conditions and neoliberal subjectivities in a state secondary school. *Language Policy, 17*(4), 479-499.

Copland, F., & Creese, A. (2015). *Linguistic ethnography: Collecting, analysing and presenting data*. London: SAGE.

Costa, F., & Pladevall-Ballester, E. (in press). Language teachers' perspectives on the CLIL experience in Catalan and Lombard secondary schools. *Rassegna Italiana di Linguistica Applicata.*

Council of Europe. (2001). *Common European framework of reference for languages: Learning, teaching, assessment.* Cambridge, U.K: Press Syndicate of the University of Cambridge.

Council of Europe. (2014). *Languages for democracy and social cohesion: Diversity, equity and quality. Sixty years of European co-operation.* Strasbourg: Council of Europe, Language Policy Division.

Coyle, D., Hood, P., & Marsh, D. (2010). *Content and language integrated learning.* Ernst Klett Sprachen.

Dooly, M., & Masats, D. (2015). A critical appraisal of foreign language research in content and language integrated learning, young language learners, and technology enhanced language learning published in Spain (2003-2012). *Language Teaching, 48*(3), 343-372.

Escobar Urmeneta, C., & Evnitskaya, N. (2014). «Do you know Actimel?» The adaptive nature of dialogic teacher-led discussions in the CLIL science classroom: a case study. *The Language Learning Journal, 42*(2), 165-180.

Escobar Urmeneta, C., & Sánchez Sola, A. (2009). Language learning through tasks in a content and language integrated learning (CLIL) science classroom. *Porta Linguarum,* 11, 65-83.

Eurydice. (2006). *Content and Language Integrated Learning (CLIL) at school in Europe.* Brussels: European Commission.

Evnitskaya, N., & Morton, T. (2011). Knowledge construction, meaning-making and interaction in CLIL science classroom communities of practice. *Language and Education, 25*(2), 109-127.

Fernández Barrera, A. (2017). Language Appropriations, Ideologies and Identities in Bilingual Schools in Castilla-La Mancha (Spain). *Bellaterra Journal of Teaching & Learning Language & Literature (Special issue: Language Ideologies and Teaching in Multilingual Contexts), 10*(2), 41-58.

Fernández Barrera, A. (2019). *Bilingual education in Spain: A critical sociolinguistic ethnography of CLIL in Castilla-La Mancha* (Tesis doctoral). Universidad de Castilla- La Mancha. Facultad de Letras, Ciudad Real.

Goffman, E. (1981). *Forms of talk.* Philadelphia: University of Pennsylvania Press.

Gumperz, J. (1982). *Discourse strategies* (vol. 1). Cambridge University Press.

Heller, M. (2006). *Linguistic minorities and modernity a sociolinguistic ethnography.* London: Longman.

Heller, M. (2007). Bilingualism as ideology and practice. In *Bilingualism: A social approach* (pp. 1-22). Palgrave Macmillan, London.

Heller, M. (2011). *Paths to post-nationalism: A critical ethnography of language and identity.* Oxford: Oxford University Press.

Heller, M. (2014). Undoing the macro/micro dichotomy: Ideology and categorisation in a linguistic minority school. In Coupland, N., Sarangi, S., & Candlin, C.N. (Eds.), *Sociolinguistics and social theory* (pp. 228-250). Routledge.

Heller, M., & Martin-Jones, M. (Eds.) (2001). *Voices of authority: education and linguistic difference*. Westport, Conn; London: Ablex Publishing.

Labajos Miquel, D., Martín Rojo, L., & López Muñoz, M. (2011). Content integration in bilingual education: Educational and interactional practices in the c o n t e x t of MEC-British Council partnership in Madrid region. In Lasagabaster, D., & Ruiz de Zarobe, Y. (Eds.), *CLIL in Spain: Implementation, results and teacher training.* Newcastle, UK: Cambridge Scholars Publishing

Lemke, J.L. (1990). *Talking science: Language, learning, and values*. New Jersey: Ablex Publishing Corporation.

Martin-Jones, M. (2007). Bilingualism, education and the regulation of access to language resources. In *Bilingualism: A social approach* (pp. 161-182). London: Palgrave Macmillan.

Martín Rojo, L. (2010). *Constructing inequality in multilingual classrooms*. Berlin: De Gruyter Mouton.

Martín Rojo, L. (2013). (De)capitalising students through linguistic practices: A comparative analysis of new educational programmes in the global era. In Duchêne, A., Moyer, M., & Roberts, C. (Eds.), *Language, migration and social inequalities: A critical perspective on institutions and work* (pp. 118-146). Bristol: Multilingual Matters.

Moore, E., & Dooly, M. (2010). «How do the apples reproduce (themselves)?» How teacher trainees negotiate language, content, and membership in a CLIL science education classroom at a multilingual university. *Journal of Language, Identity, and Education, 9*(1), 58-79.

Patiño-Santos, A. (2012). The discursive construction of school failure: A critical ethnographical sociolinguistics in a school in Madrid. *Spanish in Context*, *8*(2), 235-256.

Patiño-Santos, A. (2016). Etnografía y Sociolingüística. In Gutiérrez-Rexach, J., *Enciclopedia de Lingüística Hispánica* (pp. 53-62). Oxon/New York: Routledge.

Pavlenko, A., & Norton, B. (2007). Imagined communities, identity, and English language learning. In *International handbook of English language teaching* (pp. 669-680). New York: Springer US.

Pavón Vázquez, V., & Rubio, F. (2010). Teachers' concerns and uncertainties about the introduction of CLIL programmes. *Porta Lingarium,* 14, 45-58.

Pérez Cañado, M.L. (2013). Introduction. *Revista de Lenguas para Fines Específicos*, 19, 12-27.

Pérez-Cañado, M.L. (2012). CLIL research in Europe: Past, present, and future. *International Journal of Bilingual Education and Bilingualism, 15*(3), 315-341.

Pérez-Milans, M. (2013). *Urban schools and English language education in late modern China: A critical sociolinguistic ethnography*. New York & London: Routledge.

Pérez-Milans, M., & Patiño-Santos, A. (2014). Language education and institutional change in a Madrid multilingual school. *International Journal of Multilingualism, 11*(4), 449-470.

Rampton, B. (2006). *Language in Late Modernity. Interaction in an Urban School.* Cambridge: Cambridge University Press.

Relaño Pastor, A.M. (2015). The commodification of English in 'Madrid, comunidad bilingüe': insights from the CLIL classroom. *Language Policy (Special issue: Language Education Policy in Late Modernity: Insights from Situated Approaches), 14*(2), 131-152.

Relaño Pastor, A.M. (2018a). Narrative circularity, disputed transformations, and bilingual appropriations at a public school somewhere in La Mancha. *International Journal of the Sociology of Language (*Special Issue: *Storytelling in globalized spaces: a linguistic ethnographic perspective)*, 250, 87-112.

Relaño Pastor, A.M. (2018b). Bilingual education and neoliberal CLIL practices. In Tollefson, J.W., & Pérez-Milans, M. (Eds.), *The Oxford Handbook of Language Policy and Planning* (pp. 505-525). Oxford: Oxford University Press.

Relaño Pastor, A.M., & Fernández Barrera, A. (2018). Competing Bilingual Schools in La Mancha City: Teachers' Responses to Neoliberal Language Policy and Practice. *Foro de Educación (Monográfico: Education, Society and Elites / Educación, Sociedad y Élites), 16(*25), 283-309.

Relaño-Pastor, A.M., & Fernández-Barrera, A. (2019). The 'native speaker effects' in the construction of elite bilingual education in Castilla-La Mancha: Tensions and dilemmas. *Journal of Multilingual and Multicultural Development (Special Issue: Elite multilingualism – discourses, practices, and debate)*, 1-15.

Ruiz de Zarobe, Y. (2013). CLIL implementation: From policy-makers to individual initiatives. *International Journal of Bilingual Education and Bilingualism, 16*(3), 231-243.

Rymes, B. (2009). *Classroom discourse analysis: a tool for critical reflection.* Cresskill, N.J.: Hampton Press.

Sacks, H., Schegloff, E.A., & Jefferson, G. (1974). A simplest systematics for the organization of turn-taking for conversation. *Language*, *50*(4), 696-735.

de Zarobe, Y.R., & Lasagabaster, D. (Eds.). (2010). *CLIL in Spain: Implementation, results and teacher training.* Cambridge: Cambridge Scholars Publishing.

13. Appendix I: Transcription Conventions (adapted from Sacks, Jefferson, & Schegloff, 1974)

↑	rising intonation
↓	falling intonation
CAPS	louder than surrounding talk
> <	speech faster than normal
:::	elongated sounds
· hh	inhalations
@	indicates laughter
uhm uh	shows continuing listenership
º º	soft talk
(1.3)	time elapsed in tenths of seconds
(.)	micropause
[ ]	overlapping speech
(( ))	nonverbal behavior
( )	non audible segment
=	no interval between adjacent utterances