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FINAL DISSERTATION

CLIL teaching: a study of how an English specialist faces, plans and carries out a Science-CLIL didactic sequence

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Abstract

Since 1990 CLIL is defined as an approach that integrates the learning of subject contents and the acquisition of an L2. This approach has been implemented on different countries and schools, to enhance the teaching-learning process and the learning of a foreign language. In this case study, the methodology that an English specialist teacher of a state school uses to face, plan and carry out a Science-CLIL didactic sequence is analysed. To gather data about teacher's beliefs and concerns and the methodologies used, the transcription of an interview and the transcriptions of the observations made during two sessions were used. Moreover, the summary of the three sessions of the didactic sequence were also considered. The results lead to a reflection about challenges and difficulties of teaching Science-CLIL and to some improvement proposals have been made. Finally, it can be affirmed that more language scaffolding should be used and that IBSE cycle parts that are not considered: developing and using models, analysing and interpreting data, using mathematical thinking, constructing explanations and obtaining, evaluating and communicating information should be considered.
Key words: CLIL, Science teaching, L2, language scaffolding, IBSE.

Resum

Des del 1990 existeix una nova metodologia que integra l'aprenentatge dels continguts d'una àrea i l'adquisició d'una segona llengua. Aquesta metodologia ha estat implementada a diferents escoles i països per millorar els processos d'ensenyament-aprenentatge i l'aprenentatge d'una segona llengua. Al llarg d'aquest estudi de cas es realitza un anàlisi de la metodologia que una mestra especialista d'anglès d'una escola pública fa servir per afrontar, planificar i dur a terme una seqüència didàctica de ciències utilitzant el CLIL. A fi de recollir dades sobre el pensament de la mestra i la metodologia utilitzada, s'ha realitzat la transcripció d'una entrevista feta a la mestra i s'han transcrit les dues sessions observades. D'altra banda, també s'han considerat els resums de les tres sessions de la seqüència didàctica. Els resultats han portat a una reflexió sobre els reptes i les dificultats d'ensenyar ciències utilitzant el CLIL i a la realització de propostes de millora. Finalment, es pot afirmar que s'haurien de realitzar més ajudes lingüístiques i que les fases del cicle de l'aprenentatge de les ciències per indagació que no s'han tingut en compte: desenvolupament i ús de models, anàlisi i interpretació de les dades, ús del pensament matemàtic, construcció d'explicacions i obtenció, avaluació i comunicació de la informació s'haurien de considerar.
Paraules clau:CLIL, ensenyament de les ciències, segona llengua, ajudes lingüístiques, aprenentatge de les ciències per indagació.

1.Introduction

On 1990, a new methodological approach that considered a foreign language to learn contents appeared, CLIL. This approach has been implemented in different countries and schools as a result of educational changes. According to Juan & Salazar (2015) nowadays the foreign learning achievement in school is considered unsatisfactory and CLIL can help to "(…) turn the classrooms into a more naturalistic environment where the target language can be picked up incidentally (…)" (p.1). Moreover, CLIL involves a change in the methodology of teaching, because when teachers need to teach in a foreign language, they should to find different ways to help students to overcome their difficulties.

Considering all these elements, the object of this research focuses on a teacher that has been implementing CLIL during five years and received an extensive training on CLIL. The purpose of this study is to analyse what are the main concerns and beliefs of the teacher when she teaches Science-CLIL and how this teacher carries out a Science-CLIL didactic sequence. Having in mind the main object of the study, the main research question is: How a Primary teacher understands, plans and carries out a Science-CLIL didactic sequence? However, other sub-questions are posed:

- What are the main challenges that the teacher needs to cope with when she plans and teaches Science-CLIL didactic sequences?
- Which language scaffolding does the teacher provide to help students acquire L2?
- What is the role that L1 has during Science-CLIL lessons?
- Which are the strategies that the teacher uses to transfer scientific knowledge?
- How does the teacher integrate the Science and Language teaching in the same session?

2.Theoretical framework

2.1 CLIL approach overview

CLIL approach has been bringing up for discussion in the recent years. Different authors have defined this term. Coyle, Hood & Marsh (as cited in Calle, 2015) define CLIL as "(…) a dual-focused educational approach in which an additional language is used for the learning and teaching of both, content and language". Amat, Vallbona & Martí (2017) highlight that CLIL is a methodology for learning content and language that enhances motivation and promotes multilingualism. Furthermore, Bruton (2015) also defends that CLIL can be very effective to enhance proficiency in the foreign language and that "(…) learning English for the learning of history, geography, etc. rather than for learning English itself prepares pupils for using the language in the world outside" (p.121). Furthermore, Espinet at al. (2017) underline that "This approach advocates the need to design learning environments in which both specific content and a specific foreign language can be taught and learned together" (p.287). In this way, it is clear that when talking about CLIL there are two focus; language and subject content that have to be combined to learn both at the same time.

The first time that the word CLIL was coined was in 1990. According to Maldonado & Olivares (2013), this word was firstly used to describe and deepen in the learning of contents through a foreign language. However, considering this first description of CLIL, it is clear that although the acronym did not exist yet, the first linguistic immersion activities started before 1990. Mehisto, Marsh and Frigol (as cited in Martínez, 2011) point out that: "The first known linguistic immersion activities date back to the age of Akkadins who conquered the Sumerians. (…) Sumerian was used as a medium of instruction to teach Akkadians (…)." Moreover, the case of Latin as a language of instruction is another example of a linguistic immersion activity that appeared before 1990. However, taking into account this definition, CLIL seems to be equivalent to linguistic immersion and it is clear that it is not. In this sense, Valdés (2016) defends that CLIL is an approach that boosts the pedagogical renovation. There is a lot of research on the characteristics that differentiate CLIL between linguistic immersion and Coyle et al. (as cited in Valdés, 2016) defend that the main difference between CLIL and linguistic immersion is that in CLIL exists an integration of language and content. As Navés and Victori (2010) suggest, although the first time that the acronym CLIL appear was in 1990, it was not until 1999 that public schools in Catalonia took part in CLIL projects. What is more, just few schools could give the students the possibility to participate in CLIL sessions, but nowadays there are lots of schools that are participating in different CLIL projects.

Although CLIL is an innovative methodology that can help to enhance multilingualism and motivation, among others, it is clear that the fact of implementing CLIL is not an easy task and that when considering CLIL there are different challenges that have to be overcame. Maldonado & Olivares (2013) defend that there are three main challenges that teachers have to deal with when planning CLIL. First of all, teachers have to know the contents of the area that they have to teach, but also the methodologies that they have to apply to teach this area. In this sense, they have to think about what and how to teach. Moreover, the second challenge refers to the teaching of a foreign language. Teachers have to know the different theories related to the foreign languages acquisition, and they also have to know how apply them efficiently. Finally, for coping with the third challenge teachers should also consider the two previous challenges, because this challenge consists on integrating both, what means knowing what and how to teach the area considering at the same time effective methodologies to teach a foreign language. In this sense, they suggest that "for this reason is essential to have a theoretical framework that helps to systematize and organize the planning of the contents that have to be taught" (Maldonado & Olivares, 2013, p.18). [1]

Moreover, there are other challenges that are shared by different authors. For example, some authors highlight the fact that when planning CLIL sessions teachers have to make a bigger effort and might dedicate more time than when planning non CLIL sessions. For example, Espinet et al. (2017) argue that "one of the most representative challenges (…) was the need to increase teachers' planning time and effort." (p.293). Moreover, other authors also highlight that another challenge is to convince all the school staff that CLIL is possible, that is possible to integrate one area and a foreign language at the same time. Another important challenge shared by many authors is the fact that some teachers consider that children do not have enough knowledge of the foreign language to express the knowledge they have on the area. This belief is also shared by some university students from University of Vic that are studying for becoming English teachers, because as Amat et al. (2017) suggest on their research "most

[1] My translation from *Ensenyar ciències en anglès. La superació d'un triple repte.*

students know that their students' English level will be a challenge that they will have to overcome" (p.4934)[2] Finally, Bruton (2015) also shares this concern:

> With such evidence, it is very likely that CLIL students will often be struggling, with limited FL, with lexically dense texts, and limited background knowledge of the subject matter, all contributing probably to excessive scaffolding and little negotiation of meaning. (p. 122)

2.2 English language teaching

It is well known that nowadays English is the global language, and that the number of people that speaks English is increasing every year. As Jenkins and Mckay (as cited in Caine, 2008) highlight, "Now is an era marked by the significant spread of English worldwide, with speakers of English as a second, foreign, or other language outnumbering native speakers". For this reason, the attention given to the English language teaching increases and different authors discuss the essential elements that make the process of teaching and learning English effective. For example, Nikolav and Curtain (as cited in Bland, 2015) agree that effective programs for teaching English to Young Learners imply focusing on meaning, integrating language instruction with mainstream curriculum, using task-based and content-based approaches, providing fun in classroom, setting up children for success, fostering learner autonomy, setting realistic expectations and assessment and providing continuity between primary and secondary school language programs.

Furthermore, other authors highlight motivation as an essential aspect when talking about teaching English to Young Learners. It is clear that teachers have a key role to motivate students for learning English, and as Puskás (2016) argues it is important to not take for granted that children are already motivated. Ferlazo & Hull (2018) also defend this position: "All students (…) need our support in building intrinsic motivation for academic achievement." (p.14). Moreover, they also mention four elements that have a key role on children's intrinsic motivation that are: autonomy, competence, relatedness and relevance.

[2] My translation from *Percepciones de futuros maestros de Infantil y Primaria sobre la enseñanza y el aprendizaje de las ciencias en Inglés.*

Another aspect that should be considered is the role that L1 (students mother-tongue) should have when teaching a foreign language. Is it true that as Kang (2006) points out, in some cases, it is said that just L2 should be employed when teaching this foreign language and there are some teachers that feel bad when they use students' mother tongue. However, as he suggests, the main aim in the communicative approach is to build communicative skills, and for this reason, he proposes the use of L1 in the cases of difficult expressions or words, to make learning more efficient. Although the use of L1 while teaching a foreign language is controversial, it is proved that an efficient use of L1 can help children to acquire a foreign language.

Benefits that L1 has when learning a foreign language are also proved. Valdés (2015) also highlights that the perception of the use of L1 has changed due to the modern multilingualism and pluriculturalism approaches. According to her, it is important to stablish links between the L1 and the foreign language. Furthermore, Cathomas and Carigiet (as cited in Busch, 2011) understand that nowadays as the teaching-learning process is considered as an interaction, L1 should be present when teaching a foreign language, to use available linguistic resources from the L1 to acquire new knowledge from a foreign language.

Moreover, Kang (2006) suggests that "Use of stories and contexts that they have experienced with in their L1 could help these young learners connect a completely new language with the background knowledge they already have" (p.5). There is another author that highlights the benefits of learning a foreign language has on the L1:

> "Learning to communicate in a foreign language, therefore, involves raising the child's awareness of mother tongue and the foreign language, developing a positive attitude to language learning and the foreign language itself as well, and helping young learners discover and develop a positive attitude to the culture given foreign language embodies" (Puskás, 2016, p.14).

Another aspect that has to be mentioned when discussing about foreign language teaching is the language scaffolding that L2 teachers have to consider. Cameron (as cited in Thomson, 2002) clarifies the meaning of scaffolding that consists on giving support to students to help them to realize and activity with help, but with the main objective of being able to remove this help in the future, with the student being able to realize the task alone. For this reason, it is

important to mention two strategies that can help teachers: the use of visuals and non-verbal language, as they seem to help students to build their own understanding of the language:

> "Using visuals, such as pictures and sketches, and non-verbal cues, such as gestures and intonation, helps make language content more accessible to students. (…) can help all students (…) bring together what they are learning and/or make connections between new and prior knowledge" (Ferlazzo & Hull, 2018, p.13).

Furthermore, as Kang (2006) suggests, children's understanding comes from their eyes and ears, and taking this into account, it is clear that teachers should also consider the use of visuals and non-verbal language when teaching a foreign language. Moreover, there are authors that defend the use of routines as a tool to help children to learn a foreign language: "Young learners function well within a structured environment and enjoy repetition of certain routines and activities. Having basic routines in the classroom can help to manage young learners" (Kang, 2006, p.5).

Puskás (2016) suggests that Teaching English to YLL (Young Language Learners) implies and efficient planning. What's more, Taralunga (2006) defends that when planning teachers have to be able to answer the following questions: what to teach?, what are the aims of teaching? and how to teach?. In the case of the second question, the answers should be shared with children, because "Children need to be given a clear goal when starting on an activity" (Puskás, 2016, p.18). That means that the learning language goal should be explicit for children, to allow them to behave and act according the learning goal. Planning is a complex process that needs time, but the complexity and importance of it makes essential to consider planning as an essential process that has to be made before teaching a language. Furthermore, when planning a didactic unit consisting on different activities is important to connect them properly: "Moving from one activity to others that are related in content and language helps to recycle the language and reinforce students' understanding and use of it" (Kang, 2006, p.2).

It is well known that the way of correcting language mistakes is another aspect that should be considered for teachers. In this case, the most important aspect is to make children understand that making mistakes is a new possibility of learning. It is important that teachers highlight the positive aspects of mistakes: "Helping students see that mistakes are opportunities to learn, not commentaries on their intelligence or a sign of failure, can lead to improved academic performance" (Ferlazzo & Hull, 2018, p.15). As Puskás (2006) highlights, "children learn

better if there is a relaxed classroom atmosphere, and they are not afraid of making mistakes" (p.18). Moreover, it is also important to provide students with enough time to think before answering, because "Many researchers found that the quality and quantity of responses improve when that wait time is increase between three and five seconds" (Ferlazzo & Hull, 2018, p.13).

2.3 Teaching Science

According to Pujol (2003), "Teaching Science should promote awareness of the link between Science and social problems and the relationship between individual decisions and the consequences they have on the collective daily life" (p.58).[3] Moreover, according to Valdés (2016), "teaching Science and about Science should help people to understand the environment and how Science can contribute to build a better world, and should also help citizens to participate actively and in a responsible way in the social debates" (p.18). [4] Furthermore, Pujol (2003) highlights that Science education should give not only access to the content generated by Science but also specific scientific tools to students, to help them to analyze the world, but also to comprehend the scientific processes and attitudes as observing, experimenting, asking questions…

Teaching and learning Science is a complex process, and there is a Science teaching approach that has gained popularity on the Science Education research community and the curricular documents world-wide: Inquiry Base Science Education (IBSE). The National Research Council (as cited in Simarro, 2013) defines the IBSE model as an approach based on: the formulation of scientific questions that enhance the active participation of students, the gathering of evidences, the use of evidences to develop explanations, and the assessment, communication and justification of their own explanations. Simarro (2013) highlights that this approach can help teachers to motivate students and to develop their critical thinking as future citizens. However, there are some challenges, as the fact of dealing with the lack of rigor that students have to analyze their own learning, and the fact that students' explanations can be disconnected from scientific theories. In this sense, Simarro (2013) defends that: "the key is that the activity allows children to go beyond, that allows them to build up explanations in

[3] My translation from Didáctica de las ciencias en la educación primaria.

[4] My translation from Didáctica de las ciencias en la educación secundaria obligatoria.

harmony with the scientific knowledge to develop models that allow them to justify their explanations, but also to make predictions and explain other situations" (p.41).[5] The National Research Council highlights the eight steps that IBSE should have: asking questions, developing and using models, planning and carrying out investigations, analyzing and interpreting data, using mathematics, constructing explanations, engaging in argument from evidence and obtaining, evaluating and communicating information.

Another important aspect that helps to develop the scientific knowledge and needs to be taken into account in the Science class is the Science talk. Pujol (2003) defends that Science talk is very important, as language is the motor of scientific knowledge. In this sense, she also argues that teachers should create a relaxed environment to motivate students to exchange their ideas and engage in the scientific talking. What is more, Valdés (2016) comments that Science has its own language, a language that might be strange to most of the students. For this reason, Mercer (as cited in Valdés, 2016) argues that "one of the most important objectives in the education is to educate children to acquire, recognize and develop specific ways to use the language" [6] (p.16). Pujol (2003) argues that it is very important to teach students a Science that help them to think, make, speak and regulate their own learning. On this sense, she highlights that scientific language is essential to build up scientific knowledge and that it is essential to create situations in which every student has the possibility to represent and express their own models, to analyze and rebuild them.

It is also important to highlight the importance of teacher talk. In this sense, Couso (2014) (as cited in Valdés, 2016) defends that discursive abilities of teachers are very important to help children to have a scientific vision and to help them to produce their own discourse. Moreover, Mortimer (2003) also highlights that teacher interventions should be useful for: "shaping ideas: selecting ideas, marking key ideas, sharing ideas, checking student understanding and reviewing" (p.27). The most important tool teachers have to shape ideas are the questions. In this case, Sanmartí (2003) highlights that good questions are essential for a good teaching, and they are challenging questions that motivate students to make good observations and experiments. Moreover, Pujol (2003) defends that: "To progress in the students' scientific

[5] My translation from Indagació basada en la modelització: un marc per al treball pràctic.

[6] My translation from Indagació basada en la modelització: un marc per al treball pràctic.

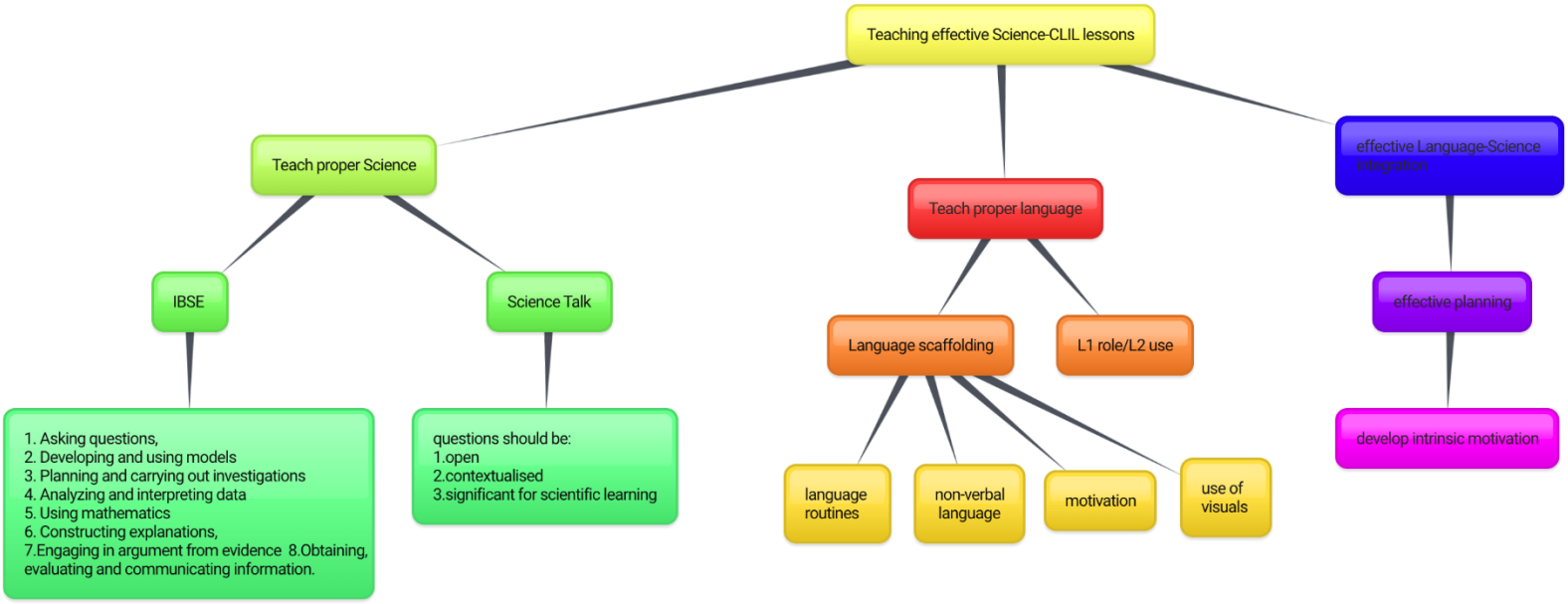
education is essential that teachers think if the questions that they are asking are key from the scientific perspective, if they are motivating students to give and contrast their own interpretations and to draw up new questions and gather new data" [7] (p.131).

Sanmartí (2003) defends that it is important to differentiate between productive and reproductive questions. According to her, reproductive questions are the ones that can be answered copying the words acquired in class or through textbooks and productive questions are the ones that have sense from the acquired knowledge, but make students create them actively. In that sense, it is clear that teachers should promote the use of productive questions instead of reproductive questions. Moreover, Sanmartí (2003) agrees that questions that are asked to students should have three characteristics, they should: have a context (to link the question with it), give clues (about which ideas should be used) and ask what is needed. Furthermore, according to Pujol (2003) questions should generate knowledge, and this is the reason why they should be open (in which more than one answer can be correct).
The answers that students give are also important to consider, and teachers should help students to elaborate new answers. According to Sanmartí (2003), for helping students to give proper answers, teachers should ask good questions that imply students to put in practice their knowledge, their ideas and the scientific knowledge that will be worked. In this sense, teachers should ask significant and contextualized questions.

2.4 Tips to teach Science-CLIL

Teaching science-CLIL involves three main challenges: teaching the language effectively, teaching science effectively and integrating both disciplines. There are some aspects a science-CLIL teacher needs to take into consideration. First, an effective planning is important in order to consider both Science and English teaching and find a way to integrate them. Moreover, it is important to help students to develop their intrinsic motivation. Regarding Science teaching, teachers should consider IBSE to give competences to analyse and comprehend the world from a scientific perspective and should highlight the importance of Science talk, engaging children on it and asking productive, open, significant and contextualized questions. Regarding the foreign language teaching, teachers cannot forget about the role of L1 and the language scaffolding, using visuals, non-verbal language and stablishing routines, among others. *Figure 1* exposes all these aspects.

[7] My translation from Didáctica de las ciencias en la educación primaria.


Teaching effective Science-CLIL lessons
Teach proper Science
Teach proper language
effective Language-Science integration
IBSE
Science Talk
Language scaffolding
L1 role/L2 use
effective planning
1. Asking questions,
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics
6. Constructing explanations,
7.Engaging in argument from evidence 8.Obtaining, evaluating and communicating information.
questions should be:
1.open
2.contextualised
3.significant for scientific learning
language routines
non-verbal language
motivation
use of visuals
develop intrinsic motivation

2. Methodology

The research presented in this paper is a case study. According to Yin (2014) a case study is an empirical inquiry that investigates a contemporary phenomenon in the real-life context. In this case, this research wants to investigate about a contemporary approach, CLIL, and considers a real context to gather, analyse and reflect about the gathered data. In this case, the study considers a case of a school that started using this approach five years ago.

School context

This case study was carried out in a state school located in "Osona", a Catalan region located in the province of Barcelona. Before choosing the school some research about different schools that are applying CLIL during Science lessons was done, but this school was chosen because it has direct contact with the university, and they have been five years teaching CLIL. Moreover, all the school staff were very opened to receive the researcher in their school to carry out this study.

The school of the study is a small school located on a village that has about 2.500 habitants. The school has about 140 students from 3 to 12 years old and since 2003 they have been doing different projects from the English area. On 2014, after carrying out different based-learning projects, they decided to start applying CLIL approach in Science lessons with fifth and sixth grade students and all the school staff and school members received the proposal with enthusiasm.

Participants

The participants of the study were 27 fifth and sixth graders students that are eleven and twelve years old and an English teacher that has experience with CLIL approach. These students have been learning English since they were six years old, but they did not start CLIL lessons since the last year, in the case of sixth graders, or this year, in the case of fifth graders. Fifth and sixth graders were mixed in heterogeneous groups in Science-CLIL lessons.

The teacher that participated in the study is a teacher that started their professional trajectory in a rural school and worked there for 14 years old. She discovered CLIL in 2008, when she went to Finland and attended to CLIL training sessions with David Marsh. In Finland, she had the opportunity to visit different schools that were applying CLIL but it was not until 2014 that the school of the research decided to apply CLIL in Science.

Context of the study

The study focused on a 3-session science-CLIL activity about electricity. The first session consisted on a recap of the introduction of the previous session and children participated in a Kahoot, read a Benjamin Franklin's biography and built up a definition of electricity. During the second session children were introduced to conductors, insulators and different parts of electric circuits and they built different electric circuits to check the different materials conductivity. The first session of the unit, the previous session that was considered during the first session observed to recap, was also considered using the planning grid that the teacher used and the different teacher annotations.

Data analysis techniques

During the process of gathering data, different techniques were used: a semi-opened interview to the teacher that was transcribed, the collection of the teacher planning documents for further analysis and the observation and transcription of 2 of the 3 sessions. All this information was used to elaborate a summary of the sessions with the teacher's support and planning (Appendix 1). Moreover, to gather data from the interview, the main contributions highlighted along the literature review of CLIL approach, Science Teaching and Language teaching were compared with the teacher's beliefs and concerns. Additionally, in the case of the summary of the sessions and the transcription, the main Science and Language teaching characteristics discussed in the literature review were compared with the teacher planning and observed actions.

Furthermore, in the case of the sessions' transcriptions, an inductive-deductive analytical tool was built. The tool used will be presented in this section, but the completed grids can be checked in *figures 5, 6 and 7* of the *Appendix 2*. First of all, a grid was built to analyse the L1 role of the first and the second transcription (*Grid 1*). In this case, the use of L1 was considered analysing three items: teacher uses L1 to clarify, teacher allows students use L1 and teacher does not allow the use of L1. The use of L2 was also considered on the grid, and the different ways in which teacher motivates students to use the L2 were taken into account. Moreover, the language scaffolding that the teacher provided was examined using four different items: use of non-verbal language, use of visuals, motivation and language routines.

Grid 1: table used to analyse L1 role along the transcriptions

L1 ROLE									
TRANSCRIPTION 1								**TRANSCRIPTION 2**	
Use of L1						**USE OF L2**		**Use of L2**	
line	**Teacher uses L1 to clarify**	line	**Teacher allows students use L1**	line	**Teacher does not allow the use of L1**	line	**Teacher motivates students to use L2**	line	**Teacher motivates students to use L2**
LANGUAGE SCAFFOLDING									
TRANSCRIPTION 1								**TRANSCRIPTION 2**	
line	**Use of non- verbal language**	line	**Use of visuals**	line	**motivation**	line	**Language routines**	line	**Language routines**

Secondly, *Grid 2* refers to the Science teaching, and the different parts of an IBSE cycle and Science Talk were considered. In this case, the different parts of an IBSE cycle: asking questions, developing and using models, planning and carrying out investigations, analysing and interpreting data, using mathematical thinking, constructing explanations, engaging in argument from evidence and obtaining, evaluating and communicating information were considered. Moreover, the kind of questions was also considered: productive or reproductive, open or close, contextualized or not contextualized and significant for scientific learning or not significant.

Grid 2 table used to analyse L1 role along the transcriptions

IBSE & SCIENCE TALK									
TRANSCRIPTION 1									
1. Asking questions									
line	question	productive	reproductive	open	close	contextualized	Not contextualized	Significant for scientific learning	Not significant
32	1.Do you…?		X		X	X			X
1.Developing and using models		2.Planning and carrying out investigations		3.Analyzing and interpreting data		4.Using mathematical thinking	5.Constructing explanations	6.Engaging in argument from evidence	7.Obtaining, evaluating and communicating information
TRANSCRIPTION 2									

3.Results

The results were extracted from the teacher's interview, the summary of the three sessions and the transcriptions of the second and the third session.

Transcription results

First of all, the results of the transcriptions will be shown. The results presented have been extracted using the tables included in *Appendix 2.* Language results are presented considering the L1 role and the language scaffolding. Science results are presented consecutively, considering IBSE and Scientific talk. 110 minutes of video in which the teacher interacts with the whole class have been analysed, 80 for the second session and 30 for the third, because during the third session there were few teacher-students interactions in the whole group.

Regarding the L1 role, in the first transcription the teacher uses L1 to clarify in five different times and allows one student to use Catalan when the student expresses that does not know how to say it in English. However, in two different cases the teacher does not allow the use of Catalan. Furthermore, the teacher motivates students to use the L2 in six different cases, translating what students say, motivating them to speak in English or asking them to translate some sentences and words. In the case of the second transcription, the teacher keeps motivating students to use L2 in six different times.

Regarding the language scaffolding, during the transcription 1 the teacher uses four different strategies: use of non-verbal language, use of visuals, language routines and motivation. In the first transcription, the teacher uses the non-verbal language in five different times to represent some key words, uses visuals once, language routines three times and motivates students ten times using different strategies: motivating them to participate actively in the debates, proposing and motivating them to participate group activities in which they have to discuss different aspects or congratulating them. In the case of transcription 2 the teacher just applies one strategy: language routines, to do a recap about the activities did in the previous sessions. However, as mentioned before, in the case of transcription two there was few teacher-students interaction with the whole group, because children spent most of the time working with their group.

Regarding the Science results, the different parts of an IBSE cycle had been considered to extract the results. However, in the case of the first transcription just two parts of the cycle had

been taken into account: asking questions (referred to scientific questions) in eight different times and obtaining, evaluating and communicating information when children build up electricity definition considering the knowledge learnt along the session and the visuals supported by the teacher. Furthermore, in the case of the second transcription there are two parts of the IBSE cycle: asking questions in seven times and participating investigations when children build different electrical circuits to check materials' conductivity. However, it must be said that children did not plan the investigations, because it was the teacher the one that developed the activity. The importance of Science talk has been discussed along the literature review and the key role of asking proper questions has been highlighted. As mentioned, proper questions are: reproductive, open, contextualized and significant for scientific learning. However, in the case of the first transcription there are not productive and contextualized questions, there is just one open question and two questions significant for scientific learning. Furthermore, in the case of the second transcription, there is one productive question, two open questions, five questions significant for scientific and there is not any contextualized question.

Interview results

The results of the interview are considered hereunder. In order to extract the interview's results, the different parts of the literature review were taken into account. First, the results of CLIL teaching results will be exposed, next the Language teaching will be presented, next the Language teaching results and finally the Science teaching results.

CLIL teaching results

Regarding the CLIL teaching, the teacher highlights the main challenges that teachers have to cope with when teaching CLIL: "(…) els recursos humans que hi hagi, el nivell d'anglès o de competència lingüística del professorat (…). També és important l'organització de l'escola, que aposti per aquest projecte i que el visquin amb il·lusió". Moreover, the teacher also adds that for teaching CLIL is very important to have an efficient planning that contains the abilities and strategies that will be used for achieving the objectives, that might be considered along the planning: "Les sessions s'han de planificar bé, han d'estar ben planificades" Regarding these CLIL objectives, she also suggests that when teaching CLIL there are three sorts of objectives that need to be account: Language objectives, Subject content objectives and competencies objectives. When talking about the integration of the first two objectives, the teacher highlights that Language and Subject contents should be interrelated: "En teoria s'han d'interrelacionar,

no hi ha una part per llengua i una part per "Science", de vegades ni se'n parla de llengua, "bueno" és que ni se'n parla normalment. (…) S'integra de forma natural". Finally, the teacher also highlights that for her, it is important to promote children's autonomy: "D'alguna manera, lu maco o important també és que ells siguin una mica autònoms a l'hora de treballar, perquè clar és molt fàcil guiar-los (…) però nosaltres el que intentem és que ells d'alguna manera dins del grup puguin tenir aquests espais d'autonomia".

Language teaching results

Regarding the L1 role, the teacher points out that children use their L1 when they participate in group activities, but she keeps defending that it is important to promote children's autonomy and allowing them to use their L1 as a strategy to promote this autonomy. Moreover, regarding the use of L2, the teacher highlights that using L2 is very challenging for students: "´És com un repte afegit perquè explicar una idea en una llengua que no és la teva és molt difícil (…)". For this reason, she also adds that it is very important to give language support and to take into account the language that children will need along the session: "(…) Necessiten molt aquest suport lingüístic per part nostra, aquest "scaffolding" (…) Seria molt important en cada sessió, en cada activitat, donar-los el llenguatge que necessiten, si ells tenen el llenguatge que necessiten es veuran capaços, es veuran segurs per utilitzar-los i expressar-se". In this sense, the teacher also points out that it is very important to plan the language that students will need during the Science-CLIL lessons, because the language should be accurate.

Regarding the language scaffolding that the teacher mentions as an important tool to teach CLIL, she defends some techniques that can help students to learn and use the L2: "es pot intentar fer aquest suport lingüístic amb imatges, amb estratègies així d'activitats com per exemple completar un text, donar-los vocabulari… Jo crec que de manera bastant natural". Moreover, the teacher also highlights that talking about the language the focus should be placed on the communication: "(…) el que ens interessa és tota aquesta capacitat de comunicació (…)". On this sense, she also adds that it is not important if children do not understand all the words or sentences in L2, because "(…) si hi ha una bona comprensió és igual que no entenguin tot un text de "Science", perquè poden entendre tot un contingut, poden entendre unes idees principals que al final, a Primària, jo penso que és el que ens toca fer". Finally, the teacher also mentions that the language contents introduced in CLIL lessons should be determined by students' language needs and students' language level.

Science teaching

Regarding the scientific part, the teacher points out that there is a Science School Curriculum based on the Primary Education Catalan Curriculum that determines which contents should be worked on the different cycles. Moreover, the teacher highlights that in each lesson she tries to put into practice all the steps of the learning cycle, that is all the steps that according to her scientific lessons should have: "En una sessió el que intentem, que tampoc ara sempre ho aconseguim, és que hi hagi tot el cercle, que es presenti, es treballi un contingut o concepte corresponent, amb el llenguatge corresponent i que puguin fer totes les seves hipòtesis i prediccions, que es pugui argumentar d'alguna manera o observar i que es puguin treure unes conclusions". However, according to the teacher, making hypothesis is very difficult for children.

Moreover, the teacher underlines the importance that students' active participation should have, as she agrees that children should have spaces to participate actively, to produce something. In this case, she gives one example that helps her to promote the active participation of students, the warm up activity that consists on doing a recap, a debate to talk about the different activities did in the previous sessions, what helps to have a basis to continue with the session. Finally, although the teacher tries to give sense to all the parts of the scientific learning cycle that are stated before, she also agrees that they should go further: "(…) caldria que ells ja comencessin a dissenyar o planificar algun petit experiment, això també és una cosa que hem d'anar introduint".

Summary of the sessions results

The results of the summary of the sessions are considered hereunder. The results are based on two main topics: Science results and Language results. The results focus on the different activities that appear in Appendix 1, the summary of the sessions. The number of each activity can be checked in the same appendix.

Science results

Regarding the Science results, in the activity six of the second session, children should define electricity, considering the different knowledge acquired along the unit and using the visuals and the words provided by the teacher.

In the case of the third session, during activity two children have the opportunity to make some hypothesis about what conductors and insulators are, while the teacher conducts this debate, proposes new contexts and asks new questions. Moreover, in the activity four children collect data, writing down the different attempts they make to check materials' conductivity. Finally, in the activity six children represent the electric circuits built, drawing the objects used, using the correct symbols.

Language results

Regarding the language results, in the activity two of the first session the new unit is introduced from a narrative, an animated comic, and then children have the opportunity to participate in a debate to discuss the different aspects of the animated comic. Moreover, in the activity four of this session, language scaffolding is also introduced, because as it can be read in the summary, children have the opportunity to draw individually about different aspects that they want to highlight about the video. Additionally, in activity six they also write different sentences to summarize their drawings.

In the case of the second session, language results can be also found. First of all, at activity two of second session there is a discussion to talk about the different activities did in the previous session, in which all the children are motivated to participate. Moreover, activity four of the second session consists on a pair dictation, in which children have to ask questions to their pairs to complete the blanks, after being explained how proper questions should be asked. Furthermore, the use of visuals is also present in the activity six of this session, as children have some visuals that help them to build up the electricity definition.

Finally, at the activity two of the third session children also do a discussion to sum up the different activities carried out in the previous session, and children have the possibility to participate actively in this conversation again.

4. Discussion

In this section, the results drawn from the different data will be analysed. The analysis will be carried out considering the three main topics of the literature review: CLIL approach overview,, English language teaching and Science teaching as well as the main characteristics of each of them.

CLIL approach overview

As mentioned in the theoretical framework, Amat, Vallbona & Martí argue that CLIL is a methodology for learning content and language at the same time. For this reason, in this case, talking about Science-CLIL it is clear that in a Science-CLIL session there should be two different kinds of objectives: Science objectives and Language objectives. In this sense, it must be said that the teacher is aware of that, because during the interview she highlights that in each lesson she sets Science objectives considering the contents that appear in the Science School Curriculum and Language objectives that are determined by students' language needs and their language level. Moreover, the teacher also sets competencies objectives during CLIL sessions. Coyle et al. (as cited in Valdés 2016) defend that CLIL differs from linguistic immersion in the sense that integrates language and content. Although the teacher knows about this interrelationship of both topics and defends that she integrates both, Science and Language in a natural way, she also recognizes that sometimes L2 is just used as a vehicle of communication and a vehicle to acquire scientific knowledge, and she does not directly talk about language during the sessions.

This fact of interrelating Science and English is very challenging and is considered a main challenge for Maldonado & Olivares (2013).

Moreover, as discussed in the literature review, there are different challenges that teachers should confront when they teach CLIL and the teacher also highlights the different challenges that she has to cope with when she teaches Science during CLIL lessons. The teacher highlights that the main challenges are the human resources and their English level and the confidence that school members have on CLIL methodology. This last challenge is also reported by other authors, as mentioned along the literature review, who agree that before implementing CLIL is very important to convince all the school staff about the effectiveness and the benefits of CLIL approach. Furthermore, the teacher also points out that planning is also challenging and ensures that an efficient planning is essential and that this planning should include the materials and

resources that will be used along the sessions, among others. Espinet et al. (2017) also agree that planning can be very challenging, and they propose that when teachers start teaching CLIL they have to increase the planning time and the effort for planning. Finally, Amat et al. (2017) suggest that most of the pre-service teachers' becoming teachers highlight that students' language level is a challenge that they will have to face when teaching CLIL.On this sense, the interviewed teacher also mentions this aspect, as she highlights that explaining an idea in a language that is not their mother tongue is very challenging for students.

Teaching Language

Nowadays, there exists a general agreement on the important role that motivation has for learning a foreign language. However, Ferlazzo & Hull (2018) advise that teachers should help students to build up their intrinsic motivation. In this case, it can be said that in some moments of the session the teacher tries to motivate students in different ways. For example, the activity one of the first session consists on introducing the unit through an animated comic, what can motivate children to be concentrated on the speech of the characters. Moreover, checking at transcriptions results, it is clear that during the sessions the teacher tries to motivate children to use L2, using different strategies as congratulating them when they do it, translating some sentences that children pronounce in Catalan or asking for some vocabulary words, for example. Furthermore, the teacher conducts different debates along the session and invites the students to participate actively on them.

Another important aspect that needs to be taken into account is the role that L1 should have in the sessions. There is an active debate about if L1 should be used during CLIL or not, but some research tends to highlight the effective impact of using it. Kang (2006) suggests that the main aim should be to build up communicative skills and in this sense, using L1 makes sense. The interviewed teacher also defends this position, as she defends that the focus should be placed on the communicative abilities that children can acquire. Additionally, the teacher also points out that the use of L1 during the lessons can enhance children's autonomy, and this aspect seems to be very important for her. The results of the transcriptions of the sessions also show that the teacher sometimes uses the mother tongue to translate, to catch children's attention or to ask some questions in the first transcription. Furthermore, the teacher allows the use of L1 when a child complains that he does not know how to express it in English, but she keeps motivating children to use L2 and that in one case she does not allow a child to express in the

L1. Moreover, Valdés (2015) also support the use of L1, as she agrees that it is very important that children stablish bridges between their L1 and L2.

As mentioned during the CLIL analysis, the teacher is aware about the challenge that using an L2 suppose for children and argues that language scaffolding is needed and that it is very important to provide children the language they need. The importance of language scaffolding is recognized by many authors, and Ferlazzo & Hull point out that the use of visuals and non-verbal language can help to make the language content more accessible. On this sense, in the summary of the sessions it is clear that in the first session children use visuals, as they have to make a drawing of the video and have to write a sentence to summarize their drawings. Moreover, in the second session visuals are also present, because some flashcards with drawings are used to build up the electricity definition. Although visuals are used once a time in the first and the second session they are not used in the third session. Regarding the non-verbal language, the results of the first transcription show that teacher uses the non-verbal language in five cases, but that she does not use it during the second transcription. Moreover, Kang (2006) keeps defending that the use of language routines can help children acquire a foreign language and the teacher uses language routines in two different cases: to catch children's attention in the first transcription using the strategy that can be checked in the results and doing a debate to recapitulate the different activities did in the previous sessions.

Teaching Science

The topic of how Science should be taught during the Primary stage is discussed by many researchers. On this sense, Pujol (2003) highlights that Science subject should help students to analyse the world and comprehend scientific processes and attitudes and for this reason, active participation is essential. Although achieving these goals can be complex, the use of IBSE can enhances the achievement of them. As cited in the literature review, the National Research Council defends that IBSE is based on eight different steps: asking questions, developing and using models, planning and carrying out investigations, analysing and interpreting data, using mathematics, constructing explanations, engaging argument from evidence and obtaining, evaluating and communicating information. Although the use of IBSE can enhance scientific learning, most of IBSE processes are not included in the lesson plan.. Furthermore, in the first transcriptions just two processes are considered: asking questions and evaluating and communicating information, when they build electricity definition, and in the second transcription another process is added to asking questions: carrying out investigations when

they build-up electric circuits to check the conductivity. On this sense, it seems that there are five processes that are not taken into account: developing and using models, analysing and interpreting data, using mathematical thinking, constructing explanations and obtaining, evaluating and communicating information. These processes should be taken into account to promote scientific thinking and to provide students with the tools and the abilities to comprehend the world. However, when the teacher was asked about the aspects that she would improve she highlights that children should have an active role during the process of planning and designing experiments. During the interview the teacher also defends the fact of considering a learning cycle that according to her comprehends the introduction of the topic, working on contents, making some hypothesis and predictions and stating conclusions. Although the first three processes seem to be considered, during the sessions the final conclusion, that it can be comparable to constructing explanations and engaging in argument from evidence, is not present in any session. Nevertheless, active participation, as mentioned before is enhanced during the different sessions.

Regarding the active participation, one clue that can allow teachers to promote it is the Science talk. According to Pujol (2003) Science talk is very important and there should be a relaxed atmosphere to motivate students to participate in this talk, because this process might be complex for some students. On this sense, it can be said that the teacher enhances the active participation of children. Mortimer (2003) points out the role that the teacher should have during the scientific talk, arguing that the teacher should shape ideas by summarizing, selecting and highlighting them, among others. From the different results, it can be stated that the teacher conducts the different debates, motivating children to participate and asking some questions. The fact of asking questions is a good tool to promote Science talk, but according to Sanmartí (2003) questions should be productive, significant for scientific learning and contextualized. Moreover, Pujol (2003) defends that questions should be open. Although productive, significant, contextualized and open questions seem to be the most efficient to enhance scientific learning, according the transcription results that appear in *figure 7* just 6,6% of the questions are productive, 20% are significant for scientific learning, all of them are not contextualized and 46,6% of them are open.

5.Conclusions

The main purpose of this study was to analyse the concerns and beliefs of an English specialist teacher that is teaching Science-CLIL and the way she carries out the lessons. Through the summary of the sessions, the two sessions observed and the transcription of them as well as the summary of the sessions, the purpose was achieved.

The main research question was: How a Primary teacher understands, plan and carries out a Science-CLIL lesson? This question was answered by giving answer to the sub-research questions. Regarding the first research question, that was about the challenges that the teacher needs to face when teaching Science-CLIL, the teacher highlights different aspects that must be considered as they might be difficult: children's difficulties when acquiring L2 and their difficulties to express an idea in a language that is not their L1, human resources and their English level, confidence of the school staff and families on CLIL approach and effective planning.

The second sub-research question referred to the language scaffolding that the teacher used along the different sessions and in this sense, the teacher uses four different strategies: use of visuals, use of non-verbal language, motivation and use of language routines. Moreover, the teacher also highlights that one strategy that help children acquire an L2 autonomously is the use of cooperative strategies to learn.

Regarding the third sub-research question that focused on the role that L1 has during Science-CLIL lessons, students always used L1 to discuss in cooperative groups, but sometimes tried to use L2 to communicate with the whole group. Moreover, the teacher used L1 to clarified or to caught children's attention, but she motivated children to use L2 and congratulated them when they did it.

The fourth sub-research question considered the way in which the teacher supports scientific learning. In this case, it must be said that the teacher tried to enhance the active participation of students, but that just three of the seven parts of an IBSE cycle were considered along the observed sessions. On this sense, the three processes that are present consist on asking questions, making hypothesis and experiment, but the other four processes that foster the scientific model thinking and the communication of scientific explanations are missing.

Moreover, along the sessions different questions appeared but few of them were productive, open, contextualized or significant for scientific learning.

Considering the sub-research questions, that refer to the integration of Science and Language, it seems that Language objectives are not explicit, as the teacher assumes that L2 is the vehicle to learn Science contents.

On this sense, it seems that the teacher perfectly highlights and is conscious about all the challenges that teaching Science-CLIL means. Moreover, she applies language scaffolding strategies that help students understand the L2. However, it seems that more language scaffolding should be provided to motivate students use L2 when they participate in group activities. Moreover, explicit language objectives and contents should be posted on the session, as CLIL implies a dual-focused approach, in which children learn contents of the area and language at the same time. Having in mind this, the teacher could check the Science objectives and contents and might try to consider explicit language objectives and contents to integrate with the scientific objectives and contents. Furthermore, it could be interesting to consider all the IBSE cycle parts to enhance the scientific learning, generating spaces to discuss, construct and communicate scientific ideas, and to transform the questions into open, contextualized, significant for scientific learning and productive questions.

Carrying out this research was not an easy task due to different aspects. First of all, some difficulties were found when choosing a school to carry out the research. Nowadays, there are still few schools that are using CLIL-Science approach and some of them seemed quite unwilling to receive my project. Moreover, another difficulty was to find the different studies to write the literature review, because there exist few articles that discuss about Science-CLIL approach. Furthermore, and due to the fact that teaching CLIL is complex, analysing the sessions was quite difficult, because there were lots of items that should be taken into account.

Although during the study different difficulties had to be faced, this study brought me the opportunity to examine and observe how an experienced Science-CLIL teacher plans and carries out a Science-CLIL activity and what are her main beliefs and concerns. This chance was relevant to reflect about the main difficulties and chances that will have to be faced when teaching CLIL. Moreover, this study also leads to an opportunity to reflect about how Science should be taught and how the Science-Language integration can be possible. In this sense, the

study helped me to realize about the complexity of the CLIL teaching approach and to examine the main characteristics that define CLIL and that should be present in a CLIL unit. However, it is clear that more training on CLIL is needed to have the tools and knowledge to teach Science-CLIL lessons, due to the complexity of this approach. Further research might imply planning Science-CLIL lessons, analysing Science-CLIL materials or observing and analysing more Science-CLIL units.

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7.Appendices

Appendix 1. Summary of the teaching sessions

The following tables are the summary of the sessions used to analyse the data

SESSION 1- BENJAMIN FRANKLIN'S EXPERIMENT		
Objective: introduce the topic and the through a narrative		
time	Description of the activity	Material
15'	**Activity 1:** this activity consists on classroom management. Children sit down cooperative groups of 4 or five students, that are made at the beginning of the school year. Children decide which role is going to have each student of the group using the role cards. The roles are group facilitator, secretary, recorder and materials manager.	Role cards
10'	**Activity 2:** children watch a ten minutes video about Ben Franklin and his discovery. The video consists on an animated comic in which different characters of Franklin age appear talking about Franklin and his discovery.	Benjamin Franklin video
10'	**Activity 3:** children talk about different aspects of the video. (when, how, what, who). Every group talk about what they saw and what they think and highlight the aspects of the video that shocked them.	-
25'	**Activity 4:** children draw individually about what they saw in the video and they also write a sentence to explain the drawing or to highlight one aspect of the video. Then, they stick the drawings on the classroom's walls.	Sheets of paper, colours, pencils…
10'	**Activity 5:** students watch the video again to extract the ideas for the next activity.	Benjamin Franklin video
10'	**Activity 6**: Students write sentences individually to summarize the main ideas about the experiment. They receive the help of the pair and the teacher. Finally, they share them with the whole group, they read their sentence and the teacher writes them on the shared document. Finally, every student can choose some of them to write behind the drawing.	Sheets of paper, pencils, computer.

Figure 2: table in which the different activities and materials of the first session are summarized.

SESSION 2- WHAT IS ELECTRICITY?		
Objective: introduce the vocabulary and build up electricity definition		
time	Description of the activity	Material
3’	**Activity 1:** the teacher introduces the university student and asks them to make the effort to speak in English.	-
5’	**Activity 2:** the teacher remembers the topic they started the previous session and children speak about what they did, while the teacher adds some information. The teacher explains the different activities they will do.	-
16’	**Activity 3:** children participate in pairs in a kahoot in which appear eleven questions related with the video they saw the previous week.	Kahoot
24’	**Activity 4:** children participate in pairs in a pair dictation. Each child has a sheet in which Benjamin Franklin’s biography appear. Each student of a pair has sheet A or B and in the different sheets they have different blanks. Children ask questions to their partner to complete the blanks, but before the activity the teacher remembered them how to ask some questions.	Benjamin Franklin’s biography (sheet A and sheet B)
22’	**Activity 5:** children answer in pairs six questions and complete four questions, writing True or False, related with the reading. Finally, they correct the questions all together.	Questions about Benjamin Franklin’s biography
10’	**Activity 6**: the teacher gives to the student flashcards in which the different words that build up the definition of electricity appear. Children, in pairs, put the words in order to create the definition. Finally, the teacher corrects the sentences of each pair.	Flashcards in which the different words of the definition of electricity appear

Figure 3: table in which the different activities and materials of the second session are summarized.

SESSION 3- CONDUCTORS AND INSULATORS		
time	Description of the activity	Material
5’	**Activity 1:** the teacher makes the group using the webpage *Instant classroom* that make groups randomly. The teacher makes some changes on the group composition.	Webpage Instant Classroom https://www.superteachertools.us/instantclassroom/
5’	**Activity 2:** the teacher asks children if they remember the topic they started the previous session and children speak about what they did, and the teacher adds some information to complete their answers. The teacher explains children that today they are going to make circuits and asks children if they remember about conductors and insulators, a topic they had been working a month ago. They argue about what is an insulator and a conductor, to finally argue about what do they need to make an electrical circuit. The teacher conducts the debate and adds some questions and information. She asks children to give some examples to defend their positions or gives them other contexts to think about their arguments.	-
7’	**Activity 3:** the teacher shows students the materials they have for building the circuits. She says the name of each object and show each of them to students. The teacher explains that they are going to classify the materials, deciding if they are conductors or insulators and shows them a worksheet that has some information about conductors and insulators that will help each group to classify the objects using a worksheet in which they can write the different attempts.	Trays with wool, folly paper, paper clips, batteries, wires, lamp holders, and bulbs. The worksheet that contains information about conductors and insulators
25’	**Activity 4:** students use the different objects to make the circuit in order to check their conductivity. The teacher walks around the classroom and helps the groups. She also checks students’ answers and discuss the answers with them.	The trays with the different objects. The worksheets with electrical circuits information. The worksheet with the different objects in which they can write the attempts.
15’	**Activity 5:** the teacher gives to each child a worksheet in which the different elements of the electrical circuit appear with their symbol and the teacher explains that they have to copy the symbol.	Worksheets with symbols of the parts of an electrical circuit.
22’	**Activity 6**: the teacher gives to the students a worksheet and explain children that they will have to draw the electric circuit they made when they decided if the objects were conductors or insulators. First of all, children have to draw the objects and then they have to represent the objects by using their symbols. The teacher walks around the classroom helping the groups and taking a look to their worksheets.	A worksheet in which children can draw an electrical circuit by drawing the objects and the symbols. The worksheet in which the symbols appear.

Figure 4: table in which the different activities and materials of the third session are summarized.

Appendix 2: Tool used to analyze transcriptions of the sessions results

The following tables contain the Language and Science data extracted from the transcriptions. These tables were used to analysed the transcriptions' data.

LANGUAGE SCAFFOLDING							
TRANSCRIPTION 1							
line	**Use of non-verbal language**	line	**Use of visuals**	line	**motivation**		line
30	Teacher moves both hands backwards to symbolize "ago"	411 - 421	The teacher gives them some flashcards with drawings to help them to build up the definition of electricity	27	Teacher motivates children to actively participate by discussing, in English or Catalan	Teacher motivates a student to make the effort to ask questions	193
81	Teacher puts her right hand on the ear to symbolize "listen"	line	**Language routines**	116 - 139	Children participate, in pairs in a Kahoot, so they have to discuss the questions with the pairs	Teacher motivates a child to answer saying "I know you know it"	267
132	Teacher moves her hands quickly making noise with her mouth to symbolize "sparks"	33	Before starting the session they do a recap about the previous session	152 - 233	children participate, in pair dictation, so they have to ask questions to answer the blanks	Teacher motivates a student by congratulating for a correct answer	301
244	acher makes a circle with her right hand to symbolize "all together"	144 - 149	Teacher uses a strategy to catch children's attention saying: Class, class and children have to answer yes, yes!	110	Teacher motivates children to speak by explaining that we will consider if everybody speaks or not	Teacher motivates a student by congratulating for a correct answer	382
341	Teacher moves her right hand backward to symbolize "past times"	235 - 240	Teacher uses a strategy to catch children's attention saying: Class, class and children have to answer yes, yes!	137	Teacher congratulates a student that has answered correctly a question that his classmate answered: "Què vol dir dangerous?"	Teacher motivates a student by congratulating for a correct answer	397
TRANSCRIPTION 2							
line	Language routines						
33-42	Before starting the session they do a recap about the previous session						

Figure 5: table that contains the Language scaffolding results from the first and the second transcription.

L1 ROLE							
TRANSCRIPTION 1						**TRANSCRIPTION 2**	
USE OF L1				**USE OF L2**		**USE OF L2**	
line	**teacher uses L1 to clarify**	line	**teacher allows students use L1**	line	**teacher motivates students to use L2**	line	**teacher motivates students to use L2**
105-108	Teacher mixes L1 and L2 in the same sentence to give a classroom instruction	66	A student says that she does not know how to say something in English and the teacher allows her to say it in Catalan	11	Teacher translates what a student says	39	Teacher translates a word that a student has said in Catalan ("lectura"-reading)
270	Teacher uses L1 to explain to a child that he should be working on the activity	line 35	**teacher does not allow the use of L1**	25	Teacher motivates students to use English as much as they can	41	Teacher translates a sentence that a student has said in Catalan ("vam jugar a un joc"- we played a game)
379	Teacher uses L1 to translate and define the word "evil"		Child asks if he can speak in Catalan and teacher invites him to try it in English	68	Teacher asks students how it is said "cometa" in English	66	Teacher translates a word that student said in Catalan ("fusta"-wood)
383	Teacher uses L1 to ask "Què vol dir això?"	169	Children are speaking in Catalan at loud and teacher says: No Catalan, please	182	Teacher asks children how should we ask "què feia" in English.	72	Teacher translates a word that student said in Catalan ("fils"-wires)
406	Teacher uses L1 to answer to a child that is complaining because it is time			188	Teacher asks children how should we ask "on va anar?" in English.	74	Teacher translates a word that student said in Catalan ("llana"-wool)
				194	Teacher asks children how should we ask "què va fer a London?" in English.	79	Teacher translates a word that student said in Catalan ("pila"-battery)

Figure 6: table that contains the L1 role results from the first and the second transcription.

IBSE

TRANSCRIPTION 1

1. Asking questions

line		productive	reproductive	open	close	Contextualized	not contextualized	Significant for scientific learning	not significant
32	1.Do you remember what did we do?		X		X		X		X
33	2.What did we do two weeks ago, more or less?		X	X			X	X	
72	3.So we could observe that metal is a… (answer is conductor)		X		X		X	X	
78	4.And what about the last part, what did you do with a sentence?		X		X		X		X
183	5. How would you say "què feia"?		X		X		X		X
188	6. How would you say "on va anar"		X		X		X		X
194	7. Què va fer a London or in France, how would you say this question?		X		X		X		X
282	8.He was ten or twelve?		X		X		X		X

1. Developing and using models	**2. Planning and carrying out investigations**	**3. Analyzing and interpreting data**
4. Using matematical thinking	**5. Constructing explanations**	**6. Engaging in argument from evidence**

7. Obtaining, evaluating and communicating information

line	
403-421	Children build up the definition of electricity, taking into account the knowledge acquired during the unit. They discuss in groups the definition.

8.Obtaining, evaluating and communicating information

TRANSCRIPTION 2									
1. Asking questions									
line		productive	reproductive	open	close	Contextualized	not contextualized	Significant for scientific learning	not significant
33	9. Do you remember the activity we did last week?		X		X		X		X
33	10. What did we do?		X	X			X	X	
43	11.Do you remember that we talked about conductors and insulators?		X		X		X		X
46	12.What is a conductor?		X		X		X	X	
51	13. And an insulator?		X		X		X	X	
56	14.What do you think we need to make an electrical circuit, which objects and things do you think we need?	X		X			X	X	
81	15. Can we bring a tower of electricity into the classroom?		X		X		X	X	
2. Developing and using models									
3. Planning and carrying out investigations									
line 87-125	Children have different elements to build an electrical circuit and try the different objects to decide if they are conductors or insulators.								
4. Analyzing and interpreting data	**5. Using matematical thinking**	**6. Constructing explanations**	**7. Engaging in argument from evidence**	**8. Obtaining, evaluating and communicating information**					

Figure 7: table that contains the IBSE and Science talk results from the first and the second transcription.