Universidad de Valladolid

FACULTAD DE EDUCACIÓN Y TRABAJO SOCIAL

FINAL DEGREE ASSIGNMENT

COMPUTATIONAL THINKING TO BOOST MOTIVATION OF STUDENTS WITH LEARNING DIFFICULTIES IN FOREIGN LANGUAGE LEARNING

Primary Education Degree

Foreign language mention - English

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"Code is the twenty-first century literacy, and the need for people to speak the ABCs of programming is imminent. Our world is increasingly run by software, and we need more diversity in the people who are building it."

Linda Liukas (2015)

ABSTRACT

21st century citizens will need to develop computational thinking. This study aims to argue the introduction of a programming environment, Scratch, to improve second language learning. When planning a didactic proposal in a specific school context, a series of problems rose which made the concrete study of the problem of a specific population worth considering: second-grade students with learning difficulties whose affective filter may be affecting their learning process. These difficulties increase when a foreign language conveys learning process. First step of a reconverted study is to verify if a proposal which integrates programming and foreign language will allow to increase their motivation facing foreign language learning besides favouring the acquisition of it.

KEYWORDS

Computational thinking, digital competence, second language learning, primary education, learning difficulties, motivation.

RESUMEN

Los ciudadanos del siglo XXI necesitarán desarrollar el pensamiento computacional. Este estudio pretende argumentar el empleo de un entorno de programación, Scratch, para mejorar el aprendizaje de una segunda lengua. A la hora de estudiar un determinado contexto escolar, se han detectado una serie de problemas que han hecho digno de consideración el estudio concreto de la problemática de una determinada población: alumnos de segundo de primaria con dificultades de aprendizaje cuyo filtro afectivo pueda estar dificultando aún más sus procesos de aprendizaje. Dichas dificultades se acrecientan cuando una lengua extrajera vehicula los aprendizajes. El primer paso de este estudio es comprobar si una propuesta de aprendizaje de programación permite aumentar su motivación de cara al aprendizaje de una lengua extranjera además de favorecer la adquisición de esta.

PALABRAS CLAVE

Pensamiento computacional, competencia digital aprendizaje de una segunda lengua, educación primaria, dificultades de aprendizaje, motivación.

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GLOSSARY OF ACRONYMS

CLIL	Content and Language Integrated Learning
CT	Computational Thinking
FL	Foreign Language
ICT	Information and Communication Technologies
PE	Primary Education
PL	Programming Language
SL	Second Language
TL	Target Language
UoW	Unit of Work

1. RATIONALE

1.1. INTRODUCTION

As the twenty-first century is progressing the educative community should question if some of the competences defined as essential are being achieved by the teaching practises. That is why there is a clear issue regarding the needs of the human being in this century because technology is becoming slowly but surely one of the main aspects of our daily lives, as thinking on future citizens of 21 century education must know how to adapt to new emergent contexts. Therefore, the use of Information and Communication Technologies can be found in the CEFR (The Common European Framework of Reference for Languages: Learning, Teaching, Assessment), in that paper there is a claim for extracting as much potential as possible from the new information and communication technologies (Council of Europe, 2001).

It is more and more common nowadays that official academics or scientific institutions present reports on this thematic scope. That is the case of the British Royal Society in whose report they state: "Every child should be expected to be 'digitally literate' by the end of compulsory education, in the same way that every child is expected to be able to read and write" (2012, p.6). This only shows that learning programming at early ages is something whose value is increasing exponentially.

Wing made a very strong statement years ago: "Computational thinking is a fundamental skill for everyone, not just for computer scientists. To reading, writing, and arithmetic, we should add computational thinking to every child's analytical ability" (2006, p.33).

The ultimate commitment of this study was to explore the possibilities of programming as a resource to learn a second language integrating both in a methodology and developing it in a concrete educative context on a pilot basis. The work presented here displays the following structure:

First, literature has been studied to attach both the problematic regarding programming and connections which can be made concerning Programming and Foreign Language Learning. Its situation has been analysed regarding the law to exposing some educational context in which learning programming has been standardized.

Second, a school context was studied with the intention to design and implement a didactic proposal with exploratory purpose. Field observation ended up with an emergent issue coming up. In that school a bilingual programme is currently being developed but there are students with learning difficulties who are expected to early abandon it. This was far from being considered as a mitigating factor of the study´s potentialities, but on the contrary, it has made the study gone somehow beyond designing a didactic proposal, since it has tried to use programming as a motivating tool. Focus was put then on trying to use programming as a tool to improve the motivation for learning a foreign

language of students with learning difficulties while exploring its prospects of matching it with FL learning.

This project has been partially implemented during the third term with second grade of primary education students. Focus was put then on trying to use programming to improve the motivation for learning a foreign language of students with learning difficulties. Using ICT and programming for this purpose is not capricious and is argued below.

1.1.1. Legal framework

Whatever action that means to be implemented in a Spanish school needs to follow the principles stated by the latest government legal framework on the national education curriculum. From the official point of view, the document which covers the rest is Decree 126/2016.

The Spanish national law to follow is Organic Law of Education 2/2006, 3rd May, modified by Organic Law 8/2013. 9th December. Royal Decree 126/2014, February 28, establishing the Basic curriculum of Primary Education, which reflects the key competences, precisely provides aims to be achieved during the PE, the two ones which are the core of this proposal and the basis to justify further actions are:

Acquire, in at least one foreign language, the basic communicative competence that allows them to express and understand simple messages and to function in everyday situations.

-   Be initiated in the use of the Information and Communication Technologies for learning, developing a critical spirit before the messages that they receive and elaborate.

Decree 26/2016, July 21, by which the curriculum is established and regulates the implementation, evaluation and development of Primary Education in the Autonomous Community of Castilla y León, provides further concretion of the national guidelines. Once a revision of all the information collected in that document has been made, it can be stated that Decree 26/2016, July 21 claims for the improvement of the educational quality by bringing remarkable changes in the way of organizing the curriculum, such as the introduction of learning standards to measure the level of performance of the students in a task.

1.2. THE INITIAL PROBLEMS

The previously mentioned revision of educative laws evidenced that no single contents supposed to be subject of study in primary education, neither evaluation criteria nor learning standards makes an explicit reference to programming. This generates the first problem regarding the introduction of programming in daily experiences. Then the fact that programming languages do not have yet an explicit framework or guideline to be developed in the education curriculum of Castilla y Leon is making the introduction of PL in the classrooms slower. In addition to this, mastering a PL is demanding somehow and teachers who are not prepared may not even consider it as an educational

tool. Ten teachers who are currently working in the school where the study has been carried out, have filled out a ten-item [1]questionnaire whose more remarkable [2]finding is: teachers do not feel prepared enough to teach programming and they considered it necessary to receive more instruction regarding this knowledge field.

> A lack of technical and theoretical knowledge is another barrier to the use of Computer assisted Language Learning technology. Not only is there a shortage of knowledge about developing software to promote learning, as shown above, but many instructors do not understand how to use the new technologies. Furthermore, little is known about integrating these new means of learning into an overall plan. (Lee, 2000, p.6).

There are more factors which may hinder the implementation of learning plans based on programming, that is the case of the economic resources which the school counts on and that may or may not favour the purchase of new technological devices or equipment. More is said about this issue in the last section.

1.2.1. State of the art

Although coding is not reflected in the Decree 26/2016, of July 21, by which the curriculum is established and regulates the implementation, evaluation and development of Primary Education in the Community of Castilla y León there are some experiences that may serve as an example of how to formulate content and learning achievements:

- Coding in English curricula (Royal Society, 2012): the 2013 update of England's national curriculum, includes the introduction of Computing as subject. Its purpose is to ensure that at the end of the end of key stage [3]4, all students have acquired a wide range of skills regarding computational thinking which goes from the understanding of computer science principles like abstraction, logic or algorithms to writing computer programs in order to solve problems.
- Computational Thinking in Swedish basic education: though it is not part of an official curricula as in the UK example, it the reflection of is the reflection of a line of work that is increasingly common to find. Some countries have started to introduce computing is their school. That is the example of Sweden and it's Computational Thinking in Swedish basic education, whose purpose was to introduce experiences related with computing science along existing subjects (Heintz, Mannila,Nygårds, Parnes & Regnell, 2015). That experience argues that it is possible to introduce notions that involve computing science at early ages.

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[1] Full questionnaire sheet can be found in Appendix I

[2] Findings have been summarized graphically in Appendix II

[3] Key stage 4 is the equivalent of second grade of Secondary Education. More can be found at https://www.gov.uk/government/publications/national-curriculum-in-england-computing-programmes-of-study/national-curriculum-in-england-computing-programmes-of-study#key-stage-4

- TACCLE 3 – Coding European Project: a programme born fruit of the agreement of several work groups of universities of different countries, whose purpose was to support school staff and educators who were teaching computing to students aged between four and fourteen years old (Garcia-Penalvo, F. J., 2016)

The detailed proposal we present in this Final Degree Assignment goes a step forward beyond this study in the sense that it pretends to promote the learning of English as a foreign language in addition to learning programming itself. Even though it may seem to be an unexplored field, some projects have been carried out, for example the one which took place in Portugal with elementary students (Costa, S., Gomes, A. & Pessoa T., 2016).

1.3. DIGITAL COMPETENCE

Likewise, Royal Decree 126/2014, February 28, which Spanish teachers have to follow to plan and design lessons, states the key competences which must be developed in Primary Education. These competences come from the 2006 Recommendation on Key Competences for Lifelong Learning and its new functions will be discussed later. One of those competences is the Digital Competence, which implies the creative, critical and safe use of information and communication technologies to achieve the objectives related to work, employability, learning, and the use of free time, inclusion and participation in society.

The Digital Competence is likely to be the one whose academic background has grown more in the recent years, to such extent, that a new framework has emerged on behalf of the European Commission, *The Digital Framework Competence for Citizens* (Carretero, Vuorikari, & Punie,2017).In that framework five sub competences can be found, being the ´digital content creation´ the one which must capture our attention. Programming is included in that area as one of the skills which contribute to foster that competence. Four proficiency levels are detailed with two steps each:

Proficiency level	Step	Indicator
Foundation	1	At basic level and with guidance, I can: • list simple instructions for a computing system to solve a simple problem or perform a simple task
	2	At basic level and with autonomy and appropriate guidance where needed, I can: • list simple instructions for a computing system to solve a simple problem or perform a simple task
Intermediate	1	On my own and solving straightforward problems, I can: • list well-defined and routine instructions for a computing system to solve routine problems or perform routine tasks

	2	Independently, according to my own needs, and solving well-defined and non-routine problems, I can: • list instructions for a computing system to solve a given problem or perform a specific task
Advanced	1	As well as guiding others, I can: • operate with instructions for a computing system to solve a different problem or perform different task
	2	At advanced level, according to my own needs and those of others, and in complex contexts, I can: • determine the most appropriate instructions for a computing system to solve a given problem and perform specific task
Highly specialized	1	At highly specialised level, I can: • create solutions to complex problems with limited definition that are related to planning and developing instructions for a computing system and performing a task using a computing system. • integrate my knowledge to contribute to professional practice and knowledge and guide others in programming.
	2	At the most advanced and specialised level, I can: • create solutions to solve complex problems with many interacting factors that are related to planning and developing instructions for a computing system and performing a task using a computing system. • propose new ideas and processes to the field.

Table 1. *Explicitation of the four proficiency levels of programming.*

Source. E*laborated from The Digital Framework Competence for Citizens.*

This display of information is quite like the Spanish Educative curriculum in the sense that these indicators are like the [4]Learning Outcomes related to the contents of study.

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[4] The learning outcomes are the goals that any learner is supposed to reach at the end of a learning process

2. THEORETICAL BACKGROUND

2.1. FROM COMPUTATIONAL THINKING TO PROGRAMMING AND CODING

It is fundamental to have a tangible definition to work with during future processes of planning and designing so an approximation to the concepts of Programming and Coding needs to be made. Firstly, it must be stated that Computational Thinking in relation to our field of study (language learning) is nothing at all related to Computer-Assisted Language Learning (CALL), which was briefly defined by Levy (1997, p.1.) "the search for and study of applications of the computer in language teaching and learning." The evolution is clear since the 60s, when rudimentary software programmes were developed to help the learning process usually by repetition. Nowadays, a wide range of applications and platforms is on offer to work in learning environments online. A coding programme is not thought, at first sight at least, to be used as a supporting tool of language learning but we will try to show how this can be not only possible but also a powerful way to teach a foreign language.

Once the previous consideration has been made, the approach towards the definition of computational thinking can be made, bearing in mind that it has been a concept easily definable by academics (Faber, H. H., Wierdsma, M. D., Doornbos, R. P., van der Ven, J. S., & de Vette, K. ,2017). The definition that enjoys a greater degree of diffusion and reputation is the one provided by Wing (2006):

> "Computational thinking involves solving problems, designing systems, and understanding human behaviour, by drawing on the concepts fundamental to computer science. Computational thinking includes a range of mental tools that reflect the breadth of the field of computer science […] Computational thinking is using abstraction and decomposition when attacking a large complex task or designing a large complex system. It is separation of concerns. It is choosing an appropriate representation for a problem or modeling the relevant aspects of a problem to make it tractable." (p.33).

On the one hand, which is most interesting about this definition is that knowing that CT implies formulating and solving problems helps to clarify in a better way the [5]first of the steps concerning programming exposed in *The Digital Framework Competence for Citizens.*

On the other hand, the definition provided by Wing is somewhat decontextualized from the classroom, which in the end is the ultimate objective of this study. Thus, what is needed is a definition

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[5] It is a way to simplify since the operational focus of a didactic proposal that this study has is focused on that step.

of operational nature which can support the introduction of methodologies and activities in the classroom.

A control point deepening in this subject can be found it in the study carried out between the Computer Science Teachers Association ([6]CSTA) and the International Society for Technology in Education ([7]ISTE) whose purpose was to extract an operative definition of CT for K-12 (Barr and Stephenson, 2011). Shortening that conceptualization to towards what may be more interesting for the study, it has been found that CT is seen as a problem-solving methodology that can be automated and transferred and applied across subjects and which is a powerful tool because it applies to every type of reasoning. Programming according to Barr and Stephenson (2011), would be one of the procedures that are part of the field of computer science.

Having described in which knowledge field programming frames, it is necessary to continue lowering in the level of concretion and to differentiate it from coding. To make the difference as clear as possible, a double search has been made in two of the most recognized English-language dictionaries.

	Programming	Coding
Oxford dictionary	[8]Noun - The process of writing computer programs.	[9]Noun - The process of assigning a code to something for classification or identification.
Cambridge dictionary	[10]Noun - The process or skill of writing programs for computers: the instructions that tell a computer what to do.	[11]Noun – A language used to program (= give instructions to) computers. Verb -To represent information in a way that is not ordinary language, as with special signs or symbols: letters, numbers, words, and symbols used for writing computer programs.

Table 2. Comparative of Programming and Coding as concepts.

Source. Elaborated from Oxford and Cambridge dictionaries´ definitions.

The first conclusion is that these are different processes, it was necessary to make this distinction since it could lead to confusions regarding the duplicity of terms. Analysing the definitions in a

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[6] https://www.csteachers.org/

[7] https://www.iste.org/

[8] ("programming | Definition of coding in English by Oxford Dictionaries", 2019)

[9] ("coding | Definition of coding in English by Oxford Dictionaries", 2019)

[10] ("PROGRAMMING | meaning in the Cambridge English Dictionary", 2019)

[11] ("CODING| meaning in the Cambridge English Dictionary", 2019)

detailed way, it can be inferred that programming cannot be carried out without first knowing a code, with everything it implies.

Then, coding is a subset of programming, so applying reductionist logic leads to consider coding as something less complex than programming. Coding implies using codes which are used in a logic way to generate a language which can be understood by a machine, so it implies a translation process and the need of knowing a language, which is the Programming Language; while programming is the process which implies building an executable program ("Coding vs Programming - Top 7 Most Important Differences", 2019).

2.2. FOREIGN LANGUAGE AND PROGRAMMING

Once the term programming has been clarified, we proceed to take a tour along the different theories that are considered more solid and more adequate for learning a second language. It aims to be a solid argument as the use of programming can contribute to improve the learning of a foreign language.

2.2.1. Matching both with a methodology: Problem-solving

In the previous section it was revealed that CT is seen as a problem-solving methodology. There are researches which prove that educative contexts where problem-solving methodology is emphasized are more likely to generate ideal social settings in which natural language acquisition can occur (Collier, 1995). Solving problems, especially with others, implies communication and its correspondent negotiation of meaning and the creation of knowledge, as Vygostkian perspective (socio-cultural, constructivist) established (Churcher, 2014).

In this way all teaching and learning acts regarding a problem-solving methodology must be under the theoretical umbrella of the communicative approach. The 'communicative approach' being one that focuses on the functions of the language, for example ask or give instructions (closely related to programming), it is radically different from the 'grammar approach' because no rules of using grammatical forms are taught (Canale & Swain, 1980).

Under these approaches, the learning environment and all learners must be taken into account regarding teaching practices, so knowledge, itself, is somehow volatile and intangible because it is directly dependent on social settings and the interactions between learners and their social context (Foster & Ohta, 2005).

However, an approach cannot be considered as a real classroom methodology due to its wideness; so, in this line in 1994 the term 'Content and Language Integrated Learning' (CLIL) was coined with the intention to gather practices and designs which were taking place in Europeans schools were learning was a second language of education (Coyle, Hood & Marsh, 2010). Before discussing a paradox, which may exist concerning content and programming it is needed to highlight that it is key

for CLIL to take into account promotion of a certain range of skills in touch with problem-solving and Higher-order thinking skills, originally proposed by Bloom (1956).

Having a slight idea of what would be the implications of CLIL in the model of this study, it is needed to reflect on one aspect which may be problematic. CLIL as its names indicates, puts in the same learning sphere one or multiple contents to study and one vehicular language to go through them. A paradox is reached here, because programming has its own language, a programming language (which can be Java, C, C+, Python, FORTRAND, just to cite some of the famous ones) "is a vocabulary and set of grammatical rules for instructing a computer or computing device to perform specific tasks" (Beal, 2019). So, there are, undeniably, two languages, the FL and PL. Thus, the next question is somehow suggested: *"Does this particular case make CLIL really a viable methodology to be applied?".* There is a duplicity of languages, and both could be considered foreign languages at a certain extent. The most simplistic reduction that can be made regarding this issue is that when the focus is placed on the study of programming language (which would involve learning about programming concepts), the FL should be the vehicular language and the programming language first and later issues concerning programming would be the targeted contents.

2.2.2. Relation with the natural approach

Five hypotheses can be found in Stephen Krashen´s Natural Approach theoretical model, being the Affective Filter Hypothesis the one which must be considered to explain how can coding help the learning of a second language. According to Krashen and Terrell (1983, p.36) "this hypothesis states that attitudinal variables relating to success in second language acquisition generally relate directly to language acquisition." A high filter is surely to cut off the input to reach the Language Acquisition Device; so, it is argued that some variables closely related to a way to subconsciously acquire the language can contribute to reduce that filter.

2.2.3. Affective filter hypothesis implications

The Affective filter hypothesis is one of the five hypotheses established by Stephen Krashen regarding second language acquisition processes. Krashen & Terrel (1983) specify that "This hypothesis states that attitudinal variables relating to success in second language acquisition generally relate directly to language acquisition but not necessarily to language learning" (p.37).

In that statement there are two special concepts which deserve a deeper look, these are 'acquisition' and 'learning'. To make the distinction clear it is necessary to rely on another one of Krashen´s and Terrel´s hypotheses, the Acquisition-Learning Hypothesis.). 'Acquiring' a language is related to a natural process, the competence is that language use would be developed by using it in natural situations; while 'learning' a language implies learning the rules of it, to have a conscious knowledge of how it works, definitely, knowing the grammar rules (Krashen & Terrell, 1983).

Learning

Acquisition

Subconsiusly

Consciously

Explicit knowledge

Implicit knowledge

Similar to child first language adquistion
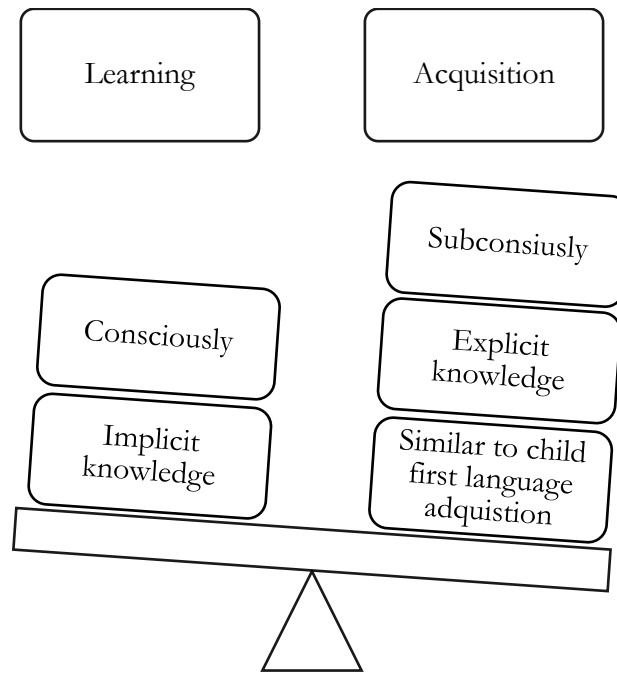
Figure 1. Strong reasons of how learning and acquisition occur.

Source. Self-elaborated.

Once the difference between Acquisition and Learning has been established a deeper view regarding the Affective Filter hypothesis can be considered. After Krashen and Terrell´s publication, emerged many studies which tried to measure the impact of this filter in the learning. For example, Laine´s Validation Study of Filtering Factors with a Focus on the Learner´s FL Self-Concept, shows a redefinition of the affective filter concept:

> "The foreign/second language learner's affective filter is a psychological construct consisting of a set of affective factors which make the learner screen incoming TL information either consciously, or unconsciously. The filter, then, is postulated as operative at both conscious and unconscious levels. The conscious part can be studied directly, and the unconscious by projection, e.g., through the subject's emotive reactions to relevant stimuli" (Laine, 1988, p.13).

There are evidences that proof that affective variables may affect the level of performance in the SL. All the literature consulted, refers to the same idea: lower anxiety levels contribute to improve language acquisition.

2.2.4. Zhao and Lai´s Theory of Technology-Enhanced Instructional Conditions

It is necessary to justify the positive impact that technology could have regarding any kind of target content of learning. Needless to say, those foundations of programming involve the use of technology. Zhao and Lai´s Theory is summarized in four instructional conditions which are not necessarily connected with technological implications but can be improved if technology is used as a

tool (Oxford, 2008). Conditions and their correspondent role of technology are reflected on the following table:

Condition	Statement	Role of technology
1	Learners need high quality input	Technologies offer authentic input of various types: comprehensible, simplified, and enhanced.
2	Learners need ample opportunities to practice	Technology provides practice via computer-mediated communication, mobile phones, and human-computer interaction.
3	Learners need high quality feedback	Technology contributes to feedback vis-à-vis error-tracking, speech recognition, adaptive feedback, and learner control of feedback (a form of self-regulation or autonomy).
4	Learners need individualized content	Technology allows greater customization and individualization.

Table 3. The four Technology-Enhance Instructional conditions.

Source. Compilation based on Zhao (2005).

Zhao (2005) described how can technology can be used to create an effective language learning environment. Hereinafter, a reconsideration of his guidelines will be made taking Scratch into account.

Firstly, how and what kind of technologies can be used to provide High Quality Input is discussed. Several gadgets are presented to be beneficious as well as some webpages, though some of them may belong to the Audiolingual method or Audiolingualism (a term coined by Professor Nelson Brooks [Richard & Rodgers, 2014]) working way. What is more interesting is to find out that actually; technologies can be a useful tool in the way to reduce affective filter in a classroom.

> Technology also helps to lower affective filters: input provided in the form of games or simulations taps the fun component of learning; hypertext allows self-selected path of navigation and make input more individualized and personally meaningful. The flexibility and learner control offered by technology enable learners to choose linguistic input that fits their needs at their own pace, which would, enhance the possibility the incorporation of input into their interlanguage system (Zhao, 2005, p.14).

Therefore, the main bone of contention is, not only taking advantage of the possibilities of communication between the human and the computer, but also generating a real communicative context encouraging peer or group work between students. That would open three lines of communication, all of them bidirectional: teacher-student, student-student and student-software.

Coming down to a more concrete level, classroom level, and having covered several topics in touch with the two areas under study, Scratch emerges as a useful tool. Before detailing what Scratch is and discussing its potentialities, it is needed to summarize schematically the relations which have been generated.
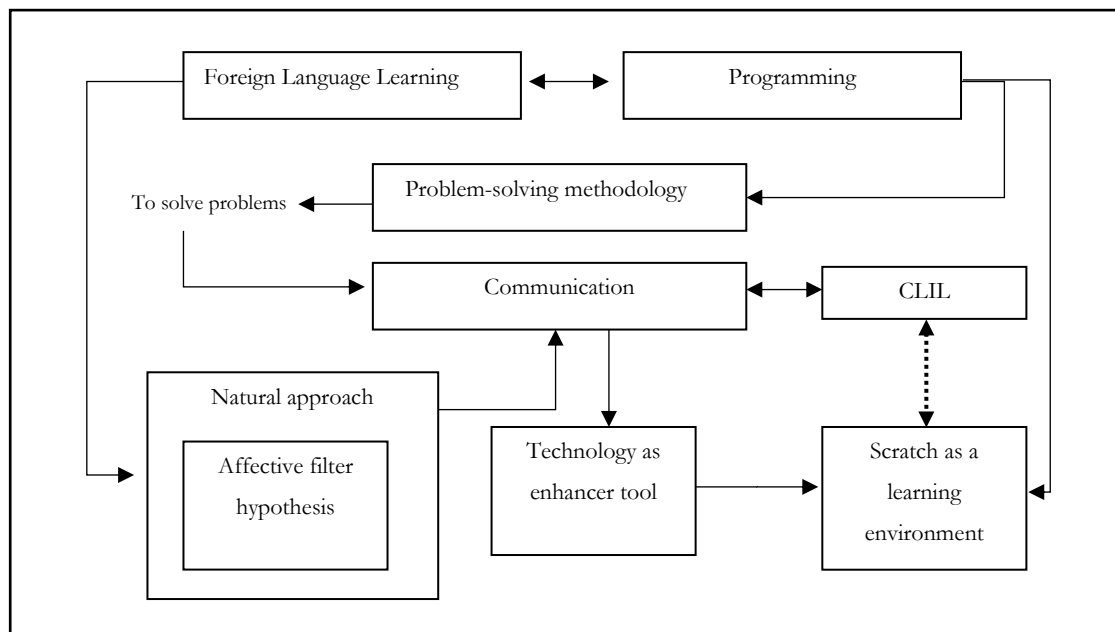
Figure 2. Scheme of connections made between FL and Programming to reach a learning tool.

Source. Self-elaborated.

2.2.4. Scratch as a powerful tool able to gather previous requirements

Before justifying its educational relevance, it will be clarified what it is. "Scratch is a visual programming environment that lets users create interactive, media-rich projects" (Maloney, Resnick, Rusk, Silverman & Eastmond, 2010, p.1). Scratch began to gestate as it is known nowadays in 2003 when [12]Mitch Resnick, John Maeda and Yasmin Kafai exposed it to the National Science Foundation (NSF) ("Development of Scratch 1.0 - Scratch Wiki", 2019). That proposal took four years to materialize, it was then in 2007 when Scratch 1.0 was finally launched, currently the version that is most used is 3.0.

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[12] Member of the Lifelong Kindergarten Group at the Massachusetts Institute of Technology and Scratch Team fame

Links of Scratch with the exposed in previous sections begin with Scratch´s definition itself, it is a programming enviroment with its own programming language which gathers syntax, type system, object model, inter-object communications (Maloney et al., 2010).

The second connection which can be established is with the Theory of Technology-Enhanced Instructional Conditions, where Scratch satisfies the technological issue having to access it through an electronic device and mediate with a certain Software.

Regarding communication, what can be added is that the spirit of sharing, collaborating, criticizing and building projects together is indeed the core of Scratch´s succeed and something to what the platform itself directly incites (Resnick et al., 2009). So, in this way, at least one type of communication is fostered. Remaining at the expense of the classroom methodology the promotion of the commutation among students. The ideal scenario is to arrange students into little groups, in which they can discuss opinions and share ideas when students must solve a problem (which is another axis of the argument line which has been exposed). One way to solve problems and foster communication is the "jigsaw", this particular methodology is based on the fragmentation of a topic into pieces which are given to student, when they reached the solution of a mini-problem, they can put it all together form the jigsaw (Aronson,1978).

Using a coding environment which looks very attractive for children due to its displayable options, can be a way to present the foreign language indirectly and to favour a more subconscious encounter with the learners, which matches perfectly with the Affective Filter Hypothesis.

As already described above, the implications of CLIL are somewhat more diffuse; lack of studies which directly connect this methodological design approach to learning a programming language put the spotlight on hypothesizing. We can interchange languages (Spanish and English in this study) once using Scratch and the point is that Scratch´s PL remains the same no matter what the FL used is, it remains its own syntax, object model and so on. Then, if a FL language is used at the same time in the enviroment while students are struggling to learn PL and how it works, the teacher can try to take advantage of the difficulties of learning how to code to "infiltrate and camouflage" the natural language learning.

In order to generate a rewarding link between a programming language and the target natural learning will be key to generate opportunities in both fields that help each other mutually. Experiences which connect these two fields are on the rise right now and their advantages can be proved directly from the involved actor, such as the one described by Omid (2014), who argues that his best way to learn English is to learn it in conjunction with something else, such as programming languages, because time and effort are equally inverted in two different projects.

The point would be to test if it is possible that while the greater cognitive demand is set in search of a solution to the problem, attention should be paid to the language used and the level of affective filter should fall. To conceptualize this, it has been given the name of Camouflage hypothesis:

- Learning Programming with Scratch configured in English, will make it easier to acquire this Foreign Language.

Veracity of this hypothesis necessarily needs to be addressed in further studies considering a wide range of issues like the text which is used in Scratch blocks: imperatives & commands or conditionals representing grammatical forms of a natural language.

3. RESEARCH METHODOLOGY

In this chapter issues regarding the chosen methodology design are discussed while research tools are showed. This section can be considered the core element of this study, because it has motivated to commit a deep study and its correspondent adaptation of a theoretical research method to study a concrete phenomenon. Even though the didactic proposal has capital relevance, without the adequate protocol of measuring variables and gathering data, a hypothetical success of the proposal would be compromised due to a too high subjectivity degree when discussing findings.

3.1. REFORMULATION OF THE ORIGINAL IDEA

Starting from the basis that the original idea was one which gets closer to proof the [13]Camouflage Hypothesis, the contact point with a real context has inevitably change that pretension. The implementation in the classroom of a short program of Scratch to reinforce Science concepts (Subject which is fully taught in English in the studied [14]context), for example, was remarkably difficult to establish in the middle of the school year because it could easily break the learning rhythm of the subject involved. It is necessary to invert time on explaining basic concepts of coding, whatever the method, and letting time for students to [15]adapt themselves to the coding environment before studying the concepts of a subject.

Having experienced a formative period in the context subject of study has helped to change the practical orientation of the study. Then, the main goal turns from "proving effectiveness of programming to acquire a FL" into "boosting motivation". All the same, the former objective has not been out of sight.

3.1.1. Context description

The study where the research has been contextualized and the didactic proposal (that will be detailed below) has taken place in a public school belonging to the Region of Castilla and Leon (Spain) whose cultural environment is tremendously rich but whose socially and economic [16]context is disadvantaged. One of most relevant characteristics of the school is that it currently offers a bilingual program.

The level of technological equipment of the school is low, around thirty computers are only available for more than three-hundred students. It implies difficulties when implementing any kind of ICT learning activity.

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[13] "Learning Programming with Scratch configured in English, will make easier to acquire this Foreign Language"

[14] This context is detailed in the next Chapter. See 4.1. Context description and participants

[15] An experience with the whole group testing the adaptability was carried out in one session. Results were satisfying enough to think that a didactic proposal based on Scratch would be motivating for them.

[16] Referred to the school.

3.1.1.1. Participant subjects

Eight subjects of year-2 of PE has taken part in the research. What they have in common is that all of them present learning difficulties for one or another reason. Furthermore, they are expected by the responsible teachers to early abandon the school bilingual program. To make the adjustment of researching techniques as well as the didactic proposal more understandable, student's difficulties have been summarized in a cursory manner.

SID	Specification of the learning difficulty
S1	Special Educative Needs: Attention deficit hyperactivity disorder (ADHD)
S2	Educational Compensation Needs - Limit Intellectual Capacity
S3	Special Educative Needs: Specific language disorder - dysphasia
S4	Educational Compensation Needs – generic learning difficulties
S5	Educational Compensation Needs - generic learning difficulties
S6	Educational Compensation Needs – generic learning difficulties
S7	Special Educative Needs: Attention deficit hyperactivity disorder (ADHD)
S8	Educational Compensation Needs – generic learning difficulties

Table 4. Student´s learning difficulties.

Source. Self-elaborated.

These students are divided into two different groups (group one: from S[17]1 to S4 and group two: from S5 to S8) in such a way that four are in one group and four in another. This implies that all the processes and implementations carried out with them have been duplicated.

3.1.1.2. Lack of motivation and second language barrier problem

In the context described there is mainly one problem in touch with the theoretical issue of this work and which has shifted study´s initial intention: the lack of motivation (perceived) of students with learning difficulties. This issue was identified along the process of observation which took part in the first phase of a practicum period. The Following fragment exemplifies a real classroom situation that has helped to detect such problem:

Field diary (Alonso, 2019) – 12 march of 2019 – Science class

> *"The teacher starts asking questions about what the students remember concerning the previous lesson. Some students respond immediately to the questions, some of them raise their hands up. Most of the class is looking at the teacher or at the partner who is talking, but there are four students who are looking at the walls of directly at their tables […]. The teacher provides an explanation of how The Earths rotates around the Sun in which students take part, they have to complete an activity in their notebooks. Three of the four students*

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[17] To fully preserve their privacy, they had been arbitrarily assigned a number according to their intervention order in the first focus group interview.

> *previously mentioned are unable to understand the instructions, and only after seeing how the others have opened their books, do two of them repeat the action. The third one needs to be encouraged by the teacher in the mother tongue"*

This passage could not seem significant at all, but it really is, because there is a pattern concerning the learning processes of students with difficulties. They really disconnect in the lessons which are in English (they have several difficulties in lessons in Spanish, but the gap is clearly big in those which are in English).

The school previously mentioned currently has an agreement which involves the Spanish Ministry of Education, Culture and Sports (M.E.C.D.) and the British Council. The framework of reference with which teachers plan the learning processes is the Integrated Curriculum. In order to have a concrete idea of the level of these students regarding second language learning, English in this context, there is a document named "[18]Guidelines for the Development of the Integrated Curriculum: Primary Stage" (Agudo et al, n.d.) which detailed three performance level taking for granted that Level 1 expresses the minimum requirements that students must reach and the end of each cycle. Focusing the attention in the first cycle, the Level 1 requirements are:

Listening and oral expression

-		Students use English to communicate their immediate concerns. They listen to the teacher and respond appropriately in most cases. They communicate with others to translate simple meanings, using a few common and simple words and phrases. They help tell stories with predictable structures and structured language.

Reading comprehension and written expression

-		Students recognize common words in simple texts. They use their knowledge of phonemes, as well as contextual clues to read texts, and to establish the meaning when they read aloud. His writing communicates meaning through common words and simple phrases. In these activities, students often need teacher support. In their reading and writing, students begin to be aware of how capitals and periods are used. They begin to express their opinion about important events or ideas in stories, poems and nonfiction texts.

Focusing the attention in the students with learning difficulties, it can be proved that their performances regarding English use stay away from these requirements. This is something that is going to propitiate that, in agreement with the by the educational project of the school, they will be left out of the bilingual project at the end of year four of Primary Education.

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[18] Hereinafter republished as: Agudo, M. T. (2006). Orientaciones para el desarrollo del currículo integrado hispano-británico en Educación Primaria. Ministerio de Educación.Cultura y Deporte.

3.1.1.3. Role of technological resources availability

Due to the context of the school, it is significant that most of the students with problems in the acquisition of a second language have more difficulties in using technology. Apparently these two things are not in touch, but it can be argued that actually they are. Families with lower economic resources have more problems to offer their children a wide range of learning scenarios out of the school.

Having studied the learning context and the resources available it was necessary to undertake a decision regarding the learning environment. Learning how to code without a computer could be seen as a paradox but it is the most efficient way.

As can be seen in Chapter 1 of this assignment, The Digital Competence Framework for Citizens does not make any special appointment in using physically the ICT devices to develop each of the skills. This must be interpreted as an open door to introduce unplugged resources in the classroom, in this way the ICT accessibility is not considered as a threat to this study´s possibilities.

3.1.2. Programming to foster motivation in Foreign Language Learning

Once the issues regarding Second Language Acquisition in this context and the ones regarding ICT and Digital Competence have been described, there comes the idea of using programming as a way of teaching Foreign Language with students whose continuity in the bilingual program is thought to be at risk.

Programming to enhance
motivation in FL Learning
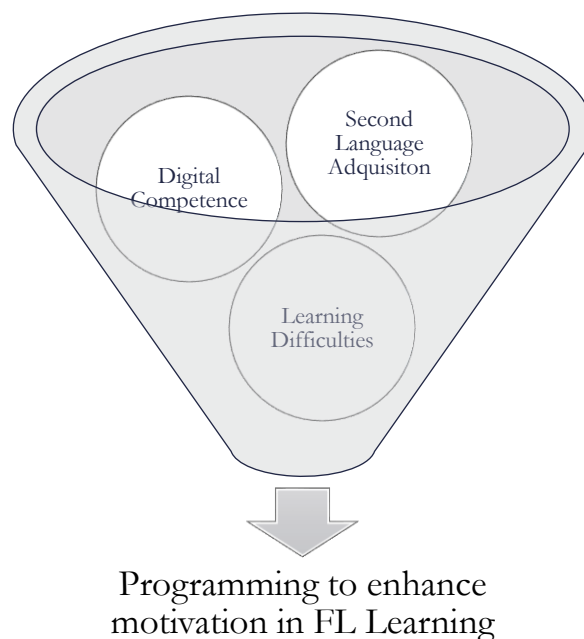
Figure 3. Elements coming up to scene in this study.

Source. Self-elaborated.

3.1.3. The problematic concerning Motivation

Measuring motivation is probably the most controversial and difficult point of the study due to the nature of the theme to study. The first step in this process is to make a theoretical approach to the concept of motivation and then create a definition that can be adapted to our specific work environment. Problems surrounding the definition of motivation have been a constant throughout the history of psychology of motivation in the sense that not too much consensus is reached (Kleinginna & Kleinginna, 1981). To reach a measurable construct to work with, it is necessary to adopt a top-down perspective from the general to the particular. Kleinginna & Kleinginna (1981) classify the following definition as one in which in motivation is distinguished from other processes:

> John P. Campbell and Robert D. Pritchard, 1976 (work motivation article) "Motivation has to do with a set of independent/dependent variable relationships that explain the direction, amplitude, persistence of an individual's behavior, holding constant the effects of aptitude, skill, and understanding of the task, and the constraints operating in the environment." (cited in Kleinginna & Kleinginna, 1981, p.283).

What is most interesting form study's perspective is that relevance of variables cannot be overlooked, therefore these variables which may seem difficult to attach had been atomized into subcategories of study (detailed in data analysis section).

The following approach makes an interesting point which can be linked to SL Acquisition. Students must feel the real need of communicate meaning, which follows communicative approach's guidelines.

> Philip Teitelbaum, 1967 (physiological text) "The motivational state--the physiological central state that corresponds to the urge to perform a given act, to obtain a certain object, or to produce a desired outcome. As long as a fixed built-in relation exists between a stimulus and a response, we have no justification for inferring the additional existence of a motivational state underlying that response to the stimulus." (cited in Kleinginna & Kleinginna, 1981, p.283).

The last definition to study allows to motivation as a mix of multiple factors, and reinforces the idea that it is not an essay construct to work with:

> James P. Chaplin and T. S. Krawiec, 1979 (history and systems text) "First, the psychology of motivation is concerned with changing physiological states .... Second, emotional states .... Third, habits .... Fourth, sets, attitudes, and values .... Fifth, incentives and other environmental influences." (cited in Kleinginna & Kleinginna, 1981, p.285).

What is important to notice is the fact that there is a component regarding motivation which has a lot to do with environmental influences, the subjects of our study may not have the same environmental influences as other students of the class. But it would imply a [19]further study to undertake.

3.1.4. The operational hypothesis

There is more to analyse concerning emotional states, a relationship can be made with the previously mentioned affective filter hypothesis, stating this hypothesis:

- [20]If the students can work in a relaxed class environment, their motivation will be fostered regardless of the task to be performed.

That hypothesis is somehow unexpected and is the result of submit the study under the "behavioural laws" of a real context. Looking back, study´s initial pretention was to proof effectiveness of programming to learn English, but an emergent issue has made that first hypothesis remained in the background. By mixing first intention and the "new" hypothesis we can have:

Premise 1 – Programming will help students´ FL acquisition.

Premise 2 – Is key to generate a learning environment, comfortable enough to reduce students´ affective filters.

Therefore: If a programming enviroment (like Scratch) is introduced and managed in a relaxed class environment, then it will help to boost students' motivation regarding FL leaning and consequently their performances in FL will improve too.

3.2. QUALITATIVE APPROACH TO MEASURE MOTIVATION

The scenario previously discussed must be considered as a [21]generic one, but the reality is quite different, and it is not necessary to travel to underdeveloped countries for example, in which these hypotheses are, unfortunately, far apart to be discussed due to the presence of quite serious problems.

Having experienced a Practicum period in a school which is located in one of the districts with more economics and social problems of a capital city in Spain has made it possible for me to observe a different reality in which problems have to be considered from a different perspective rather than quantitative numbers, which are only that, numbers. To fully understand complex phenomena, qualitative approach as a research method has been chosen due its flexibility.

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[19] Revising all the notes taking in the research dairy what can be added regarding this issue is that none of the students who had took part in this study have expressed during the classes to have had some experience related to English outside the school context, which does not mean in any case that they have not had it. With this one can only hypothesize that it is more unusual that they have had

[20] This has a crucial relevance because that fact may pollute the data to analyse at the end of the process.
[21] "Generic" understood as an ideal educational context in which any resource can be easily accessible.

3.2.1. Qualitative approach implications

It is understood that when implementing or designing a measurement instrument it should be framed within a research approach. To evaluate if the proposal is effective enough, we must design a research route that entails the choice of an umbrella-like approach covering the adhesion of measuring instruments of certain parameters. The research method chosen is qualitative, the reasons why it is considered to be more successful in this particular context are explained below.

Firstly, qualitative methods have increased their popularity since 1990s (Creswell & Creswell, 2017). The idea of designing or implementing a quantitative questionnaire is not considered as an appropriate way to collect data in this context due to the age of the participant subjects, it is quite difficult to find questionnaires measuring motivation in children under ten years old. In addition, the fact of having developed a period of training practices in this context has set in motion some forms of information collection that are consistent with the qualitative methods, as they have led to the building of ideas and hypotheses especially regarding the behaviour of students. It matches perfectly well with the definition of qualitative approach which Creswell & Creswell (2017, p.18) provide:

> A qualitative approach is one in which the inquirer often makes knowledge claims based primarily on constructivist perspectives (i.e., the multiple meanings of individual experiences, meanings socially and historically constructed. with an intent of developing a theory or pattern) or advocacy/participatory perspectives (i.e., political, issue-oriented, collaborative. or change oriented) or both. It also uses strategies of inquiry such as narratives, phenomenologies, ethnographies, grounded theory studies, or case studies. The researcher collects open-ended. emerging data with the primary intent of developing themes from the data.

Following this methodology implies that research questions may orient the study to cases or phenomena, it implies to seek common patterns and notice expected relationships (Stake, 1995). This means that variables implied in the research may be difficult to control or to define.

3.2.2. The research problem (RP)

With the purpose of tackling variables in a more concrete way, the research problem has been atomized step by step. The problem of research to untangle is:

> RP - The learning of foundations of programming to boost the motivation of students with learning difficulties in the learning of a second foreign language.

From the research problem described above, two research questions (RQ) emerge. At this point the problem diverges, first research question attends to FL learning and second one to programming.

> RQ1 - What is the perception that students have of learning English?

RQ2 – Will the foundations of programming be significant enough for the students?

On the way to concretion, the last step of this process is to define general objectives (GO) and specific objectives (SO) that irrevocably are in touch with the questions exposed above:

GO1 – Uncover if there are hidden factors that hinder students´ learning processes

SOA – Fencing they perceive as difficult

SOB - Analyse what they see as useful in FL learning

GO2 – Find out what sense do students give to programming

SOC – Unveil relations with previous knowledge background

SOD - Study the scope of family's involvement

Thematic Scope	Research problem	Research Questions	General Objectives	Specific Objectives
Motivation concerning Foreign Language Learning	The learning of foundations of programming to boost the motivation of students with learning difficulties in the learning of a second foreign language.	What is the perception that students have of learning English?	Uncover if there are hidden factors that hinder students´ learning processes	Fencing they perceive as difficult
				Analyse what they see as useful in FL learning
		Will the foundations of programming be enough significant for the students?	Find out what sense do students give to programming	Unveil relations with previous knowledge background
				Study the scope of family's involvement

Table 5. Research´s operative concretions.

Source. Self-elaborated.

3.2.3. Data gathering tools

Relevant data must be rallied with the support of several tools. The more appropriate these tools are, the better will reliability of data be.

3.2.3.1. First focus group interview

The technique that has been considered most appropriate to design the interview is the focus group interview. Interviews are considered as tools whose value in qualitative research studies is high, boosted since the emphasize was moved to in-detail and holistic description of a phenomena (Dilshad & Latif, 2013). Once we decided to implement an interview, a consideration about its nature was necessary, that was the moment when the idea of implementing a focus group interview came up. This technique is defined as "a group comprised of individuals with certain characteristics who

focus discussions on a given issue or topic" (Anderson, 1990, p.241). The main reason that drive the performance of a group interview instead of an individual one is its pragmatism, it would be much costlier in terms of time and probably less rich to conduct individual interviews.

A focus group interview, which was carefully designed following the guidelines of Anderson (1990) was designed and implemented before the didactic proposal. In this particular study, with its unique characteristic, there is the case that we have two mini groups, which surely has improved the potential of the study because of the possibility of contrasting the same experience, idea or implementation between two groups.

QUESTION	CATEGORY
1. What would you say English is for?	Introduction
2. What memories do you have of English during your life of things that you have studied or that you have seen?	Introduction
3. What do you think about studying English?	Introduction
4. What would you say if the teacher told you that now all Science lesson are going to be in Spanish?	Transition
5. How do you feel and what do you think when you do not understand something during Literacy, Science or Arts classes?	Transition
6. Is there something you would like to learn in English? What is it?	Key
7. Is there anything you do not like when learning English? What is it?	Key
8. If they told you that all the subjects are going to be in English what would you think or how would you feel?	Key
9. What things would you do to make English learning easier?	Closing
10. (After recapitulating) Do you agree?	Summary
11. Does anyone want to add something else?	Final

Table 6. Focus group interview planning.

Source. Self-elaborated.

3.2.3.2. Personal interview with external observer

The Next tool is based on the perceptions of a teacher who usually teaches Science and Arts to these students, both subjects with English as a vehicular language. Adding another researcher to this process makes the study to have a higher degree of objectivity Stake (1995). The teacher will carry out an observation focused on programme participants. The observation procedure's is spontaneous and has taken place during the subject of literacy. This technique is purely qualitative, which allows finding better moments that reveal the special and differentiating complexity of the case (Stake, 1995).

Having implemented the didactic purpose, an interview with the teacher was carried out to explore [22]their impressions regarding differential features which may not have been appraised by me.

These perceptions will be collected in two ways, sporadic observations and through an individual interview. Some considerations have taken into account with respect to wording questions, for example questions had been intended to be open-ended and "why" questions have been avoided so as not to interfere negatively in the interview (McNamara, 2009). This interview is to be combined with the teacher´s field notes, so that is why not a thorough interview has been designed. Interview´s initial script may be lightly affected while the interview takes place if interviewer makes an interesting point which needs a follow-up question.

1. Which are the school-depending factors that may influence the performance of participant students?
2. Do you consider that the degree of significance of the tasks they face in learning a foreign language is the differential factor that affects their motivation?
3. To what extent could group working affect their performances?
4. Have you observed any behaviours that you consider differential (in terms of attitude, work disposition, engagement degree) in them these days? Can you detail them?

3.2.3.3. Second focus group interview

At the end of the didactic implementation, another focus group interview was carried out, which means that at least we have a before and after tangible data, whose variability and analysis is the object of study on the *Findings* section.

3.2.3.4. Self-evaluation scale

While implementation takes place, another data gather tool had been used with the intention of monitoring students' perceptions. Two variables had been defined, "Like" and "Learn", both had to be evaluated individually by participant students at the end of each Unit of Work. They will be asked to colour with green, yellow or red depending on their own perceptions. Green represents high level of learning and liking perception, yellow intermediate and red low level. Besides, a similar scale is to be filled by them at the end of each Literacy session aiming to have another contrasting element to argue with.

3.2.4. Data analysis protocol

Analysing qualitative data implies using techniques and protocols quite different from those used in quantitative data analysis. The mayor objective should be uncovering relations which may emerge between concepts or problems when comparing or contrasting compiled information. Sometimes explanations provided by qualitative analysis can be object of controversy due to their plausibility,

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[22] Intentionally used with the purpose of preserving better the anonymity.

because focus may be diverted towards the understanding and description of socio-contextual variables rather than testing hypothesis (Neuman,2014).

However, this study intends its results be as truthful and adjusted as possible to reality so the technique chosen to compare and look for correspondence relations between data is "triangulation", whose use is defend by Stake (1995) "In our search both for accuracy and alternative explanations, we need discipline, we need protocols which do not depend on mere intuition and good intention to "get it right". In qualitative research, those protocols come under the name "triangulation"" (p.107).

In order to limit the problem as much as possible, a triangulation protocol will be implemented. According to Stake (1995) "for data source triangulation, we look to see if the phenomenon or case remains the same at other times, or as persons interact differently" (p.112). To accomplish that statement and capture the phenomenon the methodological design is the one that follows:
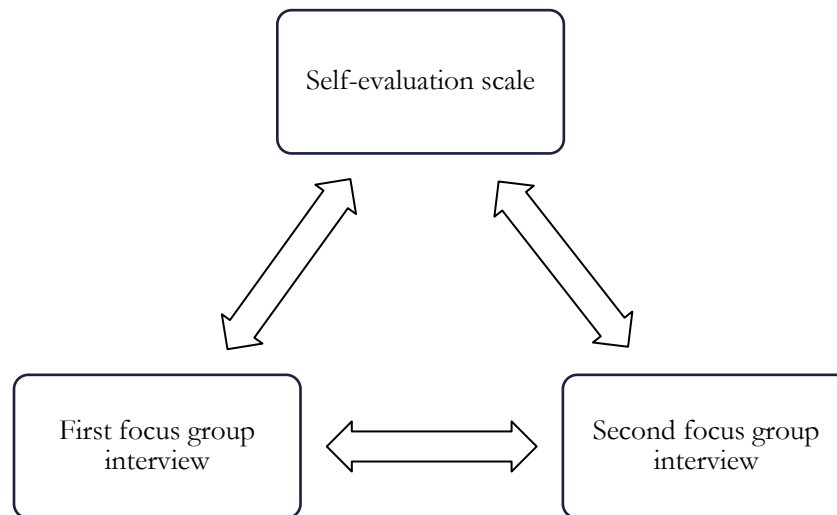
Figure 4. Triangulation protocol.

Source. Self-elaborated.

By this way, the two vertices of this triangle are formed by the two focus group interviews, both being complemented by the scale which is to be daily fulfilled by the students. When data dump coming from these sources, must be compared with data collected from external observer. This step may be integrated before, when the first data dump is on progress; as a supportive point of the process of triangulation, having a "quadrangulation" in this way.
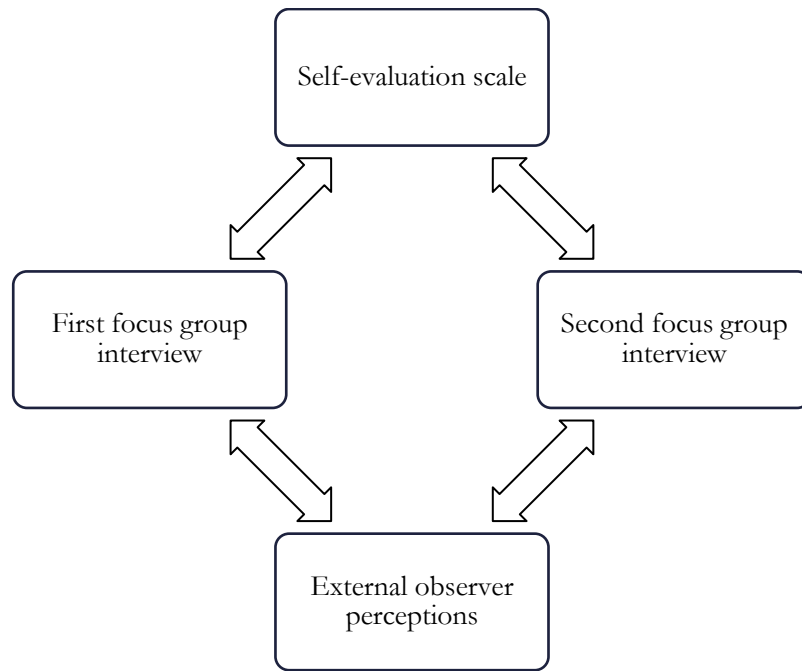
Figure 5. Re-adapted triangulation or quadrangulation.

Source. Self-elaborated.

4. DIDACTIC PROPOSAL

4.1. DIDACTIC PROPOSAL DESIGN PROCESS

To measure a learning outcome extracted directly from the Spanish/English primary integrated curriculum. Language and Literacy (Arellano Espitia et al., 2015); by matching it with the most similar learning outcome which is contained in the Regional Curriculum we can frame the proposal under a legal assessment criterion. The measurables learning outcomes chosen are the ones that follow:

From DECREE 26/2016, of July 21:

- Student elaborates simple texts based on very structured given models with lexicon worked in the classroom (2016, p. 34494).

From Spanish/English primary integrated curriculum. Language and Literacy:

- Look for key words in short information texts to complete cloze texts. (2015, p.86).
- Use a given model to write a simple report relating to a theme studied (2015, p.86)

Once reached the time to introduce [23]coding to the students and taking into account the considerations previously made, it is necessary to contextualize everything. According to Piaget (1964) the point is to make stimulus significant enough to foster learners´ performances.

According to the study´s new orientation, to promote its motivation in the learning of a foreign language, and taking into account the official dispositions gathered in the *DECREE 26/2016, of July 21, by which the curriculum is established and regulates the implementation, evaluation and development of Primary Education in the Community of Castilla y León,* the content of foreign language on which the proposal is articulated is:

- Acknowledgment of the foreign language as an instrument to communicate [Sociocultural and sociolinguistic aspects] (2016, p.34469).

So that this proposal is not separated from the curricular requirements, learning standards of the foreign language area have been atomized (readapted into much more easily measurable concretions to work with) and will be object of continuous evaluation throughout the implementation. Besides this, a learning outcome concerning programming of [24]*The Digital Framework Competence for Citizens* has been the final expected learning outcome to reach.

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[23] Not to mention that they are not told directly what coding is, this refers to the introduction of the basis.
[24] Contextualized in the first section of this study

First Second Language	
Official learning outcomes	**Operative concretion**
Understanding oral texts -The student understands the general and essential sense of oral narrations appropriate to their level with visual support. - The student recognizes very basic intonation patterns in different communicative contexts (questions and exclamations).	-The student understands one instruction or a piece of information in English (without the need of repeating it in Spanish). -The student makes a gesture while saying a word related with the task. -The student answers appropriately simple questions.
Production of oral texts: expression and interaction -The student reproduces the expressions of the teacher and the recordings used in the classroom. - The student meets the rules that govern oral interaction.	-The student repeats one word or expression of the teacher spontaneously. -The student asks for help in a communicative situation.
Programming	
Final expected learning outcome	
-The student can: list simple instructions for a computing system to solve a simple problem or perform a simple task (At basic level and with guidance).	

Table 7. Correspondence between learning outcomes and their operative concretions.

Source. Self-elaborated.

In order to contextualize and provide an appropriate approach to coding (and to programming later on), a book called *Hello Ruby: adventures in Coding* (Liukas, 2013) has been chosen. This book provides a fantastic framework to work with because it is divided in ten chapters which include some activities at the end of each. It is very significant for kids that everything makes enough sense to encourage their motivation. So that is why the decision of working with that book was considered to be better than introducing directly the activities without a frame. The use of this book is not isolated as it can be proven by a research carried out with Dutch primary students; researchers defend the use of the book because it gathers concepts related to computational thinking skills (Koning, Faber & Wierdsma, 2017) and working through it and the learnings that begin with it allow to establish a previous bridge to the introduction of Scratch.

As previously mentioned, all participating students have learning difficulties, so attention to diversity is integrated in an implied way when giving instructions, reading, asking, repeating and so on.

4.2.1. Proposal concreted into five units of work

The launched proposal included five units five [25]units of work planned to be carried out in approximately 150 minutes. Due to the special and unique characteristics of students, the implementation of activities directly from the book is tough to carry out. These five UoW are fully described in Appendix IV, although a brief description of them is reflected on forward.

In UoW 1, Ruby (main character) will be introduced as well as the story, and a brief connection with computers and creativity will be stated too. The first chapter is to be read, slowly and making necessary repetitions, then two activities adapted from the book will be explained.

UoW 2 is to have the same scheme, Chapter 2 will be read and an activity whose intention is to simulate Boolean logic (the one which computer work with, based on true or false expressions). First two UoW are supposed to be the trigger point of the implementation.

UoW 3 will start the same way, with Chapter´s 3 reading. This UoW clearly focuses on giving instructions to create sequences. Once Ruby´s book activity is done an adaption in the playground is to be carried out with real squares and toys

The next UoW starts differently from the other, with an interactive story created in Scratch. This tool will be introduced. Students will have to create a paper-based script showing an interaction between Scratchy (Scratch´s most representative character) and Ruby. They will be given plenty of blocks and with constant guide they will decide what happens in this fictional first contact between the characters.

The fifth UoW is to be carried out in ICT´s lab. Its major objective is to successfully compile successfully the story students had created in previous UoW using Scratch´s project editor. In this way, programming´s learning outcome would be somehow accomplished.

4.2. PROPOSAL´S IMPLEMENTATION

The proposal was carried in the real context with some adaptations, the first of them affects temporalization. Unit of Work 1 and 2 were carried out the same day one after the other due to temporalization issues. UoW 2 had to be modified and only one activity was done due to time issues.

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[25] Due to the special learning conditions created this name has been considered to be more appropriated because it makes a clear distinction with the other subjects when students are with the rest of their classmates and the temporalization is close to one hour.

What can be argued regarding student´s performances are that all of them were highly engaged along all the UoW. Their productions far exceeded initial expectations, which were optimistic somehow (otherwise a proposal of this natural would not have been ever considered).

Cognitive requirements of tasks belonging to UoW 1 & 2 may not have fostered students´ creativity enough. However, they must be considered as a warming-up, as a contextualization framework. Nevertheless, in terms of evaluation (considering learning outcomes) is here where most of the operative concretions described below have been reached.

	S1	S2	S3	S4	S5	S6	S7	S8
No translation needed for a concrete order	3	1	0	0	1	1	0	1
Makes a gesture	5	4	0	0	2	3	2	1
Answers simple questions	5	2	0	2	6	4	1	0
Repeats one word or expression	4	6	3	0	4	5	2	0
Asks for help in a communicative situation	2	0	0	0	2	1	0	0

Table 8. Relation of overall times that an operative concretion has been reached along the implementation.

Source. Self-elaborated.

The third UoW is to be considered as the richest one in terms of engagement, due to two reasons. First, one task was to be carried out in the playground, a place that normally students do not associate with learning experiences. The place, then helped to lower the affective filter. The second reason is that is it arguably that the UoW is the one in which spontaneous communication between students has been richer. Moreover, an unexpected situation took place with mini-group B. To fully reflect these events, narrations of both UoW implementations has been included in appendix II.

UoW 4 started with high engagement level, the virtual story was attractive for them. Students understood why now there is another character different from Ruby and why Ruby´s book was not used that day. Most of the commands were given in Spanish after having been given in English (sometimes instructions for these students are incomprehensible even in Spanish) only at the very end of the UoW when they seemed to understand that the commitment was to create a dialogue the researcher could continuously speak in English, translating what they say in Spanish and using the blackboard to write what they wanted characters to be say.
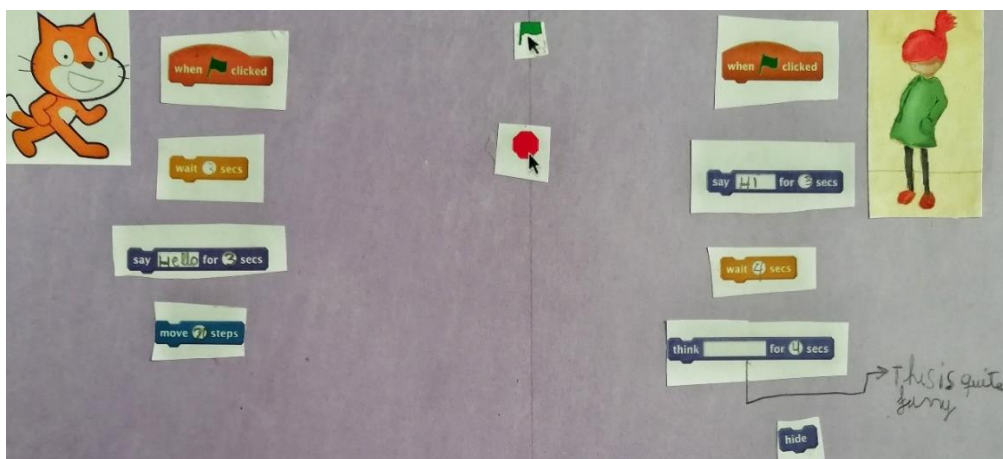
Figure 6. Sample script made between S1 & S4 during UoW 4.

Source. Taken from personal research files.

The fifth UoW took place in the ICT lab, firstly I showed them a project ready to be edited from zero, it only had Scratchy and Ruby´s [26]sprites. The researcher explained to them were they should look for each block. Secondly, I wanted to test if students would be able to reach Scratch´s home place on their [27]own (with everything it implies). Some of them were not able to switch the computer on and multiple problems emerged when they had to look for the navigator. Once in the project editor, the first steps were carried out with permanent guidance because some problems came up: they did not know to erase the given text or how to join the block. Progressively, the researcher began to interfere less and less, their conversations were rich in terms of instructions and information exchange. However, they spoke in Spanish and only in English when they read blocks´ names or text they had written in their script.

When programmes were compiled, and characters spoke they seemed to be very enthusiastic. Once their stories had been built, they had time to experiment with the editor. That possibility had been taken into account before proposal's implementation, being necessary to become familiar with the learning environment (free experimentation with the editor would have been better at the very beginning of any proposal or before recreating the story, due to temporalization issues it was carried out at the end).

The thing which grabbed most their attention was the possibility to add more sprites as well as drawing on them; students seemed to be very enthusiastic with Scratch possibilities. The research guided a little bit this experimental process by adding backgrounds to the project, sounds and so on.

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[26] According to Scratch Wiki (2019) a sprite is: either user-created, uploaded, or found in the sprite's library, are the objects that perform actions in a project.

[27] A previous experience with computers, involving all students of second year of that school showed that most of them were able to enter navigators.
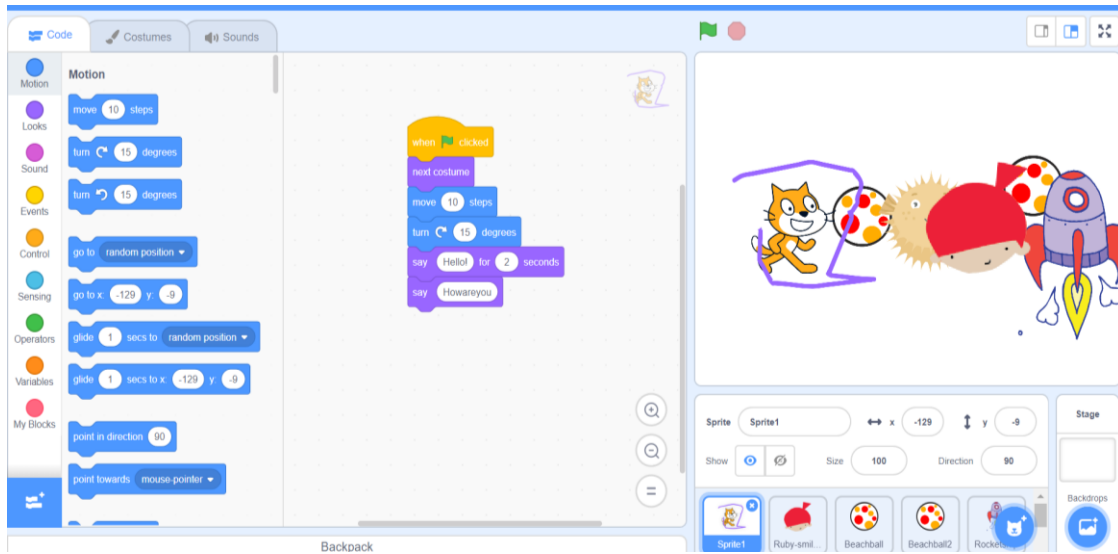
Figure 7. Screenshot taken of the project elaborated by S1 & S4 during UoW 5.

Source. Scratch´s [28] studio created on purpose for this research. Available at:

https://scratch.mit.edu/studios/14124395/

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[28] That studio gathers the four final projects created by the students.

5. FINDINGS

The role adopted as a researcher when carrying out the approach to knowledge must be central, especially since the study fits into the aforementioned qualitative methodology, "most contemporary researchers nourish the belief that knowledge is constructed rather than discovered" (as cited in Stake, 1995). Like fitting a puzzle, tasks to be carried out during this research must be considered as joining little by little knowledge pieces. In this way, the possibility of making a spontaneous and unfounded finding is excluded.

5.1. DATA DUMP & ANALYSIS

To make the analysis process more understandable one student has been selected at random. This student´s implications will be reflected on forward and they will be the plot axis of this section too. However, in the process of collecting and showing results, all participants are included because it is considered relevant in the sense that the same process could apply to any of them.

When studying data, comparing them and searching for correspondence relationship a framework or reference is needed to have a framework or reference. With that purpose objectives originated from the research questions have been reduced to subcategories that would make identifying certain data more efficient and understandable.

General Objectives	Specific Objectives	Categories	Subcategories
Uncover if there are hidden factors that hinder student´s learning processes	Fencing they perceive as difficult	Affective implications	-Frustration -Teacher´s attention
		Role of gamification	-Having fun -Active learning
	Analyse what they see as useful in FL learning	Significant learnings	-Diary life experiences -Preferences
		Progression	-Learning -Wider contexts
Find out what sense do students give to programming	Unveil relations with previous knowledge background	Interdisciplinarity	-ICT experiences -Cross-curricular topics
		Meaningful	-Contextualization -Engagement degree
	Study the scope of family's involvement	Role of inclinations	-Likes -Stimulation
		Familiar scope	-Stereotypes -Resources accessibility

Table 9. Ultimate concretion of the research problem into subcategories of analysis.

Source. Self-elaborated.

5.1.1. Data from Focus Group Interview

Attending to data collected from tools specifically designed for this study, the focus should be put first on the first focus group interview, in which students divided in their group work and the

researcher have taken part. Interviews were carried out in their [29]mother tongue due to the facts previously mentioned. [30]Student´s answers to the questions made (fully recorded in appendix III) can be analysed considering subcategories previously mentioned. After revising in detail, the interviews, some of the answers given by students have been considered relevant and they have been matched with a subcategory.

Subcategory	Statement	Student	[31]Reference
Frustration	*"Fatal, I would throw myself out of the window"*	S1	I-42
	"I feel I´ve been wronged"	S2	I-50
	"I feel wronged"	S4	I-79
	"Yes, they punish us for everything"	S3	I-73
Teacher´s attention	*"Teachers […] so much talking and then we do not clarify"*	S1	F-49
Having fun	*"Well, some lessons are quite long to me"*	S1	I-26
	"Booooooored"	S4	I-58
	"Lessons lasts too much"	S2	I-69
	"Yes, me. I liked when we went to the playground"	S2	F-81
Active learning	*"This classroom"*	S2	F-14
	"It is quite boring when we have literacy on Wednesdays"	S2	F-63
	"When we went to the computer´s room"	S1	F-82
Diary life experiences	*"At home with my brother reading a story in English. Reviewing English with my brother".*	S1	I-18-19
	"And if you don´t know something you put Google: How do you say "please in English"	S2	I-112-113
Preferences	*"Hey, let´s see…when we were studying animals"*	S1	I-8
	"Good, I would like that"	S1	F-67
Learning	*"To learn in classroom"*	S4	I-92
	"For me it´s better"	S1	F-23
Wider contexts	*"For learning and memorizing when you go to a place where they speak in English"*	S1	I-2-3
	"English, because if you learn it and you go to Disney and there they talk in English"	S2	F-42-43

Table 10. Group A focus group interview sample categorical analysis.

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[29] There is no point in taking the intverview in their second language because its purpose is not didactic, but to collect the most accurate information.

[30] Answers had been translated from Spanish to English in the most literal way possible.

[31] Codes correspondence: I – Initial. F-Final. Number – line where text appears.

Source. Self-elaborated

Subcategory	Statement	Student	[32]Reference
Frustration	*"I feel wronged"*	S6	I-72
	"Yes, I feel burdened"	S8	I-73
Teacher´s attention	*"Speak a little bit of Spanish"*	S6	I-108
	"Because sometimes -Science teacher´s name – if there is something we do not understand […] the teacher can repeat it in Spanish.	S8	I-110-111
Having fun	*"We went outside and we played games"*	S6	I-26
	"Boring, a little bit boring"	S8	I-105
Active learning	*"The Sun, because when Sun is up, it reflects perfectly our shadow, and little by little…(interruption)."*	S5	I-16-17
	"Listen and learn"	S8	F-59
Diary life experiences	*"Yes, watching videos"*	S7	I-34
	"On Youtube"	S8	I-37
Preferences	*"We have studied animals"*	S8	I-18
	"A little bit regular"	S5	F-54
Learning	*"I like everything about learning English"*	S5	I-89
	"We will not understand anything"	S6	I-103
	"No, because we would not know anything"	S5	F-51
Wider contexts	*"Yes, we will know everything about English and we will become greater English teachers"*	S5	F-21-22

Table 11. Group B focus group interview sample categorical analysis.

Source. Self-elaborated.

After classifying the statements, the next step has been contextualizing them and looking for possible explanations, especially the focus has been put on those statements which may have been affected by the programme. One of the most significant findings is the following answer, made by Student 2 when they were asked to tell me about memories related to English.

- *"This [33]classroom" S2. F-14*

Belonging to the final interview it may be an indicator that all learnings related to English have a clear connection with that room. With a further precision it may be inferred that it could be directly related

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[32] Codes correspondence: I – Initial. F-Final. Number – line where text appears.
[33] It is needed to add that the all the proposal carried out took places in a classroom different from their reference or usual classroom but eventually Science teacher uses that room for experiments.

with the didactic proposal. That affirmation is not made in vain, because revising initial interview a similar answer cannot be found. Taking that for granted, it can be considered as a positive point for the programme, because at least a direct memory has been established for Student 2.

It has to be added that no many relevant statements in touch which the programme had been found. It was something detected while the final interview was been carried out. Having detected that evident connections would not been easy to establish later, it was decided to introduce direct questions. Asking directly whether they have like the proposal, Student 2 answered:

- *"Yes, me. I like when we went to the playground" - S2. F-81*

The answer has a direct interpretation, UoW 3 implied going to the playground when they understood how to give instructions, the follow-up activity may have been seen as a game for students, especially for Student 2.

If Student 2´s statements are deeply analysed and classified attending to categories, some conclusions can be extracted. For example, most of their statements were related with active to learning experiences or to with learning processes, Student 2 mentioned "learn" several times. However, Student 2 did not declare anything related to teachers or with out of school experiences.
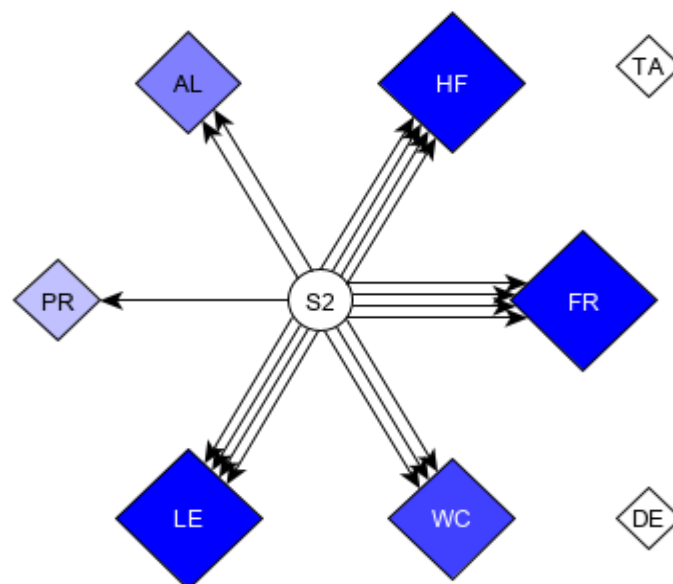
Figure 8. Student 2 virtual placement attending subcategories of analysis.

Source. Self-elaborated with Y-Ed graph programme.

Previously attached figure shows the approximate number of times that Student 2 has been associated with a subcategory of analysis. It can be seen how they remain completely independent from teacher´s actions and from daily life experiences. Whereas frustration, perception of learning and having fun are subcategories with a high implication level.

5.1.2. Data from the monitoring tool

At the end of every session they were asked to paint with colour green, yellow or red two squares which represent two variables: "Like" and "Learn". The following graph summarizes overall results of their performance recording sheets. The criteria established to make the recount is: if the square has been coloured with green – 2 points, if it coloured with yellow – 1 point and no point for those coloured with red. (It must be added that Student 4 did not participate in the third UoW so their overall mark on each parameter is eight).

LIKE AND LEARN RELATION PER STUDENT

	Student 1	Student 2	Student 3	Student 4	Student 5	Student 6	Student 7	Student 8
■ LEARN	10	7	9	5	9	10	10	9
■ LIKE	10	9	10	8	10	10	10	9
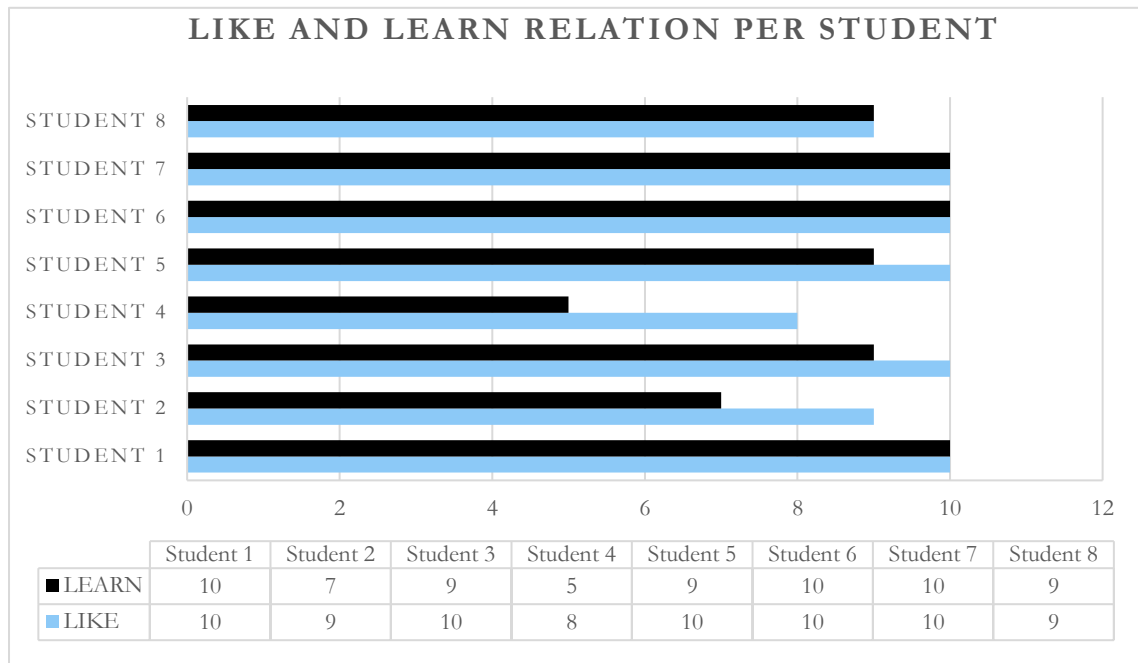
Figure 9. Graph showing the overall score per student of like & learn.

Source. Self-elaborated.

According to results "Like" takes 76 points out of [34]78, almost all possible points (97.44%). Nevertheless, it does not imply that they liked programming activities themselves, this sample could have been easily contaminated by the methodology applied in the programme. Participating students have received a personalized attention, having one teacher per four students, undeniably this factor may have affected their perception. Something similar may have happened with "Learn", having a teacher whose primary intention is to make everything understandable for them at an alarming rate may have affected their perception of learning. Overall results are, otherwise, a little bit lower than the "Like" ones, 69 points out of 78 (88.46%). It is still a high percentage, but the difference is significant enough to prove that they are conscious that they have not fully understood something

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[34] Not 80 dues to the reason expressed concerning Student 4.

or, which may be more interesting for this, they do not see any purpose at all when performing a task.

Focusing on Student 2, it is significant to notice that both variables are below the average values of the other students. It may show that Student 2 is somehow conscious that [35]they are having difficulties of learning, and there are things in the proposal with no sense for them.

Analysing these valuations from a different perspective may uncover key factors. The following graph shows overall points (the same previous system has been used) given by UoW. What can be extracted having a look at the graph is that maybe their predisposition alongside the programme has decayed a little bit. However, it contrasts with repeated statements expressed by them; every day a session had been planned they asked if they would be working with the researcher.

LIKE AND LEARN RELATION PER UNITS OF WORK

	UoW 1	UoW 2	UoW 3	UoW 4	UoW 5
LIKE	16	16	14	15	15
LEARN	14	16	13	11	15
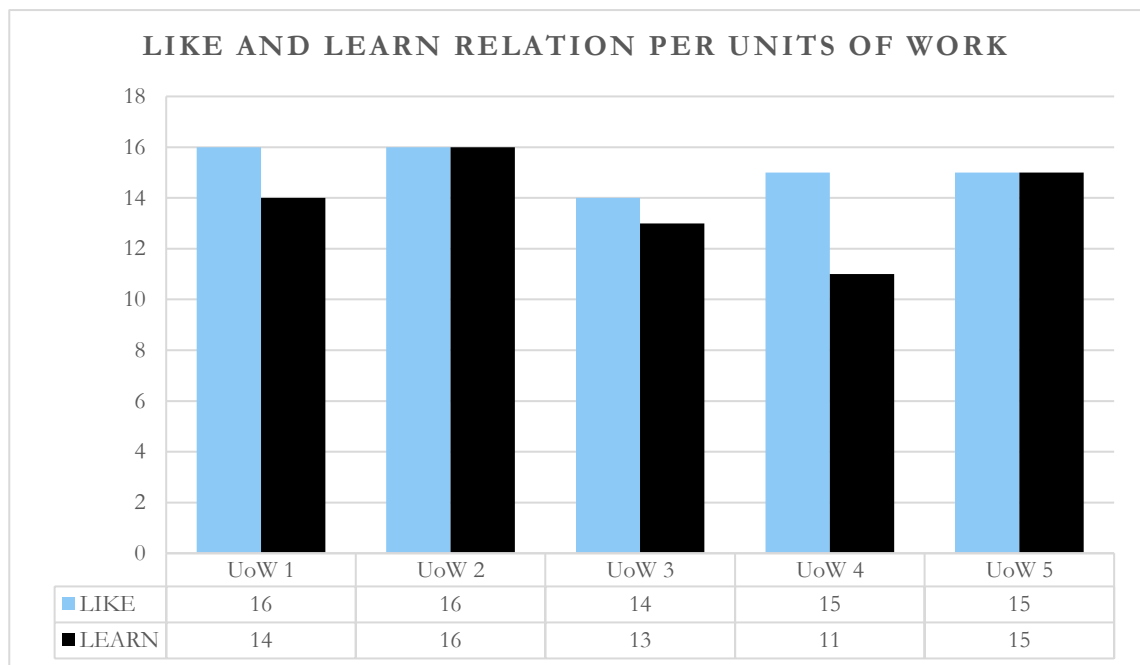
Figure 10. Graph showing overall score per UoW of like & learn.

Source. Self-elaborated.

What is most interesting of that graph is that maybe the UoW 4 was a little bit out of context for them so that could be the reason why the "Learn" perception is a little bit lower than others. Moreover, it is significant that UoW 2 was ranked with the maximum possible.

Students 2 complemented register tool after each UoW is the one which follows:

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[35] Plural form used with the intention to preserve better their anonymity.

Figure 11. Sample recording sheet of Student 2.

Source. Taken from personal research files.

What can be argued is that Student 2 probably liked most tasks which involved physical movement. It reinforces the previously stated idea regarding their level of preference for active learning. Their perception is low in the last UoW; in which they worked in couples, they had to argue, to share ideas and established roles. It could be perceived by them as a waste of time process, because they may have thought that too much time was dedicated to discussing and less time to the content itself.

5.1.3. External teacher perceptions

The perceptions of a teacher who is external to the programme are considered to be relevant. The participant teacher is the one who teaches more hours, including Science and Arts. This teacher observed participants when the didactic proposal had already finished, mainly while they were in Literacy´s class being another teacher who carried out the subjects.

For data collecting an [36]interview with this teacher was carried out days after the implementation had finished. Concerning S2 this teacher commented:

- *"For example, today S2, after having been working with you, has done the exercise well." – T. 32-33*

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[36] Fully reported in appendix VII.

6. DISCUSSION AND FURTHER RESEARCH

6.1. CONCLUSIONS

Due to the nature of this study, some issues have remained without a conclusive clarification. There are two topics of debate that emerge from this study, both are obvious, the framing and the dimension of the didactic proposal and the problematic that motivates the implementation of a research design. Before detailing these two topics, it is necessary, once the study has concluded, enhance the importance of action research in a teacher's career. Because action research represents the engine which may make teaching practises to shift into the right direction, by equipping the teacher with specialised knowledge and technical skills (Hine, 2013).

6.1.1. Regarding didactic proposal: relation with 4Cs CLIL Framework

Looking back at the theoretical background chapter, it can be read at the end of it that Scratch was intended to match with CLIL. That point cannot be overlooked because if nothing is argued, then it would remain as a mere idea with no real concretions.

Even though the 4Cs framework has recently been displaced by the 5Cs proposal (Culture´s C has been branched into Community and Competence), the first one has been chosen to be matched with the proposal because it has a deeper theoretical background and it is better (from this study´s point of view) to explore possibilities with a well-grounded and concrete framework. It is not believed that problems of extensibility towards the 5cs framework will emerge, this issue can be considered as a starting point for future studies.

Apart from the assumption, that there is no a single model for CLIL and the context must be taken into account (Coyle, Hood & Marsh, 2010) the connection which will be presented below takes into account only this group of participants. Moreover, real implications that programming and FL learning have in a concrete context have been measured once finished proposal´s implementation.

6.1.1.1. Content

First C to deal with is the most controversial one too. Content can be seen as "progression in new knowledge, skills and understanding" (Coyle et al., 2010, p.53). As it was argued in former chapters there is a paradox because programming implies learning a programming language too. In practice a FL (English in the context studied) and programming that, as if it were a seesaw, they continuously can interchange roles of content and language focus. Languages share common dimensions as syntax and grammar rules, coherence or cohesion among other. These dimensions are perfectly switchable no matter if weight is put on English or programming. UoW 5 was the only one in which Scratch was used, students struggle with Scratch´s syntax, some of them did not realize at first that blocks can be connected by using small hooks they have. Here it is interesting to make a point, when these issues emerged, they are object of debate between students, they actually discussed while trying to

solve it. Despite the teacher's multiple attempts of fostering communication in English, students taking part in this study discussed in Spanish. Hypothetically it can be stated that if English had been used as the vehicular tongue of these discussions it would exemplify a learning scenario in which English is the language and programming the content.

The opposite situation was manifested when they solved these difficulties. New ones did appear when they had to look for the same blocks that they had chosen in their script. They had to read and notice for the same structure, so then, English turned into content of study somehow while it is needed to use the same block to respect programming language requirements.

6.1.1.2. Cognition

Cognition under this framework view is understood as "engagement in higher-order thinking and understanding, problem solving, and accepting challenges and reflecting on them" (Coyle et al., 2010, p.54). Regarding the implemented didactic proposal, cognition has been reflected exactly on those statements; students had to solve several problems in different scenarios. The first of them emerged when they had to work in couples and roles had to be established by them. Whilst it could be seen as a triviality, they are solving a management problem. Devolvement of higher-order thinking skills had been fostered on a relatively high basis at the end of the implementation, when students had to test via simulations if their stories were progressing appropriately. When students tested their creations, some problems did occur, then, they thought what the cause of the problems might be. That process implies assessing information, they are close to Bloom´s Taxonomy top spots (Bloom,1956).

6.1.1.3. Communication

Communication must be the core of any problem-solving methodology, even more than solving the problem itself. By working in peers, communication is inherent in the solving process, Communication is here understood as "interaction, progression in language using and learning" (Coyle et al,.2010, p.54).

Three dimensions are created depending on language. Taking into account what is written on Scratch blocks and what it implies, imperatives and conditionals (which had not been used during the implementation but would have been a further step to commit) can be considered as the key forms in touch with [37]*language of learning*. While working, students asked a lot of questions and maintained multiple discussions, expressions emergent from that communicative situations can be clustered around *language for learning*. Students needed feedback while struggling with difficulties and strategies to understood and manage with computer error which emerged in one case. Unplanned communicative situations, whether student-software or student-teacher, are related to *language through*

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[37] Language of, for and through learning constitute "The Language Triptych" presented by (Coyle et al., 2010) from page 35 on forward.

learning (which unexpected language which may be useful to successfully perform in those communicative situations).

6.1.1.4. Culture

This dimension could be shorted as "Self and other awareness, identity, citizenship, and progression towards pluricultural understanding" (Coyle et al., 2010, p.54). Possibilities regarding this dimension were barely explored during implementation, it was only mentioned that they can share projects but there was no time for them to prove it. The idea of sharing projects and forming a large community is one of Scratch's premises (Resnick et al., 2009). It would be precisely the way in which culture is integrated in this proposal.

Figure 12 shows previously describe links that can be made between Scratch potentialities and CLIL methodology. It must be stated that these relations have been made with an exploratory intention in order to reinforce the thematic thread followed in Chapter 2 which was summarized in Figure 2.
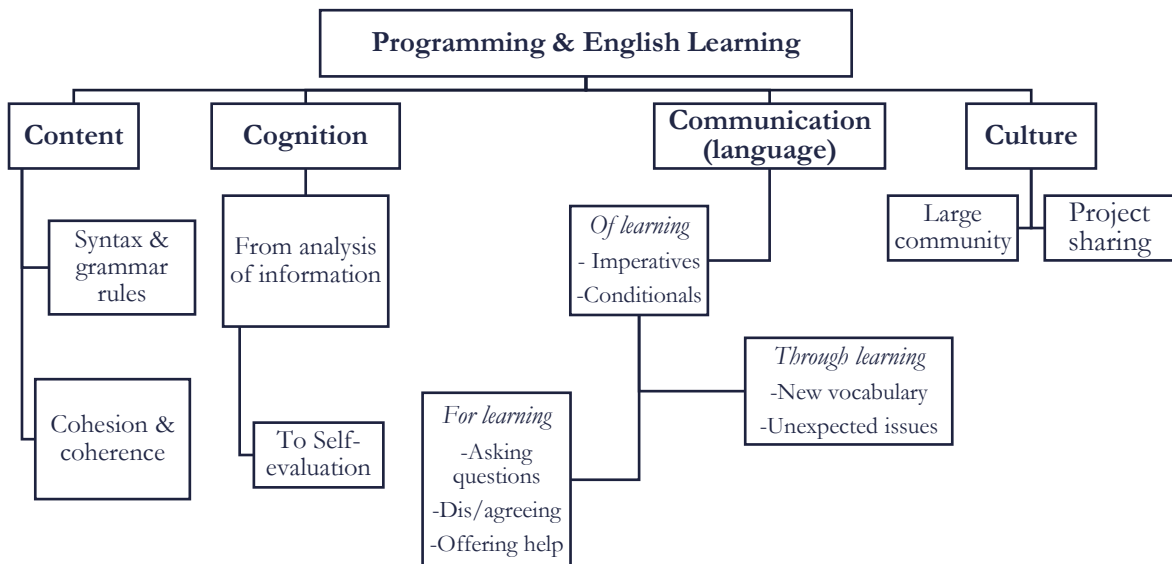
Figure 12. Summary of 4Cs´ implications.

Source. Self-evaluated.

6.1.2. Regarding research problem

The research problem is to test the effectiveness of the learning of programming foundations to boost motivation in students who have learning difficulties in the learning of a second foreign language. To tackle the research problem, it is needed to try to answer raised research questions. Student 2 is still under the spotlight in this storyline.

RQ 1 - What is the perception that Student 2 about learning English?

It could be argued that Student 2 does not have a bad perception of English. Student 2 is quite conscious that English could be a useful tool which may be considered as a surprising factor. For Student 2, learning experiences which imply active learning or "having fun" are more valuable. This may be directly related with the Affective Filter hypothesis; those learning experiences help to lower affective filter levels.

RQ2 - Will the foundations of programming be significant enough for Student 2?

Practical implications of this issue had been barely explored. Attending collected data, we cannot extract clear conclusions considering Student 2. However, considering Student 6, at least it can be argued that, for them, a connection between the studied topic and their preferences was made (as it was reflected in the narration of UoW 3 included in the fourth chapter). This does nothing more than highlight how complicated it is for a topic to become equally stimulating for all the students, especially in certain contexts where low resources may reduce the possibility of accessing a wider range of learning experiences.

Then, it is quite tough to identify if their motivation when learning English have been boosted through programming. Some evidence proves that there are indications that this is the case. But what is true is that these evidences have been contaminated; in such a way that not all increase of the motivation can directly be granted to programming. The boost of motivation may be explained merely because of the fact of working in small group which consequently fosters time of individual attention.

6.2. STUDY LIMITATIONS

This study needs to be considered as "a first contact point" because its characteristics have turned it into quite a complex problem, first to define and later to attach.

On one hand, the reliability of the findings may not be solid: however, they are considered to have enough exploratory value to accomplish some criteria of the exploration phase of future studies. Measuring the motivation has led to launching a whole methodological research design and even then, no conclusive results have been achieved.

On the other hand, effectiveness of Scratch as a tool to improve FL learning stills remains as something to be really tested. The approach is far from meeting the ambitious requirements of CLIL.

6.3. CASE STUDY AS A METHOD TO TEST EFFECTIVENESS OF: PROGRAMMING & FL LEARNING PROGRAMME IN THIS PARTICULAR EDUCATIVE CONTEXT

Rescuing the initial idea this study had, proving effectiveness of FL based on programming in a determinate context would have been impossible to carry out in a short period of time due to several issues. A programme itself could trigger designing a case study, for Merriam a 'case' could be a programme which is a single identity unit occurring in a bounded context (cited in Yazan, 2015, p.139). A 'case' may be used as arena to put in touch variables and relations. To fully understand the case, it is needed to examine its functionality and activities included in (Stake, 2013).

Designing a full-term programme should be the core action to undertake. This designing cannot miss two things: the possibility of implementing a teacher-training programme (before carrying the proposal out) and studying the real chances students have to progress on their own (it means: with home-based support. It would be interesting to know if students have the possibility of using computers at home).

However, this would only be the main actions to be carried out. In any context in general and in this particular one there are many different factors and agents which may affect in one way or another. The figure above collects some of these particularities which clearly affect studies of this nature.

The figure included in the following page summarizes the design of a future case study. It is important to notice that many considerations must be considered regarding an implementation like this to fully understand its behaviour in a real and (somehow unpredictable) context. Moreover, designs like these should be inherent to attach effectiveness of any new learning experience, whatever its context. So, we can say that the case study (and subsequently the teaching practice) should adapt to the context rather than the other way around.

Regarding following figure, main actions to undertake and participants involved are reflected in the main circle. That circle is surrounded by contextual variables which inevitably will affect actions and participants. Lastly, the two boxes below the circle are useful to keep in mind research's direction by taking issues (previously stated and new emergent ones) into account constantly.

Same neighbourhood schools

Innovative programmes carried out in this school

Designing & implementing full-term proposals

Political & Economic Context

Teacher training programmes

Extracurricular support

Several teachers

Interviews

Therapeutic pedagogy specialist

Cultural context : Inclusion

Programming field experts

SCAs

Law

Mini-cases

Research on unplugged Programming teaching

Issues:

Programme viability & sustainability

Segregated schools

Family implications

Main information questions:

Are there any replicable experiences?

What are the most adequate measuring tools?

How to individualize the programme to make it accessible for all students?

Figure 13. Proposal for a further case study.

Source. Elaborated from sample worksheet taken from Multiple Case Study Analysis, by Robert E. Stake.

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APPENDICES

Appendix I – Results of questionnaire (sounding instrument)

Questionnaire for teachers in the exercise whose purpose is to probe their impressions on digital competence, programming and robotics in Primary Education.

The purpose of this questionnaire is exploratory. It is an anonymous and results with total confidentiality. Instructions for its realization: "mark with an X in the box that best fits the degree of agreement or disagreement of the following statements". The correspondence relationship is:

1 = Strongly disagree   2 = Disagree   3 = Neither agree nor disagree

4 = Agree   5 = Strongly agree

Ítems	1	2	3	4	5
1. I consider myself a digitally competent person.					
2. I believe that the correct use of technology enhances the critical thinking of my students.					
3. I believe that the use of technologies in the classroom contributes to increase the stress levels of the students.					
4. If I had to teach an introductory lesson in programming or robotics today in any Primary Education course, I think I would have enough knowledge to do it.					
5. Programming and robotics lack educational value in Primary Education.					
6. I consider it necessary to receive more training in the management of new technologies in the classroom.					
7. I find myself more comfortable in classrooms with more technological equipment.					
8. The level of digital competence of the students of this school has increased a lot in recent years.					
9. Introduce programming and / or robotics content in the decree of minimum education in Primary Education.					
10. My academic training in the implementation of methodologies that use technologies as an element that enhances learning has been satisfactory.					

Likert scale results
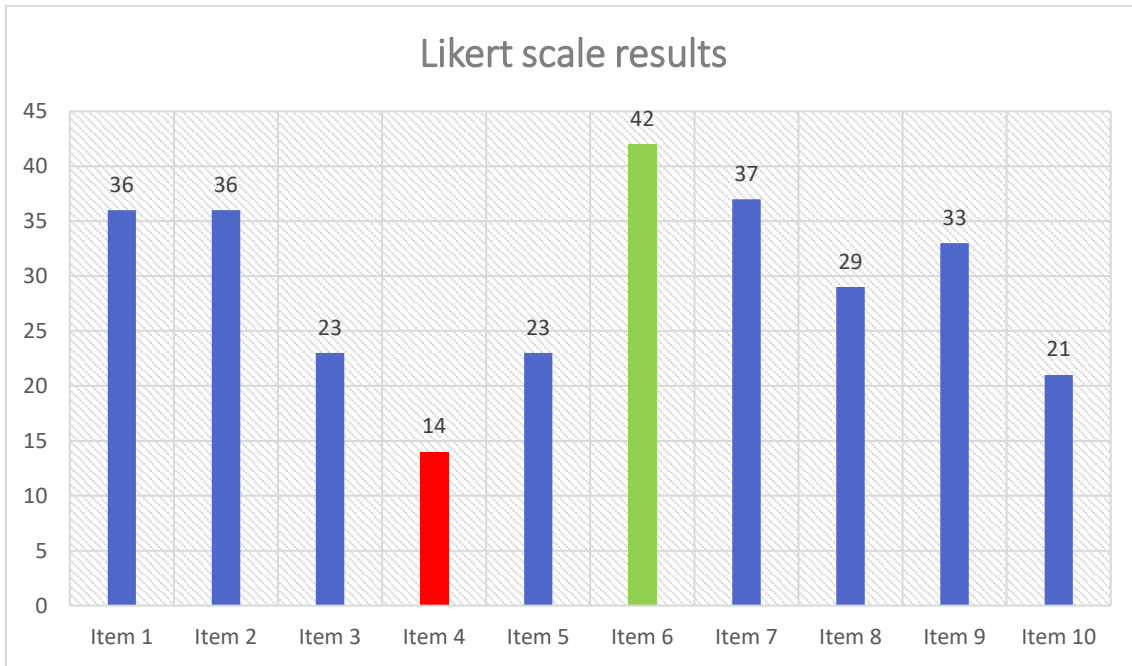
- Till June 4th 10 questionnaires have been analysed.

Appendix II – Units of work

First UoW	Meeting Ruby and waking our brain up
Task and expected time	**Description and considerations**
Lecture of chapter nº1 (3 minutes)	An introduction to the story must be done before reading it. Ruby is going to be introduced as a girl who is going to show us many different things. In order to make the story as comprehensible as possible for the students, all kind of resources can be used, putting special emphasis on voice intonation and body gestures.
My daily routine (5 minutes)	We cannot make students write anything at the beginning of this proposal, so the first activity proposed by the book must be modified if it intended to work under that pretention. Teacher will perform their daily routine making gestures and using pictures. This is an example of the needed input *"In the mornings, when the sunlight wakes me up (making the gesture and using a picture with a sun). I jump off the bed (making the gesture) and I dress up (exemplifying it using real clothes if possible), then I make up my bed ([38]ex.) and eat my breakfast (ex). I brush my teeth and wash my face, combed my hair (ex.) and pick up my bag and I go to the school with my bike (ex.)."* Then many pictures of actions will be given to the students and they will be asked to show me how their daily routines are.
Unsambling a drawing (5 minutes)	Teacher must present a real drawing and another one identical to this that can be built using little parts.
Ruby´s Outfit Rules	The five Rubys needs to be printed as well as the days of the week in order to make the sequence clearer. The teacher will put the day of the week above of the correspondent Ruby while telling a short story. Then it is showed one colour in relation with one of the outfits (as a clue) in order to make the relation easier by the student.

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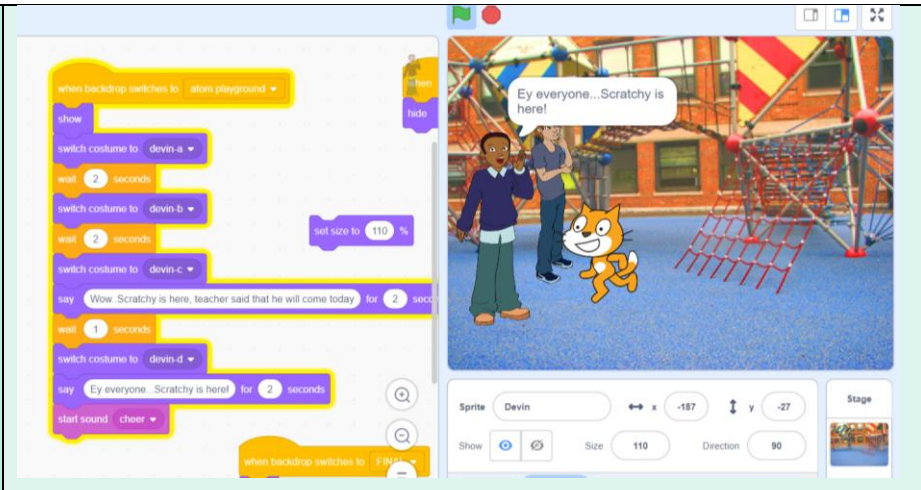
[38] Ex. Used on forward to express that an action should be exemplified

Second UoW	Follow-up Ruby
Task and expected time	**Description and considerations**
Lecture of chapter nº2 (3 minutes)	Make a quick recall of both Chapter 1 and UoW 1, making the students participate with simple questions. - Do you remember who Ruby is? - What did Ruby do?
Watch out the Keyboard (5 minutes)	Students must search for the names of Ruby and five of her friends in a keyboard. In order to make it easier, the teacher must provide them a sheet with the names or make the names visible. At the end it will be suggested that they write something in English indirectly. *Ruby and some of her friends. Picture taken from http://www.helloruby.com/play*
Eyes and Ears open	In this activity they will have to choose if one statement is true or false. In order to make this activity more interactive it can be presented as a competition, dividing the floor in two squares named "TRUE" and "FALSE". It provides a good opportunity to introduce commands and instructions students will need in further task. - If you think it is true, move a step forward - If you think is false, move to left.

Third UoW	We can be guides
Task and expected time	**Description and considerations**
Lecture of chapter nº3 (3 minutes)	Before reading with the students Chapter 3, it is needed to ask them what they remember about the two previous chapters. The same considerations as the others must be done when reading the story.
	Giving students a copy of the map, which appears in the activity section first it is needed to explain them step by step (moving a toy or marking with a pen the squares of another copy) that the sequence of arrows which appears in the book is the path that Ruby follows to reach a friend. Making this understandable for them is key to the success of the activity. Then, students will be given a sheet of paper in which they must write the sequence to reach the rest of his friends.
3D sounds better	This activity is to carry out in the playground, taking advantage of a painted chess board. It is basically the same idea, but more realistic, they will be given cards with four directions. One toy is to be put in one square and another in another square, they will have to work in group to order to give the correct instructions. They will be told not to move the toy while thinking the sequence. Troubles, like forbidden squares and more toys are to be introduced progressively when they have managed to solve the task.

Fourth UoW	Who is Scratchy?
Task and expected time	**Description and considerations**
Virtual Storytelling (5 minutes)	To contextualise the change in the best possible way, they will be showed some of the following activities in which blocks (like Scratch´s) are introduced. Scratchy is presented in this [39]story as a helper who will show how to use these blocks. The story has some interaction to engage them (questions related with general knowledge or yes/no questions). When the story finishes they will see the blocks inside the program to realize that is possible to build a story with it.

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[39] The project which includes the story can be found at https://scratch.mit.edu/projects/155278021/. It is an adapted version (translated in English) of project evaluated by professors who teach Scratch.

The Script	Students will be given a cardboard divided in two sections (Scratchy-Ruby), at the same time a project in Scratch will be open with one sprite of Scratchy and another one for Ruby. In this way the requirement will be more understandable and more contextualized because they can be showed directly one reaction of the characters. With guidance, they will cut and stick different blocks (the first one -When clicking on the green flag clicked- will be introduced by teacher but others they can chose the others).

Fifth UoW	Virtual storytellers
Task and expected time	**Description and considerations**
Turn into Storytellers	This UoW is to be carried out in the ICT lab. Students will need a briefly review of what has been done in previous UoW. It is important to catch students´ attention on what they must look for once they will be in Scratch´s building platform. They are going to work in couples (same as the UoW 4). The initial plan is that they turn on the computer and with guidance open the navigator and access Scratch´s webpage, if they are not able then the teacher will need to do it. Once they are ready to edit a pre-set project (It is needed to add Ruby´s sprite) they will be told: "Now, here is Scratchy and here it is Ruby. It is like your cardboard, now you have to look for the blocks and match them, they are like pieces…". Successive interventions will depend on the needs and inconveniences that arise

Appendix III – Extensive narration of UoW 3

UNIT OF WORK 3 Group A – 27/05/2019 – 10:30 – 11:00

There was one student missing (student 4) today. The three of them remember me that we are reading a book, and the thing they remember the most was the fact that Ruby was looking for the gems. They said to me that we have seen two chapters already.

When I started reading, two of them were looking at me, but I had to grab the attention of student 3 on several occasions, as S3 was very excited with the tasks to do today.

I read the chapter, stopping at every sentence till one of them repeated any word, I tried to use the pictures of the book and if it was not possible I made gestures or exemplified with any object we had there. The foxes caught their attention, they tried to guess the meaning, that word seemed familiar to them. At the end of the chapter they had the idea that we were going to play a game of something related to a map, without me showing them the corresponding activity.

I tried to explain the activity in English, S1 did understand it, but not the others two. S2 had an idea but did not know how to execute it exactly. I had to repeat the activity´s instructions in Spanish especially for S3; and, despite not understanding at all, S3 looked focused to their limits during the two or three minutes in which the activity took place.

After that, I showed them the cards with the directions (I should have practised with them the directions before introducing it) and we went to the playground. Taking advantage of a chess board which is painted on the ground, we managed to recreate some of the situations of Ruby´s map.

I asked them to solve the task in group, to order the cards without moving the toys. "talk, you are a team, please collaborate, talk, help each other, you are team, come on". They spoke in Spanish during all the process, S1 took the initiative, and I had to intervene in order to give a chance to S3 to clearly express their opinion. Since they seemed to have worked well, all the interactions between them were related to the requirements of the task.

When they were encouraged to do the evaluation of the unit, specially S2 was excited about it, and said (in Spanish) "Are we going to see only one chapter today?".

UNIT OF WORK 3 Group B – 27/05/2019 – 11:20 – 12:00

The four students taking part in the study of this class did come today to the school, when I entered to their class, S5 asked me if they were going to work with me today. This session was different at the beginning due to one contextual thing which was somehow expected to happen. At the end of the second unit of work, I told them that all things we were doing were to try to understand how robots and computers think. After it S5 said in their mother tongue (Spanish):

- "I have a robot in my house"

- "Oh, really, must be amazing" I replied

- "I can bring it to the class" he added

- "Would be fantastic" I pointed

(That situation had a clear and direct interpretation, the topic we are working on is being stimulating enough at least for that student).

Today he brought the robot to the class, and I let them show it quickly to their classmates, and I said that it would be very useful at the end of the session.

The process regarding the chapter with this group was more or less similar to the other group, the attention of S5, S6 and occasionally of S8 was very acceptable, but S7 was unable to keep concentrated on my voice or in the pictures of the book for more than ten seconds. It is significant to add that most of "disruptive" interactions that took part during the reading of the chapter were provoked by S5 and S8 asking for attention and silence, students did even argue to see who had more attention. It is curious to notice that, when the story reached "foxes", the same as in the other group happened; it was a familiar word to them; that was the word which grabbed their attention the most. At the end of the chapter, the word rope appeared, I want to make it clear that they understood practically all the details, so I tried to explained in English what a rope is, as I was not very clear with examples they started to said things and formulating their own hypothesis, specially

S8, when I managed to explain it (using the examples of previous Science lessons in which they worked with ropes) S7 took the lace of his/her trousers and said "like this".

When the time to do the activity with the map came, only student S6 was able to start doing it with the explanation given in English, S5 started to work but looking at S6´s paper. Having tried to explain it in English and exemplified it, I did have to give the instructions in Spanish to S7 and S8, even so, they were not able to accomplish the task.

Then we went outside again, and I explain the same as the other group, the autonomous organization of the group was clearly worse than the other, they were not able to establish and order. Is precisely to mark that I realized that none of them understood the cards at all, S6 at first used a "GO UP" card upside down. I had to intervene and explained them with gestures all the directions and made clear that they cannot move the cards, they had to looked for another. They had some problems with this issue several times. I had to catch S7´s attention every ten seconds, but when S8 participate he did quite well. They spoke in Spanish, my attitude was standing like a background noise, repeating the commands they said in English, I never demand them to speak in English.

I had one idea while solving the problems which I did not had with the other group, it consist on putting the cards inside the square while the toy moved.

When we came back to the classroom, I told them that the things we have been doing was like the programme inside robots and that they would have to write a programme for that robot and they would have to give me the instructions saying how I can managed to reach a toy moving the robot (we used the tiles of the ground as squares because they know that correlation card of [40]direction-square). I did not say how to order the cards, when I came back they had displayed all the cards in the floor, one by one inside each tile, which I considered a very original way to do it. While I was moving the robot, there was one which was wrong, S5 noticed about it, others said "we have made a mistake"; S6 quickly grabbed the correct card and put it in the floor.

The unit of work concluded with them doing the personal assessment, during this process I had to repeat instructions in Spanish.

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[40] Students understood that one tile of the ground was the equivalent to one square of the board.

Appendix IV – Initial Focus group interview´s transcription

Mini-group A *Carried out the 23th of May 2019*

Line	Speaker	Statement
1	I	**What would you say is English for?**
2 3	S1	For learning and memorizing when you go to a place where they speak in English.
4	S2	For example, Disney, to say one.
5	S3	Of course.
6 7	I	**What memories do you have of English during your life of things you have studied, or you have seen?**
8	S1	Hey, let's see ... when we were studying animals.
9	S4	Animals…
10	S3	The same to me.
11	I	All about animals?
12	S2	And when we were learning fruits with a poster.
13 14	I	But all of this refers inside the school, I would like to know what do you remember outside the school.
15	S1	Out of the school…yes, with (literacy´s teacher).
16	I	But…I mean not dealing with school hours.
17	S3	¡The shadows, the shadows!
18 19	S1	At home, with my brother reading a story in English. Reviewing English with my brother.
20	S3	I don't know, I don't know…
21	I	Movies maybe?
22	S4	Yes, English movies.

23	S1	Yes, once I saw half of a movie […] but it was from school.
24	**I**	**What do you think about studying English?**
25	S2	Well, to learn is good.
26	S1	Well, some lessons are quite long to me.
27	**I**	Are they?
28	S4	Yes, half an hour only.
29	S1	But I mean with (literacy´s teacher).
30	**I**	**What would you say if teacher tells you that now all Science lesson are**
31		**going to be in Spanish?**
32	S1	I would say… (interruption)
33	S2	I would say: thank you! Thank because I am [41]there with English.
34	S1	I would say: *ouch*
35	**I**	Is that *ouch* good or bad?
36	S1	Bad, because you have to learn English, it is a life´s right.
37	S4	That´s true.
38	**I**	Anything else?
39	S3	*Ouch*
40	**I**	**How do you feel and what do you think when you do not understand**
41		**something during Literacy, Science or Arts lessons?**
42	S1	Very bad, I would throw myself out of the window.
43	S3	Me too...
44	S2	Firstly, I try it and try it until a point appears, then I call to teacher and he/she
45		explains it to me.
46	**I**	What about you, S4?

---

[41] Means: "I am struggling with English".

47	S4	I would think till I have to say it.
48 49	I	How do you feel inside your body, what sensation do you have when you do not understand something?
50	S2	I feel I´ve been wronged […]
51	S1	I say…
52	S2	[…] But I do not cry.
53	S1	…How hard life is…
54	I	Is really that what you think when you do not understand something?
55	S3	Me too.
56 57	I	What about you, S3, when you do not understand something, you look at the chair…?
58	S4	Boooooooored.
59	S3	Bored, I try to get someone to explain things to me.
60	I	**Is there something you like about learning English?**
61	S1	Ehh…yes.
62	S3	I don´t anything.
63	S1	To learn English.
64	S4	English stories.
65	S2	What I like most are "[42]animals"
66	S3	Me […]. I do not like English at all.
67	S2	Colours and fruits to me. And "animals"
68	I	**And is there something you do not like when learning English?**
69	S2	Mmm, yes. Lessons last too much.
70	I	Does lessons last a lot?

---

[42] Animals literally said in English.

71	S4	Yes, they last a lot.
72	S1	We are punished for everything. (They are laughing).
73	S3	Yes, they punish us for everything.
74	S1	Ey! Do not copy me!
75 76	I	**If teachers tell you that all the subjects are going to be in English what would you think or how would you feel?**
77	S1	I would feel super good.
78	S2	I feel wronged.
79	S4	[…] I feel wronged.
80	S1	I would feel good, but in the English of (literacy´s teacher).
81	I	But I mean, all subjects in English…Maths in English, Physical Education…
82	S1	Well, then…no.
83	S4	Then no.
84	S2	P.E. should last longer.
85	I	But if it is in English?
86	S2	Eh, […] no. I think it should last fifteen minutes in English.
87	I	**What things would you do to make learning English easier?**
88	S2	To listen, it is the easiest thing.
89	S1	To help people.
90	I	What kind of things would you do here at school or at home?
91	S2	To practise. For example, I am good at knowing what a [43]"hat" is.
92	S4	To learn in classroom.
93	S1	Write in English.
94	I	With any device maybe?

---

[43] Literally in English too.

95	S1	Me and my brother.
96	S4	My dad and my mom.
97 98	S2	I know it, I know it…there is an app for mobile phones. You press, and it speaks to you in English.
99	I	(After summarizing ideas) Do you want to add anything else?
100	S2	Not me.
101	S3	No.
102	S1	(four seconds later) […] English is for having fun.
103	S2	To learn.
104	I	Do you believe it is always for learning?
105	S2	No.
106	S1	There are times also…in which is to motivate you.
107	I	What does it depend on?
108	S1	On how you use it.
109 110	S2	For example, you go to Disney and they speak to you in English. You have to speak in English too.
111	S4	To learn.
112 113	S2	And if you don´t know something you put Google: How do you say "[44]please" in English?
114	S1	Please. (answering the hypothetical question).
115	S2	Please.
116	S1	I think that is how it is said.
117	I	Ok. We have finished. Thank you very much kids!

---

[44] Literally in English

Mini-group B *Carried out the 23th of May 2019*

Line	Speaker	Statement
1	I	**What would you say English is for?**
2	S5	To learn English.
3	S6	To know English.
4	I	(after a pause) Anything else?
5	S5	Yes, to learn English and […] to know a lot when we are older.
6	S6	To study, like you.
7	S5	To study like you and learn a lot.
8	S6	And to be smart. (S5 & S6 are talking simultaneously)
9	S5	And…super intelligent. […] And when I am old I want to be like you. (Laughing)
10 11	I	**What memories do you have of English during your life of things that you have studied or that you have seen?**
12	S7	[45]Liquid, liquid water.
13 14	I	Good point, but that you have seen that in yesterday´s class. Do you remember something a little bit more distant in time?
15	S6	The Sun.
16 17	S5	The Sun, because when the Sun is up, it reflects perfectly our shadow, and little by little…(interruption).
18	S8	We have studied animals.
19	S5	Yes, we have studied a lot about animals.
20 21	I	And outside of school, what memories do you have regarding English outside school?

---

[45] All of it in was said in English.

22	S7	The [46]shadow.
23	S5	The shadow.
24 25	I	No, no. I do not mean in Science lessons. I mean, when you are at home or on holidays.
26	S6	We went outside and we played games.
27	I	But, that has to do with school?
28	S6	Yes.
29	I	I do not mean at school. I mean things that have nothing to do with school.
30	S5	How to play.
31	S6	How to go to the park.
32	I	Do you practice English there?
33	S6	No.
34	S7	Yes, watching videos.
35	S6	Me too.
36	I	How do you see videos?
37	S8	On YouTube.
38	S5	Me…I want to speak English.
39	S8	On the tablet.
40	I	Do you see those videos in English?
41	S6	Yes
42	I	Anything else? What about movies?
43	S5	Eh, I do not see movies.
44	S7	King Kong! It is in English.
45	**I**	**What do you think about studying English?**

---

[46] They are referring to one experiment which took part in the playground.

46	S8	Well…
47	S5	Well, great.
48	S6	We can learn a lot with pencils.
49	S5	And become scientist.
50	S6	That is.
51 52	I	**What would you say if teacher tells you that now all Science lesson are going to be in Spanish?**
53	S8	Well, I would say they are better in English.
54	S5	Yes. For me too.
55	S6	Yes, because we learn more.
56	S5	Then if we go to another country we know another… (interrupted)
57	S6	We already know Spanish.
58 59	I	**How do you feel and what do you think when you do not understand something during Literacy, Science or Arts classes?**
60	S5	We think we should know to learn a little bit more.
61	S6	Raise my hand up.
62	S8	Well, I would say…
63	S6	We have to try harder.
64	S5	Yes.
65	S8	I would say […] I wish I knew what to say.
66 67	I	What´s about you S3, when you do not understand something, what do you do?
68	S7	I raise my hand.
69	S8	I said: "I do not understand".
70	I	Do you feel bad when you do not understand something?

71	S5	Yes.
72	S6	I feel wronged.
73	S8	Yes, I feel very burdened.
74	I	What happens then?
75	S8	Like a very large load.
76	S6	As if I do not do it today… (making a concerning gesture).
77	S7	Like (a TV channel).
78	S5	Like a blackboard inside my heart.
79	S6	Exhausted.
80	I	**Is there something you like about learning English?**
81	S5	Eh, yes.
82	S6	[47]Water, animals…
83	S8	Learning what animals eat.
84	S5	See a snake.
85	S8	Learning how flowers are, what animals eat.
86	S5	Like nature.
87	I	**Is there anything you do not like?**
88	S6	Nothing.
89	S5	I like everything about learning English.
90	S7	I do not like to study Chinese.
91	I	But we are talking about learning English S3, is there anything you do not like
92		concerning English learning? (Laughs can be heard).
93	S5	Well, I do not like people who complain about English.
94	S8	For example, someone says "I do not like English", but I like it, so you don´t

---

[47] Both said in English.

95		have to say it in front of me.
96	S5	Because I love it.
97	I	**If teachers tell you that all the subjects are going to be in English what**
98		**would you think or how would you feel?**
99	S7	No, no, not Physical Education. (scared expression)
100	S8	Let´s see. I may feel good, but too many lessons…
101	S7	But in Music, we cannot…
102	S8	…all lessons in English…
103	S6	We will not understand anything.
104	S5	Only one in English, not so many.
105	S8	Boring, a little bit boring.
106	I	**What things would you do to make English learning easier?**
107	S5	To learn English easier, then…
108	S6	Speak a little bit of Spanish.
109	S5	Yes!
110	S8	Because sometimes – Science teacher´s name - if there is something we do not
111		understand […] the teacher can repeat it in Spanish.
112	S5	Some things [48]we do not understand because I came from another country.
113	S6	We say "please…can you repeat it?"
114	S5	And thanks to my colleagues […] I came from another country…and I did not
115		understand anything. Well, my colleagues had helped me a lot and I have learnt
116		a lot of things.
117	I	(After summarizing) Would you like to say anything else?
		S5, S6 & S8 denied with their heads while S7 did not do any gesture.

---

[48] It is not a mistake. S5 said "we" there.

118	I	So, we have finished. Thank you, kids!

Appendix V– Final focus group interview´s transcription

Mini-group A *Carried out 3rd of June 2019*

Line	Speaker	Statement
1	**I**	**What would you say English is for?**
2	**S3**	For learning.
3	**S1**	For practising if you go to any place.
4	**S2**	For learning English.
5	**S3**	That´s what I said. (they laugh)
6 7	**I**	**What memories do you have of English during your life of things that** **you have studied or that you have seen?**
8	**S1**	[49]Animals.
9	**S2**	[50]Animals me too.
10	**S3**	Animals.
11	**S1**	Dice.
12	**I**	Dice?
13	**S1**	No, no, my mistake.
14	**S2**	This classroom!
15	**I**	This classroom?
16	**S1**	Yes, we study in English. […] [51]metal, plastic…
17	**S4**	[52]Plants.
18	**I**	**What do you think about studying English?**
19	**S2**	Good to me. Not so good, not so bad, but good.
20	**S1**	Better to me. I have repeated because of English and because of my behaviour

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[49] Said in English.
[50] Said in English.
[51] Said in English.
[52] Said in English.

21		in Maths.
22	I	Compared to months ago? Is it better?
23	S1	For me it´s better.
24	S2	Much better. […] (Referring to S4 – Why do you stay there without talking?
25 / 26	I	**What would you say if the teacher tells you that now all Science lesson are going to be in Spanish?**
27	S4	Good.
28	S1	I would say…" ouch".
29	S2	I would say "good".
30 / 31 / 32	I	**How do you feel and what do you think when you do not understand something during a lesson? Remember these past days we have been working.**
33	S1	I would throw myself out of window.
34	S4	Weird.
35	S2	I you realise. We are repeating everything!
36	I	Do you understand everything related with Ruby?
37	S2	Yes, I understood everything.
38	S1	What I liked the most […], I only liked […], I liked everything.
39	I	**Is there anything you like about learning English?**
40	S2	Animals.
41	S1	But we have already learnt that.
42	S2	That´s why.
43	S1	Aaammm.
42 / 43	S1	English, because if you learn it and you go to Disney and there they talk in English.

44	I	**Is there something you do not like?**
45	S1	Yes, yes…for me it is a little bit boring […] sometimes.
46	I	Could you say to me what that depends on?
47	S1	They start talking and talking and later on they do not clarify anything.
48	I	Who start talking?
49	S1	Teachers. […] so much talking and then we do not clarify.
50	I	And regarding these activities, have we clarified things?
51	S1	Yes, because you speak less.
52	I	**If teachers tell you that all the subjects are going to be in English what**
53		**would you think or how would you feel?**
54	S2	Bad, bad to me.
55	S1	Ay.
56	S2	With no break time?
57	I	With break time of course, but all lessons in English.
58	S4	Bad.
59	S1	Good.
60	I	All subjects…Music, P.E…
61	S2	Physical Education, if it is on Wednesdays. (interrupted)
62	S1	No, no, no.
63	S2	It is quite boring when we are in Literacy on Wednesdays (interrupted).
64	S1	I don't like it.
65	I	And regarding ICT lab? Regarding computers?
66	S4	Good, good.
67	S1	Good, I would like that.
68	S3	I do not want anything in English!

69	I	**What things would you do to make English learning easier?**
70	S1	To study English…
71	S2	To say it.
72	S1	Studying English every day so then it will be easier and shorter to me.
73	S3	Studying […], learning […] and listening!
74	S2	I learn English…
75	S4	Studying.
76	I	And something that you say "With this I learn better"
77	S4	Repeating it in Spanish.
78 79	S1	In literacy I am the first of the class, because like I have repeated…I understand better.
80	I	Do you want to say something more? Something related with these days?
81	S2	Yes, me. I liked when we went to the playground.
82	S1	When we went to the computer´s room.
83	S4	That´s true.
84	S3	To me like S2 has said […] playground.
85	I	That´s it. We have finished. Thanks!

Mini-group B *Carried out 3rd of June 2019*

Line	Speaker	Statement
1	**I**	**What would you say English is for?**
2	**S5**	Good.
3	**S8**	For learning.
4	**S6**	Yes.
5	**S8**	English is for becoming teacher…
6	**S5**	Well, teacher, doctor, and many things more.
7	**S6**	For example […] a person comes and talks in English. What will we know?
8	**S5**	Yes, what will we know? We won´t know how to talk…how to say…nothing.
9	**S6**	So…hello.
10 11	**I**	**What memories do you have of English during your life of things that you have studied or that you have seen?**
12	**S8**	A shadow, water…
13	**S5**	We have studied animals.
14	**S8**	Flowers.
15	**S6**	Plants.
16	**I**	Anything else?
17	**S5**	Animals can be short and tall…
18	**I**	What do you think about studying English?
19	**S5**	It is very interesting, of course, because if someone comes… (interrupted)
20	**S6**	So, then we can understand two languages.
21 22	**S5**	Yes, we will know everything about English and we will become greater English teachers.

23	I	**What would you say if teacher tells you that now all Science lesson are going to be in Spanish?**
24		
25	S8	If everything is in Spanish, we will be bored a little bit.
26	S5	We will be bored a lot.
27	S6	And we won´t learn.
28	S5	Could be sometimes in English, sometimes in Spanish…
29	I	**How do you feel and what do you think when you do not understand**
30		**something during a lesson? Remember these past days we have been**
31		**working.**
32	S8	I feel loaded…
33	S5	I feel wronged […] because it is my fault not to have known something. I should
34		have known it.
35	S6	Overwhelmed.
36	I	But, you know S5, that is not only your fault… there are many other things.
37	S5	Yes, but I want to know everything.
38	I	**Is there something you like about learning English?**
39	S8	Activities…
40	S5	To build things, so when we are older we could build things.
41	S6	The [53]bird.
42	I	**Is there anything you do not like?**
43	S5	If all lesson were in English…I do not know…
44	S6	When teachers get angry.
45	I	**If teachers tell you that all the subjects are going to be in English what**
46		**would you think or how would you feel?**

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[53] A craft they made in Arts, which is taught in English.

47	S5	Not Physical Education…it is my favourite
48	S8	Not everything, some of them, four or five…
49	S5	If they were only three…
50	I	And using ICT lab computers in English?
51	S5	No, because we would not know anything.
52	S8	Well… (makes a gesture).
53	I	What does it mean?
54	S5	A little bit regular.
55	S6	A little bit good […] bad.
56	I	**What things would you do to make English learning easier?**
57	S6	To copy.
58	S5	Listen.
59	S8	Listen and learn.
60	S5	Study a lot.
61	S3	Raise the hand up.
62	S5	By reading an English book everything will be in your brain.
63	I	Okay, we have already reviewed everything, thank you.

Appendix VI – Results of monitoring tool

	UoW 1		UoW 2		UoW 3		UoW 4		UoW 5	
	Like	Learn	Like	Learn	Like	Learn	Like	Learn	Like	Learn
S1	green	green	green	green	green	green	green	green	green	green
S2	green	yellow	green	green	green	green	yellow	yellow	green	yellow
S3	green	green	green	green	green	green	green	yellow	green	green
S4	green	yellow	green	green	white	white	green	red	green	green
S5	green	green	green	green	green	yellow	green	green	green	green
S6	green	green	green	green	green	green	green	green	green	green
S7	green	green	green	green	green	green	green	green	green	green
S8	green	green	green	green	green	green	green	yellow	yellow	green

Colour green represents a positive valuation while colour yellow represents the intermediate level and colour red a negative valuation.

Appendix VII – Sample of field notes taken by Observing teacher

Carried out in during a Literacy lesson, the 31th of May 2019.

S1 – clearly the one who is paying more attention.

S2 – like absent. Their jacket on the table. Sucking his hands. However, as I am distributing the reading books if you are aware of who is your turn. S2 controls whose turn it is f their peers and if the book he wants is free.

S3 - stays for a short time because S3 goes out to receive support with the specialist teacher of therapeutic pedagogy. Time S3 remains in the classroom is expended playing.

S4 - barely shows attention, is dedicated to play. He is looking for other students and those around him. The teacher gives S4 a "test" and S4 makes an effort to do so.

Carried out during a Literacy lesson, the 4th of June 2019.

S5 – is always smiling. S5 shows attention at a high level.

S6 – is absent.

S7 – is always looking at the others and works whenever S7 wants.

S8 – spends most of the time talking and playing with their hair. It is needed to say S8 what S8 must do at any moment.

Appendix VII – Transcription of Interview with Science and Art's teacher

Carried out the 3rd of June 2019

Line	Speaker	Statement
1 2	Interviewer	Which are the school-depending factors that may influence the performance of participant students?
3 4 5 6 7 8 9 10	Teacher	Moments when sessions are carried out. Motivation degree that they may have had in previous session, I think that is so important too. If they have been very focused on the previous activity the following may be tough. On the contrary, when they did not like previous lessons, as soon as you came into the classroom, they always want to go out with you. These days the heat for sure is a factor which goes against any positive performances. Sometimes feeling that they leave the class makes them feel special, I think that also attracts their attention.
11	Interviewer	And that is something that you perceive as negative?
12 13 14 15	Teacher	It depends, sometimes I see it as negative and in others I see it positive. I believe that you are like a prize for them. So, for them it is special, in this case it is positive. Maybe when the P.T. or the A.L. specialist come to look for them to class is different.
16 17 18	Interviewer	Do you consider that the degree of significance of the tasks they face in learning foreign language learning e is the differential factor that affects their motivation?
19 20 21	Teacher	I see it basic (essential) I believe that this is when they learn the most, but adults do the same. Achieving that for them in the long term is paramount, for life, better than the learning of the content itself.
22	Interviewer	To what extent could working in a small group will have been affected in

23		their performance?
24	**Teacher**	To these students it means everything, it benefits them a lot. If there were
25		less students per class, it would be much easier to reach them, but of course,
26		as they are so numerous and with so many levels it is very difficult. This way
27		of work (referenced to the researcher´s didactic proposal) suits them very
28		well if it could be done once a week, so as not to make them feel separated
29		from the rest, because always taking them out would not look good either.
30	**Interviewer**	What memories do you have of English during your life of things that you
31		have studied or that you have seen?
32	**Teaacher**	For example, today S2, after having been working with you, has done the
33		exercise well. S2 has managed to write push and pull (Science session) in
34		every gap, so maybe it (the proposal) has created more security. S3 always
35		has that desire to work and S4 tries it. The other day for example in
36		Literacy´s session they put more interest somehow. Slight improvements
37		can be observed.