

Master's Dissertation/
Trabajo Fin de Máster

**STUDENT-CENTRED
METHODOLOGIES APPLIED
TO THE NATURAL SCIENCE
SUBJECT:
A CLIL PROPOSAL FOR
THE 5TH YEAR OF
PRIMARY EDUCATION**

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July, 2020

ABSTRACT

The present MA Dissertation consists in the design of a didactic proposal in the Natural Science subject based on the CLIL approach, which aims to contribute to improving learning and the foreign language proficiency in students of 5th grade of Primary Education.

The paper presents a theoretical review of the CLIL approach, its principles, benefits and limitations, as well as the result of some initiatives. Moreover, it includes the evaluation of different Student-Centred Methodologies that benefit CLIL. The active, participatory and flexible methodology which it involves means that the teacher guides and scaffolds the construction of knowledge, while the student learns and uses an L2 naturally and spontaneously. Linking these methodologies enhances not only students' communication and participation but also their autonomy, independence, creativity and teamwork skills that maximise each one's learning.

Key words: CLIL, Student-Centred Methodologies, Natural Science, English language.

RESUMEN

El presente Trabajo de Fin de Máster consiste en el diseño de una propuesta didáctica en la asignatura de Ciencias Naturales basada en el enfoque AICLE, que pretende contribuir a mejorar el aprendizaje y dominio de la lengua extranjera en los alumnos de 5º de Educación Primaria.

El trabajo presenta una revisión teórica sobre el enfoque AICLE, sus principios, beneficios y limitaciones, así como el resultado de algunas iniciativas. Además, incluye la evaluación de diferentes metodologías centradas en el estudiante que benefician AICLE. La metodología activa, participativa y flexible que implica significa que el profesor guía y provee andamiaje para la construcción del conocimiento, mientras que el estudiante aprende y utiliza una L2 de forma natural y espontánea. Conectar estas metodologías no solo mejora la comunicación y la participación de los estudiantes, sino también su autonomía, independencia, creatividad y habilidades de trabajo en equipo maximizando el aprendizaje de cada uno.

Palabras clave: AICLE, Metodologías Centradas en Estudiante, Ciencias Naturales, lengua inglesa.

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1. INTRODUCTION AND JUSTIFICATION

This Master's Dissertation is focused on linking the importance of Student-Centred Methodologies when applying Content and Language Integrated Learning (henceforth, CLIL) methodology in the subject of Natural Science, to know if they can create a suitable environment in which the apprentices feel assured and motivated to learn contents while using a second language. To this end, a didactic CLIL proposal is designed where some of them should be exemplified. Therefore, promoting the use of methodologies grounded on the learners' active role that lead to greater effectiveness of the learning of a second language (from now on L2) constitutes the main motivation of this work, starting from the possibilities that the CLIL context offers.

The idea of the Thesis arises after the completion of a training compulsory course for teaching non-linguistic disciplines in English in the Valencian Community (*Capacitación en Inglés*) as well as after studying some subjects of the present Master's degree, and also as a personal challenge for future employment, since it is considered that the fact of investigating the different methodologies for teaching an L2, as well as developing a didactic proposal for intervention in the classroom, will make it possible to go deeper and better understand how to apply them according to the contents to be acquired and the language skills to be developed for the students.

Nowadays, the knowledge of the English language is essential to cope with an increasingly globalised society, in which the development of new technologies - mainly the Internet- has favoured the expansion and use of that language. A good linguistic competence in this language is essential to successfully carry out tasks related to the business world, as well as in the fields of science, technology and medicine, where most publications are produced in this language. This is emphasised in the *Ley Orgánica 8/2013* (p. 10) which maintains that the dominance of a second or a third foreign language is considered a primary issue in education, and at the same time, it is viewed as one of the major deficits of the Spanish education system.

The school of the 21st century also needs to rethink the educational model paying attention to the students' needs, natural abilities and expectations. This

entails methodologies that help students to grow personally and professionally as well as develop social skills to work collaboratively (Ráez-Padilla, 2018a: 4). Some of these approaches have been focusing on pupils' active role. Student-centred methods are based on constructivist principles (O'Neill & McMahon, 2005: 29) and have been proven to be more favourable than the traditional teacher-centred approach to education. These methods sustain both students' autonomy and cooperation, involving learners in critical thinking, problem-solving skills, self-confidence and motivation.

Nowadays, the scarcities schools show in foreign language (henceforth, FL) can be unravelled with the CLIL paradigm. Indeed, it is considered a pivotal approach to bilingual education and has been widely considered as a powerful methodology to renovate and be successful in the learning of an L2 and as the forceful arm to face the current FL deficit in Spain (Pérez-Cañado, 2018a)¹.

Studying the different Student-Centred Methodologies (henceforth, SCM) and implementing them in CLIL in the Natural Science subject should provide a wide knowledge of them and understand which strategies help students to acquire contents while developing communicative competence.

For all these reasons, a proposal for intervention in the classroom has been put forward. The Natural Science area has been chosen as the content for learning in the L2, and the topic of this unit plan is specified in the third block of contents "The living things" and in the theme of "The Plant Kingdom". The unit will be taught at the "*San Miguel*" school in *Armillá (Granada)* to the 5th course of primary school pupils in the second quarter of the 2020/21 academic year. Given that the implementation of bilingualism requires a great endeavour on the part of all educational agents, the educators implied will receive specific training for their adequate development.

Finally, it should be noted that the current MA Thesis first focuses on the targets to be reached. Next, the Theoretical Framework conceptualises the most useful SCM like Cooperative Learning, the Task-based Approach, the Project-Based Approach and the Flipped Classroom; the CLIL methodological approach -

¹ Whenever a page number is not mentioned in this dissertation, it was not provided in that source or it is an online reference.

characteristics, possibilities and limitations, language skills to be developed and experiences of some schools- and the relation with the Natural Science subject. Then, a didactic unit is developed, ending with the conclusions and a personal reflection. This is completed by bibliographical references and appendices.

2. OBJECTIVES

2.1. General objective

The general goal of this MA Dissertation is to promote methodologies centred on the student that lead to greater effectiveness of the learning process within a CLIL context in the 5th year of Primary Education (henceforth, PE) in the area of Natural Science.

2.2. Specific objectives

In order to reach the aforementioned objective, the following precise objectives have been determined:

- To examine different useful SCM: Cooperative Learning, the Task-based Approach, the Project-Based Approach and the Flipped Classroom.
- To conceptualise the CLIL context and to know about its characteristics, possibilities and limitations, as well as the result of some initiatives carried out.
- To design a CLIL didactic proposal within the Natural Science area where the most suitable student-centred methods should be developed for effective learning.

3. THEORETICAL FRAMEWORK

3.1. Student-centred methodologies

The previously dominant paradigm in education centred on teachers, who solely possessed and transmitted the knowledge to the neophyte (Harden & Crosby, 2000: 335), with little or no intervention on the part of the student. In this “so-called educational atmosphere, students became passive, apathetic and bored” (Rogers, 1983: 25) and did not take responsibility for their own learning.

In the last years of the 20th century, scholars began increasingly interested in involving students in the learning process (Sánchez-Calvo, 2007: 190) to face the educational demands and speedy challenges that the new era was to entail. This

supposed moving away from traditional teaching towards student-centred learning, and consequently, to redesign both, teacher and students' role, as well as what and how students learn, and how the learning process is evaluated (McCombs & Whistler, 1997, in TEAL, 2010: 1)

This new teaching and learning conception is founded on constructivist axioms and has led to a general approach, namely Student-Centred Methodologies. SCM scenarios involve a change in the learners and educators' roles and responsibilities. Apprentices are at the epicentre of the learning process and become dynamic actors of their own learning as they learn by doing, take decisions, reflect on their learning and build new meaning from experience. As for teachers they act as facilitators, coaches and models of good problem-solving skills, supplying guidance and support to their students.

The benefits of SCM include increasing students' motivation and commitment for learning, development of autonomy, self-confidence and control over learning leading to better outcomes. Pragmatically, SCM promote the development for lifelong learning, one of the main targets of European Union educational policies, particularly regarding FL acquisition (Barbero-Andrés, 2012: 9).

On the grounds of these premises, crucial learner-centred methods that best fit into the CLIL approach will be analysed in the next sections. The techniques and procedures involved in them will be pivotal for the discussion of CLIL and its implementation in the classroom.

3.1.1. Cooperative learning

Cooperative Learning emerged throughout the 20th century as a replica to traditional teaching that stresses the student's individual work, memorisation of contents, competitiveness or the finding of objectivity among others. Cooperative Learning is sometimes considered as a synonym of collaborative learning, although they present remarkable differences. The latter involves groups of students working together to accomplish the same target through interaction and synergic decision-making, where each individual's ideas and opinions are respected and sum to the whole (McInnerney & Robert, 2004: 205). However, cooperative learning entails small groups of students working together in a structured task to achieve a shared-

common objective to maximise their own and each other's learnings, providing multiple benefits (Johnson, Johnson & Holubec, 1999: 10) as detailed below:

- The sum of individuals' efforts helps to improve the performance and productivity of all the students: they better their long-term memory retention, increase intrinsic motivation, and develop reasoning and critical thinking.
- Students' relationships become more positive: increasing solidarity and commitment, becoming aware of team spirit, supporting each other personally and academically and valuing diversity and cohesion.
- Students' psychological health ameliorates in terms of self-strengthening, social development, integration, self-esteem, sense of self-identity, and the ability to cope with adversity and tensions.

Building cooperative learning into the classroom should be an examination of key aspects of the curriculum like learning outcomes, methodology or assessment and involves redesigning activities, strategies and classroom management procedures as well as the teacher and students' roles (Shindler, 2009: 228).

3.1.1.1. Procedures for organising the classroom

The creation of an adequate atmosphere to cooperative learning involves organising the classroom accordingly to the activity procedure, as the physical arrangement of desks, chairs, and presentation in a teaching room can significantly affect the way students learn. Whatever the classroom layout used, teachers should ensure the **visibility** from any students' location to the board, digital screen, the teacher, peers, etc.; the **mobility** around the room; and the **change of layout** without causing too much chaos. Some classroom arrangements to foster cooperative learning could be pair rows, clusters and horseshoes or semicircles:

- **Pair rows** and **clusters** are especially fructuous when students work in pairs or small groups during a large part of the class-time. This kind of organisation provides the educator opportunities to work more closely with individuals and groups and facilitates face-to-face interaction and communication. However, it becomes more difficult to assess their individual performances and level of understanding (Finnley & Wiggs, 2016: 41).
- **Horseshoes or semicircles** layout is especially useful to support both teacher-to-student interaction and student-to-student interaction. In this format,

the educator has more opportunities to work with learners one to one (Íbidem: 42). Oral/visual presentations and discussions typically function well with this configuration.

Regarding **group distribution**, heterogeneousness is pivotal. Teachers should create teams making sure that each group is balanced; comprising students with low-medium-high abilities, gender or ethnic background among others (Smith & Spindle, 2007: 156). A quite helpful instrument to visualise the structure of a group is making a “group-grid”, where the names of students are displayed in rows from the strongest to the weakest according to the assessment previously conducted. In this sense, when choosing students from the same row, they will have similar abilities, and by column, their skills will be mixed (see Figure 1). Furthermore, assigning a drawing or shape to each student facilitates the formation of heterogeneous groups (see Figure 2) and simplifies the creation of balanced pairs (see Figure 3).



Figure 1. Group grid (my own creation)

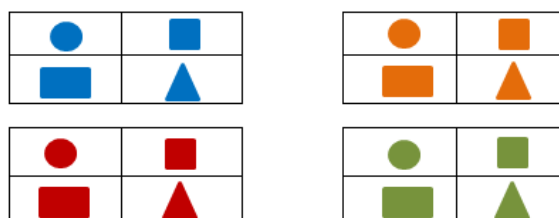


Figure 2. Mixed-abilities groups (my own creation)

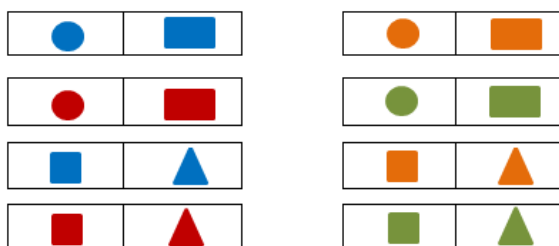


Figure 3. Mixed-abilities pairs (my own creation)

Source: adapted from Pujolàs-Maset (2011: 3-4)

According to Johnson & Johnson (2017: 4-5), a cooperative classroom entails the integration of three different **groupings**: formal, informal, and base groups:

- **Informal cooperative learning groups** involve learners working hand in hand from part of the lesson to the whole one. They are intended to create the adequate atmosphere for learning, to help students to focus attention, to set expectations, to ensure they have processed the information or to provide a wrapping up to the lesson (Johnson *et al.*, 1999: 6).
- **Formal cooperative learning groups** entail pupils working jointly for a concrete period of time, which may last from one lesson to numerous weeks to fulfil a concrete duty or task. They entail involving students in an experiment, the solution of a problem or reading and writing an article among others.
- **Cooperative learning base groups** are long period working-teams with permanent components, in which learners give the aid, support and enhancement that each member needs for an adequate academic and social development, allowing students to establish responsible and lasting relationships to accomplish their school obligations (Johnson *et al.*, 1999: 6)

Another pivotal issue in cooperative learning is **assigning roles** to students and, rotating them periodically, to reinforce the most necessary skills (Shindler, 2009: 235) if we want the group to succeed. Assigning specific roles entails advantages since each member has a clear guideline of his/her responsibility, preventing that weaker students feel frustrated or left out. However, they should be given a part that they can accomplish. According to Pujolàs-Maset (2002: 32), the possible **students' roles** may be the following:

- The **moderator or leader** is responsible to coordinate teamwork; keeps the group focusing on the task; encourages team-members to advance and controls time.
- The **coordinator** is in charge of materials, checks work-planning accomplishment; revises homework; remembers team goals and peer's personal commitment.
- The **supervisor** encourages teammate's participation; controls noise and distractions.
- The **reporter or secretary** writes and communicates team's decisions and conclusions.

3.1.1.2. Cooperative learning techniques

Teachers should define the patterns of interaction among students in different ways to engage them positively and accomplish the achievements planned, while they should establish the lesson target and select the best cooperative structure to provide students the optimal learning experience. Some samples of the structures used in the didactic proposal are presented below (Table 1), for extended details see Appendix 1.

Encouraging dialogue/participation
• Round robin: in this brainstorming strategy, the team discusses a topic. In turns, the members orally share their thoughts about it guaranteeing balanced participation.
Processing and understanding information
• Think-pair share: students reflect individually on a topic. Then, share ideas/solutions with a peer and reach an agreement, which is presented to the whole class. • Roundtable: the teacher provides a sheet divided into four parts to each group with a concept. In turn, each student (with a different coloured pencil) writes one answer in the sheet and passes it around the group. As everyone also reflects his/her name on the page, thus, the instructor can assess their contributions individually.
Building knowledge together
• Jigsaw: the teacher divides a topic/problem into four parts and numbers each member from 1 to 4. Each teammate becomes an expert on the assigned theme by studying it with students from other groups provided with the same subject. Upon coming back to their teams, by turns, everyone instructs the team. Finally, all the students are assessed on all topics. • Station-work: students are grouped in teams of 4/5. The teacher establishes and designs the same amount of stations as groups. The activities must not take more than 6-10 minutes. The students move around the stations doing the activity planned in this place while the teacher marks the time. When all the teams have passed through all the stations, all the activities should be completed.

Table 1. Cooperative structures (my own creation)

Source: Adapted from Ráez-Padilla (2018a: 21-5)

3.1.2. The Task-Based Approach versus the Project-Based Approach

Task- and Project-Based Learning are two models of valuable SCM. By turns, the resolution of a central task is the main focus on a **task-based lesson**, in which the language is used as a vehicle to develop it, and is learnt through its context usage. The task can be part of a unit or a unit itself, is usually centred on the curriculum short term objectives and its results are foreseen.

In this approach, tasks are divided into three steps: *Pre-Task* (the instructor presents the theme and the language and explains the task), *Task* (apprentices do the task using the target language) and *Task-Assessment* (students reflect on their performance). Thus, at the beginning, the focus is on the fluency of language and completion of the task, whereas in the later stage, the focal point moves to feedback and accuracy.

A **Project-based lesson** engages the students through an extended learning process (a term or an academic year) in which they have to search for information to solve a challenging question, case or matter that allows them to develop and improve their skills (Markham, Larmer, & Ravitz, 2003: 4). This methodology requires skilled instructors to guide students in problem-solving and teamwork skills which conduct them towards better outcomes and the supremacy in the learning process. The defiance of implementing this cooperative learning scenario will imply all the school stakeholders, from teachers to pupils and families.

When apprentices are involved in a project-based lesson, they work in teams. Here, the task is the main focus of the lesson which involves pupils developing and polishing their language skills through the carrying out of projects both in and outside the class. Additionally, it entails teachers establishing an atmosphere of creativity and engagement, in which learners share their work and reflect on the processes they use to complete their project (Cooper & Murphy, 2016: 19).

A successful project should start by asking pupils a complex and meaningful question, problem or challenge (driving question) which immerse them actively investigating to complete it properly (in-depth enquiry). Then, they critically evaluate,

examine and review the outcomes (revision and reflection) and choose how to present them (voice and choice) to their classmates (public audience).

The benefits of both approaches in CLIL range from increasing students' critical thinking skills, developing strategies for engaging culturally diverse learners, improving students' abilities to negotiate meaning, and enhancing their opportunities to use the FL in authentic settings (SRI International, 2000: 7).

3.1.2. The Flipped Classroom

The **Flipped Classroom**, also named the *inverted classroom*, is an innovative model within SCM supported by the use of technologies. This recent educational approach comprises two essential components: interactive learning activities are carried out inside the school, while individual teaching takes place outside through new technologies (Bishop & Verleger, 2013: 5). Thereby, learning starts at students' home where they watch videos or other educational materials, while homework is done in the school, where instructors and pupils discuss and answer questions. Moreover, a flipped classroom should be designed taking into account Bloom's revised taxonomy of the cognitive domain. Consequently, homework will demand lower mental processes (Low Order Thinking Skills -LOTS), whereas demanding ones (High Order Thinking Skills -HOTS) will be exerted in the classroom activities.

Its effectiveness in the procedure of teaching and learning a FL like English has been demonstrated by many investigations, as Evseeva & Solozhenko (2015: 209) assert. These researchers verify that this pedagogical model increases students' interest and motivation towards the FLs, as they become more responsible and self-disciplined on the learning process. In addition, it improves pupils' academic performance, increases teachers' satisfaction and contributes to lifelong learning development and the skills demanded by the society of 21st century (O'Flaherty & Philips, 2015: 85).

As a conclusion of this section, it should be highlighted that cooperative learning is on the grounds of task-, project-based learning, and the flipped classroom since they are clearly related to academic achievement, critical thinking, and the development of social and collaborative skills that maximise each other's learning (Johnson *et al.*, 1999: 54).

3.2. CLIL (Content and Language Integrated Learning) Context

3.2.1. *Origins and conceptualization of the CLIL approach*

Over the last two decades, interest in finding new formulas or methodologies for effective and efficient FL learning has been the subject of research. The English abbreviation CLIL emerges in Europe in the early nineties from the hand of David Marsh and has subsequently been studied and developed by Do Coyle and other researchers.

This approach arises as a consequence of the curricular innovations applied in the Finnish education system and also as a response to a latent social demand: the need to train citizens capable of speaking in various languages to facilitate their mobility, coexistence and incorporation into the workplace in an increasingly globalised and multicultural society. Later on, this approach was extended to several states of the European Union, especially in the area of teaching-learning English as a FL,

[...] In the European Union the field of second language teaching and learning is experiencing the enthusiastic growth of a pedagogic and educational orientation towards the integration of language and content in the classroom. (Muñoz-Lahoz, 2007: 17).

Marsh (2002: 2) defines the CLIL context as learning situations where an L2, either foreign or other, is used as a medium to teach and learn a non-linguistic curricular discipline, with a dual focus, the learning of content and simultaneously learning of a FL. Marsh (2012: 14) argues that this approach is effective because the language is learnt naturally, just as the mother tongue, using it as a vehicle for social communication, that is, a medium to express real and everyday situations. It should be noted that learning a second language is a natural and long process, in which the apprentice must necessarily advance gradually from the phases of "imperfect" knowledge to master the different aspects of the L2.

The effectiveness and efficiency of this approach are supported by experts such as Fernández-Agüero (2009: 253). This researcher affirms that CLIL provides great benefits to the student at the psycho-cognitive level: the content is presented in a logical and significant manner; the materials are organised by themes to facilitate their assimilation and learning; the motivation and interest of the student are linked to

his/her capacity to process complicated material, remember information and re-elaborate it. In addition, Stoller (2002: 108) verifies that the learner masters the subject when s/he is able to turn knowledge into increasingly complex tasks. Coyle, Hood & Marsh (2010: 10) ratify these psycho-cognitive advantages, highlighting mainly the stimulation of cognitive flexibility.

However, researchers such as Vale & Feunteun (1999: 73) retract Marsh and doubt the students' ability to simultaneously assimilate: content and FL, since the results obtained in some bilingualism experiences face controversies. On the one hand, the initiatives developed in Canada demonstrate that children can learn them concurrently. Nevertheless, in some European countries, the results obtained call their effectiveness into question.

But what does the CLIL methodological approach really consist in? CLIL is not a concrete learning methodology, but an environment where the combination of various learning methods and approaches allows a double objective to be achieved: to acquire the substance of a non-linguistic discipline together with the internalisation and absorption of the normal functioning of an L2. As stated by Mehisto, Frigols & Marsh (2008: 11) the pivotal constituent of CLIL is the integration of both content and language through which the learner will process information and develop learning skills.

CLIL is based on exposing students to an extensive quantity and quality of input in the FL and greater motivation to learn (Pavesi *et al.*, 2001: 110). As research shows, to achieve a good competence in the L2, it is essential to keep in touch with the language naturally. Learners must have spontaneous accessibility to spoken communication, if possible within interactive settings in which apprentices can realise about how the L2 works and how it is structured, as they test the assumptions being made about the language they are learning. In addition, as Navés-Nogués & Muñoz-Lahoz (2000: 2) state, learners are motivated because they learn by doing and discover they can resolve problems and perform activities even though using other languages.

3.2.2. Methodological principles of a CLIL context

As explained in the previous section, the CLIL approach does not use a specific methodology, nor can it be assumed that there is a more or less homogeneous way of developing this approach; however, it is related to a series of considerations and didactic strategies that are common to the different CLIL programmes. The basic principles that should govern a CLIL context according to researchers such as Pavesi *et al.* (2001: 110-12) are the following:

- **The use of the L2 has specific, natural and significant communicative purposes** and does not represent an end in itself. Fluency is over grammatical perfection and accuracy in the use of the L2. Thus, constant correction should be avoided (errors are considered a natural part of the language acquisition process). For this reason, it is paramount that communication in the content-subject class be in the L2.
- **Flexibility in the use of L2 and L1.** 10-11 year-olds still have difficulty internalising lexical forms, thus, it is sometimes advisable to introduce concepts in the mother tongue and then reinforce them in the L2 or use visual resources.
- **Emphasis on active methodologies** (learning by doing) that involve cooperative and collaborative learning (project-work, problem-solving...).
- **The use of scaffolding strategies.** Scaffolding is a metaphor used in education to describe the guidance and support offered by the teacher to help student to understand the new knowledge. These strategies can be linguistic: repeating, paraphrasing, reformulating, simplifying...; extra-linguistic: images, gestures, movements...; or para-linguistic: intonation, voice volume... (García-Iglesias, Méndez-Marassa, & Saura-Rami, 2014: 4-7)
- **Collaboration and teamwork between CLIL teachers and the Department of Languages** to study the characteristics of the specific language of the subject to be taught and hence be able to design actions that allow students to understand and use this language. Therefore, as stated by Pérez-Torres (2015: 7) the subject studied is the one that conditions the kind of language that students have to learn.

- **Student-centred teaching:** providing students with learning strategies so that they increase their autonomy and progressively acquire responsibility for their own learning process (metacognitive strategies, memo techniques...).
- **Respecting students' diversity** by using multimodal and multisensorial tasks to adapt to the varied students' learning styles or intelligences.
- **To promote open activities that allow creative resolution**, that is, those that admit multiple answers or that can be done in several ways.

As stated by Mehisto *et al.* (2008: 29) it is about establishing a multiple-focus of learning, creating a safe and enriching environment, where authentic situations are provided in which students participate actively and cooperatively.

3.2.3. Planning and organising teaching in CLIL

The integrated of teaching of content and language implies a previous and adequate planning and organisation. Coyle (2006, 9-10) designed a planning tool called "the 4 Cs Framework". This model considers the four key elements that make up any teaching intervention and which must be given in an interrelated way:

- **Content.** Content (knowledge and skills) is the axis that establishes the learning path. Therefore, first, what is to be taught and what students are intended to learn should be defined, and then, the rest of the elements should be established: objectives, activities and language. However, CLIL also emphasises how to learn. As mentioned in the previous section, the apprentice is placed at the epicentre of the teaching-learning process and builds his/her own knowledge by working in groups, asking questions, solving problems, creating and verifying hypotheses, etc. while the instructor's part is relegated to pave the way of that process.
- **Communication.** The language is used as a means or a vehicle for communicating and learning. It consists in the use of the foreign language in the class to learn from three perspectives, which, although different, are closely related to each other: the *language of learning*, the *language for learning* and the *language through learning*, called by Coyle *et al.* (2010: 36) "The Language Triptych". From this viewpoint, language is learnt when it is used in spontaneous performances, but set as a "scaffolding". Furthermore, it

should be necessary to distinguish between BICS (Basic Interpersonal Communication Skills) and CALP (Cognitive Academic Language Proficiency) (Cummins, 1999, in Pérez-Cañado, 2018a: 7). BICS refers to the everyday, here-and-now expressions normally used for social interaction, while CALP is related to the more abstract language used for academic purposes. In this sense, both are developed in CLIL through the simultaneous development of language and content learning.

- **Cognition.** It refers to learning and thinking processes. The student builds his/her own knowledge in a personalised way through understanding, analysis and reasoning, while having opportunities to develop new skills and cognitive abilities that allow him/her to successfully face his/her own learning (for example: formulating hypotheses, understanding cause-effect relationships...).
- **Culture.** Language, thought and culture are linked. Studying content in a language different from one's mother tongue fosters intercultural understanding. Exposure to different perspectives facilitates understanding of the other and helps to express one's own, encourages tolerance and promotes attitudes of respect towards others and their differences. With CLIL, culture is not reduced to isolated and stereotyped knowledge, but rather aims to develop a multicultural and intercultural awareness.

For adequate planning of the sessions, it is also necessary to consider learning objectives, evaluation tools, as well as activities to be developed by the students. For this reason, within "the 4 Cs Framework", the taxonomy created by Benjamin Bloom in 1956 will also be taken into account. The central pillar on which this taxonomy rests is that the "educational objectives" that apprentices are expected to achieve should be ordered gradually -from less to more complex-. The proposal for intervention is based on the review carried out by Anderson & Krathwohl (2001: 67-8). These authors classified the cognitive processes into six levels, hierarchical and differentiated according to the degree of demand and difficulty, as detailed in Figure 4 (see below).

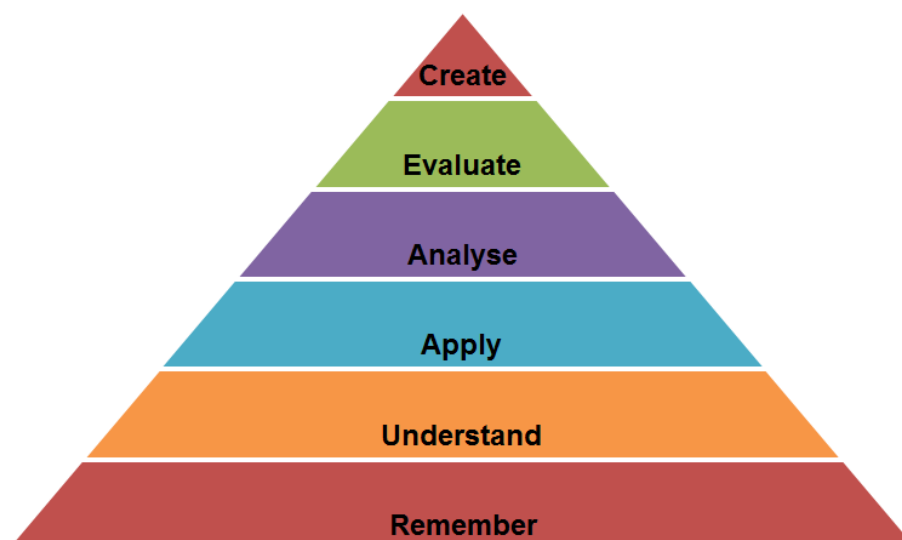


Figure 4. Mental processes classification (my own creation)

Source: Adapted from Anderson & Krathwohl (2001: 67-8)

The first three layers of the pyramid correspond to lower-order thinking skills: remember-understand-apply. The last three layers contemplate thinking skills of a higher order: analyse-evaluate-create, whose development allows knowledge to be fixed better and in greater depth. In addition, the strategies that facilitate the student to develop these cognitive processes and become actively involved in building meaningful learning are the following (see Figure 5):

Remember	Understand	Apply	Analyse	Evaluate	Create
• Describe • Find • Identify • List • Locate • Name • Recall • Recognise • Retrieve	• Classify • Compare • Exemplify • Explain • Infer • Interpret • Paraphrase • Summarise	• Articulate • Carry out • Execute • Implement • Relate • Transfer • Use	• Attribute • Compare • Deconstruct • Differentiate • Find • Integrate • Organise • Outline • Structure	• Check • Detect • Experiment • Hypothesise • Judge • Monitor • Test • Critique	• Construct • Design • Devise • Invent • Make • Plan • Produce

Figure 5. Strategies to promote cognitive processes (my own creation)

Source: Adapted from Anderson & Krathwohl (2001: 67-8)

3.2.4. Limitations and possibilities of CLIL

The CLIL approach is currently quite popular; in fact, it is being implemented in many Spanish schools for students to learn a FL effectively. However, it is necessary to know the limitations and possibilities that its application entails.

In the first place, it should be noted that its implementation involves certain structural and logistical difficulties. Some researchers consider that CLIL is not valid for teaching any subject, that there is a lack of research on the consolidation of the contents or that the students may diminish their linguistic competence in L1 and, even inhibit their expression due to the difficulty that may arise in L2.

Harrop (2012: 59) analyses the pros and cons of the four central postulates of this methodological approach, highlighting the following:

- **CLIL leads to an increasing language competence in L2** because the learner is exposed to a natural learning environment where s/he receives understandable input in the L2 for many hours. However, this improvement does not occur in all language skills in a balanced way, as the learner develops better the receptive language skills than the productive ones, which means that they are skilled at listening and reading rather than at speaking and writing. Furthermore, as mentioned in the previous sections, CLIL prioritises communication and not accuracy in form. This is a limitation in this statement, thus it is necessary to introduce activities to improve form (Lyster, 2007: 57) and include which linguistic objectives should be achieved at each educational level.
- **CLIL increases apprentices' self-confidence and motivation**, both in the language and in the content to be learnt (Hewitt & García-Sánchez, 2012: 59). CLIL generates intrinsic motivation by involving students in meaningful tasks that satisfy their interests. This is defined as incidental learning, because the student does not focus his or her attention on the language to be acquired but on the content being taught. As Pavesi *et al.* (2001: 112) report, language learning incidentally is the most effective, profound and lasting. However, there are also handicaps here; according to Harrop (2012: 63) the meaningful context for authentic communication in the L2 must be completed with good teaching practice, a variety of teaching styles and providing students with positive feedback in order to achieve the goals set.
- **CLIL is suitable for students of all abilities** according to its supporters, as it does not only helps them achieve adequate language competence in the L2, but also to develop their cognitive skills and creativity regardless of their learning style (Coyle *et al.*, 2010: 43). A balanced relation among language-

content-cognition is needed, since the L2 is considered a tool for learning and is essential to establish scaffolding and progress in content. The drawback in this premise appears when programmes are developed by teachers who do not master the L2 or have not been trained in specific strategies for its development (Mehisto, 2008: 104) or when they give more importance to content than to language (Lyster, 2007: 6). If this double process is not properly carried out, negative effects will arise in the students, such as the lack of language proficiency in the L2, and this may be a barrier to understanding content.

- **CLIL promotes intercultural understanding** by providing students with experiences that are impossible to provide in a traditional or monolingual scenario. Although language and culture are inseparable tandems, learning or mastering a FL does not lead apprentices to become tolerant and self-aware of cultural differences, nor to understand interculturality (Broady, 2004: 68). But the CLIL approach gives meaning to the context, where the L2 as a learning tool is the one that allows exploring and building such meaning. In this postulate, shortcomings arise when the learning subject does not have much relation to cultural aspects, such as Mathematics. In these cases, teachers must include in the learning process the cultural elements that support the FL within such contents in order to prepare students for globalised citizenship.

3.2.5. Benefits of a CLIL methodological approach

CLIL implementation brings benefits to students, teachers as well as to the school and its environment, as detailed in Table 2.

STUDENTS
• They acquire appropriate linguistic competence in all the language skills: listening, speaking and interaction, reading and writing, as there is greater exposure to the L2 than in a traditional educational context (Pavesi <i>et al.</i>, 2001: 111). • They become familiar with registers of various subjects, learn to express themselves effectively, and therefore, are better prepared for a future job. • They increase their motivation when they transfer specific knowledge to another language and express it. Pupils work on problem-solving and make an effort when

carrying out activities in the L2. Consequently, they use the FL spontaneously and naturally in everyday situations (Harrop, 2012: 62). • They stimulate their cognitive abilities by making greater use of the L2. • They establish significant connections between the different curricular subjects; consequently, there is no fragmentation of the knowledge.
TEACHERS
• They transform the conception of learning by using different methodological strategies and make it as a construction rather than an instruction. • They gain prestige by collaborating with other centres -national and international- and exchanging materials, experiences or practices, and therefore promote the development of new methodological approaches. • They are true protagonists of educational innovation by promoting new pedagogical practices, which, as Pavón-Vázquez & Méndez-García (2017: 237) state, have a favourable influence on their self-love and motivation. • L2 educators become aware of the motivational potential that the contents provide to the student (Pavesi <i>et al.</i>, 2001: 118), while teachers of non-linguistic subjects recognise the importance of language in the learning process.
SCHOOLS
• Schools are seen as modern and innovative, prepared for the challenges of the 21st century society. A school where their teachers cooperate with each other to train the students required by the globalised society in which they are immersed.

Table 2. Benefits of the CLIL approach (my own creation)
Source: Adapted from Navés-Nogués & Muñoz-Lahoz (2000: 2-16)

3.3. CLIL outcomes

3.3.1. Some CLIL initiatives in Spain

The implementation of CLIL as an educational approach has been growing gradually in Europe (Marsh, 2002: 4), although with some methodological and structural modifications, due to its flexible nature. This approach has been the subject of various investigations to justify its efficiency and effectiveness in learning an L2.

Gallardo del Puerto & Martínez-Adrián (2013: 26-27) study the efficacious of CLIL programmes in some Spanish schools, corroborating they ameliorate the student's linguistic aptitude and attitude and motivation towards L2, while reducing their anxiety. In their study, they conclude that CLIL significantly improves general competence in L2, although some linguistic aspects -pronunciation, listening, vocabulary, syntax, discursive ability- need to be reinforced.

Ruiz de Zarobe (2008: 417-8) examines the differences between learning the FL in a traditional context and in a CLIL context. This philologist concludes that students who learn L2 through content achieve more meaningful learning in that language -in comparison with those who learn it in a traditional context-, although she also remarks that the methodology used in these contexts is mainly communicative (comprehension and oral fluency) and that it should be essential to include activities that promote written production, for students to improve formal aspects of language.

Other experts deliberate around the problems CLIL teachers have to face in terms of novelty of the project, language proficiency, lack of training programmes together with the extra time and effort to plan, collaborate and implement it (Pérez-Cañado, 2018a: 11-2). In this sense, Doiz-Bienzobas, Lasagabaster-Herrarte & Sierra-Plo (2011: 353-4) consider that for these programmes to be successful, more research and support from the educational administration is needed, together with incentives for teachers such as reducing their workload or others.

3.3.2. CLIL and Natural Science

Empirical research conducted on CLIL in Europe highlights that Science and Social Science together with History and Geography are the most frequent disciplines to teach a FL, particularly in Secondary Education; and English, German and French the most frequent languages used (Pérez-Cañado, 2012: 319-320).

Recent research captained by Pérez-Cañado (2018b: 26) affirms that CLIL students who study Natural Science perform slightly better than their colleagues who learn using their first language, particularly after a long period of time, confirming that CLIL pupils achieve better results than their non-CLIL equals when they culminate compulsory education, but not in PE, where no statistically relevant differences are

observed. Therefore, the positive effects of CLIL are specially harvested in the future (Íbidem: 18).

A study about PE students' contentment and insight within CLIL linguistic hindrances conducted by Barrios-Espinosa & Acosta-Manzano (2020: 11) reports that 17% of students are not satisfied and around 20% find mild to severe complication to learn in the FL. The research also concludes that social aspects play a strong part in the students' perception of CLIL and may underpin their satisfactory outcomes and continuity in the next stage. However, Pérez-Cañado (2019: 12) asserts that these social aspects influence in the same way both, students following CLIL and non-CLIL programmes. In addition, the former study remarks that the government should take steps to compensate for the lack of support of disadvantaged students to promote a real equitable bilingual education.

3.4. The foreign language legal framework

In 1995, the European Commission signed an educational commitment in the manuscript entitled "The White Paper on Education and Training. Teaching and Learning. Towards the learning society". This document remarks as one of the main objectives for students to master three community languages (p. 30), suggesting the teaching of curricular subjects in a FL as a means to contribute to achieving multilingualism (p. 44). This purpose regarding languages is also highlighted in Annex I of the *Ley Orgánica 8/2013* (p. 97865).

In 2005, the Andalusian Community initiated an ambitious project named *Plan de Fomento del Plurilingüismo en Andalucía (PFPA)*, intending to renew and ameliorate language teaching methodology. This plan has been updated in December 2016 by the *Plan Estratégico de Desarrollo de las Lenguas en Andalucía. Horizonte 2020 (PEDLA)*, and its central targets are: (1) to ameliorate learners' communicative competence in their L1 and other FLs; (2) to augment the pupils' level of proficiency in at least one FL regarding the *Common European Framework of References for Languages* (henceforth, *CEFR*); (3) to better the language teaching methodologies applied in the schools; and (4) to raise the number of citizens certified with a C1 level in language proficiency (*PEDLA*, 2016: 19) (my own translation).

These pillars are reflected in the legislation of the Andalusian bilingual education, since each year the educational authorities provide the guidelines to complete and reinforce the actual law specified in the *Orden de 28 de junio de 2011*, as it can be verified in the *Instrucción 7/2020*.

4. DIDACTIC PROPOSAL

4.1. Justification

The reasoning of this unit plan is firstly based on the **legal framework**, since Natural Science is a compulsory subject in PE and; bilingual education through innovative methodologies like CLIL is also driven by current national and regional educational legislation.

The didactic proposal has been developed following the framework nationwide *Ley Orgánica 8/2013*, which provides Autonomies with the general brushstrokes to plan and elaborate the documents that govern the school life. Furthermore, it has deemed the *Orden ECD/65/2015*, which explains the relations among contents, key competences and assessment criteria and the *Real Decreto 126/2014* that determines the basic pillars to develop the Primary Education curriculum.

Moreover, official regulations from Andalusia have also been accounted, namely the *Decreto 97/2015* and the *Orden de 17 de marzo de 2015*, where the curriculum for PE is expanded and some key issues regarding attention to diversity and the assessment process are determined. Besides, it is considered the *Orden de 28 de junio de 2011* that regulates bilingual education as well as the *Instrucción 7/2020* that provides specific commands for the academic year 2020/21.

The didactic proposal is entitled “The Plant Kingdom” and is addressed to students in the 5th year of PE. This **topic** is of essential importance in the Natural Science Area, and is encompassed in the third block of contents: “The living things”. This block is oriented to know the multiple forms of life of the environment as well as to study and appreciate the main ecosystems while promoting values to defend and recover the ecological balance, and foster attitudes of respect and responsibility towards the environment.

This topic is of high interest to students, as plants are present in their real-life situations: feeding, medicine, health, etc., and some problems affecting plants such as pollution, acid rain and climate change are broadcasted in the media and school initiatives, awaken students' curiosity about them. In this sense, the methodology of the Natural Science area is oriented to provide students with experiences to observe the environment, ask themselves questions, and reflect on natural phenomena to help them to elaborate critical answers.

The **CLIL** approach is also promoted in the *Orden de 28 de junio de 2011*. As article 3 states, the schools will foster the development and acquisition of students' linguistic competence by implementing content and FL integrated learning (p.7). Besides, article 9 (*íbidem*) emphasises that methodology should be based on communicative activities to help students to master the linguistic competence, always following the European recommendations detailed in the **CEFR** (my own translation).

Finally, the *Decreto 97/2015* emphasises the use of active, motivating and participative teaching methodologies. In this sense, **SCM** offer powerful procedures and strategies in which students play an active role, as they learn interacting with peers, discussing, searching for information, investigating phenomena and facts, reflecting on their learning and building new meaning from experience.

4.2. Contextualization

The didactic proposal has been devised for students in the 5th course of PE of "San Miguel" school in *Armillá (Granada)*, an Andalusian town which has about 24.000 inhabitants. The centre is located in a middle-class district where many families work in the service sector. In general, they are quite implicated in the school linguistic project and in their children's education.

The school has been enrolled in the bilingual programme since 2008 and, according to the current law, 50% of non-linguistic disciplines are taught in the English language. Thus, students are familiarised with the CLIL approach, since they have been learning different content-subjects in the English language from the first course of PE. In addition, their linguistic level of competence in the FL is about A1 within the *CEFR*, and the aim is that they achieve A2 level at the end of this stage.

The group is formed by 20 apprentices, 12 boys and 8 girls aged between 10 and 11. Twelve are Spanish and eight come from different nationalities. Three students present learning difficulties and need extra aid. The class is arranged in clusters of four students, to encourage mutual aid and different types of interactions.

4.3. Objectives

The objectives are taken from the *Orden de 17 de marzo de 2017* and have been adapted for this didactic proposal. Besides, they have been planned considering “**the 4 Cs Framework**”. In this sense, objectives related to the content subject (the primacy in CLIL), the English language (communication), the cognition and the culture can be distinguished. In the case of communication, objectives are framed considering both “**The Language Triptych**” and the **BICS** and **CALP** distinction.

4.3.1. Content objectives

- To recognise the importance of plants for life.
- To know the structure and parts of a plant and understand their functions.
- To differentiate and classify plants into flowering and non-flowering.
- To understand the main processes of plants (nutrition, respiration and reproduction).
- To know some threats of the plant kingdom.
- To understand how plants adapt to their environment.
- To introduce students in science research.

4.3.2. Communication objectives

- Language of learning
 - To know and use scientific terms related to the plant kingdom topic (CALP).
 - To explain the functions of the main components of plants (CALP).
 - To comprehend oral and written texts about the topic (CALP).
 - To give instructions of a process (BICS).
 - To make descriptions and comparisons (BICS).
- Language for learning
 - To understand instructions during the lesson (BICS).
 - To make an oral presentation (BICS/CALP)

- To interact with classmates: to ask questions, to discuss, to make hypotheses... (BICS/CALP).
- To become familiar with “Real English” expressions (BICS).
- Language through learning
 - To learn and use new expressions for communication (BICS).
 - To express opinions and new ideas about the topic (CALP).

4.3.3. Cognition objectives

- To develop progressively critical and creative thinking skills (LOTS/HOTS).

4.3.4. Culture objectives

- To recognise local and regional plants: features, location, uses, and curiosities regarding culture.
- To value the importance of research in society.
- To raise awareness about environmental issues.
- To introduce students in planting.
- To enhance individual responsibility and group-work skills (Cooperative learning).

4.4. Contents

4.4.1. Subject contents

- The structure and parts of a plant and their functions.
- Characteristics and classification of plants.
- Plants nutrition, respiration and reproduction.
- Local and regional plants.
- Plants adaptation.
- Introduction to research and the use of various sources of information.
- Interest in the observation and study of environmental issues.
- Individual and group-work responsibility, empathy and interpersonal skills.

4.4.2. Language contents

- Language of learning

Vocabulary:

- Elements of plants: anther, bulb, calyx, corolla, ferns, filament, leaf/leaves, mosses, ovary, ovule, peduncle, petal, phloem vessels, pistil, root cap, root hairs, roots, seed, sepal, sori, spore, stamen, stem, stigma, stomas, style, veins, xylem vessels.
- Processes of plants: carbon dioxide, chlorophyll, elaborated sap, fertilisation, germination, minerals, nutrients, nutrition, photosynthesis, pollen, pollination, raw sap, reproduction, respiration.
- Types of plants: angiosperms, deciduous, conifers, evergreen, gymnosperms.
- Local and regional plants: almond tree, carob tree, fir, flax, geranium, lavender, olive tree, pine, rosemary.
- Others: acid rain, deforestation.

Grammar structures

- Present simple: “Deciduous trees survive...”, “Leaves have...”
- Past simple: “Did all the plants grow the same?” “Which plant was...”
- Present perfect: “Have you seen this type of plant?”
- Imperative form: “Put a layer of gravel”, “Cover it with soil”...
- Modal verbs: “We should use green energies”, “We shouldn’t use plastic bags”
- Second conditional: “If plants didn’t have roots, they wouldn’t be able to...”
- Superlative and comparative sentences: “This forest is denser than...”, “The most sensitive to temperature is...”...
- Language for learning
 - Language to understand instructions: “Read activity one”, “Take notes”, “Look at the picture”...
 - Language to ask for clarification: “Could you repeat it, please?”, “Do you understand it?”, “What do you mean?”...
 - Language to work cooperatively: “Do you agree?”, “What do you think about it?”...
 - Language for oral presentations: “I’m going to introduce/present/explain...”, “Good morning, my name is...”...
 - “Real English” expressions: “Super-duper!”, “Way to go!”, “You are on fire!”, “Time’s up!”, “Keep it down!”...

- Language through learning
 - Language to express new ideas/opinions.
 - New language that emerges in the interaction peer-teacher /peer-peer.

4.5. Key competences

Along with the development of this unit plan, the key competences defined by official regulations will be promoted in the following way:

KEY COMPETENCES	
LC Linguistic competence	Students will make use of their communicative skills (listening, speaking and interaction, reading and writing) in the FL, as well as learning and using scientific vocabulary related to the topic at hand and useful structures of the discourse.
CMST Mathematical, Scientific and Technological Competences	This competence will be pivotal along with the unit plan. The students, particularly, will interact with the environment and interpret it, use observation techniques, define problems, analyse facts and outcomes, develop scientific reasoning, etc.
DC Digital competence	Apprentices will use ICT, either to watch videos, tweet measures to prevent acid rain or look for information on the Internet, becoming aware of the importance of choosing reliable data or information.
LTL Learning to Learn	Pupils will acquire techniques and strategies to organise, memorise and recover information, like summaries and mind-maps. In addition, they will reflect on what and how they have learnt, telling it orally or in a written way. Therefore, this competence will contribute to increasing their autonomy and lifelong learning.
SCC Social and Civic Competences	This competence will be encouraged by working cooperatively. Pupils develop social skills and learn to be respectful with other's ideas and opinions, wait for one's turn to speak, etc.
SIE Sense of Initiative and Entrepreneurship	Pupils extend this competence when they are able to plan their work, brainstorm ideas, argue opinions and provide answers, make self-criticism of their habits and try to change them, have their criteria in their productions, etc. All this will influence positively the development of their initiative, autonomy and personal self-esteem.
CAE Cultural Awareness and Expressions	This competence will be promoted through the acquisition of scientific and technological culture of their close environment.

Table 3. Key competences (my own creation)

Source: Adapted from *Orden de 17 de marzo de 2015* (p. 17-19)

4.6. Attention to diversity

It becomes pivotal to think about methodological problems to attend diversity as mixed-abilities students are a common pattern of all classes and learning contents through a FL may entail hindrances for the student to assimilate them.

Following the guidance of regional law², schools have the autonomy to adopt measures like curricular adaptations and flexibility in terms of grouping and reinforcement programmes. According to Pavón-Vázquez (2018), this can be made in collaboration with the language assistant (henceforth, LA) whose extended role also involves helping students with learning needs during class hours.

The use of ICT is also promoted through the unit since it is considered pivotal to cater for diversity (Ráez-Padilla, 2018b: 9), as they facilitate the acquisition of contents through videos, pictures, and gamification techniques. In addition, SCM foster the use of strategies which encourage mutual aid and different types of interactions, where students feel disinhibited and more confident to ask questions and participate.

Based on these arguments, the following measures are taken to cater to diversity:

- **Methodology:** the implementation of cooperative learning procedures and strategies in which apprentices work in heterogeneous pairs or small teams and the teacher names a secret helper pupil to monitor a peer who needs extra aid. Moreover, a wide array of teaching strategies to ease understanding should be applied by the teacher like paraphrasing, simplifying, modelling, giving samples, speaking more slowly, using body language, providing translations into L1, etc.
- **Human resources:** the LA and the support teacher.
- **Materials:** the use of ICT, adapted texts, list of cognates and synonyms, useful language prompts, visual support or *realia* objects, etc. Furthermore, a Classroom Blog (<https://mynaturalscienceblog2020.blogspot.com/>) is created as a way to gather all the videos, readings and activities for students to consult and to revise them. This blog also includes additional materials and extra-activities for pupils

² *Instrucciones de 8 de marzo de 2017.*

with a higher level than the average, to strengthen their knowledge and allow them to go beyond.

- **Timing:** provide students with additional time to finish activities, more opportunities to visualise videos or listening to recordings.

4.7. Interdisciplinarity

The interdisciplinary vision of knowledge highlights the connections between different areas and the contribution of each one to the global understanding of the phenomena studied in the Natural Science area. In this sense, the English language takes an important part, being the vehicle of communication and knowledge acquisition and transmission.

Throughout the unit, students perform different activities which are connected with other subject areas like Social Science (geographic location of plants), Arts and Crafts (design a booklet, draw plants, take photos...), Spanish Language (instructive texts, descriptive texts...), Maths (collect data, compare temperatures and amount of precipitations...), Music (sing a text using different music styles) and the Social and Civic Values subject (habits to respect the nature and raising awareness to prevent acid rain).

In addition, in the activities, specific grammar structures, verb tenses, comparisons or pronunciation, among others, are developed, which benefit the English subject as students gain confidence in the linguistic skills (listening, speaking and interaction, reading and writing).

4.8. Sessions

The sessions are divided into three stages. The beginning of the session is devoted to introducing the topic, generating motivation and interest while exploring students' previous knowledge. Then, students develop activities that present different levels of cognitive challenge, to acquire knowledge in a constructive and meaningful way. Finally, they perform activities to apply what they have learnt while reflecting on their learning (evaluate measures, take decisions, create a booklet or tweet actions to prevent acid rain). Furthermore, the mini-project is developed using the Flipped

Classroom methodology, enhancing students' autonomy and responsibility of their learning process.

Finally, it should be remarked that before starting the unit, students are assigned with roles that will last all the sessions. Besides, throughout the unit, the use of "Real English" for communicative interaction is promoted by the teacher so that the apprentices start getting acquainted with the language used in songs, television, social networks or the Internet. This will help pupils to gradually use these expressions and sound more natural when speaking (Pérez-Cañado, 2018c: 4).

4.8.1. Session 1

Let's know plants (see Appendix 2) ³		LS ⁴	Time
Activation	S1.1. The teacher displays a poster on the wall and asks the pupils questions to discover previous knowledge: • <i>What living things can you see in the poster?</i> • <i>What are plants important to humans/ecosystems?</i> • <i>Do plants need humans' help to grow up?</i> • <i>Do all the plants grow up everywhere?</i> • <i>Do you know how to plant and grow up plants?</i> • <i>Which parts can you identify?</i>	S/I	10'
Development	S1.2. The teacher performs the steps to plant and grow up a plant using the cooperative learning strategy <i>Silent-demo</i>. S/he uses <i>realia</i> (<i>real objects</i>) from step 1 to 5, and pictures from step 6 to 8. In this technique, the teacher presents the steps of the procedure in silence, without giving explanations. The students, in pairs, talk about what they have seen, trying to establish the steps that the teacher has followed. Then, they share ideas with the team and write an instructive text (a model is provided).	S/I R W	25'

³ All the materials, templates and resources for each session are gathered in the Appendix indicated.

⁴ LS: language skills.

Revision	S1.3. The students working in small groups start an investigation. The teacher explains that each team has to plant 4 plants and label them: - Plant 1: No water - Plant 2: No light (they cover with a paper bag) - Plant 3: No air (they cover with a plastic bag) - Plant 4: The control plant They have to put them on a windowsill, and during the unit, they have to water them regularly, except for plant number 1. They also have to ensure that the control plant has air, light and water. They have to observe the plants and take notes twice a week to complete a table. The experiment conclusions will be reported at the end of the unit.				S/I R W	25'
	Attention to diversity	Heterogeneous pairs/groups Visual support, instructive text model, key vocabulary, useful language.	Materials/ Resources	Poster Pots Seeds Soil	Worksheet Gravel Plastic & paper bags Watering can	

Table 4. Session 1 (my own creation)

4.8.2. Session 2

Parts of the plants (see Appendix 3)					LS	Time
Activation	S2.1. Children work in small groups. The teacher provides each team with a plant specimen. They have to observe it with hand lenses and make predictions about roots, stems and leaves features, writing them in a template. The teacher will ask questions to scaffold comprehension: <i>Are the roots long/short?</i> <i>Is the stem woody/herbaceous?</i> <i>What shape are the leaves?</i> Then, they exchange plants to compare differences, examining all the specimens. They write all the facts they know about roots, stems and leaves.				S/I W	15'
	Development	S2.2. In small groups, students using the strategy <i>Running Dictation</i>, copy the definitions of the parts of the plants. Then, they check answers and correct mistakes. Finally, they label the main parts of them.			S/I R W	25'

Revision	S2.3. Using the cooperative strategy <i>One-two-four</i>, the teacher poses different questions: • Which part of the plant transports materials? • What are root hairs? • Why are stomata important? • What do we call the stem of trees? • What is the difference between herbaceous and woody? In pairs, students share ideas and formulate sentences using the second conditional: • If the plants didn't have <u>roots</u>, they wouldn't be able to <u>absorb minerals</u>. After that, pairs contrast their answers within the team, checking if they are appropriate. Finally, each team reads sentences to the whole class.		L S/I R W	20'
	Attention to diversity	Heterogeneous pairs/groups Support teacher Key vocabulary, useful language, visual support	Materials/ Resources	Plant specimens Hand lenses Worksheet

Table 5. Session 2 (my own creation)

4.8.3. Session 3

How plants respond to the seasons (see Appendix 4)				LS	Time
Activation	S3.1. The teacher displays on the board four pictures of trees, one for each season. The students work cooperatively using the strategy <i>Round Robin</i>. They have to compare, make predictions, and elicit what the differences are. The teacher encourages them with questions like: • What are the differences between the four trees? • Which is the reason for these changes? • Can you identify the season of each picture? • How does temperature influence the leaves and fruits? • Do you think photosynthesis occur in winter? • Do all the trees have leaves in winter? Finally, answers are shared with the whole class.			S/I R W	15'
	S3.2. In small groups, the students watch a video about how trees change through the seasons using the strategy <i>team Word-webbing</i>. After watching it, all the members in unison write ideas on a sheet, make drawings and add elements to establish relationships among them. Finally, this information is shared with the whole class.			L S/I R W	20'

Revision	S3.3. The students search for information on the Internet to discover the differences between evergreen and deciduous forests. Using the cooperative technique <i>Pens in the middle</i>, they complete a leaflet by answering the questions that the teacher poses. Students place their pens in the centre of the team-table to point out that at that time they are allowed to speak but not to write. Students try to agree with the answer. The moderator makes sure that everyone takes part, sharing and understanding the meaning. Finally, each member takes his/her pencil and writes the solution they have previously agreed. At this point, they are allowed to write but not to speak. • <i>Do evergreen trees shed their leaves?</i> • <i>Do deciduous trees survive in warm weather?</i> • <i>Does soil of evergreen forests have lower amounts of nutrients?</i> • <i>Is annual rainfall more than 200 mm?</i> • <i>Is deciduous forest sensitive to temperature?</i> • <i>Which of the two forests is denser?</i>	L S/I R W	25'
Attention to diversity	Heterogeneous small groups Language assistant Video with subtitles, key vocabulary, visual support, useful language.	Materials/ Resources	Pictures Worksheets Video Internet Laptop

Table 6. Session 3 (my own creation)

4.8.4. Session 4

Plants nutrition, respiration and reproduction (see Appendix 5)		LS	Time
Activation	S4.1. The lesson starts revising the parts of a plant. Students read aloud them and the teacher checks pronunciation. Then, s/he displays a poster of the plant cycle and asks them questions: • <i>How do plants grow up?</i> • <i>How do plants breathe?</i> • <i>What does photosynthesis mean?</i> • <i>How do plants reproduce?</i> • <i>How do plants make nutrients?</i> Students make predictions and the teacher writes them on the board.	L S/I R	10'

Development	S4.2. The students work cooperatively using the strategy <i>Jigsaw</i> . The teacher divides the topic into four parts: nutrition, respiration, reproduction of flowering and non-flowering plants. Each teammate of the group reads information to become an expert on the assigned theme by studying it with students from other groups provided with the same subject. The experts come back to their groups, and in turns, teach the team with the aid of pictures provided.	L S/I R	35'
Revision	S4.3. The teacher displays a <i>Plickers</i> questionnaire on the IWB and students answer it using <i>Plickers-cards</i> . Finally, the solutions are revised together.	S/I R	15'
Attention to diversity	Heterogeneous pairs/groups. Support teacher. Visual support, key vocabulary, useful language, more time to answer questions and revise solutions	Materials/ Resources	<i>Plickers</i> application and cards

Table 7. Session 4 (my own creation)

4.8.5. Session 5

In this session, students start a mini-project in which the flipped classroom method is put into practice. To this purpose, the language teacher will collaborate along with it.

Flowering and Non-flowering plants (I) (see Appendix 6)		LS	Time
Step 1	S5.1. The students have been watching some videos at home and taking notes to discover differences between plants. To facilitate it, a list of questions is provided. Besides, the school library has been also available after school hours. Thus, the lesson starts working cooperatively in small groups. They share ideas and fulfil a mind-map.	L S/I R W	10'
Step 2	S5.2. The students work cooperatively using the strategy <i>Station-work</i> . In each station, they read a short text and label the parts of each type of plant. Every four minutes, they change from one station to other until they fulfil the four types.	S/I R W	20'
Step 3	S5.3. The students visit the school botanical garden to develop a booklet of local and regional plants. They take photos and notes. Then, they come back to the classroom, search for information on Internet and write their features and location in a template.	S/I R W	30'
Attention to diversity	Heterogeneous small groups Language assistant Video with subtitles	Materials/ Resources	Videos Worksheets Digital cameras Internet Laptops Botanical garden

Table 8. Session 5 (my own creation)

4.8.6. Session 6

Flowering and Non-flowering plants (II) (see Appendix 7)			LS	Time
Step 4	S6.1. The students have been watching videos at home (library) about the use of some plants (medicine, cuisine, aromatherapy, furniture...) and also asking families curiosities about them. In the session, they work in teams, share information and fulfil a template. Then, they give some examples of the uses of plants through the cooperative strategy <i>Roundtable</i> .		L S/I R W	10'
Step 5	S6.2. The students work cooperatively to complete the booklet: they have to write the particular uses and curiosities of the plants and bind them as a mini-book.		S/I R W	20'
Step 6	S6.3. In this part of the session, families are invited to the Booklet oral presentation. First, the secretary introduces the team and shows the Booklet. Then, each member explains one of the plants. The booklet will be uploaded onto the classroom blog. Finally, students complete a comparative teacher/peer/self-assessment regarding cooperative work (see Table 17 in section 4.11.1.2.).		L S/I R	30'
Attention to diversity	Heterogeneous small groups Language assistant Video with subtitles, visual support	Materials/ Resources	Videos Worksheets	Internet Laptop

Table 9. Session 6 (my own creation)

4.8.7. Session 7

Plants adaptation (see Appendix 8)			LS	Time
Activation	S7.1. The teacher places posters about different ecosystems on the wall and asks the students to identify them, detail their features (dry/wet, warm/cold), and give examples of plants. S/he also asks if there is a place where plants do not grow up.		S/I	10'
Development	S7.2. In pairs, using the <i>Think-pair share</i> strategy, students see a picture of a desert and try to answer some questions about this ecosystem. Finally, they share information with the whole class.		S/I R W	20'
Revision	S7.3. The students read the text " <i>How plants adapt</i> ". They work in small groups using the cooperative strategy <i>Teammates consult</i> . They interact giving reasons and negotiating to complete a mind-map. Finally, they share ideas with the whole class.		S/I R W	30'

Attention to diversity	Heterogeneous pairs/groups Support teacher Visual support, key vocabulary and useful language.	Materials/ Resources	Posters Picture Worksheets
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Table 10. Session 7 (my own creation)

4.8.8. Session 8

Acid rain (see Appendix 9)			LS	Time
Activation	S8.1. The teacher displays on the board two landscapes (one verdant, the other arid and desolated) and asks the students to compare, make predictions, and elicit causes about the devastated landscape.		S/I	10'
Development	S8.2. In small groups, students read an adapted text from National Geographic about " <i>Acid rain</i> ". They argue about the causes and consequences of this matter and write the main ideas in a mind-map which will be uploaded onto the class blog.		S/I R W	20'
Revision	S8.3. The students watch two videos about how to prevent acid rain and individually take notes. Then, using the cooperative learning strategy <i>Roundtable</i> each member writes his/her measures to prevent it. Finally, the team organises ideas and tweets them on Twitter using the hashtag: <u>#R A R</u> (Reduce Acid Rain) (E.g. <i>We should use green energies; We should use public transport</i> , etc.). Besides, they retweet and comment about other teams' measures in a free manner.		S/I R W	30'
Attention to diversity	Heterogeneous small groups Language assistant Video with subtitles Key vocabulary and visual support	Materials/ Resources	Posters Worksheets	Videos Internet Laptop

Table 11. Session 8 (my own creation)

4.8.9. Session 9

Let's revise (see Appendix 10)			LS	Time
Introduction	This session is intended to evaluate students. Using the strategy <i>Station-work</i> , students work in small groups to perform different activities and demonstrate the knowledge learned during the didactic unit.			
Station-1	S9.1. Students play a game. They have to roll a spinner with different plants and tell the features of them.		S/I	10'
Station-2	S9.2. The students write 3 sentences about measures to take care of the environment, prevent acid rain and deforestation. Then, they have to sing them using a music style: rap, rock, opera, etc.		S/I R W	10'

Station-3	S9.3. The students write the conclusions of the experiment carried out during the unit.	S/I R W	10'
Station-4	S9.4. Using the <i>Roundtable</i> strategy, the students write tips to take care of plants. Each student writes his/her ideas and name on the paper with a different colour, thus the teacher can assess each one's contributions.	R W	10'
Final test	S9.5. The students answer a test using the application <i>Kahoot!</i> . Then, the solutions are revised together. To conclude the unit, students complete self-assessment grids regarding content and language acquired along with the lesson (see Figure 6 and Table 16 in section 4.11.1.2.).	S/I R	20'
Attention to diversity	Heterogeneous small groups Language assistant Key vocabulary, visual support More time to answer questions and revise solutions.	Materials/ Resources	Game Worksheets Internet Laptop Tablets

Table 12. Session 9 (my own creation)

4.9. Materials and resources

In the selection of materials and resources, the following aspects are taken into consideration: materials that are easily accessible, varied -in format, content and suitable with the specific moment of the learning process- that allow the development of autonomy and intellectual capacity, adapted to different levels of understanding (taking into account diversity), and global and interrelated with other learning areas.

In addition, following Tomlinson's (2002: 66) suggestions, a wide variety of materials are included (instructional/informative, experiential, elicitive and exploratory) to supply pupils with opportunities to search new learning paths and experience content and language while fostering interaction and increasing their interest, motivation and creativity. Moreover, to ensure the quality of the CLIL materials, the criteria of the tentative checklist developed by López-Medina (2016: 172) has been borne in mind in their choice and design. Thus, the following means and resources will be used:

- **Ordinary materials:** adhesive tape, cardboard, crayons, glue, markers, notebook, pencils, pens, scissors, wax, etc.

- **Printed materials:** pictures, posters, questionnaires, readings texts, worksheets, games, etc.
- **Audio-visual and computer materials:** classroom blog, digital cameras, Interactive White Board (IWB), Internet connection, laptops, tablets, applications and webpages indicated in the activities, etc.
- **Human resources:** classroom teacher, language teacher, language assistant and support teacher.
- **Space resources:** classroom and botanical garden.
- **Other materials:** gravel, hand lenses, pots, plant specimens, seeds, soil, spades, watering cans, etc.

4.10. Timing

The *Instrucción 8/2020* determines ninety minutes per week to the Natural Science subject, but gives autonomy to schools to extend the timetable of subjects that entail more contents (section “e”, p.6). For this reason, the weekly time to develop this proposal is established in 2 hours -two sessions of 60 minutes-, as stated in section “a” (p.3). Thus, the proposal will last nine sessions and should be taught during the second term of the academic year:

TIMING					
SESSION / WEEK	1	2	3	4	5
1. Let's know plants!					
2. Parts of the plants					
3. How plants respond to the seasons					
4. Plants nutrition, respiration and reproduction					
5. Flowering & non-flowering plants (I)					
6. Flowering & non-flowering plants (II)					
7. Plants adaptation					
8. Acid Rain					
9. Let's revise!					

Table 13. Temporal distribution of the sessions (my own creation)

4.11. Assessment

Assessment is an integrative and fundamental piece in the teaching-learning process which allows obtaining information about how it is being carried out, in order to readjust the educational intervention. This procedure not only affects students but

also, all the elements implicated in the learning process from instructors to materials, procedures, the rest of stakeholders, etc.

4.11.1. Students' assessment

4.11.1.1. Assessment criteria and assessable learning standards

The assessment criteria and assessable learning standards for this didactic proposal are established in the *Orden de 17 de marzo de 2015*, in the "3rd Block of Contents": *The living things*. These criteria and standards have been adjusted to the didactic unit as explained below:

Assessment criteria:

1. To know the structure and parts of a plant and understand their main functions.
2. To differentiate and classify plants into flowering and non-flowering
3. To understand the process of nutrition, respiration and reproduction of plants.
4. To recognise some local/regional plants, identifying their features, location, uses and curiosities regarding culture.
5. To know some threats of the plant kingdom.
6. To understand how plants adapt to their environment.
7. To acquire skills for science research.
8. To cultivate values and habits of respect to the natural environment.
9. To develop social skills and work cooperatively.

Learning standards

- 1.1. The student differentiates the structure and parts of a plant understanding their functions.
- 2.1. The student observes and identifies the features of plants and classifies them.
- 3.1. The student knows and relates the nutrition, respiration and reproduction of plants.
- 4.1. The student recognises local/regional plants, identifying their features, location, uses and curiosities regarding culture.
- 5.1. The student recognises the effects of acid rain on the Earth and details actions to prevent it.
- 6.1. The student recognises how plants adapt to their environment.
- 7.1. The student develops skills in scientific research.

8.1. The student shows respect and care about the environment.

9.1. The student works cooperatively developing social skills.

4.11.1.2. Types of assessment and instruments

The evaluation of the pupils' learning process is continuous, formative, global and integrative as established in the *Orden de 17 de Marzo de 2015* (p. 27). Hence, if learning difficulties are detected, reinforcement measures will be taken, so that they acquire the necessary knowledge. There are four important moments in the assessment process: diagnostic, initial, formative and summative. By turns, at the beginning of the course, the **diagnostic assessment** allows detecting the students' level to design the syllabus accordingly; and the **initial evaluation** provides the teacher with insights to determine the proper scaffolding, detect some lacunae and make adjustments to manage mixed-abilities students.

Once the teaching-learning process starts, **formative assessment** is conducted along with the lessons through direct observation of students' participation in debates, attitudes in cooperative work; and the proposed activities: the completion of summaries, mind-maps, worksheets, instructive and descriptive texts, etc. Finally, **summative assessment** is carried out to verify the knowledge acquired. This is conducted through a **discrete-item** test developed with the gamification tool *Kahoot!*, and **global integrative formats** such as extensive writings and an oral presentation accomplished in the mini-project (booklet). Furthermore, students' self-assessment and peers' assessment are also considered as the outcomes gain force when combined with other rubrics (Panadero-Calderón & Jonsson, 2013: 130).

Finally, all the activities will be collected in the ELP (European Language Portfolio). This tool combines formative and summative aspects of the assessment, since mini-projects, written activities, graphic organisers, as well as self-, peers-and teachers' assessment and parents' comments will be included in it. In this way, the portfolio frames a complete picture of the student learning process and progress.

In the next pages, rubrics for assessing content and language are displayed (Tables 14 and 15) as well as templates for students' self-assessment (Figure 6 and Table 16). Moreover, a comparative teacher/peer/self-assessment sheet is provided to value cooperative learning during the mini-project (Table 17).

CONTENT (80%)					
ASSESSABLE LEARNING STANDARDS	Excellent	Good	In progress	Needs improvement	Assessment tool
1.1. The student differentiates the structure and parts of a plant understanding their functions.	The student recognises the structure of a plant, identifying all its parts and explaining correctly its main functions in the plant life-cycle.	The student recognises the structure of a plant, identifying some of its parts and explaining some of its main functions in the plant life-cycle.	The student recognises the structure of a plant, but sometimes is not able to identify its main parts and explain its main functions in the plant life-cycle.	The student recognises the structure of a plant, but is not able to identify its parts and explain some of its main functions in the plant life-cycle.	Observation Activities: S2.3 Final test Self-assessment
2.1. The student observes and identifies the features of plants and classifies them.	The student always recognises the features of plants and classifies them into flowering and non-flowering plants.	The student often recognises the features of plants and is able to classify some of them into flowering and non-flowering plants.	The student sometimes recognises the features of plants and is able to classify some of them into flowering and non-flowering plants.	The student shows difficulties to recognise the features of plants and does not classify them into flowering and non-flowering plants.	Observation Mini-project Final test Self-assessment
3.1. The student knows and relates the nutrition, respiration and reproduction of plants.	The student always understands and explains the process of nutrition, respiration and reproduction of plants.	The student often understands and explains the process of nutrition, respiration and reproduction of plants.	The student sometimes understands and explains the process of nutrition, respiration and reproduction of plants.	The student never understands and explains the process of nutrition, respiration and reproduction of plants.	Observation Activities: S4.3. Final test Self-assessment
4.1. The student recognises local/regional plants and identifies their features, uses, location and curiosities regarding culture.	The student always recognises local/regional plants and identifies their features, location, uses and curiosities, providing a lot of examples.	The student often recognises local/regional plants and identifies some of their features, location, uses and curiosities, providing some examples.	The student sometimes recognises local/regional plants and identifies some of their features, location, uses and curiosities, providing a few examples.	The student shows difficulties to recognise local/regional plants, does not identify their features, location, uses and curiosities and is unable to provide examples.	Observation Mini-project Final test Self-assessment
5.1. The student recognises the causes and consequences of the acid rain on the Earth and details actions to prevent it.	The student always identifies the causes and consequences of the acid rain and enumerates measures to prevent it.	The student often identifies the causes and consequences of the acid rain and is able to enumerate some measures to prevent it.	The student sometimes identifies the causes and consequences of the acid rain and is able to enumerate a few measures to prevent it.	The student never identifies the causes and consequences of the acid rain and is not able to enumerate measures to prevent it.	Observation Activity S8.3 Final test Self-assessment
6.1. The student recognises how plants adapt to their environment.	The student always identifies the specific elements of the plant that allow it to adapt to the characteristics of its environment.	The student always identifies the specific elements of the plant that allow it to adapt to the characteristics of its environment.	The student always identifies the specific elements of the plant that allow it to adapt to the characteristics of its environment.	The student never identifies the specific elements of the plant that allow it to adapt to the characteristics of its environment.	Observation Activities: S3.3. / S7.3 Final test Self-assessment
7.1. The student develops skills towards scientific research	The student always shows interest in the observation of plants, makes hypothesis and predictions, uses different sources of information, analyses and organises it, in order to come to solid conclusions.	The student often shows interest in the observation of plants, makes hypothesis and predictions, uses different sources of information, analyses and organises it, in order to come to solid conclusions.	The student sometimes shows interest in the observation of plants, makes hypothesis and predictions, uses different sources of information, analyses and organises it, in order to come to solid conclusions.	The student never shows interest in observing plants, does not make hypothesis and predictions, does not use different sources of information, nor does he analyse and organises it, in order to reach solid conclusions.	Mini-project Activities: S1.3 / S9.3 / S2.2 Self-assessment
8.1. The student shows respect and caring behaviour towards environment.	The student always shows respect and takes care of the environment.	The student often shows respect and takes care of the environment.	The student sometimes shows respect and takes care of the environment.	The student never shows respect and takes care of the environment.	Observation Mini-project
9.1. The student works cooperatively developing social skills.	The student always supports peers, respects others' opinions while working cooperatively in pairs or groups.	The student often supports peers, respects others' opinions while working cooperatively in pairs or groups.	The student sometimes supports peers, respects others' opinions while working cooperatively in pairs or groups.	The student never supports peers, respects others' opinions while working cooperatively in pairs or groups.	Observation Mini-project Comparative teacher/peer/ self-assessment sheet

Table 14. Rubric to assess content (my own creation)

LANGUAGE (20%)	The student is able to...	Very well	Well	With difficulty	With a lot of help	Assessment tool
Language of learning	Know and use scientific terms related to the topic.					Observation during the activities and the mini-project.
	Comprehend oral and written texts about the topic.					
	Explain the main concepts learnt.					
	Give instructions of a process.					
	Make descriptions and comparisons.					
Language for learning	Understand instructions during the lesson.					
	Interact with classmates: ask questions, discuss, make hypothesis, etc.					
	Become familiar with "Real English" expressions.					
	Make an oral presentation	Fluency				
		Accuracy				
		Pronunciation				
		Coherence				
		Enthusiasm				
Language through learning	Learn and use new expressions for communication.					
	Express opinions and new ideas about the topic.					

Table 15. Rubric to assess language (my own creation)

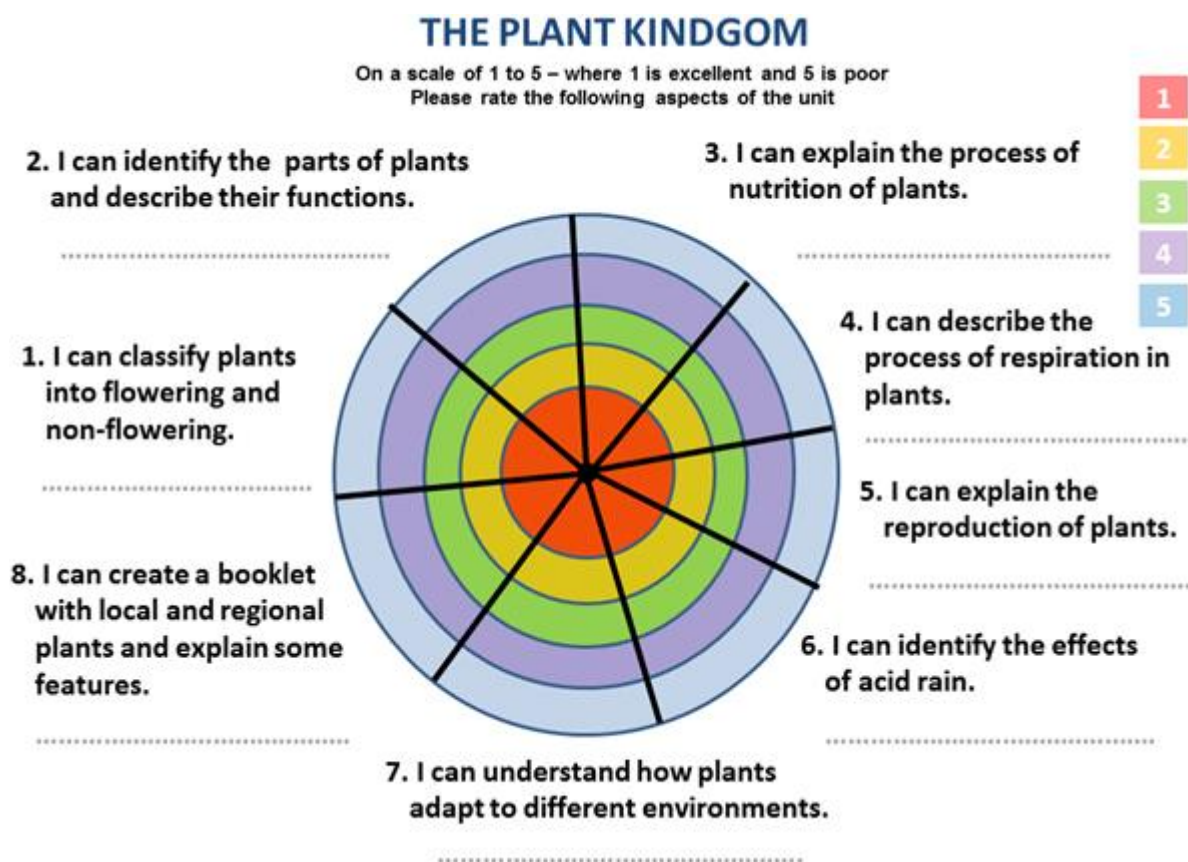


Figure 6. Target of evaluation to self-assess content.

Source: adapted from <https://tinyurl.com/y8rncndm> (Plata-Luque, 2018: 40-41)

I am able to...	Very well	Well	With difficulty	With a lot of help
Know and use scientific terms related to the topic.				
Comprehend oral and written texts about the topic.				
Explain the main concepts learnt.				
Give instructions of a process.				
Make descriptions and comparisons.				
Understand instructions during the lesson.				
Interact with classmates: ask questions, discuss, make hypothesis, etc.				
Become familiar with "Real English" expressions.				
Make an oral presentation.				
Learn and use new expressions for communication.				
Express opinions and new ideas about the topic.				

Table 16. Rubric to self-assess language (my own creation)

Comparative teacher / peer / self- assessment sheet COOPERATIVE WORK									
Criteria	Self-assessment			Peer assessment			Teacher assessment		
									
I can contribute to create a good working-atmosphere.									
I can collect and share information with peers.									
I can complete the task.									
I can wait my turn to speak.									
I can contribute with my ideas.									
I can respect my peers' opinions.									
I can help my peers when they need.									
I can cooperate with my team.									
I can manage and coordinate my part of the work.									
I can look after work tools and materials.									
Notes									

Table 17. Comparative teacher/peer/self-assessment sheet (my own creation)

4.11.2. Assessment of the teaching process

To finish this process, the importance of self-assessing the teaching practice and the execution of the unit designed, in terms of objectives, achievement and coherence within contents, language and methodology, as well as the effectiveness of activities and resources should be highlighted. In order to do so, the "CLIL Unit

Checklist” proposed by Coyle *et al.* (2010: 84-5) is a powerful tool for the educator to reflect and self-assess their teaching practice (see Appendix 7.11). Moreover, to know the students’ perceptions about the unit, a questionnaire is designed (see Appendix 7.12).

5. CONCLUSIONS

In the present Thesis, a proposal of intervention has been made for the teaching of a non-linguistic discipline: Natural Science, using a FL such as English, with the double purpose of learning both contents and language. This proposal, as indicated in this dissertation has not been put into practice yet.

As the main contribution of the project, it should be pointed out that delving into the CLIL learning approach and the different SCM has enabled me to know in detail the aspects to be borne in mind in the design, planning and organisation of a didactic unit, as well as to reflect on which methods or strategies can be more efficient, effective and motivating, for the acquisition of contents and the L2 proficiency by the students to whom the proposal is addressed.

The literature review allows me to conclude that CLIL is underpinned by SCM, as it is founded on a dynamic, flexible and participatory methodology -where the student learns by doing- and the teacher acts as a guide-, offering a variety of scaffolding strategies so that the apprentice gradually increases his or her knowledge, in a context where the L2 is learnt naturally and spontaneously, just like the mother tongue, as the child uses it in real and daily interactions. Besides, it should be remarked that cooperative structures fit within these methodologies since they favour not only students’ communication and participation but also their autonomy, independence, creativity and teamwork skills that maximise each other’s learning.

The design of the didactic unit has attempted to combine all the SCM methodologies. However, the implementation of project-based learning and the inverted classroom have been more complex. The former involves more time to be developed, generally a term or an academic year; and the latter implies students having technological resources at home, apart from the autonomy and responsibility

that the method and the use of ICT require. For this reason, the proposal shows a slight brushstroke of them, demonstrating the flexibility of their application.

After the completion of the thesis, there is confidence in the project's viability, Nevertheless, the following improvements have been estimated: enrolling the school in a European programme like *E-Twinning*, inviting natives to provide students with different accents and variety of real interactions, and the participation of the parents through training workshops, since if they do not know the L2 it is difficult for them to help their children. In addition, concerning attention to diversity, only the current students in the classroom have been considered, thus, guidelines are needed for the possible incorporation of new mixed-abilities students.

This proposal will not be possible without a trained, stable and cohesive bilingual team, since cooperative working is pivotal in this approach. Besides, it should be led by a participative and committed bilingual coordinator who involves all the team members and arranges regular meetings to check if CLIL methodology is been implemented correctly.

Finally, to conclude this MA Dissertation, it could be asserted that CLIL offers an open window to an inspiring real bilingual education which gains momentum when underpinned by SCM. Despite this, continuous research should be done to detect oversights in the current CLIL practice, to look for the best pedagogical solutions and to ensure the outcomes that CLIL brings to the educational system are favourable. Overall, on the practical side, CLIL equips pupils for lifetime integration and internationalisation, fuelling the demands of the 21st-century global society.

6. BIBLIOGRAPHICAL REFERENCES

- Anderson, L.W. & Krathwohl, D.R., (2001). *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. New York: Longman.
- Barbero-Andrés, J. (2012). CLIL: Perspectives from a Competency-Based Approach in the Spanish Context. In *Estilos de Aprendizaje. Investigaciones y Experiencias (V Congreso Mundial de Estilos de Aprendizaje)*. <https://tinyurl.com/ycn8st9j> (last access: April 15th 2020).
- Barrios-Espinosa, E. & Acosta-Manzano, I. (2020). Primary students' Satisfaction with CLIL and Perceived CLIL Linguistic Difficulty. *Journal of Multilingual and Multicultural Development*, 1-14. doi: 10.1080/01434632.2020.59610.
- Bishop, J.L. & Verleger, M.A. (2013). The Flipped Classroom: A Survey of the Research. In *American Society for Engineering Association, 120th ASEE Annual Conference and Exposition*, 30, 1-18. <https://tinyurl.com/yakusjvm> (last access: April 15th 2020).
- Bloom, B.S., (Ed.) (1956). *Taxonomy of Educational Objectives. Handbook I: Cognitive domain*. New York: David McKay Company.
- Broady, E. (2004). Sameness and Difference: The Challenge of Culture in Language Teaching. *Language Learning Journal*, 29(1) 68-72. doi: 10.1080/09571730485200131.
- Cooper, R. & Murphy, E. (2016). *Hacking Project Based Learning: 10 Easy Steps to PBL and Inquiry in the Classroom*. Cleveland, OH: Times 10.
- Council of Europe (2001). *Common European Framework of Reference for Languages: Learning, Teaching, Assessment*. Cambridge: Cambridge University Press. <https://tinyurl.com/yalebyjk> (last access: June 26th 2020).
- Coyle, D. (2006). Content and language integrated learning: Motivating Learners and Teachers. *Scottish Languages Review*, 13, 1-18.
- Coyle, D., Hood, P. & Marsh, D. (2010). *CLIL: Content and Language Integrated Learning*. Cambridge: Cambridge University Press.
- Cummins, J. (1999). *BICS and CALP: Clarifying the Distinction*. Washington, D.C.: ERIC Clearinghouse on Languages and Linguistics.

- Decreto 97/2015, de 3 de marzo, por el que se establece la ordenación y el currículo de la Educación Primaria en la Comunidad Autónoma de Andalucía. Boletín Oficial Junta de Andalucía, 50, de 13 de marzo de 2015.*
- Doiz-Bienzobas, A., Lasagabaster-Herrarte, D. & Sierra-Plo, J.M. (2011). Internationalisation, Multilingualism and English Medium Instruction. *World Englishes*, 30(3), 345-349. doi: 10.1111/j.1467-971X.2011.01718.x. <https://tinyurl.com/y9oxpr47> (last access: May 19th 2020).
- European Commission (1995). *The White Paper on Education and Training. Teaching and Learning. Towards the Learning Society*, (42). European Commission: Directorate-General XXII, Education, Training, and Youth. <https://tinyurl.com/y8799hvf> (last access: April 25th 2020).
- Evseeva, A. & Solozhenko, A. (2015). Use of Flipped Classroom Technology in Language Learning. *Procedia-Social and Behavioral Sciences*, 206, 205-209. <https://tinyurl.com/ybpluf7j> (last access: May 9th 2020).
- Fernández-Agüero, M. (2009). *Descripción de los Elementos Curriculares en la Enseñanza Bilingüe del Inglés: Aproximación a la Situación en la Comunidad de Madrid*. (Tesis doctoral). UNED, Madrid. <https://tinyurl.com/ycvg3kug> (last access: April 15th 2020).
- Finnley, T. & Wiggs, B. (2016). *Rethinking Classroom Design: Create Student-Centered Learning Spaces for 6-12th Graders*. London: Rowman & Littlefield.
- Gallardo del Puerto, F. & Martínez-Adrián, M. (2013). ¿Es más Efectivo el Aprendizaje de la Lengua Extranjera en un Contexto AICLE? Resultados de la Investigación en España. *Revista Padres y Maestros*, (349), 25-28. <https://tinyurl.com/ycq3rdhu> (last access: May 19th 2020).
- García-Iglesias, M.V., Méndez-Marassa, E. & Saura-Rami, J.A. (2014). Estrategias de Andamiaje del Docente de ELE en la Interacción del Aula: Análisis de una Interacción. *Marco ELE Revista de Didáctica Español Lengua Extranjera*, (18), 1-15. <https://tinyurl.com/y7qed24u> (last access: April 20th 2020)
- Harden, R.M. & Crosby, J. (2000). AMEE Guide Nº 20: The Good Teacher is More than a Lecturer. The Twelve Roles of the Teacher. *Medical Teacher*, 4(22), 334-347.
- Harrop, E. (2012). Content and Language Integrated Learning (CLIL): Limitations and Possibilities. *Encuentro*, (21), 57-70. <https://tinyurl.com/yad7zzvv> (last access: April 26th 2020)

- Hewitt, E. & García-Sánchez, M.E. (2012). Evolución del Aprendizaje Integrado de Contenidos y Lengua (AICLE/CLIL) en España: Un Proyecto Empírico en la Universidad. *LACLIL*, 5(1), 57-67. doi: 10.5294/lacil.2012.5.1.5. <https://tinyurl.com/y9bjb3jo> (last access: April 26th 2020).
- Instrucciones de 8 de marzo de 2017, de la Dirección General de Participación y Equidad, por las que se actualiza el protocolo de detección, identificación del alumnado con necesidades específicas de apoyo educativo y organización de la respuesta educativa.*
- Instrucción 7/2020 de 8 de junio, de la Dirección General de Ordenación y Evaluación Educativa, sobre la Organización y Funcionamiento de la Enseñanza Bilingüe en los Centros docentes andaluces para el curso 2020/2021.*
- Instrucción 8/2020, de 15 de junio, de la Dirección General de Ordenación y Evaluación Educativa, por la que se establecen aspectos de Organización y Funcionamiento para los Centros que imparten Educación Primaria para el curso 2020/2021.*
- Juan-Sánchez, C. (2020). *The Natural Science Blog*. <https://tinyurl.com/yadvnrpv> (last access: July 15th 2020).
- Johnson, D.W. & Johnson, R.T. (2017). *Cooperative Learning*. In *Innovación Educación. I Congreso Internacional*, 1-12.
- Johnson, D.W., Johnson, R.T. & Holubec, E.J. (1999). *El Aprendizaje Cooperativo en el Aula*. Barcelona: Paidós. <https://tinyurl.com/yco7c2lz> (last access: May 5th 2020).
- Junta de Andalucía. (2005). *Plan de Fomento del Plurilingüismo en Andalucía*. Sevilla: Junta de Andalucía. <https://tinyurl.com/ydg7dzfe> (last access: May 9th 2020).
- Junta de Andalucía. (2016). *Plan Estratégico de Desarrollo de las Lenguas en Andalucía. Horizonte 2020*. Sevilla: Junta de Andalucía. <https://tinyurl.com/y6jzbax5> (last access: May 9th 2020).
- Ley Orgánica 8/2013, de 9 de diciembre, para la Mejora de la Calidad Educativa (LOMCE), Boletín Oficial del Estado, 295, de 10 de diciembre de 2013.*
- López-Medina, B. (2016). Developing a CLIL Textbook Evaluation Checklist. *LACLIL*, 9(1), 159-173. doi:10.5294/lacil.2016.9.1.7.

- Lyster, R. (2007). *Learning and Teaching Languages Through Content: a Counterbalanced Approach*. Amsterdam: John Benjamins Publishing Company.
- Markham, T., Larmer, J., & Ravitz, J. (2003). *Project-Based-Learning Handbook*. (2nd ed.). Novato, CA: Buck Institute for Education.
- Marsh, D. (2002). The Relevance and Potential of Content and Language Integrated Learning (CLIL) for Achieving MT+2 in Europe. <https://tinyurl.com/y8bdx7h8> (last access: April 14th 2020).
- Marsh, D. (2012). *Content and Language Integrated Learning (CLIL) A Development Trajectory*. Córdoba: Servicio de Publicaciones de la Universidad de Córdoba. <https://tinyurl.com/yab8b5ro> (last access: April 16th 2020).
- McCombs, B. & Whistler, J. (1997). *The Learner-Centered Classroom and School: Strategies for Increasing Student Motivation and achievement*. San Francisco: Jossey-Bass Publishers.
- McInnerney, J. & Robert, T.S. (2004). Collaborative or Cooperative Learning. In T.S. Roberts (Ed.), *Online Collaborative Learning: Theory and Practice*, 203-214. Hershey, PA: Information Science Publishing.
- Mehisto, P. (2008). CLIL Counterweights: Recognising and Decreasing Disjuncture in CLIL. *International CLIL Research Journal*, 1(1), 93-119. <https://tinyurl.com/ydhqc9ns> (last access: April 10th 2020).
- Mehisto, P., Frigols, M.J. & Marsh, D. (2008). *Uncovering CLIL: Content and Language Integrated Learning in Bilingual and Multilingual Education*. London: Macmillan.
- Muñoz-Lahoz, C. (2007). CLIL: Some Thoughts on its Psycholinguistic Principles. *Revista Española de Lingüística Aplicada*, 1, 17-26. <https://tinyurl.com/y9xjzbbs> (last access: April 14th 2020).
- Navés-Nogués, T. & Muñoz-Lahoz, C. (2000). Usar las Lenguas Extranjeras para Aprender y Aprender a Usar las Lenguas Extranjeras. Una Introducción a AICLE para Padres, Madres y Jóvenes. In D. Marsh & G. Langé (Eds.), *Using Languages to Learn and Learning to Use Languages*, 1-16. Finland: University of Jyväskylä. <https://tinyurl.com/y9de2moc> (last access: April 20th 2020).
- O'Flaherty, J. & Philips, C. (2015). The Use of Flipped Classrooms in Higher Education: A Scoping Review. *Internet and Higher Education*, 25(1), 85-95. <https://tinyurl.com/yb428bee> (last access: April 20th 2020).

- O'Neill, G. & McMahon, T. (2005). Student-Centred Learning: What Does it Mean for Students and Lecturers? *Emerging Issues in the Practice of University Learning and Teaching*, (1) 27-36. <https://tinyurl.com/y78okbl5> (last access: April 5th 2020).
- Orden de 28 de junio de 2011, por la que se Regula la Enseñanza Bilingüe en los Centros Docentes de la Comunidad Autónoma de Andalucía. *Boletín Oficial de la Junta de Andalucía*, 135, de 12 de julio de 2011.
- Orden de 17 de marzo de 2015, por la que se desarrolla el currículo correspondiente a la Educación Primaria en Andalucía. *Boletín Oficial de la Junta de Andalucía*, 60, de 27 de marzo de 2015.
- Orden ECD/65/2015, de 21 de enero, por la que se describen las relaciones entre las competencias, los contenidos y los criterios de evaluación de la educación primaria, la educación secundaria obligatoria y el bachillerato. *Boletín Oficial del Estado*, 25, de 29 de enero de 2015.
- Panadero-Calderón, E., & Jonsson A. (2013). The Use of Scoring Rubrics for Formative Assessment: A Review. *Educational Research Review*, 9(0), 129-144. doi: <http://dx.doi.org/10.1016/j.edurev.2013.01.002> (last access: May 29th 2020).
- Pavesi, M., Bertocchi, D., Hofmannová, M. & Kazianka, M. (2001). Cómo Utilizar Lenguas Extranjeras en la Enseñanza de una Asignatura. In D. Langé (Ed.), *Enseñar en una Lengua Extranjera*, 105-134. Milán: TIE-CLIL. <https://tinyurl.com/ycdsvpg3> (last access: April 15th 2020).
- Pavón-Vázquez, V. (2018). Coordination and Organisation of CLIL Programmes. (Master's Course, Topic 2). Jaén: Universidad de Jaén.
- Pavón-Vázquez & Méndez-García (2017). Analysing Teachers' Roles Regarding Cross-curricular Coordination in Content and Language Integrated Learning (CLIL). *Journal of English Studies*, 15, 235-260. Doi: <http://doi.org/10.18172/jes.3227> (last access: April 18th 2020).
- Plata-Luque, C. (2018). Evaluation and Assessment in CLIL Programmes. (Master's Course, Topic 3). Jaén: Universidad de Jaén.
- Pérez-Cañado, M.L. (2012). CLIL research in Europe: Past, Present, and Future. *International Journal of Bilingual Education and Bilingualism*, 15(3), 315-341. doi: 10.1080/13670050.2011.630064.
- Pérez-Cañado, M.L. (2018a). What is CLIL? Origins, Definition, and Characterisation. (Master's course, topic 1). Jaén: Universidad de Jaén.

- Pérez-Cañado, M.L. (2018b). The Effects of CLIL on L1 and Content Learning: Updated Empirical Evidence from Monolingual Contexts. *Learning and Instruction*, 57, 18-33.
- Pérez-Cañado, M.L. (2018c). "Real English" for Communicative Interaction in the CLIL Classroom. (Master's course, topic 1). Jaén: Universidad de Jaén.
- Pérez-Cañado, M.L. (2019). CLIL and Elitism: Myth or Reality? *The Language Learning Journal*, 1-14. doi: 10.1080/09571736.2019.1645872.
- Pérez-Torres, I. (2015). *Uso de Recursos Educativos Abiertos para el Aprendizaje Integrado de Contenidos y Lenguas Extranjeras (AICLE)*. Bloque 1. INTEF. Madrid: Secretaría General Técnica. Centro de Publicaciones. Ministerio de Educación, Cultura y Deporte. <https://tinyurl.com/ybodds6y> (last access: April 12th 2020).
- Pujolàs-Maset, P. (2002). El Aprendizaje Cooperativo. Algunas Propuestas para Organizar de Forma Cooperativa el Aprendizaje en el Aula. Vic: Universidad de Vic. Laboratorio de Psicopedagogía. <https://tinyurl.com/yd5vs3lr> (last access: May 20th 2020).
- Pujolàs-Maset, P. (2011). La Estructuración Cooperativa en el Aula. (II) Algunas Ideas Prácticas. Vic: Universidad de Vic. Laboratorio de Psicopedagogía. <https://tinyurl.com/ybugntwj> (last access: May 8th 2020).
- Ráez-Padilla, J. (2018a). Student-Centered Methodologies and New Technologies for CLIL (Master's course, topic 1). Jaén: Universidad de Jaén.
- Ráez-Padilla, J. (2018b). Student-Centered Methodologies and New Technologies for CLIL (Master's course, topic 2). Jaén: Universidad de Jaén.
- Real Decreto 126/2014, de 28 de febrero, por el que se establece el currículo básico de la Educación Primaria. Boletín Oficial del Estado*, 52, de 1 de marzo de 2014.
- Rogers, C.R. (1983). As a Teacher, Can I Be Myself? In *Freedom to Learn for the 80's*. Ohio: Charles E. Merrill Publishing Company.
- Ruiz de Zarobe, Y. (2008). Aprendizaje Integrado de Contenidos Curriculares en Inglés Lengua Extranjera: Diferencias con el Aprendizaje del Inglés Como Asignatura. In R. Monroy & A. Sánchez (Eds.), *25 Years of Applied Linguistics in Spain: Milestones and Challenges*, 413-419. <https://tinyurl.com/y9b7lblg> (last access: April 20th 2020).

- Sánchez-Calvo, A. (2007). A Learner-Centred Approach to the Teaching of English as an L2. *Revista de Filología Inglesa*, 8(28), 189-196. <https://tinyurl.com/y7cue8qv> (last access: April 12th 2020).
- Shindler, J. (2009). *Transformative Classroom Management: Positive Strategies to Engage all Students and Promote a Psychology of Success*. San Francisco, CA: Jossey-Bass Teacher.
- Smith, J. & Spindle R.M. (2007). The Impact of Group Formation in a Cooperative Learning Environment. *Journal of Accounting Education*, 25(4), 153-167. doi: 10.1016/j.jaccedu.2007.09.002
- SRI International (2000). *Silicon Valley Challenge 2000: Year 4 Report*. San Jose, CA: Joint Venture.
- Stoller, F. (2002). Project Work: A Means to Promote Language and Content. In J.C. Richards & W.A. Renandya (Eds.), *Methodology in Language Teaching: an Anthology of Current Practice*, 107-119. Cambridge: Cambridge University Press.
- TEAL-Teaching Excellence in Adult Literacy, (2010). Student-Centered Learning. In *TEAL Center Fact Sheet*, (6), 1-5. <https://tinyurl.com/y7ogxpg8> (last access: April 11th 2020).
- Tomlinson, B. (2002). Materials Development. In R. Carter & D. Nunan (Ed.), *The Cambridge Guide to Teaching English to Speakers of Other Languages*, 66-72. Cambridge: Cambridge University Press.
- Vale, D. & Feunteun, A. (1998): *Enseñanza del Inglés para Niños: Guía de Formación para el Profesorado*. Cambridge: Cambridge University Press.

7. APPENDICES

7.1. Appendix 1. Cooperative structures

Encouraging dialogue/participation
• Talking chips: each member of the team receives a “Talking chip” (it can be any game token or other tangible item), and when s/he talks, places it in the middle of the team-table. When they run out of chips, they may not talk until all the team members have used their chips. • Three-step interview: students interview each other in pairs. First, one way and then, the other. Each teammate shares with the group information they have learnt in the interview.
Processing and understanding information
• Cooperative reading: the teacher proposes a text and forms heterogeneous pairs. Pupil A reads the first section aloud and pupil B follows the reading carefully. Finally, B asks A: What is the main idea? And A gives his/her opinion and if B agrees, they underline it. If not, they discuss until a consensus is reached. They move on to the next paragraph and switch roles. Finally, they make a summary with the underlined ideas. It can be done in groups of four. • I know, we know: students are grouped in pairs. The instructor announces the topic and asks the pupils to think and write down what they know about it. Each pupil writes what s/he knows on one side of the sheet: "What I know". Then, the students share their opinions within the couple. Then, they build a common response. They write it on the other side of the sheet: "What we know". Finally, the educator collects the sheets and asks some partners to share their work. • Note-taking pairs: each pupil takes notes and summarises his/her understanding of a concept base. Then, s/he gets reflective feedback from their peer and has the opportunity to discover significant downfalls in their written records. • Think-write-pair share: in groups, pupils write or draw their own ideas before they join in pairs to discuss them with a peer. This permits pupils to more fully develop their own ideas before sharing.

- **Three-minutes stop:** within a presentation, the teacher introduces three-minute halts, in which the teams try to orally summarise the contents explained and write a question about them. After the three minutes, each group poses one of its questions to the rest of the teams. If one question or another very similar one has already been asked by another group, they formulate the other one. When all the queries have been asked and debated, the teacher carries out the explanation, until s/he makes another three-minute stop.
- **Silent-demo:** the teacher presents a multi-stage procedure in silence, without giving explanations. The students, in pairs, talk about what they have seen, trying to establish the steps that the teacher has followed. The teacher again in silence demonstrates the first part of the procedure and the pairs try to reproduce it. Then, the teacher presents the second part of the procedure with the same strategy. Pairs attempt to reproduce it. Next, the educator poses a situation where pairs should apply the learnt process. Finally, the teacher selects some pupils to "demonstrate" what they have done to the rest.
- **Word game:** the mentor writes a few key-words on the board about the topic to be worked on. Within the teams, either orally or in writing, the students build together one or more sentences with those words, trying to express the idea behind them. Finally, a random student from each team shares their group's sentence and explains what it means.

Building knowledge together

- **Assessment collage:** the teacher distributes magazines, scissors, glue and markers among the teams. Each member spends a few minutes thinking about what s/he has learnt in the unit, they have just finished. The teams share the ideas of their members. Each group makes a collage that reflects what they have learnt. At the end, the teacher organises a gallery with the assessment collages and invites pupils to comment on them.
- **Cooperative drawing:** in teams, the students are asked to elaborate a mural, poster, drawing or any other plastic task. Each teammate is assigned a part of the task and the correspondent material. The team agrees on what it is going to do and how it is going to be done. Each pupil develops its part, all together display it in the mural, and finally, the team presents its task to the whole class.

- **One-two-four:** the instructor poses a problem or query and each student spends a few minutes thinking about the answer. Then, they share and debate their ideas with their next to teammate, trying to formulate a single answer. After that, pairs contrast their answers within the team, looking for the most appropriate answer. Finally, the educator chooses some students to explain the team answers to the rest of the students.
- **Pens in the middle:** the educator proposes an exercise or problem to the students. Students place their pens in the centre of the team-table to point out that at that time they are allowed to talk but not to write. Students try to agree on how to solve it. The moderator makes sure that everyone takes part, sharing and understanding how to solve it. Finally, each member takes his/her pencil and writes the solution they have previously agreed. At this point, they are allowed to write but not to speak.
- **Team word-webbing:** all the components of the team in unison write down ideas on a sheet, making drawings and adding elements to establishing relationships among them.

Source: Adapted from Ráez-Padilla (2018a: 21-5) (my own creation)

7.2. Appendix 2. Session 1: Let's know plants

Activation

1- Observe the poster and answer the questions.

LIVING THINGS



Source: <https://tinyurl.com/ya29luxo>

1. What living things can you see in the poster?
2. What are plants important to humans?
3. What are plants important to ecosystems?
4. Do plants need humans' help to grow up?
5. Do all the plants grow up everywhere?
6. Do you know how to plant and grow up plants?
7. Which parts can you identify?

Useful language

Plants need water...	I identify....
Plants do not need...	I think/believe....
Plants have...	I can see...
Plants are necessary for...	

Source: my own creation

Development

2.- How to grow a plant? Think about the steps followed by the teacher and write an instructive text. First, make a list of the the materials you need, and then, the steps to follow (see a [model](#)).

Example

GROWING A PLANT

Materials:

- A pot
- Some soil
- Some seeds
- A little of water
- Some gravel
- A spade
- A watering can

Instructions:



1. Get the pot.



2. Put a layer of gravel in the bottom.



3. Fill the pot with soil. Dig a hole and plant the seeds.



4. Cover with a thin layer of soil.



5. Water the seeding.



6. Put your pot in the sunshine. The seeds sprouted.



7. Wait for the plant.



8. The plant is grown.

Source: adapted from <https://tinyurl.com/ydgplzbo> (my own creation)

Useful language		
Plant	Seed	Cover
Water	Pot	Dig a hole
Soil	Put	Gravel

Source: my own creation

3.- Let's experiment.

1. Plant seeds in four pots and labelled them:

- Plant 1: No water
- Plant 2: No light (they cover with a paper bag)
- Plant 3: No air (they cover with a plastic bag)
- Plant 4: The control plant

2. Put the plants on a windowsill. Along with the unit, you will water plants regularly, except for plant number 1. You will also ensure that the control plant has air, light and water make sure.

3. Observe the plants every 2-3 days and write down notes about your observation. Complete the table.

Day	Plant 1 No water	Plant 2 No light	Plant 3 No air	Plant 4 Air, light, water
1				
4				
8				
12				

Source: my own creation

7.3. Appendix 3. Session 2: Parts of the plants

Activation

1.- Observe the plants with the aid of the hand lenses and write their features:

Rosemary	Fern	Lentils plant	Aloe
			
Roots:	Roots:	Roots:	Roots:
Leaves:	Leaves:	Leaves:	Leaves:
Stems:	Stems:	Stems:	Stems:

Images source: <https://tinyurl.com/ya9o4ggh> (my own creation)

Useful language

The leaves have.... prickles/spores/spines

The shape of the leaves are ... elliptic/oblong/pinnate/oval

The roots are... strong/weak/tiny/short/long

The stems are short/long/flexible/brown/green/thick/dense

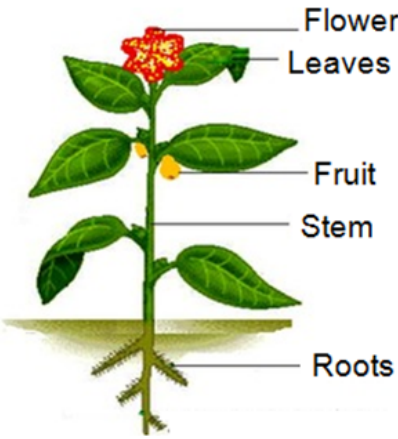
The plant has/hasn't.... flowers/fruits/

The colour is... dark/light green/brown

Source: my own creation

Development

2.- Running dictation

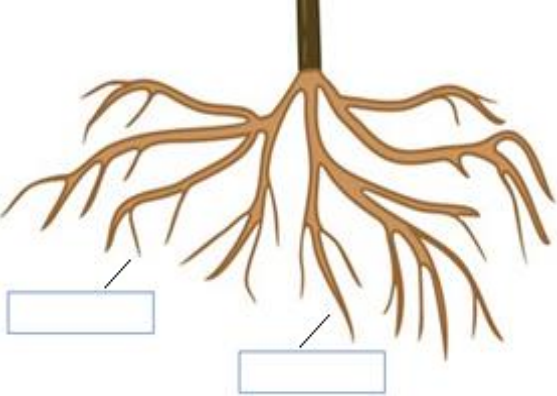
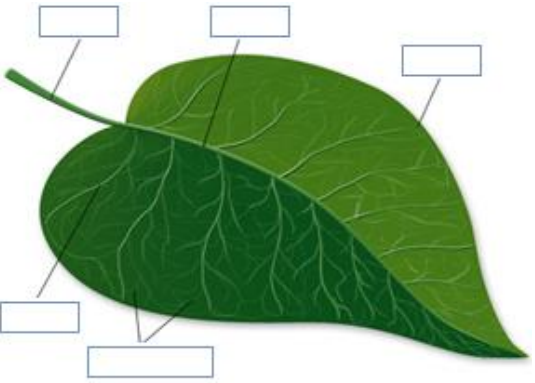
	ROOTS The roots hold the plant in the ground. Roots absorb water and minerals needed for nutrition from the ground through the root cap and root hairs.
	STEM The stem holds up the other parts of the plant. They can be herbaceous or woody. It also transports materials to and from the leaves. Water and minerals travel through the stem to the nodes and leaves for photosynthesis. The food produced through photosynthesis then travels to the other parts of the plant like the bulb.
	LEAVES Leaves contain chlorophyll, a green substance which is necessary for photosynthesis. Most leaves have two parts: the petiole and the blade. Veins in the blade support the leaf and carry water and minerals. On the underside of the blade, there are tiny holes, called stomata. The gas exchange in leaves takes place through stomata.
	FLOWERS Flowers are the reproductive organs in most of the plants. The male flower produces pollen and the female produces ovules.
	FRUIT The fruit is the sweet and fleshy product of a tree or other plant that contains seeds and can be eaten as food.

Text source: adapted from Riach, & Bacon (2014: 106)

Image source: <https://tinyurl.com/yacz5jgg>

Design: my own creation

3.- Label the parts in each picture.

PARTS OF THE....	
Plant  Source: https://tinyurl.com/yacz5jgg	Root  Source: https://tinyurl.com/yaz8el7z
Leaf  Source: https://tinyurl.com/ybnqcfho	Stem  Source: https://tinyurl.com/orvc358

Design: my own creation

Revision

4.- Write sentences about plants following the pattern:

- If the plants didn't have **roots**, they wouldn't be able to **absorb minerals and water**
- If the plants didn't have **leaves**,
-
-
-



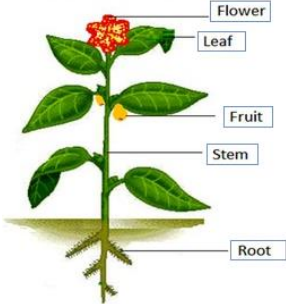
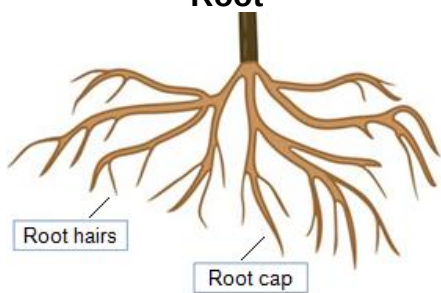
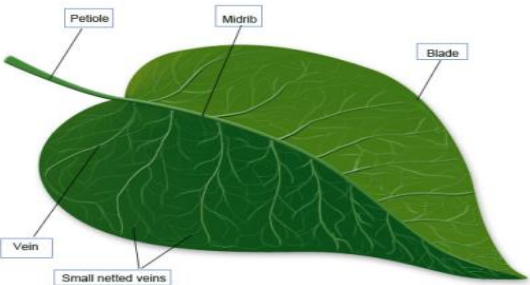
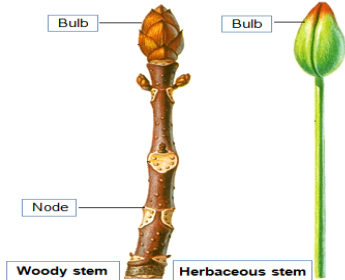
Image source: <https://tinyurl.com/y93cglmd> (my own creation)

Session 2: solutions

1.-

Rosemary	Fern	Lentils plant	Aloe
			
Roots: long, tiny Leaves: similar to needle, isolated, Stems: strong, woody, long, dense	Roots: long, tiny Leaves: small, oval Stems: large, tiny, thin, dense, herbaceous	Roots: long, thin Leaves: small, oblong Stems: large, tiny, thin, dense, herbaceous	Roots: long, wide Leaves: thick, fleshy Stems: short, strong, sparse, herbaceous

3.-

Parts of the....	
Plant 	Root 
Leaf 	Stem 

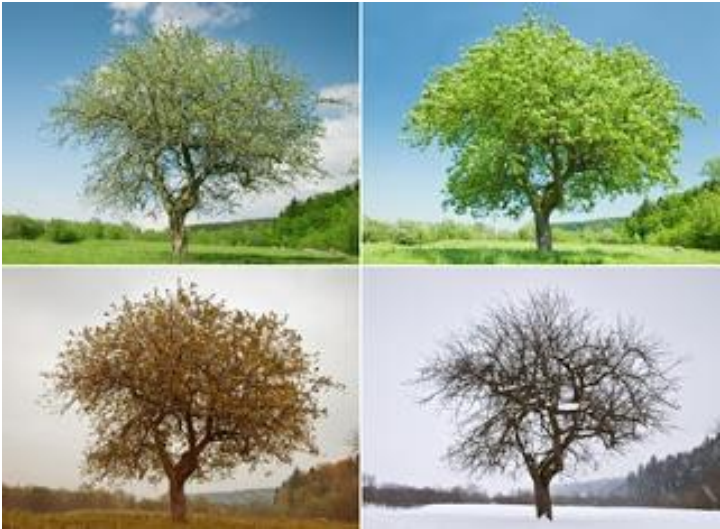
4.- Some examples:

- If the plants didn't have roots, they wouldn't be able to absorb minerals and water/grow up
- If the plants didn't have stems, they wouldn't be able to carry out minerals to leaves/hold up the other parts of the plant
- If the plants didn't have leaves, they wouldn't be able to produce chlorophyll/exchange gas/perform the photosynthesis

7.4. Appendix 4. Session 3: How plants respond to the seasons

Activation

1.- Observe the poster and answer the questions.

Why do plants change?

Source: https://tinyurl.com/ybu6tdfo
• What are the differences between the trees? • Which is the reason of these changes? • Can you identify the season of each picture? • How does temperature influence the leaves and fruits? • Do you think photosynthesis occurs in winter? • Do all the trees have leaves in winter?

Design: my own creation

Useful language
In autumn/spring/summer/winter... Flowers/leaves change/fall/bloom Temperatures are... and fruits can (cannot) grow There are a lot of precipitations/rainfall Rainfall is good for... Trees (don't) lose....

Source: my own creation

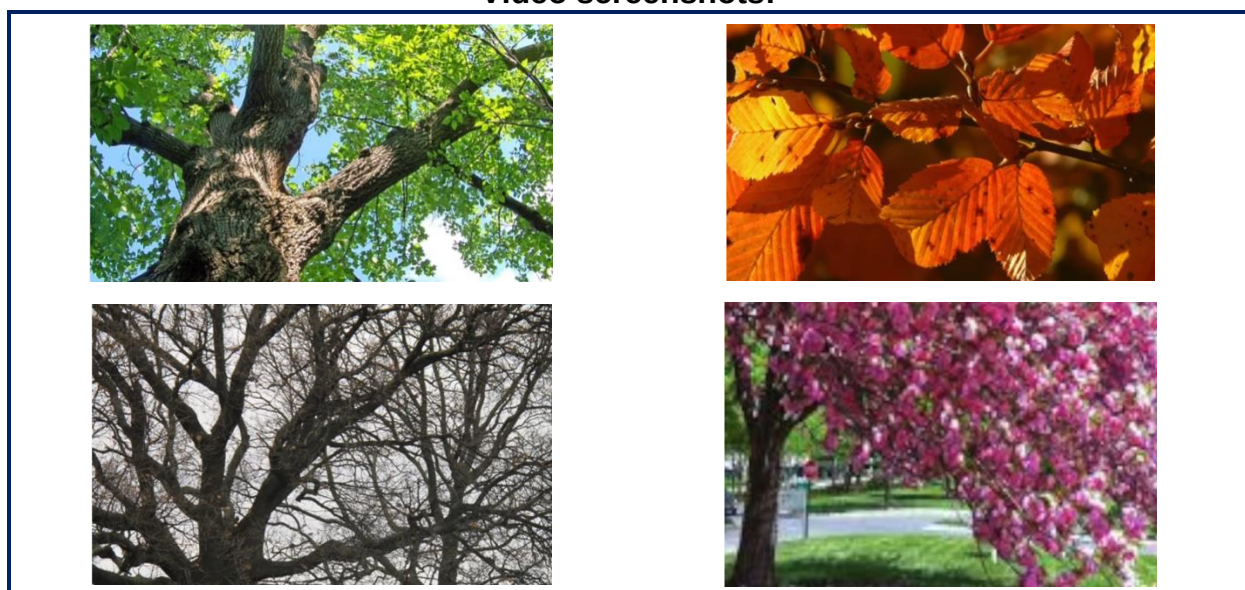
Development

2.- Watch the [video](https://www.youtube.com/watch?v=r4HR4xtY50Q) (https://www.youtube.com/watch?v=r4HR4xtY50Q) and take notes about tree features in each season. Then, make drawing and write down main features: leaves, fruits, branches, etc.

Spring	Summer	Autum	Winter
•Leaves: •Fruits: •Branches: •Temperature: •Light:	•Leaves: •Fruits: •Branches: •Temperature: •Light:	•Leaves: •Fruits: •Branches: •Temperature: •Light:	•Leaves: •Fruits: •Branches: •Temperature: •Light:
			

Images source: <https://tinyurl.com/y7t8pk34> (my own creation)

Video screenshots:



Source: <https://tinyurl.com/y9o82qsv>

Revision

3.- Look for information on the Internet. Compare both forests and write the differences.

Example

Evergreen versus Deciduous forest	
	
A forest made up of evergreen trees	A forest made up of deciduous trees, which lose their leaves
Trees do not shed their leaves seasonally	Trees shed their leaves seasonally
Trees survive in hot and warm weather	Trees survive in cold and dry conditions
Soil has lower amounts of nutrients	Soil has higher amounts of nutrients
Annual rainfall is more than 200 mm	Annual rainfall is less than 190 mm
The most sensitive to temperature	The most sensitive to rainfall
Denser	Less dense

Source: adapted from: <https://tinyurl.com/ycygxw4v>

Useful language
The soil has more/less nutrients than.... Precipitations are higher/lower than... They are sensitive to... Weather is warmer than...

Source: my own creation

7.5. Appendix 5. Session 4: Plants nutrition, respiration and reproduction

Activation

1.- Let's read these words:

- **Roots:** /ru:ts/
- **Leaves:** /li:vz/
- **Leaf:** /li:f/
- **Stem:** /stɛm/
- **Flower:** /'flaʊə/
- **Fruit:** /fru:t/

2.- Observe the plant cycle.



Source: adapted from <https://tinyurl.com/syx5ddz>

2.- Make predictions:

- How do plants grow up?
- How do plants breathe?
- What does photosynthesis mean?
- How do plants reproduce?
- How do plants make nutrients?

Useful language

Plants need/take...

Nutrients are...

Photosynthesis means...

Plants produce...

Source: my own creation

Development

3.- Study the topic with the experts and then explain it to your group with the aid of the pictures:

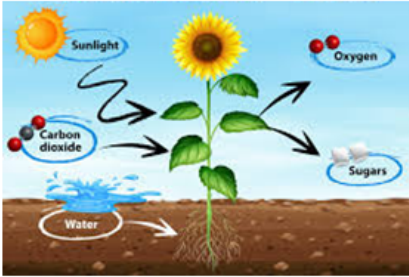
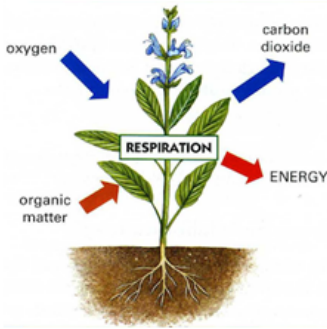
Nutrition (Photosynthesis)	Respiration
Plants make their own nutrients through photosynthesis. During this process, plants absorb carbon dioxide and water with minerals and release oxygen into the air. This process takes place in green leaves during the day. Leaves absorb energy from the sunlight through a green pigment called chlorophyll and use it to produce glucose and oxygen. 	Respiration is related to how plants get energy. During respiration, plants absorb oxygen from the air. Then, the oxygen and nutrients are transformed into energy. Finally, the plant releases carbon dioxide and water vapour into the air. Plants need energy 24 hours a day. That is why respiration takes place during the day and at night. 

Image source: <https://tinyurl.com/y7cvxv3c>

Image source: <https://tinyurl.com/yd2mfkx0>

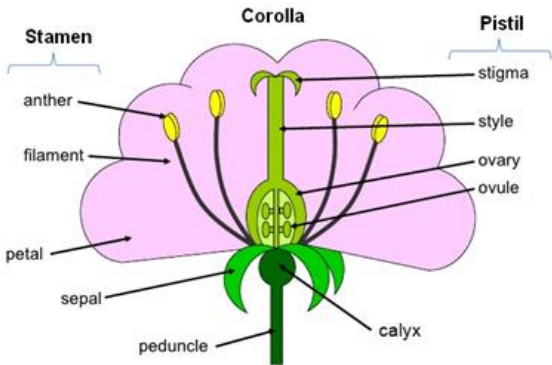
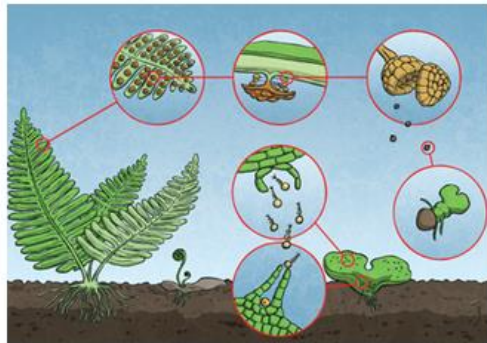
Reproduction in flowering plants	Reproduction in non-flowering plants
Reproduction takes place inside the flower, when two reproductive cells from two different plants come together. This generates a new plant. The male organ is the stamen which is formed by the anther and the filament. The female is the pistil which is formed by the stigma, the style and the ovary. 	Non-flowering plants do not have flowers or seeds. So, they use spores to reproduce. Ferns reproduce in this way: • Sori are sacks that contain thousands of spores. They are located under the fern leaves. • Spores fall to the ground and form organs that produce reproductive cells. • After fertilisation, a new fern begins to grow. 

Image source: <https://tinyurl.com/ycbohgz>

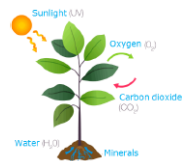
Image source: <https://tinyurl.com/y9afvk83>

Text source: adapted from Pueyo-Lobera *et al.* (2015:: 42-4)

Revision

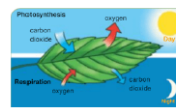
4.- Plickers questionnaire about plants nutrition, respiration and reproduction.

1 Plants use carbene dioxide...



- A to absorb light from the Sun
- B to make their own food
- C to take in mineral salts from the soil
- D to make the flowers

4 Plants release oxygen...



- A during respiration
- B during photosynthesis
- C through the roots
- D through the flowers

2 The amount of water plants need to survive...



- A varies from plant to plant
- B is the same for all plants
- C depends on the number of leaves they have
- D depends on the number of flowers they have

5 Raw sap is...



- A produced during photosynthesis
- B a mixture of water and mineral salts
- C absorbed through the stomata
- D fertile soil

3 Plants take in mineral salts through their...



- A stomata
- B roots
- C chlorophyll
- D leaves

Source: <https://tinyurl.com/ydfr6ote> (My own creation)

1 When soil is humid and rich in minerals salts, we say it is...



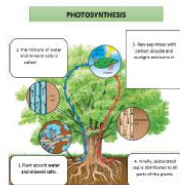
- A abundant
- B sparse
- C poor
- D fertile

4 Non-flowering plants use _____ to reproduce



- A cells
- B ovules
- C pollen
- D spores

2 Raw sap travels up to the leaves through the...



- A xylem vessels
- B roots
- C phloem vessels
- D stems

5 The pistil is ...



- A the male reproductive organ
- B the filament of the flower
- C the female reproductive organ
- D the seed of the plant

3 Pollen is transferred from the stamen of a flower



- A to the pistil of another flower
- B to the leaves
- C to the roots
- D to the calyx

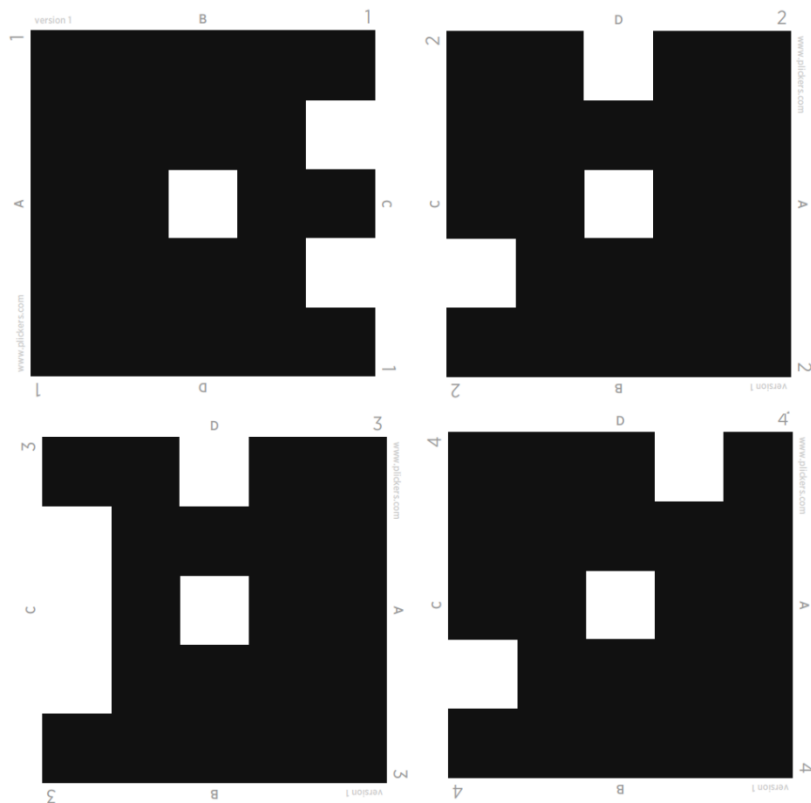
Source: <https://tinyurl.com/y9rb2by3> (my own creation)

Session 4: solutions

3.- Solutions to the *Plickers* questionnaire:

1. To make their own food 2. Varies from plant to plant 3. Roots 4. During photosynthesis 5. A mixture of water and mineral salts	1. Fertile 2. Xylem vessels 3. To the pistil of another flower 4. Spores 5. The female reproductive organ
---	---

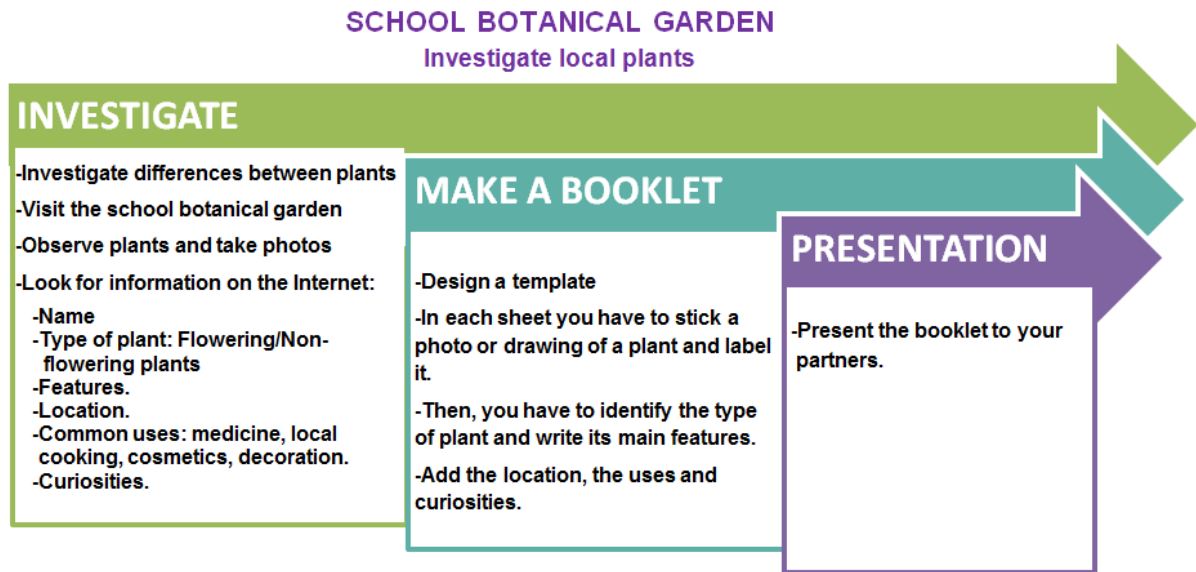
Plickers answer-cards



Source: <https://tinyurl.com/y7ng74bs>

7.6. Appendix 6. Session 5: Flowering and Non-flowering plants (I)

1.- Read the steps of the investigation.



Source: my own creation

Before the session:

Watch these videos at home(or school library) and take notes:

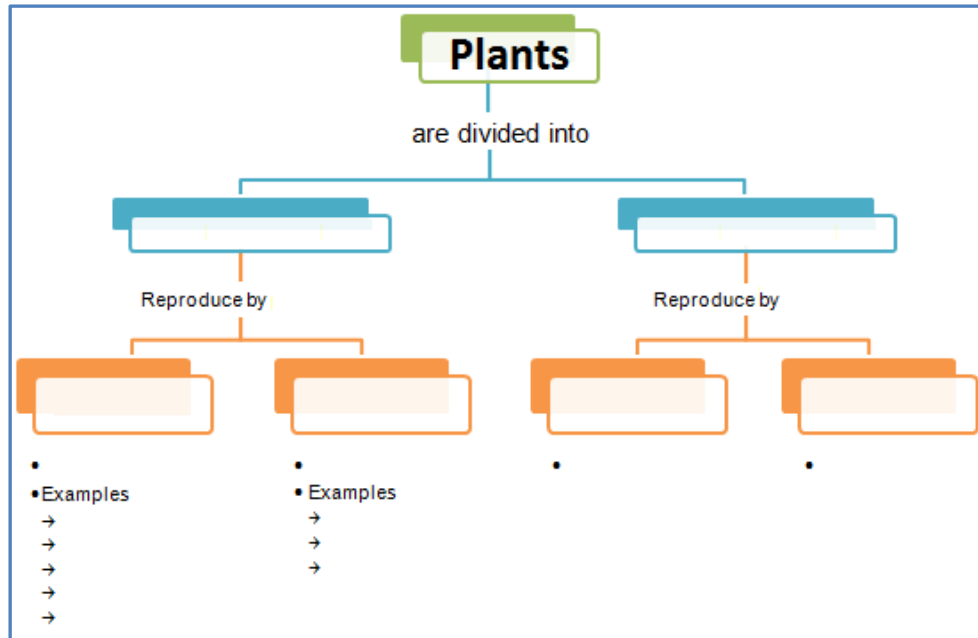
- Differences between flowering and non-flowering plants
 - <https://vimeo.com/289823436>
 - <https://www.youtube.com/watch?v=5erDiPb0--w>
- Examples of Flowering and Non-flowering plants
 - <https://www.youtube.com/watch?v=mpNUElQfzqo>

Some questions that can help you to take notes:

- What do they have in common?
- Which are the differences between a sunflower and a fern?
- How do they reproduce?
- Do they produce fruits or cones?
- Do they have spores?
- Do they have flowers?
- Classify the following plants: palm tree, daisy, almond tree, fir, rose, pine, fern, poppy, welcome plant, lucky bamboo, bird nest, prayer plant and moss.
- Compare a moss and a fern. What do they have in common? How are they different?

Step 1

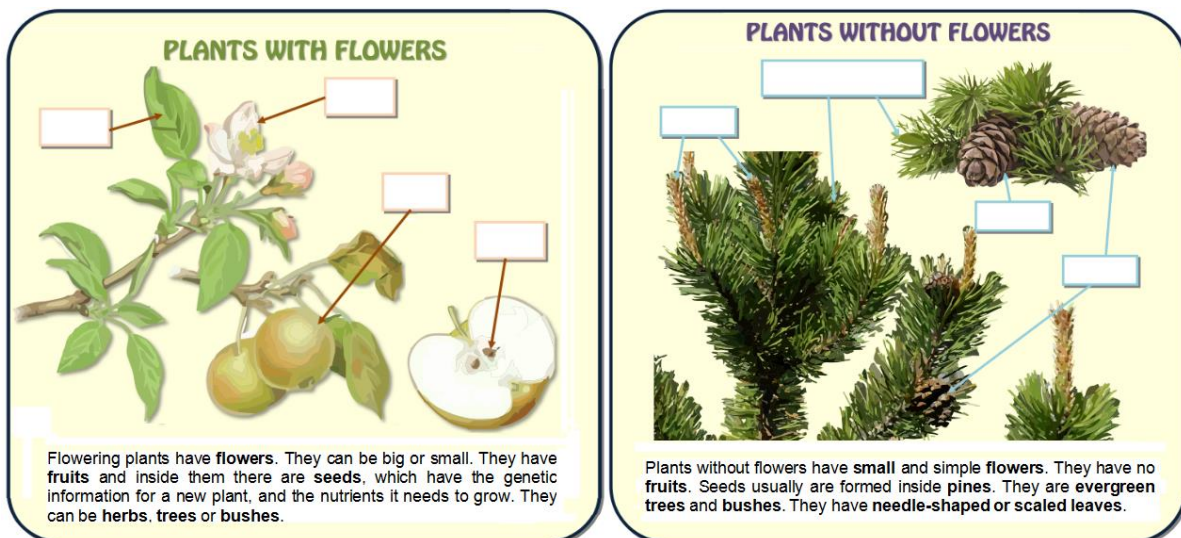
1.- Share the information you have found at home with your partners and complete this mind-map:



Source: my own creation

Step 2

2.- Read the text and label the parts of each plant.



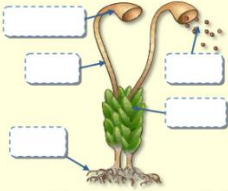
MOSS



Moss are small plants which live in **humid** places on rocks and stones, trees' trunk and the ground. They absorb water from every part of them.

They have tiny **leaves** and thin **stems**.

Spores are inside **seed-pods**, which are at the end of the stems.



They have **small roots** which are like fur and keeps them hooked to the ground.



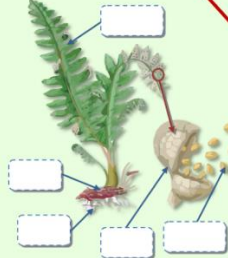
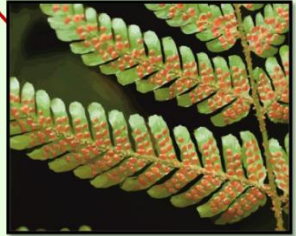
FERN



Ferns are **plants** that can grow to be really big. They grow in **humid** places, by the edge of rivers, or in the **dark** parts of the forest, where there is no light.

Ferns have an **underground stalk** (rhizome), which is the origin of both roots and leaves.

They have big leaves. In the underside of them there are small **pods** (sorus). Inside them, there are **spores**.

Source: <https://tinyurl.com/yacj3v6f>

Step 3

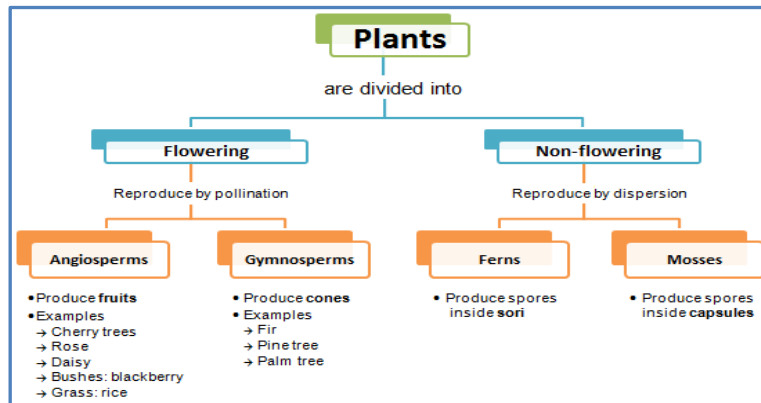
3.- The botanical garden is plenty of local plants. Design a template and complete the template with the information you have collected.

Name 	Photo
Type of plant	
Features	
Location	

Source: my own creation

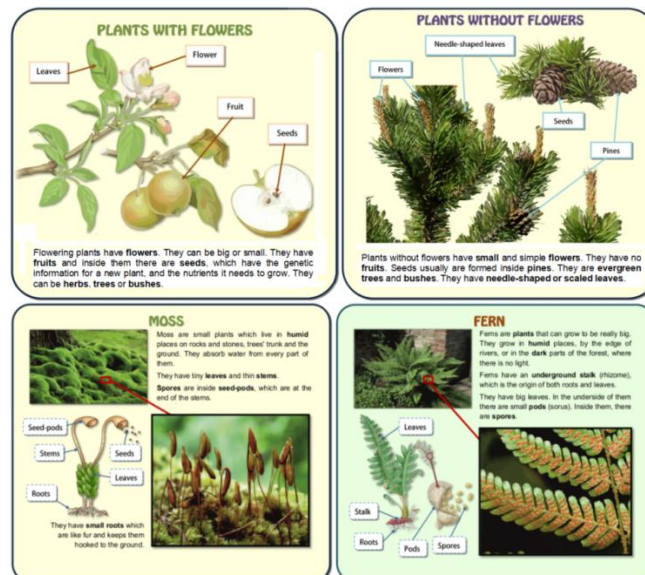
Session 5: solutions

1.-



Source: my own creation

2.-



Source: <https://tinyurl.com/yacj3v6f>

3.-

Name: Pine tree		Name: Olive trees	
Type: Flowering Gymnosperm		Type: Flowering Angiosperms	
Features: they are evergreen, coniferous resinous trees. They require full sun and very little water to survive.		Features: They are evergreen trees, short and squat and rarely exceed 8-12 meters in height. The silvery green leaves are oblong and their fruits are small drupes.	
Location: Granada, Córdoba, Jaén, Málaga, Sevilla		Location: Jaén, Córdoba, Sevilla, Granada.	

Images source: <https://tinyurl.com/ya9o4ggh>

Design: my own creation)

7.7. Appendix 7. Session 6: Flowering and Non-flowering plants (II)

Before the session:

Look for information about uses of plants and take notes. The following websites are useful:

→ **Medicine:**

<https://www.youtube.com/watch?v=6iEOTB1UjjiQ>

<https://www.youtube.com/watch?v=Czoyzw2G3xo>

→ **Cuisine:**

<https://www.youtube.com/watch?v=1Qm89IMLkQ4>

<https://www.youtube.com/watch?v=CdPRZ3wjCxA>

→ **Air-freshener:**

<https://www.youtube.com/watch?v=TgDpqdMbKtk>

<https://www.youtube.com/watch?v=T6lk-mKU4vE>

→ **Clothes:**

https://www.youtube.com/watch?v=KblAB_HhYF8

→ **General uses (decoration, furniture...):**

<https://www.youtube.com/watch?v=jwfxxdZiVq8>

<https://www.youtube.com/watch?v=TSGntvNzcBQ>

Some questions that can help you to take notes:

- Which uses do plants have?
- How do we use herbs in the cuisine?
- Can we use moss and ferns to cook?
- Which kind of plants can we use to make air-fresheners?
- Which plant do we use to make clothes?
- Are all the plants suitable for cooking?
- Can you give some examples to use the aloe?
- Classify the following plants according to their uses: aloe, lavender, thyme, cotton, almond tree, rose, bamboo, orange tree, pine tree, rosemary, palm tree, daisy, almond tree...

Step 4

1.- Share the information with your partners and give examples of plants:



Source: <https://tinyurl.com/y85rv67c>

USES OF PLANTS				
Cooking	Medicine	Aromatherapy	Furniture	Clothes

Source: my own creation

Step 5

2.- Complete the booklet with the uses and curiosities of the plants

 ROSEMARY Use: Curiosity:	 CORIANDER Use: Curiosity:	 FERN Use: Curiosity:
 OLIVE TREE Use: Curiosity:	 COTTON Use: Curiosity:	 PALM TREE Use: Curiosity:
 MINT Use: Curiosity:	 PINE TREE Use: Curiosity:	 BAMBOO Use: Curiosity:
 LAVENDER Use: Curiosity:	 FLAX Use: Curiosity:	 LEMON TREE Use: Curiosity:

Images source: <https://tinyurl.com/y85rv67c> (my own creation)

Step 6

3.- Present your booklet to your partners:

Example

BOTANICAL GARDEN Booklet San Miguel school Armillar (Granada)	
Name: Pine tree	
Type: Flowering Gymnosperm	Features: they are evergreen, coniferous resinous trees. They require full sun and very little water to survive.
Location: Granada, Córdoba, Jaén, Málaga, Sevilla	
Use: They are used in air-fresheners, cuisine, furniture, paper and medicine.	
Curiosity: Their trunks produce resin, which is used to make rubber and glue.	

Name: Almond trees	
Type: Flowering Angiosperms	Features: They are deciduous trees. They can grow up until 4-5 meters. Their leaves are dark green and have a shape that looks like a lance.
Location: Granada, Córdoba, Jaén, Málaga, Sevilla	
Use: They are used in pastry making, cosmetics, aromatherapy...	
Curiosity: There are more than 20 varieties. They were introduced by Arabian culture.	

Name: Olive trees	
Type: Flowering Angiosperms	Features: They are evergreen trees, short and squat and rarely exceed 8-12 meters in height. The silvery green leaves are oblong and their fruits are small drupes.
Location: Jaén, Córdoba, Sevilla, Granada.	
Use: They are used in the medicine, aromatherapy and cuisine in which olive oil is well-known around the world.	
Curiosity: Olives are harvested in the green to purple stage.	

Images source: <https://tinyurl.com/ya9o4ggh>

Design: my own creation

7.8. Appendix 8. Session 7: Plants adaptation

Activation

1.- Observe these pictures:



Images source: <https://tinyurl.com/ya9o4ggh>

2.- Answer the questions:

- Can you identify these ecosystems?
- Can you describe them?
- Can you give examples of the plants that live there?
- Is there any place where plants do not grow?

Useful language

It is an evergreen/deciduous...
I think they need water/sunlight/
They need cold/warm temperatures to...
It rains/snows... It doesn't...
Terrestrial/aquatic
Dessert/pond/river

Source: my own creation

Development

3.- Observe the picture and complete the template with your peer. Then, share your comments with the whole class:



Source: <https://tinyurl.com/ydyobzdg>

THINK-PAIR SHARE			
What's the question?	 What do I think?	 What does my peer think?	 What do we think?
What ecosystem can you identify?			
What do these plants store water?			
Why do cacti have thorns?			
Do you think the roots of these plants are short or long? Why?			

Images source: <https://tinyurl.com/y7sbf3s4> (my own creation)

Revision

4. Read the text.

HOW PLANTS ADAPT

In order to survive, plants have developed specific adaptations to the conditions of different areas. Some examples are:

- ❖ In areas where water is **scarce**, plants grow further apart. They may have **waxy** leaves, or some have no leaves at all. This helps to reduce loss of water through evaporation.
- ❖ In areas with less light and cool temperatures, trees have broad leaves to absorb lots of sunlight. They have thick **bark** to protect themselves against cold winters.
- ❖ In areas with cold temperatures, trees have needle-like leaves to help to reduce loss of water and to allow snow to fall off more easily. Their leaves are dark in colour to absorb sunlight and heat.
- ❖ In areas with very cold temperatures, plants are small by growing close to the ground, they keep warm. Their leaves are dark in colour to absorb sunlight and heat. Plants in cold areas grow in groups to keep out the wind and cold air.



Vocabulary

Scarce: few

Waxy: smooth

Bark: tree covering

Source: adapted from <https://tinyurl.com/y6xu5yv8> (my own creation)

5. Choose one adaptation per area and complete the graphic organiser:

PLANTS ADAPTATION

Type of area	Plant features	What are the reasons for adaptation?
	→	
	→	
	→	
	→	

Source: my own creation

7.9. Appendix 9. Session 8: Acid rain.

Activation

1.- Observe the images:

HABITATS - DIFFERENCES



Source: <https://tinyurl.com/ych4a5sk>



Source: <https://tinyurl.com/y9dkkpre>

2.- Compare the pictures and make predictions:

- What are the reasons of the desolated forest?
- Are they naturally or man-made?
- Have you ever seen a desolated forest?

3. Read the text.

WHAT IS ACID RAIN?

By [Christina Nunez](#)

Acid rain is any form of precipitation that contains high levels of nitric and sulfuric acids. It can be in the form of snow, fog, and **tiny** dry material that **settle** to Earth.

Causes of acid rain

Most of the acid rain is the result of human activities: **coal** burning power plants, factories, and automobiles. When humans burn fossil fuels, many toxic gases go into the atmosphere and they react with water, oxygen, and other substances, and form acid. When acid rain **reaches** the Earth, it contaminates the water and the soil.



Coal burning power plant

Effects of acid rain

Acid rain has many ecological effects, especially on lakes, streams, wetlands, and other aquatic environments. Acid rain also damages forests because it removes essential nutrients from the **soil**. The effects of acid rain make animals, trees and plants less healthy and more vulnerable to cold temperatures, insects, and disease. Acid rain is also dangerous to humans because it can cause respiratory **diseases**.



The consequences of acid rain on trees

What can we do?

The only way to fight acid rain is burning fewer fossil fuels, use alternative sources of power and controlling air-quality emissions.

Vocabulary list:

-Coal: carbon

-Reach: arrive

-Soil: ground

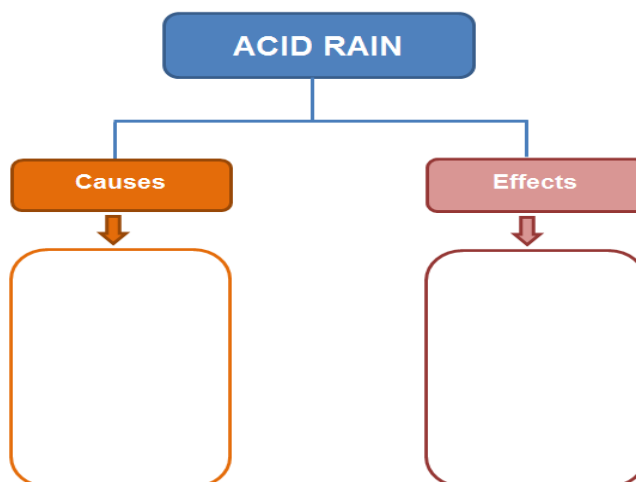
-Disease: illness

-Settle: establish

-Tiny: very little

Source: adapted from <https://tinyurl.com/y8otqnvj> (my own creation)

4. Read the text again and fulfil the mind-map with the causes and effects of acid rain.



Source: my own creation

Revision

5.- Watch these videos and take notes about how to reduce acid rain.

- “Effective acid rain solutions that are easy to implement”
<https://www.youtube.com/watch?v=xQJ0YeG4eMI>
- “Reducing acid rain”
<https://www.youtube.com/watch?v=VILCk2CpUCw>

6.- Write ideas to prevent and reduce acid rain.

- We should use green energies.
- We shouldn't drive the car to go near home
- We should...

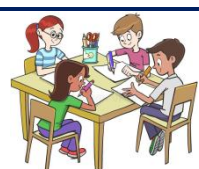


Image source: <https://tinyurl.com/y8zdec5q> (my own creation)

Then, tweet them on Twitter using the hashtag **#R A R**
(<https://tinyurl.com/y9jzaxcc>) and comment about your peers' tweets.

7.10. Appendix 10. Session 9: Let's revise.

STATION 1: SPINNER GAME: Flowering and Non-flowering plants

1.- Move the spinner and tell the features of the plant to you teammates.



Images source: <https://tinyurl.com/ya9o4ggh> (my own creation)

STATION 2: MEASURES TO TAKE CARE OF THE ENVIRONMENT

2.- Write three measures to take care of the environment. Then, sing them to the teacher using a music style (rap, rock, opera...):



TITLE:

Music style:

-
-
-

Image source: <https://tinyurl.com/y74mkumn> (my own creation)

STATION 3: CONCLUSIONS EXPERIMENT

1.- Analyse the information collected during the experiment and answer the questions.

Information collected				
Day	Plant 1 No water	Plant 2 No light	Plant 3 No air	Plant 4 Water, light, air
1	It doesn't grow	It grows a little	It grows a little	It grows quickly
4	It grows a little	It grows very little	It doesn't grow	It has many leaves
8	It is dry	It is withered	It is dry	It is very tall
12	It is dead	It is dead	It is dead	It's got two flowers

EXPERIMENT CONCLUSIONS

1. Compare your results and answer the questions:

a. Did all the plants grow the same? Explain.

.....

.....

.....

b. Which plant was the healthiest?

.....

c. Which plant was the least healthy?

.....

2. Now, write a conclusion.

.....

.....

.....

Source: my own creation

STATION 4: TIPS TO TAKE CARE OF PLANTS

4.- Write tips to take care of plants at home.

-
-
-

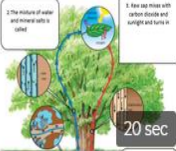
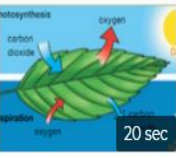


Image source: <https://tinyurl.com/y93cglmd> (my own creation)

Final test: *KAHOOT!*

5.- Read the questions of the [Kahoot!](#) game. Then, tick on the best answer.

The password is: _____

Questions (10)	Show answers
1 - Quiz What do the roots absorb from the soil?	 20 sec
2 - Quiz What do the plants use the carbon dioxide?	 20 sec
3 - Quiz What do the plants need to grow up?	 20 sec
4 - Quiz What are the consequences of acid rain?	 20 sec
5 - Quiz What do gymnosperm plants produce?	 20 sec
6 - Quiz Raw sap is...	 20 sec
7 - Quiz Plants release oxygen....	 20 sec
8 - Quiz The non-green parts of the plant...	 20 sec
9 - Quiz Which vessels reach all parts of the plant?	 20 sec
10 - Quiz Which sentence is FALSE?	 20 sec

Source: <https://tinyurl.com/y92gaonc> (my own creation)

7.11. Appendix 11. CLIL Unit Checklist

CLIL Unit Checklist	
CLIL Theme _____	Date _____
Unit of work _____	Class _____
Clarifying global goals, teaching aims and learning outcomes	
☐ Are the global goals (vision) embedded in the unit planning? ☐ Are the teaching aims clear? ☐ Are the learning outcomes defined? Which ones can be measured? How?	
Content	
☐ Have I considered how to scaffold content learning? ☐ Are my presentations of new content clear? ☐ Is the content accessible?	
Language/Communication	
☐ Are the students involved in <i>using</i> language? ☐ Are students involved in <i>learning</i> language? Are there adequate opportunities for them to practise the new language structures? ☐ Are my instructions clear? ☐ Are the questions I ask at the appropriate level? Do the questions relate to the cognitive demands? ☐ Have the students got adequate vocabulary/language to answer my questions? ☐ Are my presentations of new concepts clear? ☐ Have I planned language of learning? ☐ Have I planned language for learning?	
Cognition/Thinking	
☐ Are the questions/problems to be solved at the appropriate cognitive level? ☐ Have I considered how I can ensure that the learners progress cognitively, and how I can measure this progress? ☐ Are there ways to assist learners in developing a range of strategies through the CLIL language?	
Culture	
☐ Have I thought about the contribution that this unit makes to changing classroom culture (e.g. from arguing or not taking account of other's views to listening and managing differences of opinions)? ☐ Have I considered how the theme of this unit can promote awareness of cultural difference /global citizenship? ☐ Have I identified opportunities that are now available for me to develop a pluricultural perspective on what I am teaching because I am using the medium of another language? ☐ Have I identified opportunities in this unit which encourage curriculum links? Can we communicate with and work alongside learners from other countries?	
Activities	
☐ Do the tasks designed relate to the global goals, aims and outcomes in terms of the 4Cs? ☐ Is progression built into language and content tasks? ☐ Do the activities help to develop talk for learning? ☐ Have I considered which language is needed to carry out each activity? ☐ Is this an initial /progress/summary/assessment activity?	
Supporting learning	
☐ Are there adequate opportunities for students to engage in practical activities to experience CLIL? ☐ Have I identified which type of teacher scaffolding is needed to support language and learning? ☐ Have I analysed the content and cognition for potential difficulties? ☐ Have I recycled new language from previous units to support learner progression?	
Assessment	
☐ Have I considered how the learners will know what they have learnt? ☐ Have I considered how I will know what they have learnt? ☐ Have I decided what to assess during the unit to ensure that feedback informs further learning? ☐ Do I know what my choices are in terms of what I will assess? ☐ Do I know what kind of formative and summative assessment tasks I will need?	
Reflection	
☐ Is there variety (groups, pairs)? ☐ Have I allocated enough time? ☐ Have I thought about what I might change in this unit? ☐ Have I thought about what I might add to or leave out from this unit? ☐ How can I collect students' views about this unit? And act on them?	

Source: Coyle *et al.* (2010: 84-5)

7.12. Appendix 12. Students questionnaire to assess the teaching process

Students questionnaire to assess the teaching process															
Please, answer the following questions about the unit “The Plant Kingdom”: 1.- How do you find the contents? ☐ Very interesting ☐ Interesting ☐ Boring 2.- How do you find the English level? ☐ Too high ☐ Medium ☐ Low 3.- Which five activities do you find more motivating? <table border="0"><tr><td>☐ Running dictation</td><td>☐ Experiment with plants</td><td>☐ Mind maps</td></tr><tr><td>☐ Mini-project</td><td>☐ Oral presentation</td><td>☐ Spinner game</td></tr><tr><td>☐ Kahoot!</td><td>☐ Plickers</td><td>☐ Observe specimens</td></tr><tr><td>☐ Jigsaw</td><td>☐ Station-work</td><td>☐ Investigate at home</td></tr><tr><td>☐ Tweet opinions</td><td>☐ Invent songs</td><td></td></tr></table> 4.- How do you prefer to work in class? ☐ In small groups ☐ In pairs ☐ Individually 5.- Which activities would you like to do in the next unit? _____ _____ 6.- Do you have any suggestions to improve this unit? _____ _____	☐ Running dictation	☐ Experiment with plants	☐ Mind maps	☐ Mini-project	☐ Oral presentation	☐ Spinner game	☐ Kahoot!	☐ Plickers	☐ Observe specimens	☐ Jigsaw	☐ Station-work	☐ Investigate at home	☐ Tweet opinions	☐ Invent songs	
☐ Running dictation	☐ Experiment with plants	☐ Mind maps													
☐ Mini-project	☐ Oral presentation	☐ Spinner game													
☐ Kahoot!	☐ Plickers	☐ Observe specimens													
☐ Jigsaw	☐ Station-work	☐ Investigate at home													
☐ Tweet opinions	☐ Invent songs														

Source: my own creation

8. BIBLIOGRAPHICAL RESOURCES FOR APPENDICES

- 123RF (n.d.). Website. <https://tinyurl.com/ydgplzbo> (last access: June 15th 2020).
- Brainy Garden. (n.d.). *Difference Between Flowering & Nonflowering Plants*. [Video file] <https://tinyurl.com/y7rg9cwp> (last access: June 18th 2020).
- Buzzle. (2017, January 19). *Effective Acid Rain Solutions that are Easy to Implement*. [Video file] <https://tinyurl.com/ycuqlxv8> (last access: June 17th 2020).
- Clipart. (n.d.). Website. <https://tinyurl.com/y74mkumn> (last access: June 19th 2020).
- Clipart. (n.d.). Website. <https://tinyurl.com/ych4a5sk> (last access: June 19th 2020).
- Cooking with Kids. (2015, October 12). *How to use Herbs and Spices - for Kids!* [Video file] <https://www.youtube.com/watch?v=1Qm89IMLkQ4> (last access: June 19th 2020).
- Coyle, D., Hood, P. & Marsh, D. (2010). *CLIL: Content and Language Integrated Learning*. Cambridge: Cambridge University Press.
- Dawson, B. (2015, May 8). *Tree changes throughout the season year 1*. [Video file] <https://tinyurl.com/y9o82qsv> (last access: June 17th 2020).
- Dreams Time. (n.d.). Website. <https://tinyurl.com/y8zdec5q> (last access: June 19th 2020).
- Etapé, V. (2016, July 18). *Plants Adaptation. Presentation for Kids*. [Slideshare]. <https://tinyurl.com/y6xu5yv8> (last access: June 19th 2020).
- Flexiguru. (2015, June 16). *Uses of plants*. [Video file] https://www.youtube.com/watch?v=KblAB_HhYF8 (last access: June 20th 2020).
- Flow Vella. (n.d.). Website. <https://tinyurl.com/yd2mfxko> (last access: June 18th 2020).
- FuseSchool. (2014, August 10). *Reducing Acid Rain or its Effects*. [Video file] <https://tinyurl.com/hu2t2sn> (last access: June 17th 2020).
- Garden Love to Know. (n.d.). Website. <https://tinyurl.com/syx5ddz> (last access: June 17th 2020).
- Good Science. (n.d.). Website. <https://tinyurl.com/y7cvxv3c> (last access: June 18th 2020).
- Juan-Sánchez, C. (2020). *The Natural Science Blog*. <https://tinyurl.com/yadvnrvp> (last access: July 15th 2020).
- Juan-Sánchez, C. (2020). (2020, June 20) *Reduce Acid Rain #R_A_R*. Twitter. <https://twitter.com/conxajuans/status/1229726317207269377> (last access: June 20th 2020).

K5 Learning. (n.d.) Website. <https://tinyurl.com/yaz8el7z> (last access: June 16th 2020).

Kahoot! (n.d.). Website. <https://tinyurl.com/y92gaonc> (last access: June 20th 2020).

Learning to Jum. (2012, May 18). Website. <https://tinyurl.com/ybu6tdfo> (last access: June 16th 2020).

Makemegenius. (2014, March 13). *Uses of Plants for Kids*. [Video file] <https://www.youtube.com/watch?v=Czoyzw2G3xo> (last access: June 19th 2020).

Moyá-Ruíz, L. (n.d.). Website. <https://tinyurl.com/yacj3v6f> (last access: June 18th 2020).

My Science School. (2018). Website. <https://tinyurl.com/ybnqcfho> (last access: June 16th 2020).

National Geographic. (n.d.). Website. <https://tinyurl.com/y8otqnvj> (last access: June 19th 2020).

Natural Ways. (2019, October 3). *Best Smelling Houseplants To Perfume Your Home*. [Video file] <https://www.youtube.com/watch?v=TgDpqdMbKtk> (last access: June 19th 2020).

Olac, C. (2017, January 7). *Flowering and Non flowering Plants Complete*. [Video file] <https://www.youtube.com/watch?v=mpNUEIQfzgo> (last access: June 18th 2020).

Parker, M. (2014, November 14). *Plant Reproduction*. [Slideshare]. <https://tinyurl.com/ycbohguz> (last access: June 18th 2020).

Pediaa. (2018, August 13). Website. <https://tinyurl.com/ycyqgw4v> (last access: June 17th 2020).

Pinterest. (n.d.). Website. <https://tinyurl.com/y7t8pk34> (last access: June 17th 2020).

PITB. (n.d.). *Flowering and Non Flowering Plants*. [Video file] <https://tinyurl.com/ycguh2tm> (last access: June 18th 2020).

Pixabay (n.d.). Website. <https://tinyurl.com/ya9o4ggh> (last access: June 16th 2020).

Pixabay. (n.d.). Website. <https://tinyurl.com/y85rv67c> (last access: June 18th 2020).

Planbclub. (n.d.). Website. <https://tinyurl.com/ya29luxo> (last access: June 15th 2020).

Plickers. (n.d.). Website. <https://tinyurl.com/y7ng74bs> (last access: June 18th 2020).

Plickers. (n.d.). Website. <https://tinyurl.com/y9rb2by3> (last access: June 18th 2020).

Plickers. (n.d.). Website. <https://tinyurl.com/ydfr6ote> (last access: June 18th 2020).

Pngitem. (n.d.). Website. <https://tinyurl.com/y93cglmd> (last access: June 16th 2020).

- Pueyo-Lobera, I., Hidalgo-Moreno, J.A., Expósito-González, M., Peña-Pérez, A., Navarro-Elbal, A. & López-, S. (2015). *Natural Science. Primary 5. Student's book*. Madrid: Ediciones SM.
- RareSeeds. (2018, June 29). *Top Ten Fragrant Plants for your Garden*. [Video file] <https://www.youtube.com/watch?v=T6lk-mKU4vE> (last access: June 19th 2020).
- Riach, M. & Bacon, T. (2014). *Natural Science. Primary 5. Teacher's book*. Zaragoza: Ediciones Bilingües.
- Shiachildren. (n.d.). Website. <https://tinyurl.com/orvc358> (last access: June 16th 2020).
- Sukhdev Singh. (2015, August 4). *Uses of plants for Kids*. [Video file] <https://www.youtube.com/watch?v=TSGntvNzcBQ> (last access: June 20th 2020).
- Teachers Pay Teachers. (n.d.) Website. <https://tinyurl.com/yacz5jgg> (last access: June 16th 2020).
- Topper TV. (n.d.). *All about Plants | Types and Uses of Plants*. [Video file] <https://www.youtube.com/watch?v=jwfxxdZiVq8> (last access: June 20th 2020).
- Twig Education. (2012, October 12). *Biology Lesson Idea: The Medicinal Properties of Plants*. [Video file] <https://www.youtube.com/watch?v=6iEOTB1UjiQ> (last access: June 19th 2020).
- Twinkl. (n.d.). Website. <https://tinyurl.com/y7sbf3s4> (last access: June 19th 2020).
- Twinkl. (n.d.). Website. <https://tinyurl.com/y9afvk83> (last access: June 18th 2020).
- United Country (n.d.). Website. <https://tinyurl.com/ydyobzdg> (last access: June 19th 2020).
- Wikipedia. (2006, July 7). Website. <https://tinyurl.com/y9dkkpre> (last access: June 19th 2020).
- WorderGrove Kids. (2014, October 14). *Where Do Fruits and Vegetables Come From?* [Video file] <https://www.youtube.com/watch?v=CdPRZ3wjCxA> (last access: June 19th 2020).