Centro de Estudios de Postgrado
Máster Interuniversitario en Enseñanza Bilingüe y AICLE

UNIVERSIDAD DE JAÉN

UNIVERSIDAD DE CÓRDOBA

Master's Dissertation/
Trabajo Fin de Máster

TASK-BASED LEARNING THROUGH CLIL IN BIOLOGY AND GEOLOGY (4th ESO). A DIDACTIC PROPOSAL

Student: Infantes González, Álvaro

Supervisor: Dr. Carmen Plata Luque
Department: English Philology

July, 2021

MIEB
MASTER INTERUNIVERSITARIO EN ENSEÑANZA BILINGÜE Y AICLE

TABLE OF CONTENTS

ABSTRACT

In this Master's Dissertation, a CLIL didactic proposal has been designed to show the great potential of integrating Content and Language Integrated Learning (CLIL) and Task-based Learning (TBL). Particularly, a didactic unit entitled "Human beings and the environment" is presented, to be applied in a CLIL classroom of Biology and Geology, in the 4th year of Compulsory Secondary Education.

In the first part of the Dissertation, a literature review is given on Task-based Learning concept and its main features, strategies and techniques, assets and pitfalls, and on how it is related to CLIL approach, according to published studies in this field. In the second part, the designed didactic unit itself is described. It is divided into different sections, covering contents related to natural resources, human impact on the environment, global environmental problems, waste management or sustainable development. Varied activities are proposed to exemplify Task-based Learning in the CLIL classroom, with emphasis to real-life concerns and objectives, such as ecological footprint calculation or a debate about sustainable cities.

Key words

Task-based Learning, Content and Language Integrated Learning, Biology, environment, sustainable development.

RESUMEN

En este Trabajo de Fin de Máster, se ha diseñado una propuesta didáctica AICLE para mostrar el gran potencial de la integración del Aprendizaje Integrado de Contenidos y Lenguas Extranjeras (AICLE) y el Aprendizaje Basado en Tareas. En concreto, se presenta la unidad didáctica titulada "El ser humano y el medio ambiente", para una clase AICLE de Biología y Geología, en el 4º curso de Educación Secundaria Obligatoria.

En la primera parte del Trabajo se realiza una revisión bibliográfica sobre el concepto de Aprendizaje Basado en Tareas y sus principales características, estrategias y técnicas, ventajas y limitaciones, así como sobre su relación con el enfoque AICLE, según los estudios publicados en este campo. En la segunda parte se describe la propia unidad didáctica diseñada. Esta se divide en diferentes secciones, que abarcan contenidos relacionados con los recursos naturales, el impacto del ser humano en el medio ambiente, los problemas ambientales globales, la gestión de residuos o el desarrollo sostenible. Se proponen diversas actividades para ejemplificar el Aprendizaje Basado en Tareas en el aula AICLE, con énfasis en contextos y objetivos de la vida real; por ejemplo, el cálculo de la huella ecológica o un debate sobre ciudades sostenibles.

Palabras clave

Aprendizaje Basado en Tareas, Aprendizaje Integrado de Contenidos y Lenguas Extranjeras, Biología, medio ambiente, desarrollo sostenible.

1. INTRODUCTION

In a globalized and interconnected world, people need to interact in a multicultural society in which being able to communicate in foreign languages is essential. In concrete, a good command of English in our daily lives acquires great relevance to succeed at a personal and at a professional level. In this sense, communication with people from other parts of the world, access to other cultures or increased job opportunities are just some examples of the many advantages of paving the way for bilingualism in our multilingual scenario.

Under these circumstances, a shift is required in educational methodologies, in general, and in English language teaching, in particular, to adapt them to the current needs of the students. In the case of Spain, traditional teaching methods must be updated to give way to new approaches that contribute to the development of students' communicative competences in foreign languages, since this will be highly beneficial regarding their future. Definitely, the schools of the 21st century must bet big on a solid Bilingual Education of quality, in which fluency and communication are prioritized over grammatical correctness.

In this context, Content and Language Integrated Learning (CLIL) and Task-based Learning (TBL) prove to be excellent alternatives to traditional teaching and learning methods. The principles of both CLIL and TBL approaches have set the guiding principles for the elaboration of this Master's Dissertation, in which a CLIL didactic proposal related to Task-based Learning has been designed. Indeed, this Dissertation consists of two main sections. In the first part, a literature review has been carried out on the main features of both approaches, and how their integration is beneficial, according to published studies in the field of Bilingual Education.

In accordance to this theoretical framework, in the second part the didactic proposal itself is described. In concrete, the Didactic Unit "Human beings and the environment" for the subject of Biology and Geology, for a classroom of 4th ESO has been designed. Varied activities are included to exemplify Task-based Learning in the CLIL lessons, with emphasis to real-life concerns and objectives regarding topics such as environmental problems, consequences of waste or sustainable development, which deserve great attention within the current curriculum of Secondary Education.

2. THEORETICAL FRAMEWORK

2.1. Content and Language Integrated Learning (CLIL)

CLIL, which stands for Content and Language Integrated Learning, is a dual-focused educational approach in which a foreign language (L2) is used for the simultaneous teaching and learning of both content and language (Coyle *et al*., 2010). Then, in CLIL lessons the foreign language is used as a tool to achieve two main objectives in an integrated way: to learn the contents of a non-linguistic subject, and to promote acquisition and development of the language itself (Marsh, 2002).

Among the many benefits of CLIL methodology, it is worth highlighting the great amount of exposure of students to the target foreign language, higher than in other traditional approaches. As a result, learners have the chance to experience real-life communicative situations through which meaningful learning of both content and language is possible. On the other hand, it must be assumed that the implementation of CLIL requires a higher effort to be made by teachers and students. Particularly, teachers' planning and management of the lessons acquire a huge relevance. On a general basis, a methodological shift is necessary for teachers adopting CLIL, to ensure students' learning in a purposeful and engaging way. In the same way, these teachers must envisage possible difficulties that this implementation could bring to their groups of students, as well as solutions to them.

When designing CLIL lessons, teachers must consider the four relevant areas of the so-called "4Cs framework for CLIL". "4Cs" stands for content, communication, cognition and culture. The *content* is related to the subject topics and ideas that are taught and learnt, while *communication* refers to language use and learning to support this *content*. As far as cognition is concerned, thinking processes should be considered for the learning process, giving importance to the development of higher order thinking skills (HOTS) through tasks. Finally, *culture* refers to intercultural awareness and citizenship development through language (Coyle *et al*., 2010). As shown in **Figure 1**, all these four elements are interconnected, so the right implementation of CLIL approach will depend on their globalized and harmonized consideration in the teaching practice.

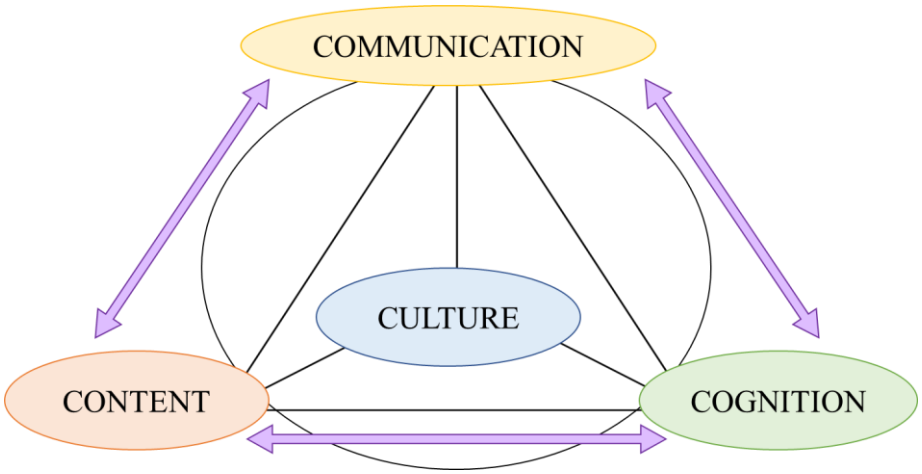


Figure 1. The 4Cs Framework for CLIL. Adapted from Coyle, 2007.

The wide versatility of CLIL implementation models allows its effective combination with other approaches (such as Cooperative Learning) and available resources (such as Information and Communication Technologies, ICTs). In concrete, this Master's Dissertation aims to explore the relationship between CLIL and Task-Based Learning (TBL), to portray it in a didactic proposal for Biology and Geology in Secondary Education.

2.2. Task-based Learning (TBL)

2.2.1. Definition and general features

Since Task-based Learning focuses on tasks, this is the first term worth defining. Among the variety of definitions that have been proposed by different scholars to describe what a task is, there are two of great relevance. Firstly, Willis (1996) defined a task as a "goal-oriented activity in which learners use language to achieve a real outcome". Some years later, Nunan (2004) suggested a nuanced definition considering that tasks should have a sense of completeness and that communication should be intrinsic to them. For him, a task is "a piece of classroom work that involves learners in comprehending, manipulating, producing or interacting in the target language while their attention is focused on mobilizing their grammatical knowledge in order to express meaning rather than to manipulate form".

Then, the essence of Task-based Learning approach involves creating class activities or tasks leading to real-life communicative situations that are contextualized so that a meaningful use

of language takes place. In this way, students can develop L2 in a similar way that they do with L1.

The proposed tasks can be simple or complex, depending on the type of operations that they involve. In TBL approach, it is important to decide the pedagogical task type as the first step to start its design, considering the needs of the target group of students. According to Willis (1996), the main types of tasks would involve the following processes: listing, ordering, sorting, comparing, problem-solving, sharing personal experiences and being creative.

2.2.2. Phases of Task-based learning

For Willis (1996), there are three essential conditions (exposure, use, and motivation) and one desirable condition (instruction) for successful learning. According to the structure initially proposed by her, three different stages can be identified in the development of a task: a pre-task phase, a task cycle and a post-task phase or language focus (**Figure 2**). This structure has later been adopted by many other scholars and researchers, like Ellis (2009) or Ting (2016).

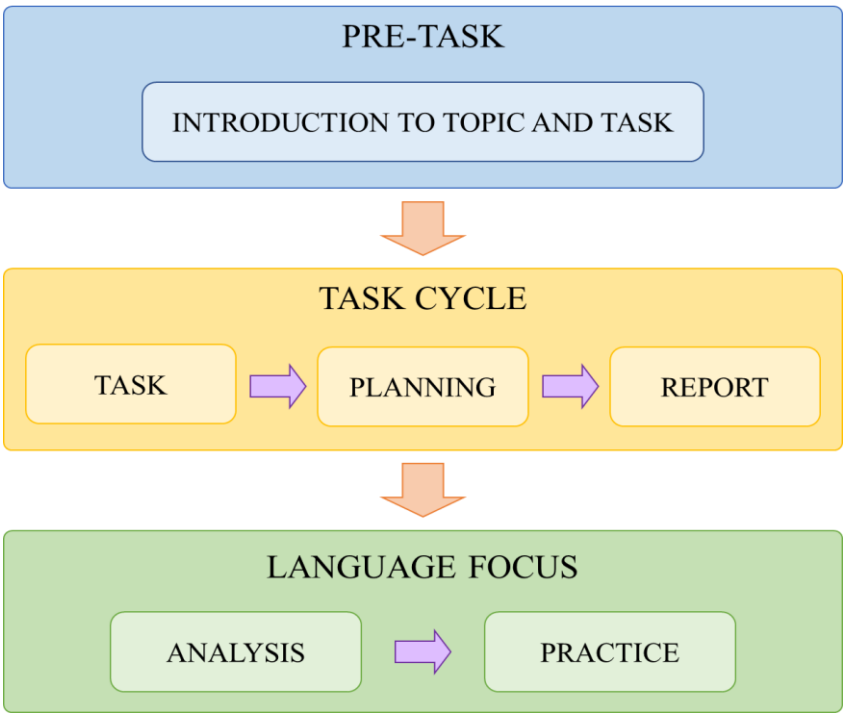


Figure 2. Task-Based Learning Diagram. Adapted from Willis (1996).

At the pre-task stage, the teacher must introduce the topic to learners, eliciting their prior knowledge of the subject by exploring the content and emphasizing the most relevant language that will be needed in the task. At this phase, the instructions for the task are given and its objectives are set. The goal of the task should be meaningful in order to raise students' motivation. Also, by highlighting useful words and phrases for the task, the teacher can achieve to create a comfortable environment in which students feel free to use the target language (Chowdhury, 2014).

During the task cycle stage, students perform the task, usually in pairs or in small groups, using their own language resources for communication. At this stage, importance should be given to their fluency, and the teacher must act as a facilitator, guiding and monitoring students' performance. Once they have finished, the students must plan and rehearse how to present and share the outcome of their work with the rest of the class. Here the teacher may suggest the use of certain language structures and correct students' performance regarding organization and accuracy. While presenting their findings, students must report the conclusions they have reached, which may then be commented by the teacher or other students in the class.

The final stage, language focus, provides a chance to analyze the language features arising from the previous stages of the task. The teacher must explore certain technical aspects of the language (i.e. vocabulary and grammatical issues) to raise students' awareness. These language aspects must then be put in practice in different activities. According to Willis (1996), the fact this focus on language form comes at the end in TBL is what mainly distinguish it from the classic Presentation, Practice, Production (PPP) approach.

2.2.3. Assets and pitfalls of Task-based Learning

2.2.3.1. Task-based Learning assets

The benefits of TBL are multiple. To begin with, students are expected to learn better when they are engaged in tasks that they must complete using their communicative competence. As a whole, TBL helps students to improve their competences in L2 by imitating the natural process in which L1 is learnt.

The fact that students' prior knowledge is activated to involve them as active agents in the task is also tremendously beneficial. In fact, according to the theory of scaffolding, this provides the students with an enormous capacity for self-management and self-learning (Wood *et al*., 1976). Once a student becomes responsible for an individual or group performance, the capacities of self-improvement and self-autonomy are usually boosted.

Since under TBL approach language is used as a tool to complete task using interactive communication skills, the establishment of a cooperative learning environment is more than convenient. According to the nature of the task and the class' needs, different types of arrangements can be planned to promote students' cooperation and collaboration (e.g., in pairs, in groups, or as a whole class). Indeed, it is more than probable that most students (especially those who are rather introverted) feel more comfortable and confident when communicating in pairs or small groups. Moreover, providing and obtaining feedback from partners is a fruitful practice that facilitates help among students (Harmer, 2007).

2.2.3.2. Task-based Learning pitfalls

Despite all the aforementioned positive points, the effectiveness of TBL has also raised some criticism. TBL implementation is sometimes believed not to achieve the proficiency level that is reached using other traditional method of English language learning. In addition, it is assumed that, although vocabulary and pronunciation are developed in TBL, more attention should be paid to grammar aspects (Ellis, 2009). In the same way, reporting group activities may be difficult when applying TBL in large groups of students (Chowdhury, 2014).

As I see it, these pitfalls may be overcome with a right planning of the task and considering that the versatile nature of TBL admits a progression along time. In fact, at the initial stages of L1 acquisition, grammar does not play a central role. Anyway, designing a task should be regarded as a careful process that requires a lot of teacher's time to succeed. The necessary resources must be used to orient the task to a purposeful and meaningful use of the language, according to our students' proficiency level, producing own materials to satisfy their specific needs. Furthermore, in a right TBL implementation, communicative competences are developed through interaction, and language correctness is progressively promoted and assessed, so that students can evolve in all linguistic aspects, including grammar. These principles that have been taken into account to design the didactic proposal of this Master's Dissertation.

2.3. Why CLIL and Task-based Learning in Biology and Geology?

2.3.1. The synergy between CLIL and TBL

The main objective of CLIL approach is to boost learners' ability to communicate in a purposeful and meaningful way, while making them focus on learning the subject content. Tasks allow students to achieve this, as they encourage them to communicate through a realistic interaction to achieve a certain goal. In fact, well-designed tasks do not only pay attention to meaning, but also to communication, fluency and accuracy (Shehadeh, 2005). This makes TBL especially suitable to be combined with other communicative methodologies.

According to the so-called Interaction hypothesis, input, output, interaction and feedback play an essential role in L2 Acquisition (Ortega-Auquilla *et al*., 2019). These four elements are included in Task-based Learning. *Input* refers to the language that learners are exposed to (e.g., texts, dialogues, videos or recordings), while *output* is the language that they produce in the assigned task. This output is indeed infused by the negotiation of meaning during *interaction* among learners involved in the task. Finally, *feedback* allows students to focus on their linguistic mistakes in L2 production and correct them as a result. Precisely, the struggle to find the right structure is termed by Richards (2015) as the "gap" that they must notice and regard as a motivating agent to acquire new language during the language focus stage, with in turn increases their self-confidence and motivation.

The most convenient tasks to be developed through a combination of CLIL and TBL approaches will be those that promote both the learning of the contents of the subject and the communicative use of L2 when carrying out a series of activities to achieve a final product. Below some relevant examples of these tasks are provided, distinguishing between receptive and productive ones (Dale *et al*., 2011).

- Receptive tasks (listening and reading):
    - Assigning labels or names to certain contents.
    - Identifying or choosing parts of the content according to a given criteria.
    - Completing tables, diagrams and concept maps.
    - Interpreting and reorganizing information or images.

- Productive tasks (speaking and writing):
    - Answering to comprehension or listening questions.
    - Performing oral presentations.
    - Expressing opinions and debating on a certain topic.
    - Searching for specific information in books or on the Internet.

2.3.2. Pedagogy of Biology and Geology through CLIL and TBL

All the previously presented sorts of tasks, among others, are highly appropriate to be included in Biology and Geology CLIL lessons. Taking into account that this is a cognitively difficult non-linguistic area, a thoughtful planning of a varied combination of tasks is needed to stimulate content and language output in the students.

Indeed, teaching Biology through a CLIL approach in Secondary Education has been reported to be beneficial according to studies carried out in European contexts (Kalogerakou *et al*., 2017). Among these benefits, it is often highlighted the fact that nowadays there is a huge amount of research and information published in English language, so there is a high interest in students developing this foreign language to succeed. In the same way, the scientific discourse contains many terms that acquire a more complete and meaningful sense when understood in English (Aragón, 2007). On the other hand, nowadays there is to a certain extent, a lack of research that provides insights into the relationship between teaching Science in a foreign language and an improvement in conceptual contents (Cenoz *et al*., 2015).

Nevertheless, the University of Cambridge (2011) has proposed some guidelines to be applied when designing CLIL Science lessons. These guidelines are summarized as follows:

- The lesson should start by activating students' prior knowledge about the Science topic. Since they may struggle to communicate some complex ideas in L2, it is expected that they occasionally formulate them in L1 and then translate into L2.

- Input provided to students must be carefully planned, and enough time should be given so that they can assimilate new Science content and language in L2. In this sense,

scaffolding techniques acquire great relevance, especially at early stages of CLIL implementation.

- Pair and group work must be prioritized in CLIL approach, as well as tasks that involve higher order thinking skills (HOTS) and suppose a cognitive challenge to learners.

When it comes to language focus, three levels can be distinguished within Sciences lessons according to Kelly (2010). To begin with, scientific concepts are usually associated with noun and phrases that account for the *subject-specific language*, which students must reproduce to get familiar with. A *general-academic language* can also be found in Science lessons, consisting of cross-curricular language, which is not exclusive from Science, but shared among the different subjects that form the curriculum. Finally, as in every teaching-learning context, there is a *peripheral language* that results from communication between the teacher and the students during the classroom management. While the two first types of language promote Cognitive Academic Language Proficiency (CALP), the later may be more related to Basic Interpersonal Communication Skills (BICS).

2.3.3. Teacher and students' roles

Both teachers and students are responsible for the development of classroom interaction in TBL and CLIL approaches. In this section, the roles that should be assumed by these stakeholders are presented.

2.3.3.1. Teacher's role

For a start, teachers should always bear in mind that, under TBL and CLIL methodology, the lesson focus is placed on the students. This involves leaving behind traditional approaches (in which the teacher is the only source of knowledge) to become facilitators, promoting students' autonomy and control of their own learning process. Some aspects such as exposure to comprehensible input or relevant chances to focus on form must be carefully planned for every lesson, especially for a subject like Biology and Geology, in which many contents and terms are studied in every new Unit. In the same way, a flexible and open-minded attitude is needed to solve the possible setbacks that students might find with CLIL or TBL, particularly at initial stages of their implementation (Mallorquín, 2018).

Through TBL approach, students are continuously working on activities that require attention and commitment. Then, it is necessary that teachers promote real language use and practice inside the classroom by encouraging them to communicate in the target language, using their own resources to perform as well as they can. When guiding students to accomplish a task, motivation can be boosted by activating beforehand their prior knowledge on the topic, as well as by allowing them to share their opinions, in a safe and relaxed atmosphere that stimulate a fluent communication (Harmer, 2007). In fact, according to some scholars, is it more than beneficial that the teacher adopts the so-called "negotiator role", through which a varied range of options is often suggested to students to let them choose, taking a certain degree of control of the lessons' dynamics (Richards and Rodgers, 2014).

It must not be forgotten that current Education must not be focused on the transmission of content by the teacher, but in the development of competences by the students, who are the real protagonists of the teaching-learning process. Therefore, it is more than advisable to adopt a constructivist model of teaching, through which the teacher becomes a guide that aims to the meaningful learning of the students, based on their prior knowledge. In this way, it is possible to achieve greater self-regulation and autonomy in students, contributing to their success in real life (Ortiz, 2015). In the case of Biology and Geology, it is particularly relevant that a critical attitude is developed to responsibly address some challenges of the 21st century, such as change climate, natural resources management or sustainable development, among others (Vázquez *et al*., 2006).

In fact, sustainable development is a matter affecting and concerning the entire world's population. Since 2012, the United Nations Sustainable Development Solutions Network (SDSN) initiative aims to mobilize global scientific and technical expertise to support the achievement of the so-called Sustainable Development Goals (SDGs). In this sense, Education plays a key role in helping society achieve these goals, by giving to learners the chance to develop the necessary skills and mindsets to contribute to solving current sustainable development challenges (https://resources.unsdsn.org/).

In this context, the European Union has decided to integrate these Sustainable Development Goals and adopt the implementation of the Agenda 2030 for sustainable development and the European Green Deal, with the objective of promoting a climate-friendly, resource-efficient, technologically advanced, and socially equitable development of Europe (Wibowo and

Saidikin, 2019). These objectives call for a transformation in the field of Biology Education, to consider Sustainable Development Goals in the process of teaching and learning. In the 21st century, it is necessary to bet big on a high-quality New Biology Education that integrates knowledge from varied disciplines for a deeper understanding of societal problems and their possible solutions, mainly by using natural resources in a responsible way (Reiss, 2018). In particular, the understanding of the following Sustainable Development Goals has a huge interest for the subject of Biology and Geology in Secondary Education (Wibowo and Saidikin, 2019):

- Zero Hunger
- Good Health and Well-being
- Quality Education
- Clean Water and Sanitation
- Affordable and Clean Energy

2.3.3.2. Students' role

When it comes to learners, considering that TBL and CLIL lessons are student-centered, they must take an active role to be protagonists of their own learning process, far from the traditional perspective in which they are just passive recipients of knowledge. This methodology will work as far as they adopt an autonomous, critical, committed and creative attitude towards learning. In this sense, it is desirable that they attend the lessons willing to participate and contribute into the different activities and class dynamics. They must also understand the importance that teamwork has nowadays, taking responsibility when performing with their classmates in tasks that require collaboration. In fact, this sort of learning has proved to be highly beneficial, especially when students exchange assessment with their peers, in a comfortable and committed environment that continuously promotes academic and personal improvement (Richards, 2015). In relation to this, students can easily assess their learning progress through the "can-do" descriptors proposed by the Common European Framework of Reference for Languages (Council of Europe, 2020).

As a whole, the correct implementation of a combined approach that includes both TBL and CLIL requires that the aforementioned standards of both teachers and students are achieved. Only in this way the optimal results envisaged will be able to arise. The principles stated in this theoretical framework have been considered for the design of the didactic proposal that is next presented in this Master's Dissertation.

3. DIDACTIC PROPOSAL

3.1. Justification

In this section, a CLIL didactic proposal has been designed for the subject of Biology and Geology, for a classroom of 4th ESO. Varied activities have been planned to exemplify Task-based Learning in the classroom, with emphasis to real-life concerns and objectives.

The designed Didactic Unit is entitled "Human beings and the environment", being the sixth Unit within the overall schedule of the subject: it will be taught in the 3rd term of the academic year 2020-2021. In particular, this Didactic Unit will address current environmental issues. Students will learn on how human beings use natural resources in their activities, causing some environmental impacts that negatively affect our health (being pollution one of the most serious ones). Students will also have the chance to understand that the exponential increase of human population requires an efficient waste management and the adoption of sustainable alternatives (like renewable energies) to ensure a decent quality of life for future generations.

The choice of this Unit relies on the fact that its importance transcends purely academic goals, being an opportunity for students to develop competences that allow them to exercise a responsible citizenship, showing respect to living beings and nature. In fact, according to the 11th article of the *Royal Decree 1105/2014, of December the 26th*, Compulsory Secondary Education will contribute to the students' development of competences that allow them to critically assess social habits related to health, consumption, the care of living beings and the environment, contributing to their conservation and improvement.

3.2. Contextualization

This Didactic Unit has been designed for the group of 4th ESO A of *Santa Rosa de Lima* Secondary School. This public Secondary School is located in the *Campo de la Verdad* neighbourhood, in the South of the city of Córdoba. It is a small school in which only Compulsory Secondary Education is taught, consisting of about 240 students in total (being between 11 and 15 years old). Since the academic year 2010-2011, bilingualism has been developed in this school, with very good outcomes. For the academic year 2020-2021, the non-

linguistic subjects that are taught in 4th ESO though CLIL (in English as L2) are Biology and Geology, Physics and Chemistry, Technology and Physical Education.

Although the whole group of 4th ESO A consists of 30 students, only 20 of them study the subject of Biology and Geology (the rest has opted for the subject of Technical Drawing). In this group we find a similar proportion in terms of the gender of the students (10 girls and 10 boys), as well as a wide diversity with respect to the neighbourhood of origin, belonging to families of a, rather, heterogeneous socioeconomic and cultural level. Although it is a diverse group in terms of academic performance, motivations and interests, students generally show a high interest in the subject of Biology and Geology. In fact, most of them intend to continue studying Sciences Baccalaureate or Vocational Studies related to Health. When it comes to English language, they show, in general terms, a low-medium level of English, with a limited range of vocabulary and grammar structures. They can understand written and oral texts well (according to their age), but they still struggle to write or speak in English fluently, considering that they should exhibit at least a B1 level of the CEFR according to the *Instructions 7/2020, of June the 8th, from the General Directorate of Ordination and Educational Evaluation on the organization and functioning of the bilingual education in the Andalusian educational centers for the course 2020/2021*. Even so, this group tends to be participative and shows great interest in CLIL approach. In terms of attention to diversity, there is not any student with special requirements to meet. Regarding the organization of the learning space, the classroom where the subject is usually taught has five rows of six tables each, where the students are individually distributed.

3.3. Objectives

Objectives are related to the learning standards that students must achieve at the end of the Didactic Unit, through the activities and tasks planned for this purpose. Within the objectives of this CLIL Didactic Proposal, a distinction can be established between those related to content and those related to language.

3.3.1. Content objectives

According to the objectives and competences stated in the *Order of January the 15th 2021*, the objectives that students should achieve throughout this Unit (as well as those Key Competences to be developed related in each case) are presented below:

- To know some human actions on the environment, evaluating their consequences.
- To argue in favour of individual and collective actions to prevent the deterioration of ecosystems.
- To know different waste treatment processes.
- To argue in favour of selective waste collection and its benefits.
- To associate the importance of the use of renewable energies with sustainable development.
- To recognize and value the main natural resources of Andalusia.

3.3.2. Language objectives

The different language objectives for this Unit (planned according to the CEFR) and their contribution to Cognitive Academic Language Proficiency (CALP) and Basic Interpersonal Communication Skills (BICS) development would be as follows:

- To recognize and use specific scientific vocabulary related to environmental issues (e.g. *greenhouse effect, wildlife, hole in the ozone layer* or *carbon footprint*) in both written and oral comprehension and production, respectively (CALP).
- To improve receptive and productive skills in the foreign language, both oral and written (BICS).
- To use the present simple tense to write or talk about general situations, experiments and universal truths (BICS and CALP).
- To use modal verbs related to obligation (must or have to) and advice (should) to argue in favour of actions for sustainable development (BICS and CALP).
- To use the conditional tense to write or talk about hypotheses on humans' impact on the environment (BICS and CALP).
- To use English language to communicate with fluency with other students during class activities and tasks that involve interaction (BICS).

- To use English language to express doubts, ideas and opinions to teacher and the classmates (BICS).
- To take an active part in class discussions and debates, contributing with own ideas and opinions (BICS and CALP).

3.4. Key Competences

According to the *Royal Decree 1105/2014 of December the 26th*, which establishes the basic curriculum of Compulsory Secondary Education and Baccalaureate, and the *Order ECD/65/2015, of January the 21st*, which describes the relationships between competencies, contents and evaluation criteria for Primary Education, Compulsory Secondary Education and Baccalaureate, Key Competences are the capacities to implement in an integrated way the contents of each learning situation and educational stage, with the purpose of achieving the right realization of activities and the effective resolution of complex problems. These Competencies will be worked in many ways in the subject of Biology and Geology in 4th ESO. The concrete actions for their development in the didactic Unit "Human beings and the environment" would be as follows:

- Competence in Linguistic Communication (CLC): this Competence will be worked through the right use of Spanish and English languages as an instrument for learning and communication, involving receptive and productive skills, both oral and written. In a CLIL content, this Competence is intrinsic to the acquisition of new vocabulary in the target language, as well as to the expression of ideas and doubts using it. Especial emphasis will be placed on the understanding of texts and the use of appropriate scientific terminology according to the content subject. In the same way, a favourable attitude toward reading will be pursued.

- Mathematical Competence and Basic Competences in Science and Technology (CMST): it will consist in learning and applying contents related to environmental issues, as well as using basic operations and forms of mathematical expression and reasoning to understand some aspects of the Unit. Especially, this will be worked

through the analysis of figures and charts and the resolution of real-life problems from the perspective of Biology and Geology disciplines.

- Digital competence (DC): it will be developed through the use of Information and Communication Technologies (ICTs) when performing tasks. In fact, at this educational stage, it is essential that students develop a critical attitude towards data found on the Net, learning to discern and select reliable sources of information.

- Learning to learn (L2L): it will be worked by developing strategies applicable to different learning contexts and by promoting an increasingly autonomous and creative learning experience. In this didactic Unit, in many tasks students will have the chance to use critical thinking to self-assess their performance, being able to learn from others and identify ways of improvement.

- Social and civic Competence (SCC): this Competence is related to interpersonal and teamwork skills. In this Unit, students will understand how socioeconomic differences among countries determine their unequal development, which is intrinsically related to environmental issues. When performing the different group tasks of the Unit, the students will have the chance to participate and assume responsibilities with commitment to the success of the whole group. In their discussions, students must show respect for their classmates and the environment, accepting and tolerating different ideas and opinions.

- Sense of initiative and entrepreneurship (SIE): this will consist in developing attitudes, work habits and strategies from a responsible perspective when performing either individual or group work. Students must learn to exercise an active and creative participation in classroom tasks, expressing their ideas with determination.

- Cultural awareness and expressions (CAE): throughout the Unit, students must show appreciation, respect and tolerance towards different forms of cultural manifestation. Especially, they will learn the importance of exercising a responsible European and global citizenship, palpable in current agreements and commitments to tackle environmental problems worldwide.

3.5. Contents

Contents are the set of knowledge, skills, abilities and attitudes that contribute to the achievement of the teaching objectives, as well as to the acquisition of competences. According to the *Order of January the 15th 2021*, which states the curriculum corresponding to Compulsory Secondary Education in Andalusia, the contents that will be worked through this Didactic Unit (included in *Block 3: Ecology and environment*) would be as follows:

- Impacts and evaluation of human activities in ecosystems.
- Overpopulation and its consequences: deforestation, overexploitation, fires, etc.
- Human activity and the environment.
- Natural resources and their types.
- Natural resources in Andalusia.
- Environmental consequences of energy consumption.
- Waste and its management.
- Simple techniques to evaluate the degree of pollution and purification of the environment.

3.6. Transversality and interdisciplinarity

According to the 6th article of the *Decree 111/2016, of June the 14th*, the curriculum of Compulsory Secondary Education must include transversal elements: a series of values that must be present throughout the learning process, being treated from all subjects in a cooperative way. These elements contribute to the achievement of key competences and objectives, providing an invaluable support for the process of learning. In particular, the following transversal elements will be especially considered in the designed didactic proposal:

- Promotion of well-being, safety and protection of all members of the educational community.

- Development of basic interpersonal communication skills, active listening skills, empathy, rationality and agreement through dialogue.

- Effective equality between men and women and the prevention of gender-based violence or against persons with disabilities, promoting respect for human rights.

- Critical appraisal in the use of information and communication technologies and audio-visual media.

- Awareness about issues and problems that affect people in our globalized world, including the consequences of human activities for the environment (palpable in phenomena such as natural resources depletion, pollution or global warming), in order to promote an active contribution to the preservation and improvement of our environment as a key factor for our quality of life. In this sense, it is essential that students learn the importance of sustainable development, that requires adopting individual and collective actions (e.g., a conscience about materials and energy consumption).

When it comes to promoting an integral formation of the students of Compulsory Secondary Education, interdisciplinarity plays a key role: the same aspects may be developed from different perspectives by the different areas of the curriculum. This is indeed an excellent chance for students to find interconnections among different subjects, as well as for the bilingual team to plan interconnected curricular contents. In the case of this didactic Unit, contents related to environmental issues are highly associated with many other subjects and Key Competences of 4th ESO. The most relevant links are described as follows:

- Spanish language and literature: to a great extent, the students may find the learning of their mother tongue (L1) as a reference to understand linguistic mechanisms involved in the learning of a foreign language. Skills related to both oral and written comprehension and production are boosted in this subject, being this of undeniable importance for the success of CLIL approach.

- English as a foreign language: in this subject, students have the chance to acquire and develop their linguistic competence in English (L2). Working on communicative functions in the foreign language is essential so that students success when learning a

non-linguistic subject through CLIL. Besides, grammatical accuracy can be better worked through this specific linguistic subject.

- Maths: in the didactic Unit, students will have to analyse and comment on different graphs showing parameters involved in environmental issues (e.g., human population along time or temperature increase related to carbon dioxide emissions). In this analysis, they must understand the involved variables and their units of measurement. In the same way, they must understand the numerical result obtained when using an online ecological footprint calculator.

- Physics and Chemistry: there are many chemical reactions involved in the alteration of the environment. Some notions of Chemistry are necessary so that students understand some processes, such as acid rain formation or the destruction of the ozone layer by chlorofluorocarbons.

- Technology: in this Unit, students will understand that renewable energies are of the utmost importance for sustainable development. In this sense, they must relate some of these energies to technological advances that allow to use them (e.g., solar energy or hydropower energy).

- Geography and History: one of the objectives of the Unit is that the students value the importance of the geographical region of Andalusia concerning the richness of its natural resources.

3.7. Methodology

Methodology refers to the set of strategies, procedures and actions organized and planned by the teacher in a conscious and reflective way, to enable students' learning and achievement of objectives. To help students develop competences, methodology must be active and student-centered, in order to boost their motivation and make them leaders of their own learning process. Depending on their objectives, different types of activities and tasks can be distinguished within this Didactic Proposal:

- Activities for previous knowledge analysis: they are especially useful for the analysis of students' misconceptions on the contents that will be covered in the Unit (i.e., environmental issues). Then, they allow the restructuration of knowledge to promote a more meaningful learning experience.

- Initiation activities: these activities are particularly useful when starting a new topic or content, to boost students' motivation and interest on it. For instance, several brainstorming activities are performed in this Unit for this purpose.

- Development and research activities: through these activities, students can achieve the objectives and contents of the subject, as well as develop the corresponding Key Competences.

- Conclusion activities: their purpose is to strengthen the contents learnt throughout the Unit, so that students can apply and check their learning. For instance, in this Unit a debate is proposed so that students share their ideas on urban sustainability, considering what they have previously studied in the whole Unit.

- Summative assessment activities: their aim is to check students' understanding and application of the contents they are supposed to have learnt in the Unit. In this sense, the different activities and tasks carried out by students throughout the Unit will be assessed, giving them an adequate feedback so that they understand how to improve their performance. In the same way, the teaching practice will be assessed at the end of the academic year through a self-assessment rubric and a questionnaire to be completed by the students.

In particular, for the different activities and tasks planned in the designed CLIL Unit, the following methodological principles have been considered:

- Task-based Learning: as described in the theoretical section of this Master's Dissertation, students' learning in this Didactic Proposal will be promoted mainly through meaningful and motivating tasks in which they must apply knowledge to

practical situations and real-life contexts. This required, without doubt, the development of Key Competences and Lower and Higher order thinking skills (LOTS and HOTS, respectively).

- Constructivist model of teaching: according to this model, the students are the protagonists of the process of learning, acting the teacher as a guide to help them achieve objectives and develop competences. A meaningful and strategic learning will be promoted through the proposed tasks, with especial emphasis on previous knowledge and active participation. In the same way, the interests of the group of 4th ESO A will be considered to increase their motivation towards the subject of Biology and Geology.

- Cooperative Learning: to complete many of the tasks proposed in the didactic Unit, student must be able to work in group, which calls for a good degree of organization and the adoption of certain roles and responsibilities to succeed. Groups will almost always be randomly formed by the teacher, to promote interaction and socialization among different classmates every time they deal with a new task.

- Information and Communication Technologies (ICTs): these are an invaluable resource for student motivation towards content learning. Besides, in in the context of the 21st century, it is essential that students develop their Digital Competence to their full potential, according to the guidelines of the European Digital Competence Framework (DigComp) (Guitert *et al*., 2021). Thanks to the availability of an interactive whiteboard in the classroom, many digital resources can be used when teaching this Unit in 4th ESO. For instance, YouTube videos will be often watched to understand many contents of the subject (e.g., videos about climate change or sustainable development), and web resources (e.g., Ecological footprint calculator tool) will be used to catch student's interest and attention. On the other hand, this group of 4th ESO will have access to *Google Classroom* platform, where they can find useful materials such as *PowerPoint* slides used in the teacher's oral presentations, or interesting links to educational websites. In fact, this can contribute, to a great extent, to the development of receptive and productive skills of the learners.

- Gamification: game-based learning activities often prove to be effective for increasing motivation, logical thinking, cognitive development and multidisciplinary enrichment of the learning process. In this Unit, for instance, a Kahoot Quiz will be used to analyse students' previous knowledge concerning environmental issues.

- Attention to diversity: the different intelligences, motivations and capacities of each student must be considered in nowadays Education. In this sense, according to the interests and needs of the students in this group of 4th ESO, the possibility of adoption of methodological changes will be regarded throughout all the lessons of this Unit. In the same way, a set of reinforcement and extension activities has been planned to satisfy the different learning rhythms in the group.

- Promotion of communication in English: in the CLIL context in which this Unit will be developed, it is essential that students get used to communicating in the target language (in this case, English). In particular, tasks proposed along the Unit will pursue the development of receptive and productive skills in English. Since CLIL approach involves a higher challenge when learning contents, different scaffolding techniques will be used to promote the development of communicative skills through the activities and tasks to be carried out along the Unit. The most relevant scaffolding strategies for this Unit would be as follows:

    - Learning of new vocabulary through visual aid (images, graphs or videos).
    - Paraphrasing and use of synonyms when explaining certain concepts (especially abstracts ideas), so that students can understand them properly.
    - Teacher's and peer's support while performing tasks in the classroom.
    - Providing students with the suitable vocabulary they must use to complete some activities and tasks.
    - Giving enough time for students' expression of ideas and thought in their oral contributions.

3.8. Timing

According to the academic calendar established by the Ministry of Education for the 2020-2021 academic year in the province of Córdoba, 178 school days have been set. Since in 4th ESO, 3 hours per week are devoted to the subject of Biology and Geology, a total number of 106 sessions would be available throughout the year. In the case of the Didactic Unit "Human beings and the environment", the curricular contents will be addressed during 11 sessions (of 50 minutes each), considering the characteristics of the group of 4th ESO in which it will be developed. **Table 1** shows the organization of these contents, as well as the timing of the activities to be carried out in each session and the Key Competences to be developed by the students in each case.

Session	Duration	Contents and activities	Key Competences [1]
1	20 min 10 min 20 min	*Kahoot* Quiz for assessing previous knowledge Brainstorming: Concept of environment Phases of human relationship with the environment	CLC, CMST, L2L CLC, CMST, L2L CLC, CMST, L2L, DC, SCC
2	15 min 15 min 20 min	Environmental impacts classification Classification of natural resources Design of a concept map about raw materials classification basing on their origin	CLC, CMST, L2L, DC, CAE CLC, CMST, L2L, DC CLC, CMST, L2L, CAE
3	50 min	Design of digital posters about natural resources in Andalusia	CLC, CMST, L2L, DC, CAE
4	50 min	Oral presentation of digital posters about natural resources in Andalusia	CLC, CMST, L2L, DC, CAE
5	10 min 15 min 10 min 15 min	Analysis of a graph on global population growth Overpopulation consequences Video on climate change Analysis of a graph on CO_2 and global temperature	CLC, CMST, L2L, DC, CAE CLC, CMST, L2L, DC, CAE CLC, CMST, L2L, DC, CAE CLC, CMST, L2L, DC, CAE
6	10 min 10 min 30 min	Reading a text about the ozone layer destruction Reading a text about acid rain Drawing diagrams about the ozone layer destruction and about acid rain	CLC, CMST, L2L, CAE, SCC CLC, CMST, L2L, CAE, SCC CLC, CMST, L2L, CAE, SCC
7	15 min 5 min 15 min 15 min	Listening: Pollution Waste classification Waste management methods The waste management hierarchy	CLC, CMST, L2L, DC, SCC CLC, CMST, L2L, DC, SCC CLC, CMST, CAE, SIE, SCC CLC, CMST, CAE, L2L, SCC
8	10 min 5 min 20 min 15 min	Video on sustainable development Principles to tackle environmental problems Calculation and analysis of ecological footprint Crossword: Reducing our ecological footprint	CLC, CMST, L2L, DC, SCC CLC, CMST, L2L, SIE, SCC CLC, CMST, L2L, SIE, SCC CLC, CMST, L2L, SIE, SCC
9	50 min	Classroom debate: How could we make our city more sustainable?	CLC, CMST, L2L, SIE, SCC, CAE
10	50 min	Unit Test	CLC, CMST, L2L, SCC
11	50 min	Reinforcement/extension activities	CLC, CMST, L2L, SCC, CAE

Table 1. Sequencing of contents and timing of learning activities.

[1] The correspondence of each acronym with each Key Competences is stated in section *3.4. Key Competences.*

3.9. Step-by-step planning

In this section, the planning of activities to be carried out in each session is described. In particular, according to the overall schedule, a total of 11 sessions will be devoted to this Unit, of approximately 50 minutes each.

Session 1

This session will begin with a gamification task to assess the students' previous knowledge regarding various concepts related to the beginning Didactic Unit. Specifically, a quiz will be carried out through *Kahoot* educational platform. It will consist of eight questions (with four options of which just one is correct) that will allow to analyze the general previous ideas of the group on the concepts of environment, natural resources or sustainable development, among others (**Figure 3**).

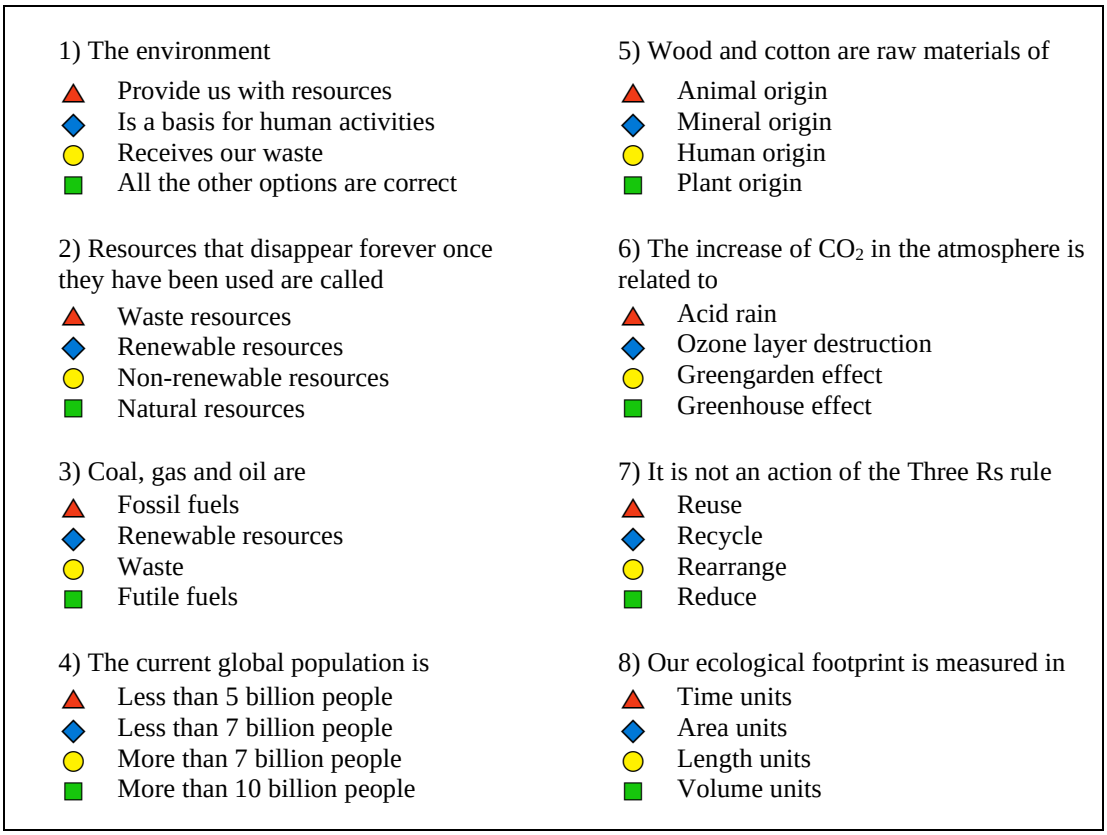


Figure 3. *Kahoot* quiz for assessing previous knowledge (Originally designed).

Once the game has finished, general misconceptions that may exist in the group will be analysed and commented. This will serve as the basis for introducing a cooperative brainstorming activity to work on the concept of environment. Students will freely share their ideas with the rest of the group, while the teacher guides them to find a suitable definition.

After suggesting students to think about how human beings have historically altered the environment, an association task will be developed to finish this first session. Pictures corresponding to the different phases of human relationship with the environment will be shown on the interactive whiteboard, and students will be asked to relate twelve proposed statements with the phase to which they belong (e.g., *minimal waste production, food production from crops and livestock, depletion of resources,* etc.). They will be encouraged to use L2 grammatical structures such as *belong to, associated with* or *related to*.

Session 2

This session will start by explaining what an environmental impact is. Then, several images depicting environmental impacts will be shown on the interactive whiteboard (e.g. a forest after acid rainfall or buildings destroyed by a tsunami). Students will be asked to orally classify them depending on their cause (use of natural resources, land occupation or pollution) and on their nature (positive, negative, direct, indirect or synergistic). In this way, they will get familiar with this specific vocabulary related to the topic.

An activity will then be carried out to address the classification of natural resources classification basing on their regeneration pace. The teacher will bring 20 self-adhesive sticky notes with a natural resource written in each of them: *direct solar energy, fresh air, wind, flowing water, tidal currents, waves, fertile soil, coal, oil, gas, iron, copper, aluminum, clay, sand, phosphates, biomass, Earth's internal thermal energy, forest* and *wildlife*. These will be randomly distributed among the students, and each of them will paste his/her sticky note in the section of the (traditional) board to which he/she considers that the resource belongs (renewable, non-renewable and potentially renewable). The proposal will be analysed together and the sticky notes will be moved until the correct classification is achieved. In fact, the teacher will then show on the interactive whiteboard a concept map on this classification, elaborated with *CmapTools* software (**Annex I**). This will serve as a scaffold for the next task, in which students will be asked to design a concept map on raw materials classification according to their

origin (plant, animal or mineral origin). As input for this task, some examples of raw materials will be given to students (e.g., wood, silk, cork, iron, carbon, rubber or gold), although they will be required to think of more examples of each origin. This task will then be collected and evaluated as part of the formative assessment of this Unit.

Session 3

The session will take place in the Computer Classroom of the Secondary School, as Internet access is required. The 20 students will be randomly divided into five groups of 4 students each to design digital posters about natural resources in Andalusia. To carry out this task, students may use *PowerPoint* or a similar software available in the school computers. Although each group is free to choose the sort of natural resource to design the poster about, some possible options will be given to them as a guide:

- Energetic resources
- Mining resources
- Water resources
- Agriculture resources
- Livestock resources
- Forest resources

During the task, the teacher will solve possible doubts concerning the design of the posters, putting emphasis on the accurate use of content and language by the students.

Session 4

Prior to this session, students will have uploaded their digital posters (preferably in pdf format) to *Padlet* so that the teacher can access them. Each group will now have 10 minutes to perform an oral presentation of their poster, which will be followed by a short turn of questions. The teacher will use a rubric to assess students' performance in the task regarding poster design, content and language (**Table 2**).

The week in which the World Environment Day is placed (5th of June), these posters will be uploaded to the webpage of the Secondary School, to make people aware of the richness of Andalusian environment and the importance of preserving its degradation.

Session 5

In this session, a worksheet will be delivered to the students to be completed and handed to the teacher by the end of the session (**Annex II**). In the first part of the worksheet, students will be asked to analyze a graph on global population growth, to make them aware of its exponential nature: the current global population is more than 7 billion people, and it is expected to reach almost 10 billion by 2050. Taking these figures as precedent, the students will be asked to think of the future consequences of human uncontrolled development regarding the following aspects:

- Land occupation and modification
- Quality of air, water and soil
- Availability of natural resources
- Waste disposal

Students are expected to come up with relevant examples of environmental impacts derived from a growing demand for resources and space, or an increased waste production. In their written production, they will be encouraged to express conditional sentences (*would/could*).

To introduce the second part of the worksheet, a video about climate change will be watched on the interactive whiteboard (*Climate Change*, https://www.youtube.com/watch?v=IJoAcD0oUww) (4:59). Then, students will be asked to follow the instructions of their worksheets to analyze the relationship between CO_2 emissions and global temperature, on a proposed graph. They are expected to think of the consequences of the Industrial Revolution and fossil fuels combustion. Once they complete the task, it will be collected and evaluated as part of the formative assessment of this Unit.

Session 6

In this session, a text-based task will be developed. Students will read two texts, each one about a major global environmental problem: the ozone layer destruction and acid rain. Authentic texts located on the Internet have been chosen, although they have been adapted to make it suitable for the academic and English language level of this group of students of 4th ESO. In the adapted texts (**Annex III**) changes of expression which have been introduced concerning nouns, adjectives, verb forms and grammatical structures (for instance, *clinging, warmth, shield, get blown into, outlawed, runoff water, airborne* or *curbing* have been replaced by more suitable synonyms). In the same way, peripheral details have been removed from the original texts to make them more accurate for their purpose.

Once they have read both texts (and solved possible doubts on their content), learners will be asked to make a schematic drawing of both phenomena in their notebooks, showing the most relevant features of their causes and consequences. As a measure for attending the different learning rhythms within the group, a video will be shown for scaffolding on cause-and-effect structures (https://www.youtube.com/watch?v=TkYO-uprqQQ). Once they have finished, students willing to share their creations will be able to draw them in the whiteboard. The idea is that the whole class can benefit from other classmates' ideas to complete their drawings and understand well these two environmental problems.

	Excellent (9-10)	Very good (7-8)	Acceptable (5-6)	Needs improvement (1-4)
Poster design (20 %)	The poster is well-organized and presents a visually captivating design, with several images. No spelling, syntax or punctuation errors are found in the poster text.	Good organization and design, containing one or two suitable images. Occasional spelling, syntax or punctuation errors are found in the poster text.	The poster contains the essential information required but it is not visually attractive. More images should have been used. Some spelling, syntax or punctuation errors are found in the poster text.	The poster is not well-organized neither visually attractive. No images have been used to present information. Many spelling, syntax or punctuation errors are found in the poster text.
Content (40 %)	Contents are well used and explained, showing a very good degree of understanding of the subject. The objectives of the tasks have been fully achieved.	Contents are well used and explained, showing a rather good degree of understanding of the subject. The objectives of the tasks have been achieved to a great extent.	Contents are used and explained in an acceptable way, showing a reasonable degree of understanding of the subject. The objectives of the tasks have been partially achieved.	Contents are not well used and explained, not showing a very good degree of understanding of the subject. The objectives of the tasks have not been achieved.
Language accuracy (20 %)	Consistent control of grammatical resources and specific vocabulary related to the topic	Good use of grammatical resources and specific vocabulary related to the topic, with occasional mistakes that do not impede communication	Limited use of grammatical resources and specific vocabulary related to the topic, involving certain difficulty for communication	Very limited use of grammatical resources and specific vocabulary related to the topic, making communication very difficult
Fluency and pronunciation (20 %)	Expression following a natural flow. Good intonation and word pronunciation.	Good degree of fluency. Reasonable intonation and word pronunciation.	Reasonable degree of fluency. Intonation and word pronunciation could improve but do not impede communication.	Limited degree of fluency. Repetition and paraphrasing are common. Intonation and word pronunciation make communication difficult.

Table 2. Rubric for assessing the oral presentation of a poster on natural resources (Originally designed).

Session 7

This session will begin with a listening task. Students will listen twice a recording on pollution (*Pollution is the world's biggest killer*, https://www.youtube.com/watch?v=F7hCoEc6Kp4) (1:55). Then, they must complete a worksheet (**Annex IV**) using information from this extract. Once they finish, it will be collected and evaluated as part of the formative assessment of this Unit.

Then, the concept of waste will be explained, and several images will be shown on the interactive whiteboard, so that students tell the type of waste depicted in each case. They are expected identify industrial, agricultural, radioactive, medical and municipal solid waste. This will serve as an introduction to explain a *PowerPoint* presentation about the main waste management methods: selective collection and recycling, biological treatment, incineration and landfills. Considering the age of the target group of students, it is essential that they develop a environmental conscience starting by recycling in their daily life. Then, a video about the importance of plastics recycling will be watched on the interactive whiteboard (*What really happens to the plastic you throw away*, https://www.youtube.com/watch?v=_6xlNyWPpB8) (4:06).

The next activity will be carried out so that learners understand the waste management hierarchy. The name of different waste management methods will be given to them (in random order): prevention, reduction, reuse, recycling, energy recovery and disposal in landfill. They will be asked to draw a five-leveled pyramid in their notebooks and write those methods so that the most preferred is at the top and the least preferred is at the bottom of the pyramid. To do so, they must think about the easiness and benefits of each of them. Once they have finished, they will be allowed to share their proposed hierarchy, giving arguments for justifying their ideas. The discussion will take place until all together find out the right order.

Session 8

To introduce this session, a video to understand the concept of sustainable development will be watched on the interactive whiteboard (*Two minutes to understand sustainable development*, https://www.youtube.com/watch?v=jfsWI8XgQyo) (3:49). Students will then be asked whether they are familiar to two major principles to tackle environmental problems: the Three Rs rule

and the idea "Think globally, act locally". Students are expected to contribute with their knowledge of the meaning of both principles.

Next, a task will be developed so that students can analyze their own individual actions towards sustainability. A worksheet consisting of two parts will be delivered to them (**Annex V**). In the first part, they must access to the Internet (using their mobile phones) to calculate their ecological footprint using an *Ecological footprint calculator* tool (available at https://www.footprintcalculator.org/). In the worksheet they are required to comment on their results and to instigate possible daily life actions to improve them (making sentences with *should, must, had better*, etc.). The second part of the worksheet is a crossword puzzle that the students must solve by using specific vocabulary related to environmental issues in general, and to the reduction of our ecological footprint, in particular. Specifically, through this crossword students are expected to come up with the following vocabulary: *conscious, packaging, public, bags, disposable, consumption, reduce, locally, friendly* and *recycled*. At the end of the session, the worksheet will be collected and evaluated as part of the formative assessment of this Unit.

Session 9

During this session, a debate will be held in the classroom on the following question: *How could we make our city more sustainable?* To try to answer it, students will be divided into four groups of five people each (selected in a random way by the teacher). Each group must think of sustainable ideas from a different perspective. In particular, the following fields will be randomly assign to the different groups: *energy, water, urban design* and *transport*. After 20 minutes, a spokesperson of each group will express their ideas, and the rest of the class will have the chance to comment on them, trying to find interconnections among the proposals of the different groups and consensus concerning the most sensible, responsible and profitable alternatives.

As a whole, the objective of this activity is that students apply the knowledge they have acquire in previous sessions while making use of English to communicate. In this sense, they are expected to use specific vocabulary related to the topic, as well as grammatical structures of hypothesis, obligation or advice, that have been worked through the different tasks of the Unit.

Session 10

In this session the students will take a written test, as a summative assessment of the Didactic Unit, which will consist of questions of different type to work on the contents learnt in this Unit (**Annex VI**). In this test, students are expected to write with accuracy, using the vocabulary and grammatical structures practiced during the different tasks carried out along the Unit.

Session 11

In this final session, depending on the results of the summative assessment of this Didactic Unit, each student will complete a worksheet with reinforcement or extension activities (**Annex VIII**), as well as a target of evaluation as a self-assessment tool. Since some activities call for information search, students will be allowed to access to the Internet during this session.

3.10. Materials and resources

According to the objectives and contents intended to be developed in this Unit, as well as to availability at school, the material and resources selected to be used would be:

- Classroom with traditional whiteboard and interactive whiteboard connected to the computer of the teacher's table, with Internet access.
- Computer classroom (with computers for students and Internet access).
- Mobile phones (*BYOD*: *Bring Your Own Device)*
- Textbook *Biology and Geology Secondary 4*. (1st ed.). McGraw-Hill Publishing House. 2016. ISBN: 9788448608903.
- Photocopies of worksheets for classroom tasks, reinforcement and expansion activities, etc.
- Stationery material for classroom activities (e.g., self-adhesive sticky notes).
- ICT resources:
    - *Google Classroom, Padlet* and *Kahoot* platforms.
    - *PowerPoint* software.
    - *YouTube* videos.

3.11. Assessment

Evaluation is a general term thar refers to the continuous and comprehensive process of gathering information about students' performance, with a view to make decision and changes in the learning process (Sharma, 1975; Arends, 1997). The evaluation of the learning process of the students will be individualized, inclusive and continuous. In the case of CLIL approach, in particular, the following principle must be considered: "The content that was taught in the L2 needs to be assessed in the L2, as well" (Massler, 2011). Within assessment, three stages can be distinguished:

- Initial assessment: at the beginning of the Unit, the previous ideas of the students will be detected to anticipate difficulties and have a variety of suitable activities appropriate to this group of 4th ESO.

- Formative assessment: checking the students' development in the tasks and activities carried out in the classroom, the teacher will be able to detect misconceptions and obstacles in contents assimilation, and to adapt lessons according to them.

- Summative assessment: taking as reference the evaluation criteria of each block of content and the set objectives, the results of the learning process will be established at the end of the Unit. Considering them, a number of reinforcement activities will be planned for students who have not achieved the objectives, and extension activities for those who have achieved them.

In Andalusia, the *Order of January the 15th 2021*, for Secondary Education suggest the use of wide variety of procedures, strategies and tools in evaluation. In addition, concerning the development of bilingualism, the *Instructions of June the 8th 2020* establish that English teachers are responsible for the assessment of linguistic competence in the foreign language, according to the learning outcomes for the linguistic skills and considering the levels of linguistic competence of the Common European Framework of Reference for Languages (CEFR).

For calculating the students' grades for this Unit, the weighted grade of each of the different learning criteria and standards will be considered. This mark will result from their level of

performance in the the different learning tasks and activities and in the Unit test (proposed in **Annex VI**), as well as from their direct observation in the classroom. In particular, the following evaluation procedures will be used:

- Direct observation techniques: rubrics, checklists, rating scales, etc. will be used to evaluate observable procedures and attitudes.

- Review of the students' tasks: the analysis of students' productions (as individual or group work) will be used as an instrument to assess their procedures according to the degree of maturity and competences development.

- Unit test: at the end of the Unit, a test with varied questions (short answers, multiple choice, pairing, etc.) will be used as a tool to evaluate concepts and procedures.

- Target of evaluation for self-assessment: a target of evaluation has been designed, in which different "I can" statements are shown so that students can self-assess their performance in this Unit, according to the assessment criteria (**Annex VII**).

- Teacher's evaluation: the teaching practice within the different Units of the subjects will be assessed at the end of the academic year, through a self-assessment rubric and a questionnaire to be completed by the students.

Table 3 shows the weighted evaluable assessment criteria and learning standards, as well as their relationship to the development of Key Competences and the evaluation tools used in the various learning tasks and activities carried out in the Unit. Regarding the grade of the students, the Unit will be considered passed with at least 50% of the weighting of all the involved learning standards. Students whose learning objectives achievement and competences development is not enough to achieve the 50% of all the corresponding standards weighting at the end of the Unit, will have to do extra activities based on failed standards, and pass a resit on the contents related to these standards in June.

Contents	Evaluation criteria	Learning standards and weighting	Evaluation instruments	Key Comp.
Impacts and evaluation of human activities in ecosystems. Overpopulation and its consequences: deforestation, overexploitation, fires, etc. Human activity and the environment. Simple techniques to evaluate the degree of pollution and purification of the environment.	To contrast some human actions on different ecosystems, to assess their influence and to argue the reasons for certain individual and collective actions to prevent their deterioration	The student argues about human actions that have a negative influence on ecosystems: pollution, desertification, depletion of resources... (20 %)	Checklist for environmental impacts classification activity Rating scale for diagram drawings Worksheet: Listening on pollution Unit test	CLC CMST L2L SCC SIEP
		The student argues and conclude on possible actions to improve the environment (20 %)	Direct observation in brainstorming about principles to tackle environmental problems Worksheet: Calculation, analysis and reduction of ecological footprint Debate on sustainable urban development Unit test	CLC CMST L2L SCC SIEP
Waste and its management	To specify different waste treatment processes	The student describes the waste treatment processes, critically evaluating waste selective collection (15 %)	Debate on sustainable urban development Unit test	CLC CMST
	To contrast arguments in favor of the selective collection of waste and its repercussion in society	The student discusses the pros and cons of recycling and reusing material resources (15 %)	Checklist for waste management hierarchy activity Debate on sustainable urban development Unit test	CLC CMST SCC
Environmental consequences of energy consumption	To associate the importance of the use of renewable energies with sustainable development	The student highlights the importance of renewable energies for the sustainable development of the planet (15 %)	Worksheet: Calculation, analysis and reduction of ecological footprint Debate on sustainable urban development Unit test	CLC CMST SCC
Natural resources and their types. Natural resources in Andalusia	To recognize and value the main natural resources of Andalusia	The student recognizes and values the main natural resources of Andalusia (15 %)	Rating scale for natural resources classification activity Rubric to assess the elaboration and oral presentation of a digital poster	CLC CMST DC CAE

Table 3. Assessment of the Didactic Unit.

3.12. Attention to diversity

To aim for a fair teaching-learning process, the development of this Didactic Unit will be adapted to the individual needs and interests of all the students from 4th ESO A. In particular, a set of reinforcement and extension activities has been designed to fit the different individual learning paces in the group (**Annex VIII**). Although the adoption of measures of attention to diversity will be contemplated considered throughout the whole Unit, these activities of reinforcement or extension will be proposed during the session following the written test of the Unit, the moment when the teacher will have most information on the evolution of the students, being able to identify their needs.

4. CONCLUSIONS

The designed Didactic Proposal is an example of bilingualism implementation in the subject of Biology and Geology, following the principles of CLIL approach. Although it has not been possible to develop this proposal in a real context (yet currently I do not teach Biology and Geology), its outcomes are expected to be quite good if both content and language objectives set for the Unit are accomplished. As I see it, the proposed methodology allows a meaningful learning experience while boosting motivation and attending different learning paces within the target group of students.

In fact, the present Didactic Proposal can be especially relevant regarding the recent update of the OECD's Programme for International Student Assessment (PISA), which measures 15-year-olds' ability to use their reading, mathematics and science knowledge and skills to meet real-life challenges. In 2018, it conducted the first evaluation of the so-called students' "global competence" to live in an interconnected and rapidly changing world, focusing on students' perspectives and knowledge of issues of global significance, such as public health, economy, intercultural knowledge and environmental issues. The development of this global competence in our students is of undeniable importance to understand life from a holistic point of view and to build a more fair, committed, inclusive and peaceful world (https://www.oecd.org/pisa/).

5. REFERENCES

Andalusia, Spain. Decree 111/2016, of June the 14th, which establishes the organization and curriculum of Compulsory Secondary Education in the Autonomous Community of Andalusia. *Boletín Oficial de la Junta de Andalucía*, June the 26th, 2016, number 122, pages 27 to 45. https://www.juntadeandalucia.es/boja/2016/122/2

Andalusia, Spain. Instructions 7/2020, of June the 8th, from the General Directorate of Ordination and Educational Evaluation on the organization and functioning of the bilingual education in the Andalusian educational centers for the course 2020/2021. *Consejería de Educación y Deporte*, June the 8th, 2020.

Andalusia, Spain. Order of January the 15th 2021, which develops the curriculum corresponding to Compulsory Secondary Education in the Autonomous Community of Andalusia, regulates certain aspects of attention to diversity and establishes the organization of the evaluation of the learning process of the students. *Boletín Oficial de la Junta de Andalucía (Extraordinario)*, January the 18th, 2021, number 7, pages 656 to 1024. https://www.juntadeandalucia.es/boja/2021/507/3

Aragón, M. (2007). Las Ciencias experimentales y la enseñanza bilingüe. *Rev. Eureka. Enseñ. Divul. Cien.*, 4(1), 152-175.

Arends, R. (1997). *Classroom Instruction and Management*. New York: McGraw- Hill inc.

Cambridge English. (2011). *Teaching Science through English – a CLIL approach*. Cambridge: University of Cambridge. ESOL Examinations.

Cenoz, J. (2015). Content-based instruction and content and language integrated learning: The same or different? *Language, Culture and Curriculum*, 28(1), 8-24.

Chowdhury, M. (2014). The Task-based Learning Framework and Its Implications in Language Learning and Teaching. *Journal of Education and Practice*. 5(2), 111-117.

Council of Europe (2020). *Common European Framework of Reference for Languages: Learning, teaching, assessment – Companion volume*. Council of Europe Publishing, Strasbourg.

Coyle, D. (2007). Content and Language Integrated Learning: Towards a connected research agenda for CLIL pedagogies. *International Journal of Bilingual Education and Bilingualism*, 10(5), 543-562.

Coyle, D., Hood, P. and Marsh, D. (2010*). CLIL. Content and Language Integrated Learning*. Cambridge: Cambridge University Press.

Dale, L., van der Es, W., and Tanner, R. (2011). *CLIL Skills: A practical book on Content and Language Integrated Learning*. European Platform.

Ellis, R. (2009). Task-based language teaching: Sorting out the misunderstandings. *International Journal of Applied Linguistics*, 19(3), 221-246.

Global Footprint Network. (n.d.). What is your ecological footprint? Retrieved May the 21st, 2021, from https://www.footprintcalculator.org/

Guitert *et al*., (2021). The digital competence framework for primary and secondary schools in Europe. *Eur. J. Educ*. 56, 133–149.

Harmer, J. (2007). *The Practice of English Language Teaching* (4th ed.). Harlow: Pearson Education.

Instituto de Educación Secundaria Santa Rosa de Lima. (n.d.). *Bilingüismo*. Retrieved May the 15th, 2021, from http://iessantarosadelima.com/bilinguismo/

Kalogerakou *et al*. (2017). A CLIL Model: Teaching Science at Secondary Education. *Research Papers in Language Teaching and Learning*. 8(2), 136-148.

Kelly, K. (2010). CLIL in Natural Science Subjects: language and task. *Ikastaria*. 17, 91-108.

Mallorquín-Rodríguez. M. S. (2018). The Flexibility of a CLIL Teacher. *ANGLISTICUM. Journal of the Association-Institute for English Language and American Studies*, 7(5), 10-20.

Marsh, D. (2002). *CLIL/EMILE. The European Dimension. Actions, Trends, and Foresight Potential*. Jyväskylä: University of Jyväskylä.

Massler, U. (2011). Assessment in CLIL Learning. In Ioannou-Georgiou, S. & Pavlou, P. (Eds.), *Guidelines for CLIL Implementation in Primary and Pre-primary Education,* 114-136.

Nunan, D. (2004). *Task-based language teaching*. Cambridge: Cambridge University Press.

Organisation for Economic Co-operation and Development. (n.d.). *Programme for International Student Assessment*. Retrieved June the 4th, 2021, from https://www.oecd.org/pisa/

Ortega-Auquilla *et al*. (2019). The Facilitative Role of the Interaction Hypothesis: Using Interactional Modification Techniques in the English Communicative Classroom. *Pol. Con*. 31, 4(3), 3-23.

Ortiz, D. (2015). El constructivismo como teoría y método de enseñanza. *Sophia: colección de Filosofía de la Educación*, 19(2), 93-110.

Ramos-García *et al*. (2016) *Biology and Geology Secondary 4* (1st ed.). McGraw-Hill Publishing House.

Reiss, M. (2018). Biology education: The value of taking student concerns seriously. *Education Sciences*, 8(3), 130.

Richards, J. C. (2015). *Key issues in language teaching* (1st ed.). Cambridge: Cambridge University Press.

Richards, J. C., and Rodgers, T. S. (2014). *Approaches and methods in language teaching* (3rd ed.). Cambridge University Press.

Rodríguez-Bonces, M. and Rodríguez-Bonces, J. (2010). Task-Based Language Learning Old Approach, New Style. A New Lesson to Learn. *Profile: Issues in Teachers' Professional Development*. 12(2), 165-178.

Sharma R.C. (1975). *Modern Science Teaching*. New Delhi: Dhanpat Rai Publishing Company.

Shehadeh, A. (2005). Task-based language learning and teaching: Theories and applications. In C. Edwards, & J. Willis (Eds.), *Teachers exploring tasks in English language teaching*, 13-30. Springer.

Spain. Royal Decree 1105/2014, of December the 26th, which establishes the basic curriculum for Compulsory Secondary Education and Baccalaureate. *Boletín Oficial del Estado*, January the 3rd, 2015, number 3, pages 169 to 546. https://www.boe.es/buscar/act.php?id=BOE-A-2015-37

Sustainable Development Solutions Network. (2021). Transformations for the Joint Implementation of Agenda 2030 for Sustainable Development and the European Green Deal. https://resources.unsdsn.org/transformations-for-the-joint-implementation-of-agenda-2030-the-sustainable-development-goals-and-the-european-green-deal-a-green-and-digital-job-based-and-inclusive-recovery-from-covid-19-pandemic

The Teacher's Corner. (n.d.). *Generador de crucigramas*. Retrieved February the 20th, 2021, from https://worksheets.theteacherscorner.net/make-your-own/crossword/lang-es/

Ting, J. (2016). A lesson plan of TBLT (Task-based language teaching). *International Journal of Secondary Education*, 4(3), 32.

Vázquez, Á., Acevedo, J.A., Manassero M.A. and Acevedo, P. (2006). Actitudes del alumnado sobre ciencia tecnología y sociedad, evaluadas con un modelo de respuesta múltiple. *Revista Electrónica de Investigación Educativa*, 8(2).

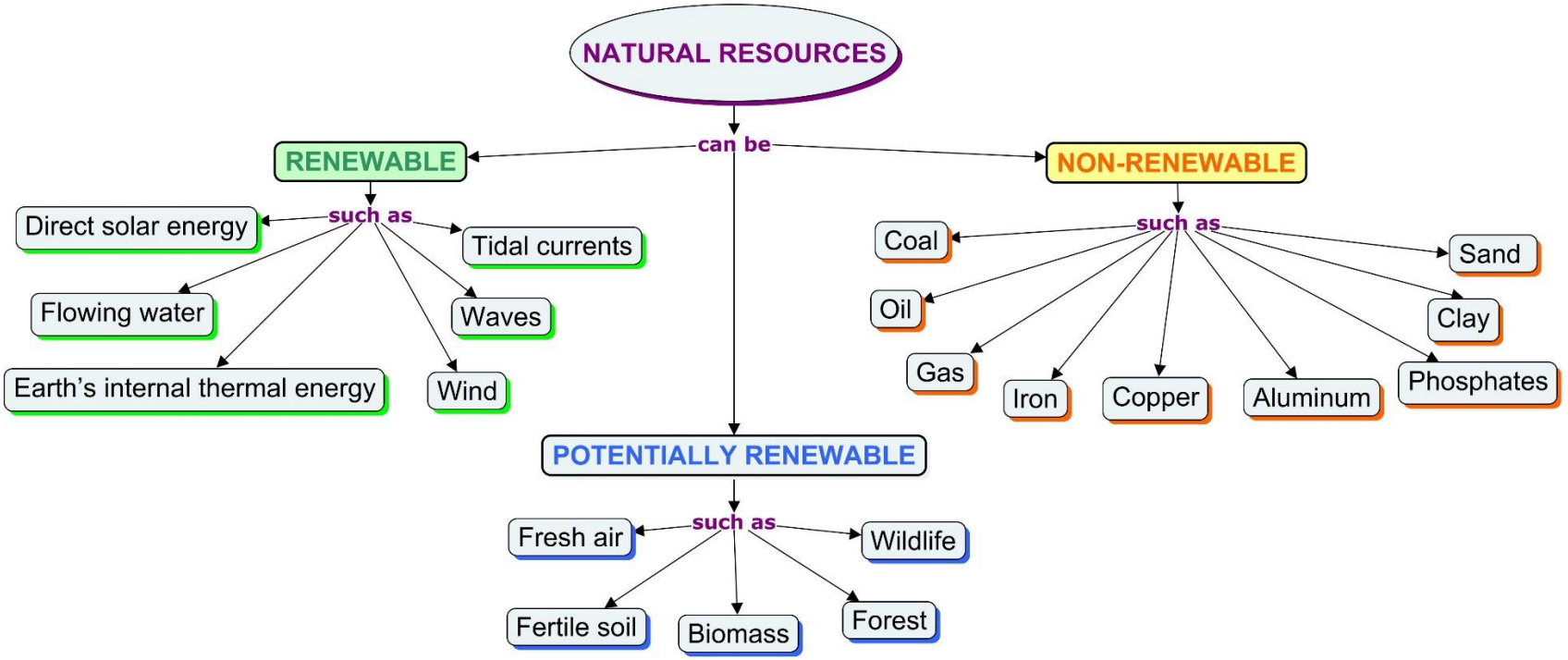
Wibowo, Y. G., and Saidikin, A. (2019). Biology in the 21st-Century: Transformation in biology science and education in supporting the sustainable development goals. *Jurnal Pendidikan Biologi Indonesia*, 5(2), 285-296.

Willis, J. (1996). *A framework for Task-based learning*. Harlow: Longman.

Wood, D., Bruner, J. S., and Ross, G. (1976). The role of tutoring in problem solving. *Child Psychology & Psychiatry & Allied Disciplines*, 17(2), 89–100.

6. ANNEXES

ANNEX I. CONCEPT MAP ABOUT NATURAL RESOURCES (Originally designed).



Designed using CmapTools v6.04

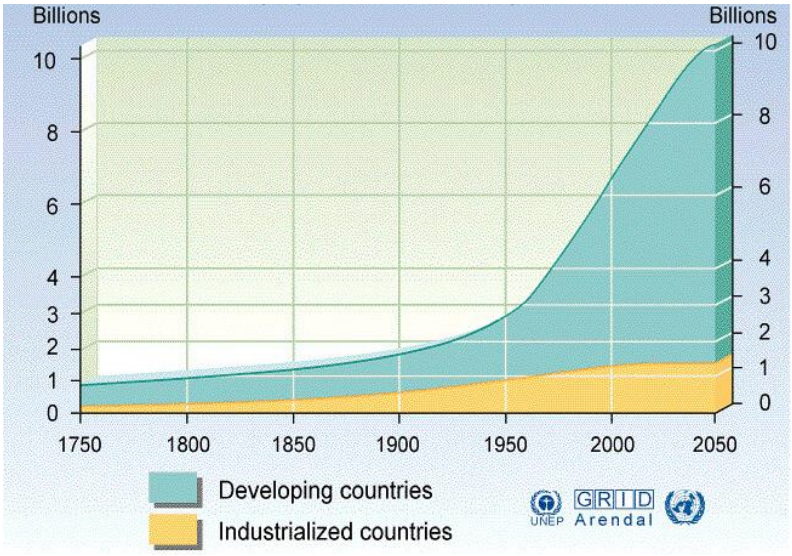
ANNEX II. WORKSHEET ABOUT OVERPOPULATION AND CLIMATE CHANGE

SURNAMES: _____ NAME: _____

Part 1: Human overpopulation

Look at the following graph on human population growth and answer the questions.

Global population growth



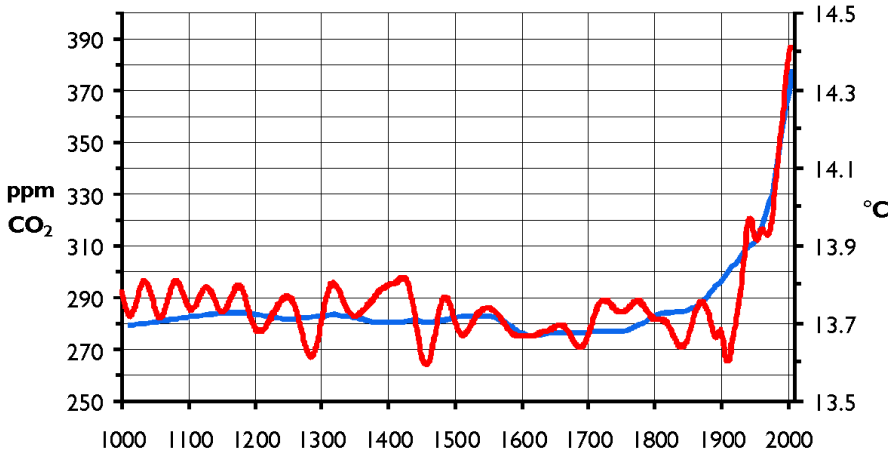
Source: https://www.grida.no/

a) Is human population growth linear or exponential? Justify your answer and tell some possible causes for this to happen.

b) Indicate at least two examples of the future consequences of human uncontrolled development regarding the following aspects. Remember to write conditional sentences using *would* or *could*.

- Land occupation and modification
- Quality of air, water and soil
- Availability of natural resources
- Waste disposal

Part 2 : Climate change



Source: https://cdiac.ess-dive.lbl.gov/

a) Which of the following titles does best describe the graph?

- Global temperature in the last decades
- Climate change and temperature
- CO_2 emission and climate change

b) What is the relationship between CO_2 concentration and temperature?

c) Do you think CO_2 increase can be harmful for the environment? Why?

d) In a certain point of the graph, there is a sharp increase in both represented parameters. What do you think are the causes of this increase?

ANNEX III. ADAPTED TEXTS ABOUT THE OZONE LAYER AND ACID RAIN

Text 1: The destruction of the ozone layer

The ozone layer is one layer of the stratosphere, a mass of protective gases staying in our planet. The stratosphere gets its name because it is stratified, or layered: as elevation increases, the stratosphere gets warmer. It increases in temperature with elevation because ozone gases in the upper layers absorb intense ultraviolet radiation from the sun.

Ozone is only a trace gas in the atmosphere - only about 3 molecules for every 10 million molecules of air. But it does a very important job. Like a sponge, the ozone layer absorbs bits of radiation hitting Earth from the sun. Even though we need some of the sun's radiation to live, too much of it can damage living things. The ozone layer acts as a protection for life on Earth. Ozone is good at trapping a type of radiation called ultraviolet radiation, or UV light, which can penetrate organisms' protective layers, like skin, damaging DNA molecules in plants and animals.

There are two major types of UV light: UVB and UVA. UVB is the cause of skin conditions like sunburns and cancers. People used to think that UVA light, the radiation used in tanning beds, is harmless because it doesn't cause burns. However, scientists now know that UVA light is even more harmful than UVB, penetrating more deeply and causing a deadly skin cancer, melanoma, and premature aging. The ozone layer, our Earth's sunscreen, absorbs about 98 percent of this devastating UV light.

The ozone layer is getting thinner. Chemicals called chlorofluorocarbons (CFCs) are a reason we have a thinning ozone layer. A chlorofluorocarbon (CFC) is a molecule that contains the elements carbon, chlorine, and fluorine. CFCs are everywhere, mostly in refrigerants and plastic products. Businesses and consumers use them because they're inexpensive, they don't catch fire easily, and they don't usually poison living things. But the CFCs start eating away at the ozone layer once they are released to the stratosphere.

Ozone molecules, which are simply made of three joined oxygen atoms, are always being destroyed and reformed naturally. But CFCs in the air make it very difficult for ozone to reform

once it's broken apart. The ozone layer, which only makes up 0.00006 percent of Earth's atmosphere, is getting thinner and thinner all the time.

"Ozone holes" are popular names for areas of damage to the ozone layer. This is inaccurate. Ozone layer damage is more like a really thin patch than a hole. The ozone layer is thinnest near the poles. In the 1970s, people all over the world started realizing that the ozone layer was getting thinner and that this was a bad thing. Many governments and businesses agreed that some chemicals, like aerosol cans, should be banned. There are fewer aerosol cans produced today. The ozone layer has slowly recovered as people, businesses, and governments work to control such pollution.

Adapted from: https://www.nationalgeographic.com/environment/article/acid-rain

Text 2: Acid rain

Acid rain describes any form of precipitation that contains high levels of nitric and sulfuric acids. It can also occur in the form of snow, fog, and tiny bits of dry material that settle to Earth. Normal rain is slightly acidic, with a pH of 5.6, while acid rain generally has a pH between 4.2 and 4.4. Vegetation and erupting volcanoes release some chemicals that can cause acid rain, but most acid rain is a product of human activities. The biggest sources are coal-burning power plants, factories, and automobiles. When humans burn fossil fuels, sulfur dioxide (SO_2) and nitrogen oxides (NOx) are released into the atmosphere. Those air pollutants react with water, oxygen, and other substances to form sulfuric and nitric acid in the air. Winds may spread these acidic compounds through the atmosphere and over hundreds of miles. When acid rain reaches Earth, it flows across the surface in liquid water, enters water systems, and sinks into the soil.

Acid rain has many ecological effects, especially on lakes, streams, wetlands, and other aquatic environments. Acid rain makes such waters more acidic, which results in more aluminum absorption from soil, which is carried into lakes and streams. That combination makes waters toxic to fish and other aquatic animals. Some species can tolerate acidic waters better than others. However, in an interconnected ecosystem, what affects some species eventually affects many more throughout the food chain, including non-aquatic species such as birds. Acid rain and fog also damage forests, especially those at higher elevations. The acid deposits rob the soil of essential nutrients such as calcium and cause aluminum to be released in the soil, which makes it hard for trees to take up water. Trees' leaves and needles are also harmed by acids.

The effects of acid rain, combined with other environmental stressors, leave trees and plants less healthy, more vulnerable to cold temperatures, insects, and disease. The pollutants may also inhibit trees' ability to reproduce. Some soils are better able to neutralize acids than others. But in areas where the soil's "buffering capacity" is low, such as parts of the U.S. Northeast, the harmful effects of acid rain are much greater. Acid deposits damage physical structures such as limestone buildings and cars. And when it takes the form of inhalable fog, acid precipitation can cause health problems including eye irritation and asthma. The only way to fight acid rain is by limiting the release of the pollutants that cause it. This means burning fewer fossil fuels and setting air-quality standards.

Adapted from : https://www.nationalgeographic.com/environment/article/acid-rain

ANNEX IV. LISTENING TASK ABOUT POLLUTION

SURNAMES: _____ NAME: _____

Pollution is the world's biggest killer

Complete this worksheet after listening twice a recording about pollution.

1) Choose the answer that fits best according to what you hear.

a) Around … % of all world's deaths are caused by pollution.

- □ 6
- □ 16
- □ 60

b) Which of the following sorts of pollution causes more deaths every year?

- □ Pollution at the workplace
- □ Air pollution
- □ Water pollution

c) Who are the people the pollution hits hardest?

- □ Children and old people
- □ Youngsters
- □ People who are between 30 and 40 years old

2) Complete the sentences with a word or short phrase according to what you hear.

a) Diseases caused by pollution include heart disease, _____ and stroke.

b) Brunei and _____ had the lowest numbers of deaths because of pollution.

c) Pollution threatens fundamental _____ such as health, well-being or safe work.

ANNEX V. WORKSHEET ABOUT ECOLOGICAL FOOTPRINT

SURNAMES: _____ NAME: _____

Part 1: Ecological footprint calculation

Access to the *Ecological footprint calculator* tool available at the following website: https://www.footprintcalculator.org/

Follow the instructions to calculate your own ecological footprint and then answer the questions proposed below:

1) What does the term *Earth Overshoot Day* mean?

2) What has been your result on this parameter?

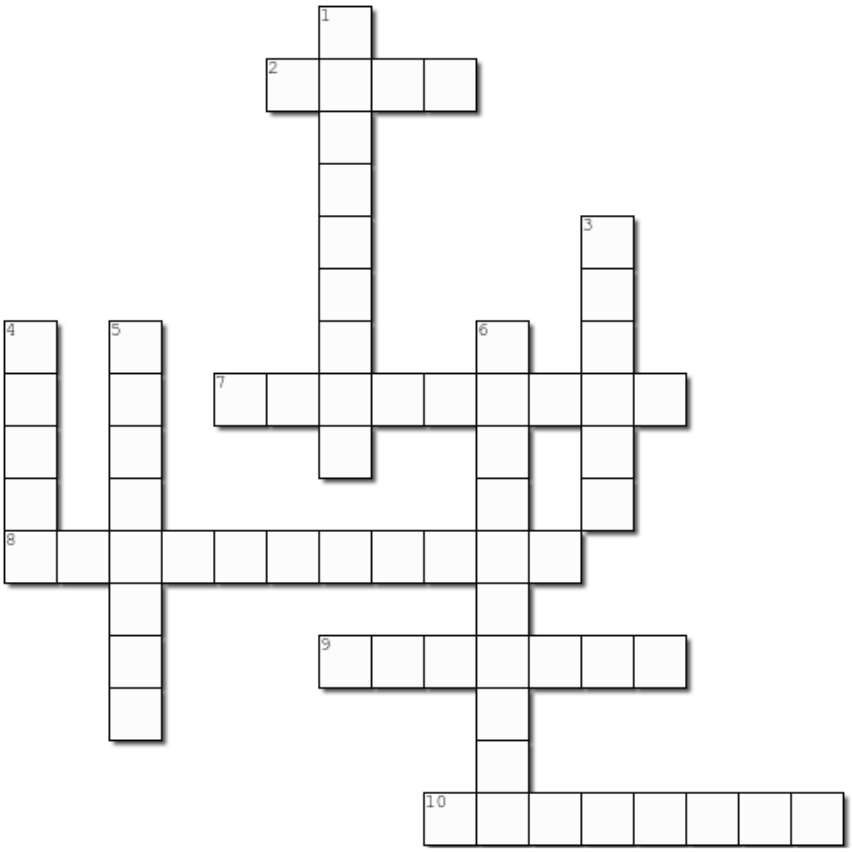
3) If everyone lived like you, how many Earth would we need?

4) Did you expect your obtained results? Think of specific actions that you could adopt to reduce your ecological footprint. Remember to express your ideas using *must, have to, should or had better*.

Part 2: Crossword puzzle

Complete the following crossword considering the clues given below.

Reducing our ecological footprint



Created using the Crossword Maker on TheTeachersCorner.net

Across

2. You should take your own shopping … every time you go to the supermarket.
7. It is necessary to adopt a … consumerism
8. We can improve the situation by reducing our water …
9. "Think globally, act …"
10. We should opt for 100% … paper

Down

1. We had better avoid buying products with too much …
3. The most important action in the Three Rs rule
4. Taking … transport is preferred instead of using the car.
5. Eco-… products have been designed to do the least possible damage to the environment
6. We must avoid … products, which are intended to be thrown away after use

ANNEX VI. DIDACTIC UNIT TEST

Test of the Unit "Human beings and the environment"

4th ESO A

SURNAMES: _____ NAME: _____

DATE: ____ / _____ / 2021

1.- Choose the option that best fits each sentence. [2 points]

a) The environment includes the following components that affect human activities

- ☐ Physical, chemical, biological, social
- ☐ Only physical and chemical
- ☐ Only biological and social

b) Fire was the main energy source in the human-environment relationship … phase

- ☐ Hunter-gatherer
- ☐ Agriculture
- ☐ Industrial-technological

c) Due to …, the combined effect of two impacts is often higher than their sum

- ☐ Negative feedback
- ☐ Synergy
- ☐ Biodiversity loss

d) Climate change is related to ocean...

- ☐ Pollution
- ☐ Alkalinization
- ☐ Acidification

e) … destroy the ozone layer

- ☐ Chlorofluorocarbons
- ☐ Ultraviolet radiations
- ☐ Acid rainfalls

f) The most preferred method in the waste management hierarchy is

- ☐ Reuse
- ☐ Prevention
- ☐ Recycling

2.- Identify the **environmental impacts** represented in these images and propose two human actions to improve the situation in each case. [1,5 points]



3.- Write a coherent **text** using all the following terms of the Unit: *climate change, atmosphere, greenhouse effect, global temperature, desertification, floods* and *Kyoto Protocol*. [1,5 points]

4.- Match each waste management method with its corresponding feature. [1 point]

Biological treatment	•	•	Collecting waste at an impermeable site and covering it with earth
Selective collection and recycling	•	•	Fermentation, digestion or oxidation allow to reduce or eliminate waste
Incineration	•	•	Extracting primary materials (e.g., plastic or glass) from waste
Landfill	•	•	Burning waste and using heat energy

5.- Explain why the following image represents the concept of **sustainable development**. [1,5 points]

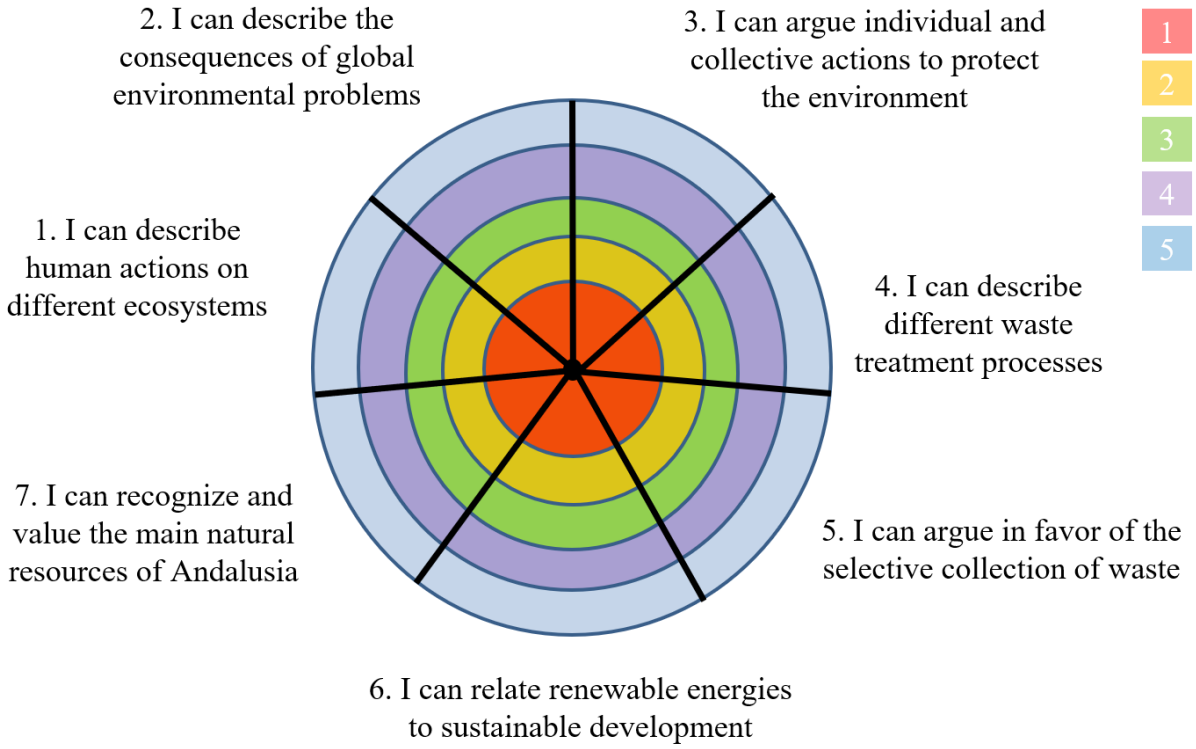
6.- Give two examples of **renewable energies**, indicating two advantages of each one. [1 point]

7.- How would you apply the **Three Rs rule** to the following objects? [1,5 points]

a) Used printer ink cartridge
b) Empty glass jar of jam
c) Old clothes

ANNEX VII. TARGET OF EVALUATION

On a scale of 1 to 5 – where 1 is “I know perfectly” and 5 is “I am not sure” – please rate the following assessment criteria of the Unit “Human beings and the environment”.



ANNEX VIII. REINFORCEMENT AND EXTENSION ACTIVITIES

Reinforcement activities

1.- What is a natural resource? Classify the following natural resources in renewable, non-renewable and potentially renewable: wind, iron, sand, biomass, oil, direct solar energy, tidal currents, forest, Earth's internal thermal energy and fertile soil.

2.- Design a concept map of the main waste management methods, including their most relevant features in each case.

3.- Fill the gaps with the word that fits each sentence:

a) _____ development is an economic model that meets current needs without threatening resources for future generations.

b) Environmental _____ are changes that cause an imbalance in the environment. Their origin can be natural, human or both.

4.- Write a list of eight habits that you could adopt to reduce your ecological footprint.

Extension activities

1.- Imagine that the population of a small island overexploits its trees to meet their wood needs, and eventually run out of them. Indicate the environmental and social consequences that this impact could have on this small island.

2.- Why are lichens said to be bioindicators of air pollution?

3.- Investigate whether the countries that signed the Kyoto Protocol have succeeded in reducing their greenhouse gas emission to the atmosphere.

4.- Investigate the causes of depletion of oxygen dissolved in water in the process of eutrophication. Make drawings to show the steps through which a lake undergoes this process.