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Master's Dissertation/
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A PRACTICAL PROPOSAL ON RECYCLING BASED ON CLIL DIDACTICS THROUGH PROJECT-BASED LEARNING

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ABSTRACT

This Master's dissertation aims to justify the importance for Primary Education of working on a latent and crucial issue for society: recycling. Its other aim is to promote interest in knowing about, designing and implementing didactic proposals based on Project-Based Learning (PBL) in the CLIL classroom.

In order to develop our proposal, the starting point is an in-depth theoretical study in which several concepts such as PBL and CLIL are defined. Also justified is the need to work on this matter in the subject of Natural Sciences and English and the way in which it is addressed in the Primary Education curriculum and the LOMLOE, together with the contribution of the 2030 Agenda to the latter educational law. In turn, the different types of competences that pupils should develop and enhance during this process are analysed, as well as a series of practical concerns that the project raises. Finally, a didactic proposal is made to work on recycling in a fifth year Primary school class through PBL and a CLIL approach.

Key words: PBL, CLIL, Recycling, Natural Sciences, Competences, LOMLOE

RESUMEN

El presente Trabajo de Fin de Máster persigue justificar la importancia que tiene para la Educación Primaria trabajar, por un lado, un tema latente y crucial para la sociedad: el reciclaje; y por otro lado, promover el interés por conocer, diseñar e implementar propuestas didácticas basadas en Aprendizaje Basado en Proyectos (ABP) en el aula AICLE.

Para desarrollar nuestra propuesta, se ha partido de una profundización teórica en la que se definen varios conceptos como el de ABP y AICLE. Además, se justifica la necesidad de trabajar este tema desde las aulas de Ciencias Naturales e Inglés y la manera en que se aborda en el currículo de Educación Primaria y la LOMLOE, así como la aportación de la Agencia 2030 a esta última ley educativa. Por su parte, se analizan los diferentes tipos de competencias que el alumnado debe desarrollar y potenciar durante este proceso así como una serie de preocupaciones prácticas que este tipo de proyectos presenta. Finalmente, se hace una propuesta didáctica para trabajar el reciclaje en una clase de quinto de Primaria mediante un ABP y desde un enfoque AICLE.

Palabras clave: ABP, AICLE, Reciclaje, Ciencias de la Naturaleza, LOMLOE

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1. INTRODUCTION AND RATIONALE

We are currently faced with environmental problems caused solely and exclusively by the humans and our need to consume. Throughout history, humans have dedicated themselves to making their lives more comfortable by using the resources that nature has to offer. However, this has been done in a very irresponsible way as these resources seem unlimited, but generally have a rather slow capacity to recover. Although all these issues have no solution as such, it is in our hands that this does not continue to worsen.

Therefore, one of the main goals of modern society is (or should be) to take care of the place where we live: our planet. And one of the ways to contribute to this is through recycling, as it involves small everyday actions that are within everyone's reach.

This topic has been chosen for this Master's dissertation for several reasons. The role of the school in dealing with environmental problems through education and training in values from Primary Education onwards is unquestionable. In this way, children will learn the immense importance of recycling and will become aware of the value of certain habits that help to protect the environment and reduce the impact that humans have on nature. Thus, they will be able to carry out small actions, not only at school but also in all the social areas in which the pupils will develop in their adult life.

For this to have an effective impact on students, it is necessary to bring them into real contexts and make their work have real meaning, and really have an impact on nature. But how can we deal with this topic in a way that is truly meaningful for primary school pupils? To do so, we will carry out a plan through Project Based Learning (PBL), an innovative methodology that is increasingly present in our classrooms but still has a long way to go. Although this concept will be discussed later, we can affirm that PBL seeks to provide solutions to real problems, making it ideal for dealing with recycling in the classroom.

Furthermore, depending on the curriculum we are working with, the type of PBL will vary. In this case, one must bear in mind that this work is aimed at the Content and Language Integrated Learning (CLIL onwards) classroom in Primary Education in Spain, and thus, the vehicular language will be English and the methodology will be bilingual. The curriculum it will be taken into account is the one established by the *Decreto 89/2014, de 1 de agosto, por el que se establece la ordenación y el currículo de la Educación Primaria en la Comunidad Autónoma de Canarias*and the subjects to be worked on will be Natural Sciences and English as a Foreign Language. In addition, the *Ley Orgánica 3/2020, de 29 de diciembre, por la que*

se modifica la Ley Orgánica 2/2006, de 3 de mayo, de Educación and the *Real Decreto 157/2022, de 1 de marzo, por el que se establecen la ordenación y las enseñanzas mínimas de la Educación Primaria* will also be taken into consideration.

Therefore, the aim of this work is, on the one hand, to investigate what PBL is and the characteristics it should follow, the regulations relating to it and how to deal with it according to the perspective and place where it is applied. On the other hand, it is necessary to promote interest in learning about, designing and implementing didactic proposals based on a PBL unit with primary school students in the CLIL classroom to work on recycling.

2. OBJECTIVES

The general objective is to design a PBL unit on recycling for 5th grade Primary school students for the subject of Natural Sciences following the CLIL methodology. In order to achieve this overall goal, the following specific objectives are pursued:

- To define the term Project Based Learning (PBL) and its characteristics.
- To justify why it is a good idea to carry out a project on recycling in the subject of Natural Sciences in CLIL.
- To raise awareness of the 2030 Agenda and its relation to LOMLOE and project-based learning.
- To explain the importance and implications of learning through enquiry-based leaning (EBL), competency-based learning and integrated language learning (ILL).
- To describe some of the concerns involved in putting PBL into practice.
- To design the CLIL recycling project for 5th year of Primary Education.

In order to meet these objectives, this work will be supported by a theoretical framework to deepen the complexity of concepts such as PBL, CLIL, Agency, the 2030 Agenda or the LOMLOE. Subsequently, a set of activities aimed at contributing to the final project on recycling will be presented. Finally, there will be a series of conclusions related to what has been presented throughout the work.

3. THEORETICAL FRAMEWORK

3.1. Destination PBL

3.1.1. What is PBL?

Firstly, to define PBL, one needs to consider the perspective from which we are going to view it. In its most formal definition, the Buck Institute for Education (2016) describes it as

"a teaching method in which students gain knowledge and skills by working for an extended period of time to investigate and respond to an authentic, engaging, and complex question, problem, or challenge". However, Vergara (2015) defines the term as a "learning strategy that seeks to create cooperative educational experiences that bring about personal and group change when confronted with them".

The first definition refers to PBL as a method, while, in the second case, it is seen as a strategy. Regardless of whether it is a method or a strategy, both coincide in the idea that it involves experiences and a level of challenge to find possible solutions or to satisfy a common need.

Therefore, this method helps learners to develop and enhance their different skills and competences from a multidisciplinary perspective. It encourages them to inquire, to investigate and to be active participants in their own learning. In short: it calls for action. PBL is, thus, referred to as a practice in which learners are encouraged to collaborate with each other from different disciplinary fields, to get involved in research projects to solve individual or collective questions and to contribute to the participation of other experiments (Reynolds, 2017).

As previously stated, although both definitions coincide with those of other authors, this will vary depending on the point of view from which we look at it. When putting it into practice, it is difficult to stick to the realisation of such a complex type of project as this one, as we are not always given the ideal conditions for this to happen (Demitroff and Reis, 2022).A Pre-primary teacher who develops a project within a published textbook series within her own classroom will have a different perspective from her Secondary colleague who has worked completely with a student-identified problem, driving question and whole team approach to sharing the unit with her colleagues.

3.2.1.1. What does PBL need to be of quality?

Not all schools are aware of the true meaning of PBL and what it entails. Therefore, it is very easy to confuse this concept with simply 'doing a project'. Although both concepts have many similarities: the learner is the centre of the educational action and has to use his or her knowledge to solve some kind of situation; that the project helps the development of the different skills of the students or that cooperative work is essential. However, there are different approaches to PBL.

As the name suggests, PBL is a project-based strategy, methodology or practice, but not just any project. The Buck Institute for Education (2016) defines on its website in more detail the main differences between PBL and what it defines as "doing a project". It refers to "doing a project" as "dessert", while PBL is the "main course" (Appendix 1).

Nevertheless, what does a PBL need to have in order to be defined as "high-quality PBL"? In order to answer this question, High Quality Project-Based Learning (HQPBL) (2018) has developed 'The Framework for High Quality Project Based Learning' which defines six essential criteria that must be present in these types of projects. However, just because a PBL has these criteria does not mean that it is 'high quality' per se. Depending on the project, each of these criteria will be assessed as having a greater or lesser quality influence on student learning.

These criteria are as follows:

Intellectual challenge and accomplishment: Projects should encourage learners to take the time to think and reflect critically about a problem, to ask questions about it and to study on how to find solutions to it. In other words, they should involve students in an intellectual activity rather than mere entertainment.

Authenticity: They must also be problems or situations that really exist in the outside world, which involve taking learners out of the classroom and making them see reality in order to work on it. In this way the class will feel that what they are acquiring has a real purpose and meaning, which will motivate them.

Public product: A quality project will give learners the opportunity to explain what they have learned to the world to people outside the school. It is not a learner-teacher-classmates presentation; they will need an audience (who may or may not be specialist in the subject) to listen to and be interested in what the class has produced.

Collaboration: Although there are small individual tasks, PBL involves learners working together on a common task, collaborating and supporting each other, sharing and respecting each other's ideas to improve and enhance their learning.

Project management: In everyday life, people organise and carry out a series of steps and procedures to achieve what they want to execute. This happens both in our working life and in our personal life. It works the same way in a project. It is important that learners are able to know how to take control over all the resources and tools and the time we need to accomplish the tasks.

Reflection: This is a key point in the process: both at the beginning, throughout and, not least, at the end. This will help learners to think about what they are doing well and what they could improve. It also helps them to reflect on what they are learning and how important it is, thus improving their self-esteem and motivation.

3.1.1.2.Agency: students take action

Motivation is related to will and interest and can be described as the impulses that incite to act in a certain way and not to give up until the initial purpose is achieved (Moreno-Garrido, 2010:2).For there to be motivation, willingness and interest, teachers must find the best way to encourage this in learners, to get them involved and actively participate in their learning.

This is when PBL might play a fundamental role in teaching recycling in the CLIL Primary classroom. Once pupils know that they are going to work on recycling, it is important to let them know that they are the ones who are going to decide what and how to work on it. We meet and agree on one of the key points of PBL: agency. What does agency mean in this sense?

PBL is considered an effective strategy to work with this concept, as agency refers to tools and processes that enhance learners' skills that will be useful, practical and necessary in the future. They promote the development of skills that will enable them to perform in any professional field, as well as the so-called 4Cs (critical thinking, creativity, communication and collaboration). It should be noted that for this to work, it is we ourselves who must bring about change, as this is only the pathway to it (Bjerede, 2017).

It has been seen that it is not only enough to follow certain steps to work on PBL, but that a number of other factors are required for this to become effective and be successful. At the beginning of this theoretical framework, six criteria were described for PBL to be considered quality. These six criteria not only support the development of the 4Cs, but also the deep learning and underpin the foundations of learner agency, i.e. "the tendency and ability for students, of their own volition, to improve or extend their own learning or learning environment" (Bjerede, 2018).

Thus, according to Demitroff and Reis (2022), agency, "as a pillar of the learner-centred curriculum, it's a HUGE concept that covers many aspects of the learning process. This refers to the possibility of letting learners actively take part in their learning process". With this definition and in order to better understand the concept, the authors reflect and ask

themselves if the learners have a say in what and how they are going to learn; if they can work individually and if we as teachers listen to them and respond to their curiosities and not so common questions.

In this way, in agreement with Self Determination Theory, there are three needs that have to be met. They are: relatedness, competence, and autonomy (Bjerede, 2018).

Relatedness correlates to the criterion of collaboration. It refers to the links between members of a group and the need for a sense of belonging in a group; *competence* is related to the criterion of intellectual challenge and allude to the ability to meet a challenge; and *autonomy* is referred to the ability to decide one's own action, to be able to decide what to do, how to do it and with whom.

In summary, it can be said that learner agency refers, on the one hand, to learners *taking action,* making sense of their learning and doing something with it: the final product of the PBL cycle. This final product can mean explaining recycling in a video or setting up a recycling system for the school community. It is about active citizenship.

On the other hand, it is about *voice and choice.* Choice is in the sense of being able to decide the subject of the project and how the pupils are going to learn; the degree of autonomy that the pupils have. Voice can be defined in terms of being able to ask all the questions they need to ask and to talk about the problems they encounter: in short, self-expression.

3.1.2. What does CLIL mean?

Having briefly defined what PBL is, now it is going to be seen why it is a good idea to work on recycling in a CLIL classrooms in the subjects of Natural Sciences and Foreign Language (English) by means of PBL. To do so, it is first necessary to define the term CLIL and its relation to PBL, in order to understand its meaning and its importance in this project.

Its acronym stands for Content and Language Integrated Learning (CLIL) and, although there are a multitude of definitions for this term, one of the most widely used is that provided by Marsh and Langé (2000: 2), who define it as "a dual-oriented educational approach in which an additional language is used for the learning and teaching of both content and language". According to Gerdes and Pavón (2008:16) "CLIL advocates assimilating the academic content of non-linguistic subjects via a foreign language, which simultaneously promotes the acquisition of content knowledge and the use of the target language".

As both definitions indicate, it has two objectives: the teaching of subject content and the teaching of a second language, which is used as a vehicular language for the first objective. They are, then, 'dual approach' methodologies (Coyle, Hood & Marsh, 2010), which are emerging strongly and arise from the need to improve the communicative competences of all citizens and, with it, the current need to master more than one language. In other words, all pupils should be multilingual or at least bilingual.

When talking about CLIL methodology, it is essential to mention the concept of 'scaffolding', which according to Mehisto et al. (2008) refers to it as different levels of learning construction, through which learners acquire new information on top of what they already know. It is based on the cognitive theory that language learning reaches a meaningful level for learners when content is presented in an engaging and productive way.

This methodology is based on four principles known as the 4Cs (different from the 4Cs for PBL mentioned above): Content, Cognition, Communication and Culture (Coyle, 2008). These are aimed at the full development of pupils and, therefore, the acquisition of the eight basic competences described in the Primary Education curriculum.

3.1.2.1. Relation between CLIL and PBL

According to Moliner-Iranzo (2017:23), "PBL has been heralded as an appropriate approach to foster content based second language acquisition", in other words, PBL is an "approach that makes CLIL methodology more effective" (Garay, n.d.).

Many authors agree that CLIL and PBL have many common features, and therefore, the application of both approaches in the classroom can only bring positive results. Moliner-Iranzo (2017) elaborates a table where she summarises many of the characteristics that both approaches (CLIL and PBL) have in common. These are the following (Table 1):

Common characteristics between CLIL and PBL	
PBL	CLIL
Cross curricular approach to knowledge Learner- centered Cooperative learning Meaningful communication (Development of the communicative competence) Comprehensible and varied input (Krashen, 1985) Language is a tool to achieve an outcome Teacher as a guide	

Learning how to learn
Formative assessment
Fosters students autonomy and motivation 21st century skills:
- Critical thinking
- Creative thinking
- Problem solving skills
- Decision making
- Cooperation
- Interpersonal skills
- Communication
- Creativity and innovation
- Digital competence

Table 1. Common characteristics between CLIL and PBL (Moliner-Iranzo, 2017:24)

As it can be seen in the table, the first common characteristic is their cross curricular approach to knowledge, since, through PBL, the learner has the opportunity to use and work on English from all the curricular areas. In this case, the area will be Natural Sciences. Furthermore, in both situations, the learner will be the centre of his or her learning, and autonomous learning and the ability to learn to learn are promoted. In any teaching-learning process, it is also essential to acquire critical thinking, especially when it is a project, which is achieved through analysis. In both cases, group communication is promoted and higher order thinking skills are fostered (Stoller, 2006).

Therefore, communication is paramount, as cooperative learning and social skills are part of both approaches. With this in mind, CLIL leaves behind traditional methodologies where the teacher is no longer the central axis, but the guide or facilitator to learning. It promotes current methodologies that help develop 21st century skills, which respond to innovative and creative approaches that, together with the use of technologies, aim to make learners connect with reality (Torrescusa-Asensio, 2018).

3.1.3. Why is it a good idea for CLIL, English and Natural Sciences to carry out a Project on recycling?

3.1.3.1.Recycling in Natural Sciences and CLIL

CLIL is a method that incorporates English into mainstream subjects in a more automatic and natural way. Language is at the centre of learning and it is integrated with the knowledge of the subjects pupils are learning. This avoids the idea of treating English as a separate or isolated subject.

In our case, the aim is to learn the contents of Natural Sciences using English as the vehicular language. It consists of the active use of the language through the teaching-learning process in order to facilitate its use in everyday situations that pupils will face in their lives. Recycling is a subject that could be taught in all areas of the curriculum, and, in fact, it should be present in all of them, even if not explicitly. However, its specific learning is associated with Natural Sciences, as we cannot forget that we have a structured curriculum and that, although there is always some flexibility of content, we have to stick to the established criteria.

Specifically, the subject of Natural Sciences dedicates a one particular section in Learning Block 4. 'Materia y energía' to talk about recycling and the need for its application. In this subject the pupils will work on energies, machines, resources and all those sources and materials that are responsible for causing damage to our planet. Therefore, it is important to teach how to make address these topics and to encourage an attitude of responsible consumption and recycling.

If we bring recycling into the CLIL classroom from the subject of Natural Sciences, pupils will not only learn the content of this topic, but they will also do it in another language. They will use English to learn an infinite number of concepts and expressions.

The purpose is to make the teaching-learning process dynamic and interactive, focused on projects and tasks, rather than purely theoretical knowledge. From the CLIL perspective, what matters is that the learner is able to communicate fluently in the foreign language and that he/she learns vocabulary and expressions about recycling. This methodology is viewed from a lexical rather than a grammatical perspective (Luján, 2016).

3.2. The 2030 Agenda, LOMLOE and competences

3.2.1. The 2030 Agenda

There are so many major challenges facing humanity that the need arose to draw up an action plan that aims to address them all. At the United Nations General Assembly, a series of objectives were agreed upon to face these challenges, among which are: equality between people, protection of our planet and ensuring prosperity. To this end, the 2030 Agenda for Sustainable Development was created, which was approved in September 2015 to meet all the goals within a period of 15 years. That is, from 2016 to 2030 (Ministry of Education and Vocational Training, 2020).

There are 17 Sustainable Development Goals (SDGs) set out in the 2030 Agenda, including SDG 4 "Quality education", which consists of "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all".

Appendix 2 shows a picture of the government's website with the 17 goals in full. In this respect, we are going to refer to the following: SDG 3 "Good health and well-being"; SDG 11 "Sustainable cities and communities"; SDG 12 "Responsible production and consumption"; and SDG 13 "Climate action", as these are the ones most closely related to the environment and recycling.

The "Good health and well-being" goal aims to reduce the impact of chemicals and pollutants on our health and that of our planet. With regard to "Sustainable cities and communities", more attention is paid to air quality and municipal waste management in order to reduce the negative environmental impact per capita of cities. “Responsible production and consumption" aims to promote environmentally sound management of chemicals, efficient use of natural resources and a reduction in food waste and wastefulness. And finally, "Climate action" seeks to implement essential measures to combat climate change and its effects, for example through the recycling of electrical appliances (Ambilab, n.d.)

Thanks to this action plan, it can be seen how in many countries there is progress in working towards these goals. However, although this project has had positive results, the speed with which they are being achieved has not been ideal. Therefore, the UN General Assembly has seen the need to call for renewed action and take further steps to accelerate this process.

Thus, the Secretary General of the Assembly wanted to promote and encourage the citizens of the world to turn the current period until 2030 into a 'decade of action', with the aim of mobilising society in all sectors and at three levels of action (The Agenda for Sustainable Development, n.d.).

1. Action at the global level, to ensure greater leadership, more resources and better and more effective responses to the SDGs.

2. Action at the local level in terms of policy regulations and financial plans, as well as government regulatory frameworks at the local level.

3. Action by people of all ages; the aim is to generate mobilisation from private sectors and circles, trade unions, the media and the rest of society to bring about these necessary transformations in the world.

There is no better place than the school to raise awareness of the 2030 Agenda, to show it to our pupils and encourage them to learn a little more about it. We must motivate them to get to know all these goals and make them want to show it to the world, starting with their families. In this way, we will all contribute to action by people of all ages and private sectors, i.e. to fulfil the third level of action. This will help to potentially lead to action at the local level and, ultimately, at the global level. Therefore, from the subject of Natural Sciences and English, this project on recycling could be the first step in making this happens.

3.2.2. LOMLOE: competence-based learning

The new LOMLOE law repeals the *Ley Orgánica para la Mejora de la Calidad Educativa* (LOMCE), and is in turn a partial modification of the *Ley Orgánica de Educación* (LOE).

The aim of the LOMLOE *(Ley Orgánica de Modificación de la LOE)*, according to the Government, is to ensure that the education and training system adapts to the constant changes of each moment in history, thus responding to the needs of the moment and to what is expected from them (Cambridge University Press, 2021).

Cambridge University Press (2021) describes the five essential points on which this law is based in order to increase educational and training opportunities, in accordance with the guidance of the European Union and Unesco. They are as follows:

1. It recognises the best interests of the child and places the rights of the child among the guiding principles of the system.
2. It promotes gender equality.
3. It promotes the continuous improvement of schools and the personalisation of learning.
4. It gives a central role to the development of digital competence.
5. It recognises the importance of education for sustainable development.

This new law now focuses on an open and adaptable model that aims to develop cognitive, social and emotional competences and skills in a cross-cutting manner, leaving behind the focus on traditional content-based learning. The LOMLOE sets three levels of competences and contents as the basis for the competency profiles at the end of basic education. These are: key competences, specific competences and basic knowledge (Cambridge University Press, 2021).

Firstly, key competences are defined as: "those that students must have developed by the end of compulsory education in order to be able to achieve personal fulfilment, exercise active citizenship, enter adult life satisfactorily and be able to develop lifelong learning throughout life" (MEC, 2022).

Key competences in the Spanish Education System are defined in the previous Acts and are listed and described in Article 9 of *Real Decreto 157/2022, de 1 de marzo, por el que se establecen la ordenación y las enseñanzasmínimas de la Educación Primaria*, as follows:

a) Competence in linguistic communication (CLC)
b) Multilingual competence (MC)
c) Mathematical competence and competence in science, technology and engineering (CMST)
d) Digital competence. (DC)
e) Personal, social and learning to learn competence (L2L)
f) Citizenship competence (CC)
g) Entrepreneurial competence (EC)
h) Competence in cultural awareness and expression (CAE)

As for the specific competences, they are at a second level of concreteness and refer to those related to each area and cycle. And finally, as regards basic knowledge, they are related to more specific aspects of each subject or learning area. Therefore, there are many specific competences and basic knowledge for each area, cycle and subject, which can be found in *Real Decreto 157/2022, de 1 de marzo*, mentioned above. They will be taken into account when drawing up teaching programmes, in addition to many other factors.

What does all this mean? Currently, in Spain, the aim is to have an educational model focused on competence-based learning. Thus, with regard to CLIL teaching, our students will need English not only for learning content but also for developing competences. Later on, the specific competences will be explained in terms of what the class will develop in our project. However, first, it will be shown how the 2030 Agenda is included in the LOMLOE.

3.2.2.1. The 2030 Agenda in LOMLOE

According to Negrín and Marrero (2021:25), the LOMLOE should include the provisions of the Action Plan for the Implementation of the 2030 Agenda in the field of education. Therefore, it includes it both in the preamble and in the fourth, fifth and sixth additional provisions.

As seen in the section dedicated to explaining what the 2030 Agenda is, the fourth goal (SDG-4) is dedicated to education, and facilitates mobility between economic and social sectors in favour of non-poverty, among other things, so that it has a great influence on the extent to which the remaining goals are fulfilled(UNESCO, 2017).

Therefore, by establishing education as a primary objective in the 2030 Agenda, it has become necessary to modify the LOE to reflect "the spirit of the same, as well as the SDGs in which education intervenes and integrating ESD-GCE in the education system, recovering curricular transversality and new transversal competences" (Negrín & Marrero, 2021:27).

Leichtet al. (2018:38) sees the need to further strengthen this link between sustainable development and education through the SDGs as bringing together all parts of the world to contribute to sustainable development and its progress over time and in all areas. These goals have contributed to fostering values, skills and competences needed in society. This should allow for a new approach in organising education in order to further promote values, skills, abilities and skills focused on sustainability, i.e. new curricular developments and competences.

The following is a list of the competences for sustainability that, according to Rieckmann (2018), are key to enhancing habits of action for sustainable development, as well as thinking skills. The following are associated with ESD and are the most internationally agreed (UNESCO, 2017):

1. Systems-thinking competence
2. Anticipatory competence, normative competence
3. Strategic competence Interpersonal or collaborative competence
4. Personal or self-awareness competence
5. Critical thinking
6. Integrated problem-solving competence

3.3. PBL through the enquiry-based leaning approach

As a starting point, we can see that "Enquiry-based learning is an approach to learning disciplinary knowledge that enables learners to develop a critical understanding of the world" (Roberts, 2013:50). Similarly, enquiry-based learning (EBL) can be defined as an approach to learning and teaching that moves away from the traditional method and encourages learners to investigate and provide answers to their own questions and interests through (Alpaslan, 2013:59):

1. Formulation of significant questions
2. Research strategy planning and implementation
3. Collecting data from different sources
4. The discussion of the information
5. Self-reflectionon what they have learnt.

PBL involves enquiry-based assignments by learners that encourage them to work on scientific, social and core curriculum content (Nastu, 2009). Thus, in terms of learner-centred instruction, according to Alpaslam (2013:59), PBL and EBL are closely related: "they go hand in hand".

Both PBL and enquiry-based learning are active learning methods that the teacher can use to engage pupils in authentic learning, learning connected to real-world experiences and discoveries. In this way, PBL is one of the approaches that EBL can take.

3.3.1. The challenge of competency-based learning

As mentioned above, PBL presents a challenge to learners, teachers and the educational context itself. It is also competence-based learning, not only those described in the primary curriculum but others related to 'enquiry', and it develops many kinds of skills. This means that for pupils to be successful in carrying out such a project, and for enquiry-based learning to work well, they need to be able to develop a range of skills such as the following:

Selecting. Learners have at their disposal a wealth of information of a diverse nature and presented in different formats. It is important for learners to know what kind of information they need and what format will be useful to them. In order to do this, they will need to examine the sources available to them and then select and work with the most useful information they extract from them.

Interpreting. As mentioned earlier, there are many formats for presenting information and, therefore, learners need to know what these are and how to interpret, read and understand them and then transform them. This task involves, for example, "understanding maps and graphs, analysing statistical tables, reading texts in a comprehensible way and interpreting photographs and films" (Roberts, 2013:50). All of this, obviously, adapted to the level and abilities of the learners, and the needs of the project.

Cross-checking. Then, from the information that has been selected and interpreted, it is important that they know how to cross-check it. To do this, the learners need to be critical

in consulting different sources, comparing and selecting them, but in a more thorough way (Roberts, 2013:50). It is about making sure that the information they are working with is scientifically-based or comes from reliable and real sources.

Summarising. In addition to the above, it is essential that learners know how to summarise. When we examine and select the information we consider most important, we are already beginning this process of summarising. According to Charoles (1991) summarising consists of taking a longer base text and reproducing a shorter one whose information is faithful to the original but which is formally different. It is therefore a matter of knowing how to read, understand, select and make the information your own. Something that can help us with this process is mind mapping.

Re-presenting. Once learners have made the information their own, it needs to be presented to the world in the way they have interpreted and elaborated it. To do this, learners have had to connect and make links between the new information they have gained and their prior knowledge from everyday life (Roberts, 2013:50), as well as connections between the various pieces of information they have encountered. It is now up to them to be able to represent the real-life situations they have researched and worked on through the project.

Collaborating. One of the characteristics of PBL is that learners work together. All of the above would not make sense in a project of these characteristics if there is no teamwork; collaborative work. Through it, students develop collaborative skills, such as interpersonal and intrapersonal competences that allow us to collectively solve a problem successfully or move towards a common goal: accomplishing the project.

3.4. Integrated Languages Learning (ILL)

The process of teaching and learning a language, as well as the development of different skills and abilities, is not an isolated or watertight process. Over time, there has been a growing awareness that the integrated learning of different skills brings far more benefits than their treatment in isolation. In the case of language, from a multilingual approach, Integrated Language Learning (ILL) or Tratamiento Integrado de las Lenguas (TIL) builds on this idea (Pereira et al, 2022).

The school curriculum in some Spanish regions includes the teaching of subjects in different languages, i.e. multiple languages converge in the curricular areas with the aim of teaching non-linguistic content through second languages (integrated content and language through CLIL methodology); as well as working on Integrated Language Learning or ILL. A

clear example is the Community of Navarre or the Basque Country, whose official languages are Basque and Spanish.

At first sight, Integrated Language Learning (ILL) may seem to be a very broad and complex term which is related to the processing of different languages at the same time. Moreover, it is often confused with the term of CLIL, as both deal with content and language learning. However, there are several differences between the two concepts.

The main difference is that while ILL deals with subject content in both Spanish and English (and sometimes other languages); CLIL focuses on teaching content through a foreign language. The ILL model can be said to be based on the CLIL methodology. Thus, taking the above into account, ILL enhances communicative competence in all languages as the knowledge acquired through and for languages is transferred from one language to another (Alonso, 2020). Based on this idea and the theory of Cummins (1979), all languages integrate a series of concepts, skills and knowledge that generate interdependence for speakers of two or more languages. This is due to the fact that speakers of more than one language have a centralised cognitive system that makes this happen.

Integrated Language Learning is a trend in language teaching which attempts to coordinate all the languages included in the curriculum and which are the object of learning so that they share the same educational programme. In this way, teaching programmes are created in which all the languages have a common methodology and share objectives and assessment criteria. It is important, therefore, that there is coordination between the content taught and organisation between teachers and school (Ruiz Pérez, 2008).

In plurilingual contexts, whose aim is therefore to develop plurilingual competence, there is a first language which is used much more frequently in the daily life of pupils (which is generally their mother tongue or tongues) and other second languages to which they also have access in certain areas such as school (Simard, 1997), and which it should b epromoted as much as possible.

Therefore, our aim is to bridge the gap between the mother tongues and the second languages by planning language work together in order to achieve greater development in all of them. The progress of language acquisition and the difficulties the learner has to face during learning will be determined by the linguistic distance between the L1 and the L2. If the learner is not able to understand information first from his or her L1, it will be much more difficult for them to understand it in a second language.

But how could this be successful? How can the teaching and use of so many languages be coordinated? For this to work, it has to be taken into account that it is hard work on the part of the teaching staff to programme in an integrated way. Thus, a project is needed to facilitate the realisation, coordination, organisation and implementation of the ILL model: the School Language Project (SLP).

3.4.1. ILL and SLP

Ruíz (2012) defines School Language Project (SLP) or Proyecto Lingüístico de Centro (PLC) as follows:

> Proyecto Lingüístico es el documento que, teniendo en cuenta los objetivos educativos y lingüísticos del centro y su realidad sociolingüística, recoge el conjunto de criterios de actuación y de organización por los que se regula y planifica la introducción, el grado de presencia yel tratamiento de las diferentes lenguas del currículo, y se fijan los medios y los recursos necesarios para garantizar un desarrollo coherente y coordinado de su proyecto bilingüe o plurilingüe en todos los ámbitos del centro (Slide 5).

In the following table, we present how teachers coordinate their work with ILL by means of the PLC. On the one hand, it shows what ILL requires from teachers and, on the other hand, how SLP facilitates or helps teachers in organising, planning and regulating it (table 2).

El Tratamiento Integrado de las Lenguas y El Proyecto Lingüístico	
El Tratamiento Integrado de las Lenguas exige que el profesorado:	**El Proyecto Lingüístico de Centro facilita que el profesorado:**
1. Forme un equipo docente que intervenga de manera coherente y consensuada	1. Tome decisiones de manera conjunta y las refleje en un documento compartido
2. Comparta conocimientos, reflexione conjuntamente sobre el T.I.L.	2. Encuentre tiempos y espacios comunes para la reflexión teórica
3. Analice su práctica docente y tome decisiones compartidas para mejorarla	3. Utilice herramientas de análisis adecuadas y recoja las decisiones consensuadas.
4. Introduzca modificaciones puntuales para actualizar y coordinar la práctica didáctica.	4. Decida qué modificaciones va a introducir y marque un protocolo de actuación común.

5. Elabore una programación coordinada de las diferentes lenguas del centro. 5.1. Asuma unos criterios de secuenciación comunes a todas las lenguas. 5.2. Adopte una metodología común en todas las lenguas. 5.3. Seleccione el material didáctico idóneo para trabajar en cada lengua	5. Acceda a modelos de programación y reflexiones sobre ellos. 5.1. Analice, decida y registre los criterios de secuenciación de los contenidos lingüísticos. 5.2. Observe diferentes metodologías y opte por la más apropiada. 5.3. Compare material didáctico diverso y establezca criterios de selección.

Table 2. El Tratamiento Integrado de las Lenguas y su reflejo en el Proyecto Lingüístico de centro (Ruíz, 2012: Slide 8).

Following the table above, firstly, through ILL, teachers form a team with all school staff to make decisions together and thus contribute to the development of pupils' competences. This is embodied in the SLP document. Secondly, ILL requires teachers to share their knowledge and reflect together on how to address the Integrated Language Learning. SLP facilitates joint teacher education, promotes collaboration and takes into account the connection between practice and theory among other things.

Thirdly, Integrated Language Learning requires teachers to analyse and improve aspects such as classroom organisation, materials used, language use, linguistic diversity, interactions and teaching practices, in order to finally make coherent decisions that fit into the SLP and the linguistic and social context of the school.

Fourthly, ILL involves introducing modifications to update and coordinate teaching practice. The SLP makes it easier for teachers to decide which ones to modify and to establish a common action protocol, incorporating assessment indicators for the different language skills into the different languages.

Finally, from ILL, teachers develop a coordinated programme for the different languages (e.g. Basque, Spanish and foreign languages) through the selection of assessment criteria, methodologiesand teaching materials. However, in order to do so, it is necessary to observe, analyse and compare the different options beforehand in order to finally decide and translate them into the SLP.

It should be kept in mind that changes in language teaching facilitate ILL (such as active teaching or project work) contributing to the development of linguistic communication competence (Ruíz, 2012; Slide 28). In our case, working from the SLP with an ILL model

would be ideal for the development of PBL, thus giving the possibility of not only working on the content of the subjects through a second language but also integrating all the languages of the curriculum, facilitating real uses of languages and real teaching contexts.

3.5. Practical concerns

Thus far, an overview has been provided of what PBL stands for, the importance of working on recycling in the subject of Natural Sciences and the relationship with the 2030 Agenda, the LOMLOE and its connection with competences, as well as Integrated Language Learning as part of the SLP, among other sections.

However, although in theory all this may seem relatively easy to connect in practice, when it comes to putting it into action there are a number of concerns that need to be taken into account for this project to work and make sense.

Firstly, and relating the concept of PBL in its 'pure' state to what the Buck Institute for Education refers to as the 'main course', it may prove to be an obstacle when considering the Spanish curriculum, which is loaded with content. The Spanish curriculum is quite dense and relies too much on textbooks. One might argue that often schools start with the intention of doing a PBL 'main course' and end up doing a 'dessert' project because conditions and circumstances do not allow it. This means that instead of making projects based on offering real solutions to social problems, where the final product is useful for the community, the projects are limited to fictitious situations that simulate reality, such as exhibitions of models or posters related to the topic. Therefore, they end up as school projects that do not exactly fit the ultimate goal they define as PBL.

In contrast to, for example, the American model ('pure' state), in Spain the KWL (what I know, what I want to find out and what I have learned) project format is often followed in pre-primary classes. Another concern is: how do *we* define PBL? If one is not going to follow PBL in its pure state as previously discussed; how does one then define PBL? In fact, there is no single way to do it, and therefore it is not easy to answer this question. This method of teaching and its success with it will depend to a large extent on the type of personality types involved, the class being taught, the methods being used and thousands of other variables, including the learning ability of the learners and the resources available and the level of support from the school. It must therefore be adapted and defined according to the country, the curriculum followed and other characteristics.

As mentioned above, it should not be forgotten that the Spanish curriculum is structured and organised by subjects. Nevertheless, although the projects revolve around a theme, which we generally pigeonhole in a specific subject, precisely the essence of PBL is that it does not want subjects, but projects in a multidisciplinary fashion state that requires activates all the students' skills. So it can easily limp along.

Therefore, it is also evident that it will be a competency-based work, otherwise how could the subjects be related? It would be impossible; consequently, its complexity allows it to have a huge inclusive-differentiated learning load. However, as Barbero-Andrés (2012:4) argues, "Unfortunately, Spanish curricula cannot be fully defined as competency-based curricula as they stick to a predictable design inspired in traditional curricula with just a superficial mention to this new concept of "basic competencies"".

To address this, it is therefore important to define from the outset the core competences to be worked on (both linguistic and non-linguistic) and how this is to be done. The skills needed for such a large-scale project, such as summarising, research, integrated language processing, working with large texts and collaborating are often neglected.

Children need skills to do secondary research, to summarise texts, to learn to work in a team and to work with various sources. All of these need to be built and worked on over the years as pupils move up the system. If this has not happened in school throughout primary school, the whole idea falls apart.

Throughout this theoretical framework the importance of enhancing learners' skills and competences has been discussed, but one issue of concern seems to be that the two concepts are often referred to interchangeably when in fact they are different terms. At the 2nd International Colloquium at the University of Porto, in response to a question posed by a participant, Marsh (2021, March 26-27) considered that no one has clearly defined competences for CLIL, making a distinction from the concept of skills. Meanwhile, the Americans consider that the use of competence really refers to skills, but the influence in European languages of EU-defined educational jargon results in skills being called competences.

Bearing in mind also that the PBL to be developed will be carried out using the CLIL methodology, it should be remembered that the four principles are the so-called 4Cs. And this is where Ball (2016:18-19) speaks of the missing 'C', i.e. the "absence of possibly the most important 'c' - that of competences". It is no longer about competences for the realisation of a

project per se, but for the process of learning a second language and learning content through a second language, which will also be the fundamental part of the project.

Furthermore, if it is just an English project focused on a small group, it will fail: the best decision is to make it a whole-school initiative. As Demitroff and Reis (2019) quote: 'it's only cool if it's with the whole school'. This would involve working with both the Natural Sciences specialist and the Spanish language teacher, as well as the English language teacher so that the communicative competences are worked on first the L1 and then the L2 over time. It would also be an idea to involve the rest of the teachers of other subjects to work on all skills.

In the case of agency, it should also be borne in mind that it must be developed over a period of years and through a whole-school approach, as it cannot be produced in pupils overnight. Therefore, it is a concept that must be made known and worked on from an early age and throughout the education system so that they gradually learn to have the necessary tools that will be useful, practical and necessary in the future. They should also form part of their daily lives, and not just for the project.

A final important point is the training of teachers and their coordination with the school, pupils and parents. In other words, for this to be really successful, teachers should be informed and trained, know what PBL consists of and how to work with the students and the rest of the school. The problem that often arises is that, as it is an innovative approach, it is possible that teachers are afraid of change (Borg, 2006), as they have to leave their comfort zone.

This is because, according to Pereira et al., (2022)it involves revising methodological approaches, which requires more work on the part of teachers and cooperation between teachers that favours the process. As a consequence, more time is needed to ensure success; time both to review their professional tasks and design the new approach and time for coordination, among other things. To this end, it is vital that there is an investment in the training of teachers and other staff involved in the project, as well as a study of the school's needs and linguistic reality.

4. PRACTICE PROPOSAL - PBL PROJECT

4.1. Introduction

The following didactic proposal has been developed taking into account the theoretical knowledge presented above. The proposal consists of a series of activities aimed at working

on recycling, not only in the classroom but also in the school environment and in the daily life of pupils, teachers and family through a second target language: English. For this purpose, the CLIL approach has been taken; this approach combines non-verbal content and English as an L2 to promote cooperative learning among learners through project-based learning.

This didactic proposal is part of a project that takes place every Friday in the Natural Sciences class and will last approximately one school year. From Monday to Thursday, the rest of the topics will be worked on using the textbook and other materials created by the teacher. Besides, this project will involve the whole school, including pupils, families, teachers and other school staff. The following sections describe the proposed intervention in detail: learning context, methodology, content and language objectives, session plans and assessment.

4.2. Context

4.2.1. *Description of the student group*

The following CLIL project plan has been selected for a group of 16 children in the fifth year of Primary Education aged 10 and 11 with an approximate A1.2 level of English, according to the CEFRL. The Common European Framework of Reference for Learning (CEFL) describes, among other things, the objectives, contents and methodology to be followed, as well as the levels of proficiency of the second language, which facilitates the control of the teaching-learning progress at each stage throughout the educational process of the learners. It is intended for the second language teaching community throughout Europe (Consejo de Europa, 2002: 1).

Most of the pupils have been in the same school since Pre-primary and have been together all these years, which is a great advantage because they all know each other very well and share interests. In addition, this increases their self-esteem and motivation to work, so they are very interested and willing to face any challenge they are given. They are also characterised by being a very active group, which is sometimes a disadvantage as it is difficult to settle them down and make them work in a relaxed manner. They all work at a very similar pace and their main interests are handicrafts and anything to do with manipulation and experimentation through the body.

4.2.2. *Description of teaching context*

It is a public bilingual Primary School located in a neighbourhood of the capital of Gran Canaria with a middle-class socioeconomic and cultural level. The school has several

facilities at its disposal and generally has no shortage of materials and resources, both technological and manipulative.

This class is equipped with a digital whiteboard, which the teacher uses to display content and show videos, images or activities; a tablet for each student; various types of manipulative materials such as notebooks, folders and sheets; and finally, a lot of recyclable material to raise awareness among pupils about the use of this material in their daily lives.

With regard to the organisation of the classroom, the arrangement of the tables is usually varied according to the activities we are working on. The aim is for pupils to work most of their time in groups of three or four, where each one has a role depending on the activity and number of people.

4.3. Methodology

The teaching methodology proposed for this project is based on the principles of PBL and CLIL described earlier. This methodology includes both the 4Cs framework and the four skills (writing, speaking, listening and reading), as well as the six essential criteria defined in section *3.1.1. What is PBL?,* for a Project-Based Learning to be defined as "high quality" according to High Quality Project-Based Learning (HQPBL) (2018).

It is therefore designed to develop as far as possible the communicative and collaborative competences of the learners, together with the secondary skills and competences characteristic of PBL, such as the personal or self-awareness competence, critical thinking or the skills of selecting, interpreting or cross-checking.

The aim of this communicative approach is to encourage the development of learning strategies that help improve the learners' autonomy and group work, through texts, authentic materials and interactive and practical activities (AA.VV: 2008)so that pupils can attempt to make the leap from imitating reality to providing answers to real problems.

Although this project is worked mainly from the areas of English and Natural Sciences, it has been designed from a multidisciplinary approach. This means that we will count on the collaboration of teachers of other subjects, such as Mathematics and Art Education. It is also intended that all teachers of the school are involved, doing small activities related to the topic or even their own didactic units, that will help the full development of the project.

In addition, there will be an English assistant, who will dedicate several sessions to working with them on vocabulary, practising the L2 orally and assisting the class in general, both with the target language and the content.

At the same time, ICT occupies a very important role in this project, both for pupils and teachers. As mentioned above, pupils need electronic devices to search for and work with useful data; this type of project especially helps to enhance their technological skills, information searches and manipulation or creation of materials, for which learners will use the Internet.

It is worth highlighting the role played by attention to diversity within this educational methodology, focused on improving educational success and individualised learner support. This approach aims to work through 'scaffolding', which is defined in section *3.1.2. What does CLIL mean?* Learners build new information from what they already know (Mehisto et al., 2008). This means that the activities proposed in this project are prepared so that each pupil receives specific support to solve a problem, generally in a collaborative or cooperative manner adaptable to any learning pace. Nevertheless, any activity can always be changed, substituted or adapted to the interests and needs of the learners whenever required.

For this to be most successful, most of the activities will be done through collaborative work, which can be described as a "successful teaching technique in which a group of people work together in smaller groups to which (part of) a project or task has been assigned" (Ortega & F.J. Ávila, 2021). Therefore, for a specific task, each member will have a defined role adapted to their needs and abilities. Each group will have a coordinator, a secretary, a spokesperson and a supervisor, who will be in charge of carrying out the corresponding tasks.

4.4. Content and language objectives

In first place, the activities described below are intended to develop all the key competences mentioned throughout the theoretical framework and the cognitive skills that correspond to: attention sustained (ASU); attention selective (AS); attention divided (AD); memory long-term (MLT); memory working (or short-term) (MST); logic and reasoning (LR); auditory processing (AP); visual processing (VP); processing speed (PS). In the sequence of sessions, the skills and key competence that each activity is intended to develop will be specified.

Secondly, for the description of the specific objectives of this project, we will take into account the LOMLOE, where the three levels of curricular concreteness described in section

3.2.2. LOMLOE: competence-based learning are set out. Table 3 in Appendix 3 shows the learning objectives and the level of concreteness that each activity of the project has in relation to the subject of Natural Sciences.

Finally, the specific content and language objectives of the CLIL lesson plan attached are described below, taking into consideration the 4Cs Framework and the BICS (Basic Interpersonal Communication Skills) and CALP (Cognitive Academic Language Proficiency). In this way, the 4Cs correspond to *content*: C1, *communication*: C2, *cognition*: C3 and *culture*: C4.

The objectives will be also classified according to HOTS (High Order Thinking Skills) and LOTS (Low Order Thinking Skills) and the type of level of understanding established by Bloom's taxonomy and reviewed by Anderson and Krathwohl (2001): 1. Remember, 2.Understand, 3.Apply, 4.Analize, 5.Evaluate and 6. Create. Lastly, regarding the language Triptych, the objectives will be also classified as Language *of* learning (LOL), Language *for* learning (LFL) and Language *through* learning (LTL) (Ortega & F.J. Ávila, 2021).

Following the criteria set out in the *Decreto 89/2014, de 1 de agosto*, mentioned above for the subject of English and criterion number one, four, five and six of the same Order for the subject of Natural Sciences along with the cross-curricular objectives, the following CLIL contents and language objectives will be taken into account (Table 4):

Objectives PBL Recycling for CLIL					
5th grade of Primary Education					
Content Objectives - Natural Sciences At the end of this unit, learners will be able to:		The 4Cs			
		C1	C2	C3	C4
LOTS (Low Order Thinking Skills)	Understand the different type of materials to recycle such as plastic, paper and glass (understand)	X			
	Classify the products according to the colours of recycling bins (apply)	X			X
	Understand the concept of ‘wish-cycling’ (understand)	X			
	Identify 'wish-cycling' materials and reflect on the products they themselves have 'wish-reclycled' over a week (understand and evaluate)	X		X	
	Visit and discover what the recycling plant looks like (understand)	X		X	X
	Create a survey following models (create)	X		X	
	Interview families about recycling at home (apply)	X	X		X

	Do research and report on how to recycle paper (understand and apply)	X		X	X
	Collect unused paper from school for X amount of time (apply)	X		X	
	Recycle paper using the appropriate steps they have previously researched (apply)	X		X	
	Relate the characters in the book with the actions they do (analyse)	X			
HOTS (High Order Thinking Skills)	Draw a mindmap of the recycling process and reflect on it (apply)	X			
	Identify and contrast the steps involved in the recycling process using two videos without sound (analyse)	X			
	Compare the recycling process in the Canary Islands with that of Atlantic County in the second video (analyse)	X		X	X
	Select the most relevant information from the recycling plant and produce a presentation about it (create, analyse and apply)	X	X	X	X
	Analyse the results (analyse)	X		X	
	Reflect on what goes wrong with recycling at home and think about possible solutions (evaluate)	X	X	X	X
	Reflect on the plastics used at home and what for, how long they last, etc (analyse and evaluate)	X	X		X
	Draw up a plan for the experiment following the appropriate steps (create and apply)	X		X	
	Analyse the plastic in different types of rubbish bags using the agreed procedures (analyse)	X			
	Conduct a recycling awareness campaign for the community (apply)	X	X	X	X
Language Objectives – English At the end of this unit, learners will be able to:		The 4Cs			
		C1	C2	C3	C4
CALP (Cognitive Academic Language Proficiency)	Understand written texts related to recycling - LFL	X			
	Know specific vocabulary related to recycling - LOL	X			
	Elaborate answers to questions about the recycling process using appropriate vocabulary, language functions, grammatical structures learned - LOL/LFL	X	X		X
	Identify and understand the information they are looking for on the internet about the topic: how to recycle paper, different type of plastic - LFL	X		X	X
	Understand the gist of short, well-structured written stories and identify the main characters and their actions - LFL	X		X	

	Write an authorisation for parents to sign - LFL	X	X		
	Translate Spanish recycling vocabulary into English and vice versa - LFL/LOL			X	
	Invent another ending to the story in writing - LFL	X		X	
	Make up and write a new story using the same vocabulary learned - LFL	X		X	
CALP and BICS	Guess the meaning of unknown words from the context in the book - LTL/LFL	X		X	X
	Work on intonation and pronunciation when reading the book and elaborating presentations - LFL				X
	Look up in on internet the meaning of vocabulary that is not understood - LFL	X		X	
	Deliver orally and in writing the simple presentation about their trip in the recycling plant - LTL	X	X		X
BICS (Basic Interpersonal Communicatio n Skills)	Develop a set of questions to ask the recycling plant and bus company before making the visit, about price to be paid, the rules to be followed or the specific address using the right key question structure - LFL	X	X		X
	Use everyday vocabulary, connectors and adverbs of frequency to express the content - LOL/LTL	X	X		X
	Interact and make oneself understood in short oral and written interventions such us interviews or phone calls - LFL/LTL		X		X

Table 4: Content and language objectives PBL Recycling for CLIL (author's own)

4.5. CLIL lesson plan: PBL

The duration of this project is one school year and will be carried out in 20 sessions of approximately 50 minutes each, including an outing of between two and three hours and a recycling awareness campaign, which will be the final product of the project.

Table 5 below has the sessions, activities carried out per session, organisation of the groups, resources to be used and setting where the activities will take place as well as the specification of the key competences and cognitive processes to be developed in each activity.

SESSION 1
The driving question: What happens to plastic/cardboard/brick/cans/ containers once they are used? (Recycling process)
This session will focus on the driving question. We will spend 10-15 minutes asking the question, looking at different materials or photos of them and reflecting on the first

ideas that come to mind. Then, Ss will talk for another 10 minutes about the objects they see, if they have ever used them and what they normally do with them, as well as work on the vocabulary/ expressions that can be used for this topic. Finally, the activity will be explained, which will be to draw up a mind map with their families explaining the process for the different materials we recycle after disposing of them in the bin.

Activity 1. Conceptual map

Cognitive process	Groups	Timing	Scenarios	Resources	Key competences
AS, MLT, MST, VP	Whole class Individual	50 mins	Classroom Home	Images or objects to recycle, a paper or any device where they can draw the map	CLC, MC, L2L, CAE

Explanation:

Projects are often planned around a driving question. That is, a class is motivated to investigate a topic that interests them. We started with a simple map, based on packaging/containers of already consumed products. Then, at home, they will work with their families to help them complete the drawing of where these products go. Some will have a clearer idea of where these products go: to the containers, then to the recycling plants... Perhaps others will think that they will end up in nature or in the sea. Once they have their maps ready, they will show to their classmates and discuss about what really happens.

Option 1. Ask the question and they will think about it and each person seeks ideas from family members and discuss them in class. They make the maps with their families.

Option 2. Show different products to recycle (bring them to class or show pictures), they reflect on them and each person seeks ideas from family members and discuss in class. They make the maps with their families.

SESSION 2

Watching videos in silence

In this session, the pupils will watch two videos without sound and then simplify the process with props and a basic explanation: the recycling centre inside and out; the rubbish trucks and workers; the different products and materials; the machines; the different processes the rubbish goes through (sorting, compression); etc. After that, they will have to reflect and answer a set of questions about the video, with the whole group

and in groups of 8 people.

Activity 2. Reflexion video 1.

Activity 3. Questions video 2.

Cognitive process	Groups	Timing	Scenarios	Resources	Key competences
ASU, AS, MST, VP	Whole class 2 groups of 8.	50 mins	Classroom	Video 1 and 2, a paper, notebook, or any device where they can write their answers. Appendix 4 - Questions	CLC, MC, DC, CC

Explanation:

First, they will watch **Vídeo 1:**https://www.youtube.com/watch?v=eQwf7wgJbes. After this, they will answer a few questions about it and discuss them with their classmates. Those questions would be: What are they doing? Where is the rubbish going? What colour are the bins? Are they doing the work well? Where is it? Are we doing it the same way? What do we see that is strange?

Then, they will watch **Vídeo 2**: https://www.youtube.com/watch?v=o-wBF84fr5Q. The class will be divided into two groups and each group will have a question to answer and must write their answers down: Group 1: What do we need to recycle? And Group 2: What process is followed to recycle (steps to follow)?

Finally we will play the video with sound and check if they had similar answers.

Video 2. **Recycling plant. Group 1**	**Video 2**. **Recycling plant. Group 2**
What do we need to recycle? *Possible answers: - Trucks - Machines - Personnel - Recycling products - Recycling plant	What is the process (steps)? *Possible answers: - Collect rubbish. - Take out large objects that obstruct. - Sorting process - Compression process

What questions do they have? Questions should arise as to why all the rubbish is collected together if we have to recycle and separate the materials. One answer may be that not all recycling plants are the same and this one works this way to 'make it easier

for the citizen'. In reality, it is much easier to recycle using the coloured bins because the process in the recycling plants is quicker. It stops materials jamming in certain machines and it doesn't take so much time to separate all the rubbish once it arrives at the recycling plant, but each material goes into its own bin and the waste is separated by procedures.

SESSION 3

Concept of 'Wish-cycling' (our first little experiment)

In the second video of the previous session (minute 3:13-: 4:00) the concept of 'Wish-cycling' is mentioned, which consists of the action of putting trash into the recycling bin hoping it can be recycled when, in fact, it is not. In this third session, this concept will be discussed and an experiment will be carried out to find out whether children 'wish-cycle' or not. They will also show their concept maps from Activity 1, explain the them and compare the content with what they have learned in the previous videos.

Activity 4. 'Wish-cycling' experiment.

Activity 5. Reflexion on the Conceptual maps.

Cognitive process	Groups	Timing	Scenarios	Resources	Key Competences
AS, AD, MLT, VP	Groups of 4	50 mins	Classroom	Video 2	CLC, MC, L2L CC, AE

Explanation:

The concept of 'Wish-cycling'; what does it mean? Vídeo (minute 3:13-: 4:00) https://www.youtube.com/watch?v=s4LZwCDaoQM

The aim is to found out if the pupils 'wish-cycle' or not. In groups of 4 they will recycle plastic/paper/glass/waste (one material per group) for a whole week, and we will call in experts to analyse our waste like the woman in the video does.

Option 1. When we go to the recycling plant (further on) the students will bring the rubbish bags with them to analyse them and see if they are doing it right. They will write down all those materials that we think we are recycling well when in fact we are 'wish-cycling'.

Option 2. We call an expert to come to the school and analyse our rubbish.

On the other hand, once they have seen and got a preview of what the recycling process

actually consists of, they are going to show their mindmaps and explain what they thought the process was like before they saw the video and the differences with the actual process.

SESSION 4

Planning our visit to the recycling plant in Gran Canaria.

During this session a trip to the recycling plant in Gran Canaria will be planned. To do so, in groups of 4, they will plan the outing through a series of activities such as: asking permission and making an appointment at the recycling plant, hiring the bus, drawing up authorisations for parents and making a list of the things needed for the visit.

Activity 6. Planning the trip

Cognitive process	Groups	Timing	Scenarios	Resources	Key competences
ASU, AS, AD, MLT, MST, AP	4 groups of 4	50 mins	School	Paper and pen Appendix 5 (trip list and rules)	CLC, MC, DC, L2L, CC, AE

Explanation:

First of all, the students will be put into three or four groups of 4 people and each group will be in charge of one activity. The first group will ask the company for permission to visit the recycling plant. They themselves will call and ask a series of questions that we have previously agreed on, such as how much it will cost, the rules to follow, the address, etc. They will also do this to hire the bus and other services that we need.

The second group will take care of the authorisations for the parents. They will make a model template including all the necessary information (day, time, price) and they will make them themselves to give to the families.

The third group will be in charge, on the one hand, of making a list of everything we need to take with us on the trip: comfortable clothes, food for the snack, camera, notebook to write new vocabulary down, etc. And on the other hand, to make the list of vocabulary we need to bring to our excursion, the questions we want to ask the professionals of the recycling plant.

Everyone had to prepare a range of topic-specific vocabulary and expressions for the excursion. In addition, in pairs they prepared one or two questions for the staff of the recycling plant.

SESSION 5

We visit the recycling plant in Gran Canaria.

It is time for pupils to visit the recycling plant. The pupils will observe the recycling plant process live: ask questions to the workers on site, teach English vocabulary to the company staff, etc.

Activity 7. Visiting the recycling plant.

Cognitive process	Groups	Timing	Scenarios	Resources	Key competences
AS, AD, MLT, AP, MST, VP	Whole class	2-3 hours	Recycling plan	Vocabulary list Appendix 5 (trip list and rules)	CLC, MC, L2L, CC, CAE

Explanation:

The idea is that the experts will explain something similar to the following video: https://www.youtube.com/watch?v=ID2hx8DJWJU.

Before leaving, they will check that they have all the money, authorisations and everything they need from the list they made in the previous session. Once they have checked that they have everything, they will go to the recycling plant.

On this trip, the experts will speak in Spanish as this is the Canary Islands (Spain). Here the children could 'teach' the staff how to say the key concepts in English. The vocabulary has been prepared beforehand and we have warned the plant that the pupils will try to say all the vocabulary in English. They will take pictures of the process, ask the staff their questions and revise what they have learnt in class about the recycling process, but this time experiencing it live.

Another activity during the outing will be to analyse the bags of rubbish that have been collected during this time to find out who has been 'wish-cyling' and with what materials.

At the same time, they can translate into Spanish material for the Atlantic County Utilities Authority in New Jersey.

SESSIONS 6 and 7

After visiting the recycling plant in Gran Canaria.

These sessions will be devoted to talking about their experience at the recycling plant, reviewing and working with the vocabulary involved and designing and delivering a

presentation about the visit.

Activity 8. Preparing the presentation

Activity 9. Delivering the presentation

Cognitive process	Groups	Timing	Scenarios	Resources	Key competences
ASU, AS, AD, MLT, MST, AP, VP	In pair Whole class	2 sessions of 50 mins each	Classroom	Ppt, Canva or any other. Laptop, tablet or any other devise to search information	CLC, MC, DC, L2L

Explanation:

In pairs, they will prepare a PowerPoint or Canva presentation of their visit to the recycling plant. They will use the photos they have taken on the trip, the answers of the questions they had prepared for the staff and, finally, they will answer the following questions: What do the recycling plants in the Canary Islands and Atlantic County have in common? What are the differences? Which one did they find better?

In session 7 each pair will present the previous presentation to the others and share their experiences with the whole class, answering questions such as: How did the visit go? Did everything go as we had planned? What new things did we learn?

SESSIONS 8 and 9

Interview to our families

During the next three sessions, a survey on recycling will be carried out with families. The pupils will develop a series of questions and analyse the answers and then think about what can be improved and how we can contribute to this.

Activity 10. Creating surveys

Activity 11. Analysing data

Cognitive process	Groups	Timing	Scenarios	Resources	Key competences
AD, MST, LR, AP, VP	Whole class Individually	2 sessions of 50 mins	Classroom Home	Paper and pen ITC devise Surveys	CLC, MC, CMST, DC, L2L, CC, CAE

Explanation:

During session 8 the teacher will show examples of surveys and then the whole class will elaborate a survey based on questions with different answer options such as: What measures do you use to recycle at home, what materials do you find most difficult to recycle, what kind of materials do you throw in the yellow/blue/... bin, do you always recycle, do you know the clean points, any questions related to wish-cycling, etc. And we plan how we are going to analyse the results; the pupils create percentage tables, etc. At the same time, the kids have given the statistics in mathematics class, so they will apply the acquired knowledge to data analysis.

Once the surveys are done, in Session 9, the results of all the surveys will be analysed in class and we will draw percentages from statistics. E.g. 80% of the people interviewed recycle at home. 18% do not know how to recycle, X% do 'wish-cycling' because they throw paper film into the plastic bin. Therefore, the mathematics teacher will collaborate in this activity.

Finally, they will reflect on what is going wrong with recycling and what measures can be taken to improve the statistics.

SESSIONS 10, 11 and 12

***LITERACY via a story* 'This is the bear'**

During these two sessions the pupils will work on Literacy through a very pleasant and easy to work with book where they will find a series of expressions and vocabulary related to the topic. From this book, they will work on a series of activities, such as creating another story using the same vocabulary or changing the ending of the same story.

Activity 12. Vocabulary we don't know

Activity 13. Put the pictures in the right order

Activity 14. Make up a new end. What would happen if...?

Activity 15. Write another story using the same vocabulary

Cognitive process	Groups	Timing	Scenarios	Resources	Key competences
ASU, AS, AD, MST, AP, VP	Individually Whole class Groups	2 sessions of 50 mins	Classroom	Book Appendix 6 (Example of activities)	CLC, MC, DC, L2L, CC, CAE

Explanation:

We watch this video and then act it out:

https://www.youtube.com/watch?v=Nb4ZjDvOYI0.

The idea is to work on LITERACY as it is very important in projects. As we have been working on soft CLIL so far, it is felt that the best way to work on language learning is through a picture book related to the topic. For this, the story 'This is the Bear' has been chosen, from which we will carry out a range of activities spread over these 2/3 sessions. 'This is the Bear' is a story about a bear that is pushed into a rubbish bin by a dog and is taken to a dump. The boy who owns the bear goes to look for him at the dump. He searches for a while through a pile of rubbish with the help of his dog and grumpy man. In the end, the bear is found and returns home with the boy and the dog.

This is a very readable and easy to work with book, with vocabulary related to the topic and very simple and useful verbs. From this book, students will tackle the following activities:

1. What vocabulary don't we know? What meaning do we deduce? Pupils will guess the meaning of the words they do not know. Then, they will look up the actual meaning to find out if the guessing where right.

2. Pupils will match the characters with the actions they did and relate them with the pictures once they have put the pictures in order.

3. What would happen if...? The teacher will ask the pupils to complete these questions with anything they want. After that, they will create a new end for the story.

4. With the vocabulary they have written down, pupils will come up with a new story, poem or song.

SESSIONS 13 and 14

Science experiment with paper.

For some time the pupils have been collecting already used paper for recycling and during these sessions they will look for information on how to recycle paper: processes to follow, materials to use, etc., and they will get down to work to do it themselves.

Activity 16. Research (write down the steps and materials needed)

Activity 17. Recycling paper

Cognitive	Groups	Timing	Scenarios	Resources	Key

process					Competences
ASU, AS, AD, MST, AP, VP	4 grupos de X Individuall y	2 sessions of 50 mins	Suitable and adapted space for the activity	2 wooden frames Tights or gauze, stapler, small hammer, tape, tub, sieve, container	CLC, MC, CMST, DC, L2L, CAE

Explanation:

The pupils will find out for themselves which material is the easiest to recycle, convert, etc., and will come to the conclusion that it is paper. Therefore, for a period of time, they are going to get people from the school to recycle all the paper they no longer use. The art teachers will collaborate with the group to make recycled paper bins and have a paper collection every so often (e.g. every week) to recycle the paper.

After that, children will do research about what paper is made of and how we can recycle it. We can also call in experts (e.g.: https://www.youtube.com/watch?v=XF6OV0brUC0).

Steps to follow:

- 1st Research what is needed and what processes need to be followed to recycle paper and write them down.
- 2nd Obtain the materials.
- 3rdLet's get down to work: we make paper and record the process on video to show to the rest of the school and families.

Option 1. We record the process on video.

Option 2. We make a workshop for our classmates. It is important to bear in mind that time restraints may be a real factor.

After the activity, the recycled paper can be used for other activities.

SESSIONS 15, 16, 17 and 18

Second science experiment: comparative study with plastic bags

During these sessions, a comparative study will be carried out to analyse the plastics from the bags and to find out which bag is the most suitable in terms of as capacity, resistance, weight, ease of use and ecology of the product. Here the maths teachers will collaborate with us to make calculations and statistics.

Activity 18. Research of plastics

Activity 19. Sciences comparative study

Activity 20. Analysis of results

Activity 21. Critical thinking activity

Cognitive process	Group	Timing	Scenarios	Resources	Key competences
ASU, AS, AD, MST, LR, AP, VP	4 groups of 4 Whole class	4 sessions of 50 mins	Class	Appendix 7 Appendix 8 Appendix 9	CLC, MC, CMST, DC, L2L, EC

Explanation:

Session 14 will be devoted to researching the different types of plastic that exist. In groups of four, the kids will do some research on the internet about the different types of plastic and those that are used for rubbish bags. Before starting the comparative study, they will answer a series of questions such as: What plastic is commonly used for rubbish bags? What is the average price of a plastic bag? How long do plastic bags usually last? Then, we will bring different plastic bags to the school to analyse to find out which one is the best to use.

Session 15 - We divide the class into groups of 4 and explain what we are going to do: the procedures to follow and the materials to use. They are asked: What criteria are we going to use to measure? What do we need for that? Then, they are given an index card with questions about the different criteria to write down the characteristics of the bags (Appendix 7) and we go on to analyse our bags in terms of: price (how much is the packet of bags worth? How many bags are there? So how much is each bag worth?) strength (length/width unstretched, stretched), ease of use (how comfortable is it? How are the handles?), "greeness" (information on the label, what is it made of and how long does it last?), capacity (we put in waste to see how much will fit).

Session 16 - Once we have completed the sheet with the characteristics of each bag by group, we are going to complete the comparative sheet for all the bags, i.e. a data recording sheet (Appendix 8). Which is the best plastic for the container bags? They will have an Additional Critical Thinking sheet with different situations to reflect on it (Appendix 9). This last paper will be in English and Spanish.

Session 17 - We will conclude with the plastic that is best for us based on all the characteristics. Then, together with the maths teacher, they are asked a series of questions and problems with which they will reflect and work on mathematical

competence.

SESSIONS 19 and 20.

Recycling awareness campaign

According to PBL purists, the end result of a project has learners informing their community about what they have learnt. For this reason, the final phase of our project is aimed at answering the following question: "How could we get our pupils to inform the community about taking care of our planet through recycling?"

For this, a recycling awareness campaign will be held where pupils will inform the community about what they have done during this process and how citizens can help contribute to the environment with small actions.

Activity 22. Showing what we have learned about recycling plant

Activity 23. Tips on how to avoid 'Wish-cycling'

Activity 24. Workshop for the community in how to recycle paper

Activity 25. The most suitable bin bag according to our criteria

Cognitive process	Groups	Timing	Scenarios	Resources	Competences
ASU, AS, AD, MLT, MST, AP, VP	In groups of 4 people	2/3 sessions of 50 mins	School	Activity 8 (presentation) Activity 16 and 17 (video and report) Activity 19 and 20. Materials needed as described in the activities above.	CLC, MC, L2L, CC, CAE

Explanation:

In this last campaign, the class-group will try not only to answer the initial driving question to the community, but will also expose the reasons why contributing to the care of our planet by recycling is not so difficult. The main aim is to raise awareness in their families, friends and other citizens (public event) of the importance of recycling and the measures we can take. Based on the activities that have been carried out throughout the course, pupils will be able to:

1. Explain what a recycling plant is and the importance of it (as well as the process it follows). For this, the pupils will show the presentations developed in activity 8 of this project, where the reflections, photos and other curiosities to which the recycling

personnel have responded are exhibited. 2. The concept of wish-cycling and what measures to take to avoid it. They will talk about the experiment they did and the main products that they themselves confused and 'wish-cycled'. 3. Do a workshop on how to recycle paper. Following the process they put in practice in activity 16 y 17, pupils will be able to show parents how to make their recycling paper. The option 2 is to show the video they have recorded about the experiment. 4. Explain which rubbish bag the most suitable according to the criteria described in activities 19 and 20. The pupils will also show the scientific experiment they have carried out and the results showing which bin bag is better. For this final activity, the children will work together in groups of four through collaborative work. They will have to share the tasks equally by applying what they have learned previously. To do this, they will work in groups of 4 or 4 people, thus forming 4 groups, each one in charge of a different task. In addition, each member of each group will have a role. For example, one of them will be the coordinator and will be in charge of distributing the tasks. The second child could be the supervisor, making sure that everyone is doing their work, has the necessary materials, etc. The third can be the person who explains to the community what each member is going to do and the activity to be carried out. And the last group of how to select the information that is going to be presented and that they have previously worked on.

Tabla 5. CLIL Lesson plan with sessions (own elaboration)

5.6. Assessment

The concept of assessment can be defined as “the process of gathering information to monitor progress and make educational decisions if necessary” (Overton, 2013). That is to say, the process of collecting, reviewing and continuously using information about education plans for their ongoing renewal and improvement, so as to ensure better results in their implementation.

Bearing this in mind, Llull et al. (2016:84) states that there are three types of assessment of learning: initial (for diagnostic purposes), formative (continuous evaluation throughout the whole learning process) and summative (to find out how much the student has learnt). In order to evaluate the activities that have been carried out in this project, as well as

the final result/activity, the objectives and competences set out in section 4.4 will be taken into consideration.

First, the initial assessment has been done beforehand and we already have a diagnosis of the pupils' prior knowledge of the subject from which we can start. Thus, throughout the process of the project, continuous or formative evaluation will be carried out with the aim of finding out how the teaching-learning process is developing as well as readjusting the contents to the level of the learners. To this end, a series of explanations and activities will be developed, such as the following, among others:

- Assessment tasks such as recall-vocabulary, recall-sentences, recall-text, application-text.
- Games such as Kahoot, Quizz and other interactive sites where learners have a multitude of games to keep them motivated.
- The European Language Portfolio, through which learners have been documenting their progress by recording their learning experiences throughout the academic year.
- A dossier in which the pupils will store activity sheets, such as those shown in the appendices, and other work they have produced.

Secondly, once the project has come full cycle, a final or summative assessment will be carried out to detect whether the children have achieved the proposed objectives. This will be done through a final activity: a recycling awareness campaign, in which all the knowledge acquired throughout the unit will be demonstrated and will be assessed using the self-assessment, co-assessment and evaluation rubrics set out in Appendices 10, 11, 12, 13 and 14.

Several rubrics will be used to assess the final task. First, each team will evaluate the other teams using the rubric attached in Appendix 12 dedicated to cooperative work. Then, they will fill in the same rubric used in the previous exercise to evaluate themselves (Appendix 11). The teacher will evaluate the presentation of the final activity, focusing mainly on the linguistic content (Appendix 13).

Eventually, the teacher will evaluate both the English and Natural Sciences contents, based on all the previous activities together with the final campaign. This will be done by completing the rubric attached in Appendix 14, which will serve to assess whether the pupils, at the end of the unit, have managed to meet the objectives described.

5. CONCLUTIONS

The initial purpose of this work was to justify the importance for Primary Education of working from the PBL approach using CLIL methodologies, in this case focusing on a crucial

issue in society: recycling. To this end, various aspects have been analysed, such as: the connexion between both concepts (PBL and CLIL) and how to work on them from Natural Sciences; the meaning of 'agency' and its importance for learners; the 2030 agenda and its presence in the educational curriculum and the contribution of competences to the LOMLOE, among other topics. This is followed by a series of conclusions that respond to the objectives pursued throughout the theoretical framework and the didactic proposal set out in the last section.

Firstly, it is necessary to mention that both the role of schools and that of families is fundamental for the full development of children in society and their contribution to it. For this reason, the creation of projects that involve all of these subjects in the treatment of the environment could result in a progressive improvement in the valuation and action towards the environment on the part of the pupils as future adults.

The second conclusion to be drawn is that, by working on PBL from CLIL, learners will have a reason to learn a second or third language, as they will be giving it a real meaning. It must not be forgotten that the ultimate aim of CLIL is for the student to be able to function in another language in certain areas, and that together with PBL, plurilingual education will motivate pupils to feel that they are fulfilling a real function through a real language.

All this leaves behind the traditional methods and theoretical explanations that they themselves can access via the internet through research, to promote 21st century skills (critical and thinking, problem solving skills, cooperation and interpersonal skills, among others) that will provide them with valuable tools for adapting to the demands of an expanding interdependent and globalised world.

With regard to the intervention proposal, previously in the theoretical framework, it has been necessary to dedicate a section to practical concerns, where it is highlighted the lack of time, the different definitions of PBL depending on the context or the need to work on the projects from the whole school and not a specific group of classes. Once the practical part of this study has been developed, the following limitations for working with PBL and CLIL have been found:

We start from the assumption that the proposal has not been put into practice and that it is not designed for an actual classroom, but rather a fictitious context where the conditions proposed are ideal for developing the project. It often happens that this situation is far removed from reality and there may be pupils in the class who have, for instance, a very low

level of the target language or who simply do not want to learn the language, so that strategies and solutions should be devised for these situations.

Another limiting factor is time, as these types of proposals are not usually included in the daily plans of the school, but are isolated ideas that not all teachers are willing to put into practice. Thus, there is a return to the structured curriculum, in which each subject has its fixed themes and a certain amount of time to dedicate to each of them. Often there is no physical time to work on the project fully and, simultaneously, cover other subjects in the established timeframe, so teachers have to eliminate many interesting proposals put forward in the projects and the final product does not end up being as it was originally planned.

Furthermore, and as mentioned on several occasions, other subjects and contents have not been dealt with in the present work due to the limited scale it has. It would be appropriate to create complete didactic units adaptable to all levels in which recycling is worked on. The project is designed to be a whole-school initiative; it could be questioned whether this is possible in practice.

Bearing in mind what has been explained in this MA dissertation and that preparation and coordination by the whole school community is essential, the focus should be on informing and training two fundamental figures in the education of the child: the family and the teachers. And this will require resources to enable us to do so. And the question is: are there really effective methods for training families and teachers in CLIL or PBL teaching? It would be interesting as a new line of research to look for training courses and other options offered to train these members of the educational community.

Finally, it can be concluded that although there is still a lot of work to be done so that bilingual education and PBL are more present in Primary classrooms. This is a difficult and costly goal to achieve, but it is possible to achieve and attain. However, resources and means must be sought to facilitate the process and a general interest must be promoted to help the new members of our society: the children.

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6.2. Educational legislation

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Decreto 89/2014, de 1 de agosto, por el que se establece la ordenación y el currículo de la Educación Primaria en la Comunidad Autónoma de Canarias.

7. APPENDICES

7.1. Appendix 1. Difference between a dessert and a main course project according to Buck Institute for Education (2016)

DESSERT "DOING A PROJECT"	MAIN COURSE PROJECT BASED LEARNING
An add-on to the traditional instruction; at the end (or alongside) of the unit	Instruction integrated into the project (The project is the unit!)
Follows direction of the teacher	Driven by student inquiry
Focused on product	Focused on product and process
Often unrelated to standards and skills	Aligned to academic standards and success skills
Can be completed alone and/or at home	Involves collaboration with students and in-class guidance from teacher
Remains within the school world	Has a real-world context and application
End result of project displayed in the classroom	Results of project shared beyond the classroom with a public audience

Source: https://www.pblworks.org/doing-project-vs-project-based-learning (screenshot)

7.2. Appendix 2.17 goals (SDG) according to United Nations.

Source:https://www.un.org/sustainabledevelopment/sdgs-framework-for-covid-19-recovery/ (screenshot)

7.3. Appendix 3.Table 3. Learning objetctives and level of concretness - Natural Sciences

TEACHING PROGRAMME 5º of Primary Education

Area: Knowledge of the Natural, Social and Cultural Environment (Natural Sciences) / **Theme:** Recycling

DESCRIPTORS RELATED TO AREA-SPECIFIC COMPETENCES:

Specific Competency 1	Specific Competency 2	Specific Competency 3	Specific Competency 5	Specific Competency 6
CCL3, STEM4, CD1, CD2, CD3, CD4, CD5, CCEC4.	CCL1, CCL2, CCL3, STEM2, STEM4, CD1, CD2, CC4.	STEM3, STEM4, CD5, CPSAA3, CPSAA4, CPSAA5, CE1, CE3, CCEC4.	STEM1, STEM2, STEM4, STEM5, CD1, CC4, CE1, CCEC1.	CCL5, STEM2, STEM5, CPSAA4, CC1, CC3, CC4, CE1

SPECIFIC COMPETENCES	EVALUATION CRITERIA	BASIC KNOWLEDGE	LEARNING OBJECTIVES	ACTIVITIES
Specific Competency 1. Manage digital resources in a safe, responsible and effective way, search for information, communicate, redesign and create the basis of education in digital content according to digital needs.	**1.1.** Use digital resources, search for information, and create simple digital content in an educational environment in a safe and effective manner.	**B. Technology and digitisation** **1. Digitisation of the personal learning environment** ▪ Digital devices and resources according to the needs of the educational context. ▪ Strategies for data collection, storage and representation to facilitate understanding and analysis.	- Use ICT devices and resources responsibly and efficiently, to search for information, communicate, work individually and in groups, and create simple digital content.	**Act 8, act 9, act 10, act 11, act 16, act 18, act 19, act 23 and act 24.**
Specific Competency 2. Formulate and answer simple scientific questions and explain facts and phenomena that occur in the natural, social and cultural environment, using different methods, tools and models of scientific thinking.	**2.1**. Demonstrate and maintain curiosity by asking questions and making informed predictions about the natural, social, or cultural environment. **2.2** Seek, select, and compare information from a variety of reliable sources, learn basic scientific vocabulary, and use it in	**A. Scientific culture** **1. Initiation in scientific activity** ▪ Phases of scientific research (observation, formulation of questions and predictions, planning, etc.). ▪ Appropriate instruments and devices for making observations	- Show curiosity about the process of recycling and action on the environment, asking questions and making predictions individually and in groups.	**Act 1, act 2, act 3, act 4, act 5, act 6, act 7, act 8, act 9, act 11, act 14, act 15, act 20 and act 21.**
	investigations. **2.3.** Plan and conduct guided experiments using a variety of research methods and models, appropriate instruments and equipment, make accurate observations and measurements, and record them correctly. **2.4.** Provide possible answers to formulated questions by analyzing the results, evaluate possible solutions, and compare them with predictions. **2.5.** Use scientific language to convey customized information and explain the steps taken.	and measurements. ▪ Basic scientific vocabulary related to different investigations. ▪ Encouragement of curiosity, initiative, perseverance and a sense of responsibility.	- Search for and select information from a variety of safe and reliable sources, acquiring and extending basic scientific vocabulary. - Elaborate answers to questions about the recycling process using appropriate vocabulary, language functions, grammatical structures learned. - Give possible answers to the questions posed. - Use research techniques and follow models. - Draw a mindmap and reflect on it.	
			- Present the results of a research task using different formats, using appropriate language and explaining the steps followed. - Represent situations in a team. - Write the script of a consultation.	**Act 17, act 19 and act 20.**
			- Design a survey/interview for families and carry it out. - Develop surveys through models. - Collect data on recycling action through an interview with families.	**Act 10 and act 11.**
Specific Competency 3. Solve problems through design projects and computational thinking that together produce creative and innovative products that meet specific needs.	**3.1.** Produce simple final products in a guided manner, provide solutions to design problems, and test several prototypes in a team. **3.2.** Present the final product of a design project orally or graphically and explain the steps in a scripted manner.	**B. Tecnología y digitalización** **2. Proyectos de diseño y pensamiento computacional** ▪ Técnicas cooperativas sencillas para el trabajo en equipo y estrategias para la gestión de conflictos y conductas empáticas e inclusivas.	- Conduct a recycling awareness campaign for the community. - Recycle paper using the appropriate steps they have previously researched. - Hold a recycled paper making workshop with parents and friends. - Deliver orally and in writing the simple presentation about the	**Act 6, act 8, act 9, act 10, act 11, act 17, act 22, act 23, act 24 and act 25.**

			recycling plant. -Interact and make oneself understood in short oral and written interventions such us interviews or phone calls.	
Specific Competency 5. Identify the characteristics of the natural, social and cultural environment, analyze its organization and characteristics and create relationships between them to determine the value of cultural and natural heritage, protect it, improve it and act responsibly towards it.	**5.1.** Identify and analyze the characteristics and organization of the elements of the natural, social, and cultural environment through research using appropriate tools and processes. **5.2.** Make simple connections between different elements of the natural, social, and cultural environment and show understanding of the relationships formed. **5.3.** Evaluate and demonstrate attitudes toward the conservation and value of natural and cultural heritage through actions that reflect a commitment to sustainability.	**A. Scientific culture** **2. Life on our planet** ▪ Basic aspects of human life functions from an integrated perspective. ▪ Guidelines that promote adequate emotional and social health: contact with nature, appropriate use of digital devices, strategies for the promotion of healthy social relationships.	- Understand the concept of 'wish-cycling' - Identify 'wish-cycling' materials and reflect on the products they themselves have 'wish-reclycled' in a week - Visit and discover what the recycling plant looks. - Select the most relevant information from the recycling plant and produce a presentation about it. - Compare the recycling process in the Canary Islands with that of Atlantic County in the second video.	**Act 1, act 2, act 3, act 4, act 5, aact 7, act 8, act 9, act 22 and act 23.**
Specific Competency 6. Identify the causes and consequences of human intervention in the environment from a social, economic, cultural, technological and environmental perspective in order to improve the ability to face problems, seek solutions and solve problems individually and collaboratively.	**6.1.** Promote sustainable lifestyles based on an analysis of human intervention that respects, shares responsibility for, and protects the planet.	**C. Societies and territories** **4. Ecosocial awareness.** ▪ Eco-social responsibility. Eco-dependence, interdependence and interrelation between people, societies and the natural environment. ▪ Sustainable development. Human activity on space and the exploitation of resources. The Sustainable Development Goals. ▪ Urban Agenda. Sustainable urban development.	- Analyse the plastic in different types of rubbish bags using the agreed procedures. - Conduct a recycling awareness - campaign for the community. - Reflect on what goes wrong with recycling at home and think about possible solutions. - Reflect on the plastics used at home and what for, how long they last, etc	**Act 10, act 11, act 19, act 22, act 23, act 24 and act 25.**

Source: Author's own (following the *Real Decreto 157/2022, de 1 de marzo, por el que se establecen la ordenación y las enseñanzas mínimas de la Educación Primaria* criteria)

7.4. Appendix 4. Activity 3 – Recycling plant

Activity 3 - Video Recycling plant

Group 1

1. What do we need to recycle??

In the recycling plant, the following elements are needed for recycling:

1.

2.

3.

4.

5.

…

Activity 3 - Video Recycling plant

Group 2

2. What process is followed to recycle?

The steps to be followed in the recycling plant are:

1st

2nd

3rd

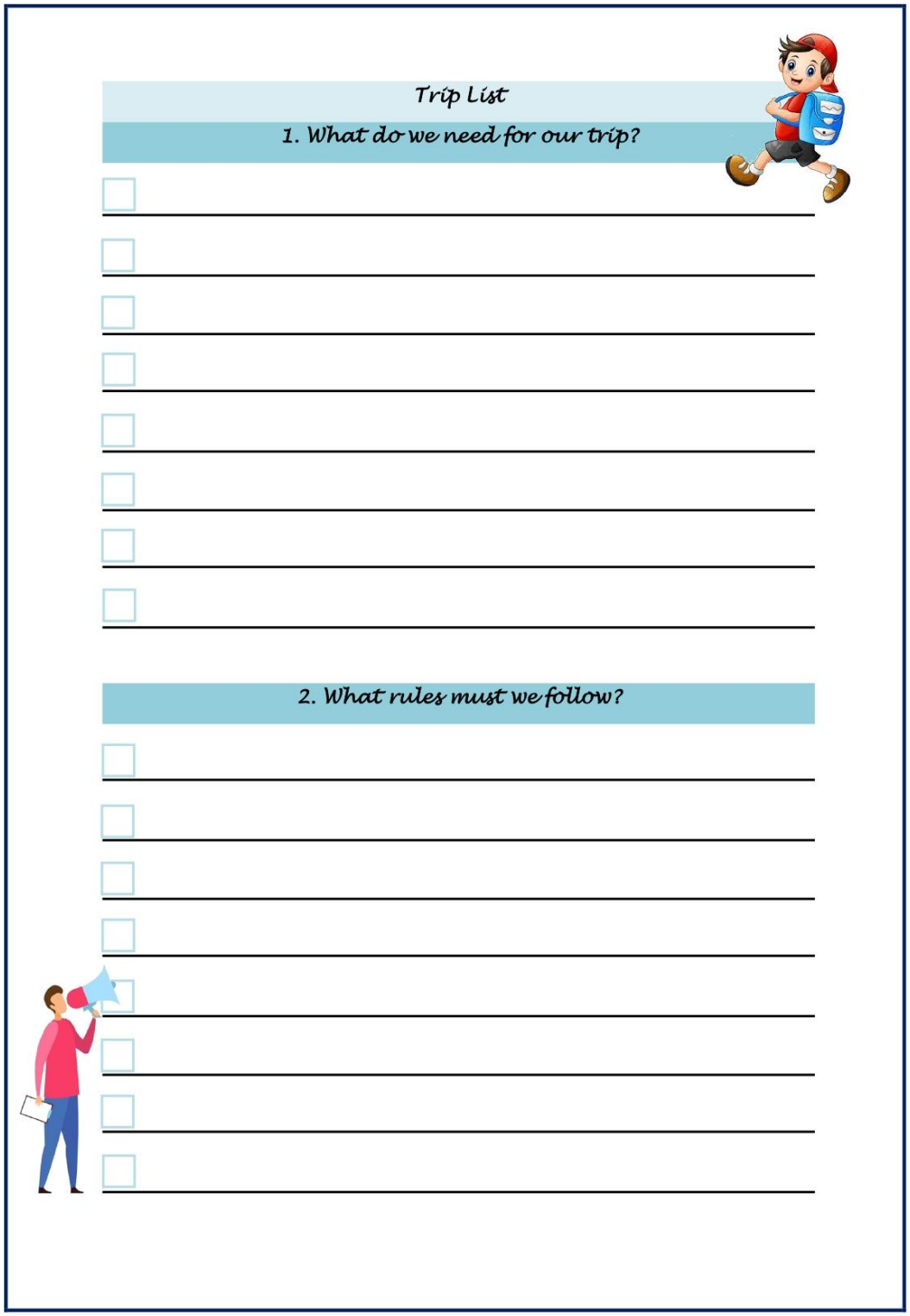
4th

5th

…

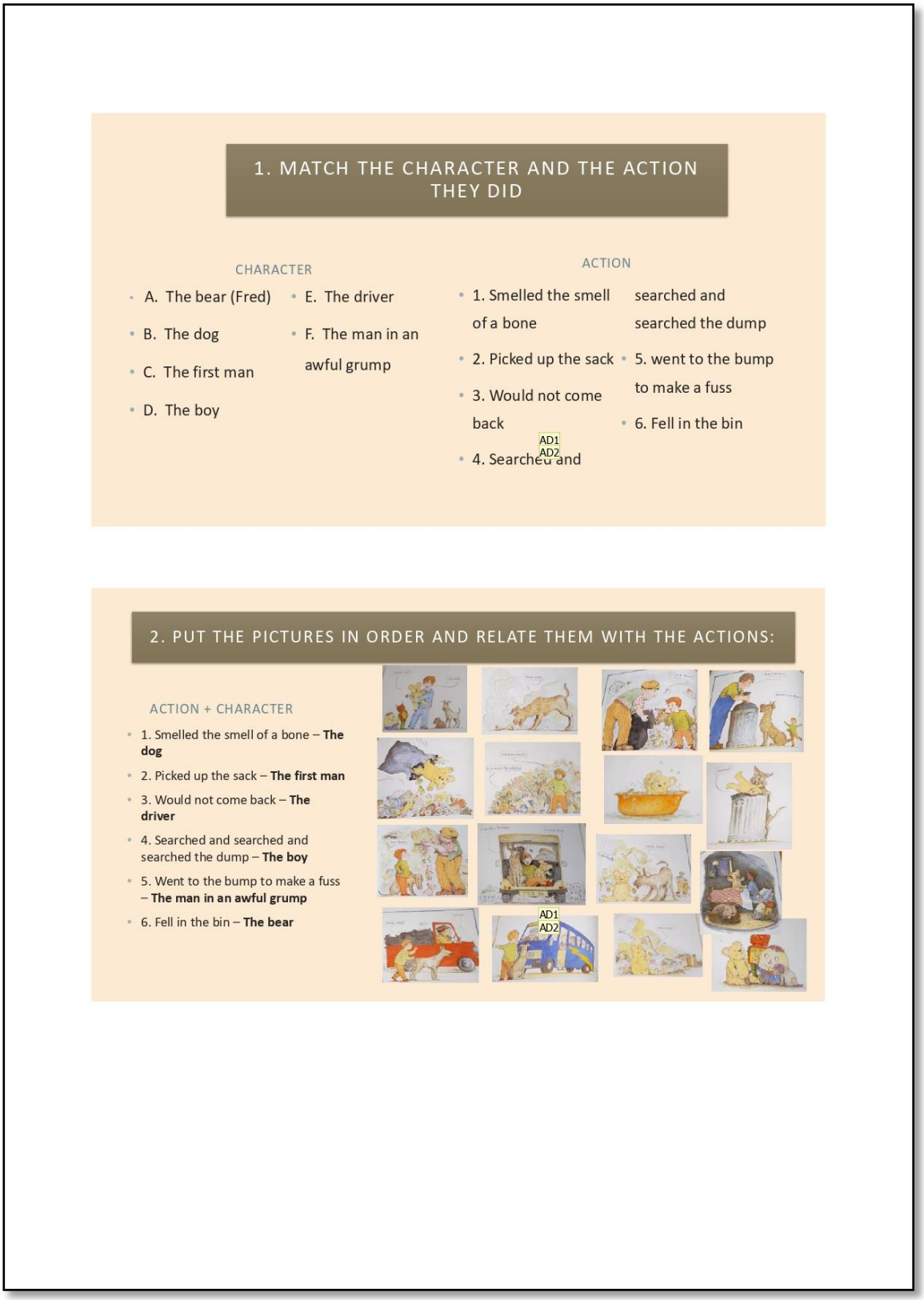
Source: Author's own

7.5. Appendix 5. Trip list and rules sheet



Source: Author's own

7.6. Appendix 6. Activities 'This is the Bear'



Source: Author's own

7.7. Appendix 7. Plastic bag criteria for science comparative study

Group's name: _____

Plastic bag: _____

Plastic bag criteria

Price

- How much is the packet of bags? _____
- How many bags are there? _____
- So how much does each bag cost? _____

Strength

Here you will have a piece of you plastic bag of 12cm x 3cm and you will measure the length and width once we have stretched it.

- How long is the piece of plastic before stretching?_____
- How long is it after stretching? _____

Ease of use

- How comfortable is the bag? _____
- How are the handles?_____
- Score from 1 to 5: _____

Capacity

- How many cans of soda can you fit in a bag?_____

"Greeness" (information on the label)

- What is it made of?_____
- How long does it last? _____

Additional characteristics:

_____

_____

_____

Source: Author's own

7.8. Appendix 8. Data collection sheetfor science comparative study

Name: _____Date: _____ Class: _____

Data Collection Sheet

Plastic bag Type	Original Size		After Stretching		Price	Easy to use	Capacity	Greeness
	Length	Width	Length	Width	Nº Cans	From 1 to 5	Nº Cans	duration
Plastic bag A								
Plastic bag B								
Plastic bag C								
Plastic bag D								

Critical Thinking! Based on your experimental results, answer the following questions:

1. **Which plastic bag is the most elastic? And the least?**

   _____
   _____
2. **Which is the cheapest plastic bag?**

   _____
   _____
3. **Which is the easiest plastic bag to use?**

   _____
   _____
4. **Which is the bag with the largest capacity?**

   _____
   _____
5. **Which plastic bag would be the best for the environment? Why?**

   _____
   _____
6. **In your opinion, which is the best plastic for the container bags? Why?**

   _____
   _____

Source: Author's own

7.9. Appendix 9. Additional critical thinking! for science comparative study

Name: _____Date: _____ Class: _____

Additional Critical Thinking!

1. In all areas of engineering and business, employees perform cost-benefit analyses to help them make smart decisions. A cost-benefit analysis is simply an investigation of whether the benefit of the item is greater than the cost to produce or purchase it. For example, a carpenter would definitely purchase an expensive tool kit if she planned on using the tools every day. Along the same lines, the factory making the tools would not produce them if the tools cost too much money to manufacture for a price people were willing to pay.

Thinking about the plastics in the activity, suppose that these are the costs of each plastic/pound in the study:

Material	Cost/Pound
grocery store plastic	$0.50
dry cleaner plastic	$0.75
department store plastic	$0.95
milk container plastic	$1.50
medical examiner glove	$1.75

Question A: You are a department store owner who does not charge customers for bags when items are purchased. If you can no longer purchase the department store bags because of a shortage, which plastic material makes the most sense to use as a substitute?

_____

_____

Question B: What would be the benefits of using the substitute plastic? Would you save money or spend more money? Note: Your store wants to provide its customer with free bags!

_____

_____

_____

_____

The Plastic Test Activity—Data Collection Sheet 1

Source:https://www.teachengineering.org/activities/view/nyu_plastic_activity1 modified by the author

7.10. Appendix 10. Peer-assessment

Name of the partner: _____				
Aspects	*Level*			
	Always 	*Sometimes* 	*Rarely* 	*Never* 
He/she participates in team decision-making				
He/she has a positive attitude to work				
He/she fulfils assigned tasks				
He/she supports the partner when she/he needs it				
He/she collaborates in the final presentation				

Source: Author's own

7.11. Appendix 11. Self-assessment

Name: _____				
Aspects	Level			
	Always 	Sometimes 	Rarely 	Never 
I participate in team decision-making				
I have a positive attitude to work				
I fulfil the assigned tasks				
I support my partner when she/he needs it				
I collaborate in the final presentation				

Source: Author's own

7.12. Appendix 12. Collaborative group assessment

On a scale of 1 to 4 – where 1 is 'Not achieved' and 4 is 'Very achieved' – please rate the following aspects described in the table for each member of the group			
Not achieved - 1	**Very little achieved - 2**	**Achieved - 3**	**Achieved to a high degree - 4**

Trabajo cooperativo				
Team:_____ *Task:_____*	*Coordinator*	*Secretary*	*Spokesperson*	*Supervisor*
Aspects	*Rate from 1 to 4*	*Rate from 1 to 4*	*Rate from 1 to 4*	*Rate from 1 to 4*
He/she actively participates in the team				
He/she shows initiative and makes proposals for achieving the task				
He/she respects the ideas and opinions of others				
He/she is respectful of the team				
He/she does each individual activity within the established time				
He/she helps colleagues to achieve their objectives				
He/she works hard on tasks				

Source: https://www.orientacionandujar.es/2020/05/24/rubrica-para-evaluar-cooperativo/ modified by the author

7.13. Appendix 13. Evaluation oral presentations

	Exelent (10-9)	**Very good (8-7)**	**Good (6-5)**	**Need to improve (4-)**
Vocabulary	The student uses a rich and varied vocabulary	The student uses a varied vocabulary	The student uses a more limited vocabulary	The student uses a vague and generic vocabulary
Grammar	The student uses complex grammatical structures	The student uses correct grammatical structures for the most part	The student makes some errors in grammatical structures	The student uses incorrect grammatical structures for the most part
Pronunciation	The student pronounces in a clear and error-free manner	The student pronounces in a clear manner but makes some mistakes	The student sometimes finds it difficult to express him/herself clearly	The student does not manage to express him/herself clearly
Fluency	The student speaks confidently with appropriate speed and expression	The student usually speaks confidently with appropriate speed and expression	The student gets stuck and does not manage to speak confidently for the most part	The student gets stuck and does not manage to speak confidently.
Content	The content is very relevant	The content is relevant	The content is fairly relevant	The content is not relevant enough

Source: Author's own

7.14. Appendix 14. Final assessment

Criteria	*Score*				
1 (insufficient) / 2 (to improve) /3 (sufficient) /4 (well done) / 5 (excellent)	*1*	*2*	*3*	*4*	*5*
Natural Sciences - The student:					
Understands the different type of materials to recycle such as plastic, paper and glass					
Classifies the products according to the colours of recycling bins					
Understands the concept of 'wish-cycling'					
Identifies 'wish-cycling' materials and reflects on the products they themselves have 'wish-recycled' in a week					
Creates a survey following models					
Interviews families about recycling at home					
Does research and reports on how to recycle paper					
Recycles paper using the appropriate steps they have previously researched					
Relates the characters in the book with the actions they do					
Draws a mindmap of the recycling process and reflect on it					
Identifies and contrasts the steps involved in the recycling process using two videos without sound					
Compares the recycling process in the Canary Islands with that of Atlantic County in the second video					
Selects the most relevant information from the recycling plant and produces a presentation about it					
Analyses the results					
Reflects on what goes wrong with recycling at home and thinks about possible solutions					
Reflects on the plastics used at home: what for, how long they last, etc					
Draws up a plan for the experiment following the appropriate steps					
Analyses the plastic in different types of rubbish bags using the agreed procedures					
Conducts a recycling awareness campaign for the community					
English – The student:					
Knows specific vocabulary related to recycling					
Elaborates answers to questions about the recycling process using appropriate vocabulary, language functions, grammatical structures learned, etc.					
Identifies and understands the information they are looking for on the internet about the topic: how to recycle paper, different type of plastic					
Understands the gist of short, well-structured written stories and identify the main characters and its actions					
Writes an authorisation for parents to sign					
Translates Spanish recycling vocabulary into English and vice versa					

Invents another ending to the story in writing					
Makes up and writes a new story using the same vocabulary learned					
Guesses the meaning of unknown words from the context in the book					
Works on intonation and pronunciation when reading the book and elaborating presentations					
Looks up on internet the meaning of vocabulary that is not understood					
Delivers orally and in writing a simple presentation about their trip in the recycling plant					
Develops a set of questions to ask the recycling plant and bus company before making the visit related to: the price to be paid, the rules to be followed or the specific address using the right key question structure					
Uses everyday vocabulary, connectors and adverbs of frequency to express the content					
Interacts and makes oneself understood in short oral and written interventions such us interviews or phone calls					
Final Score:					

Source: Author's own