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Trabajo Fin de Máster

NATURALISTIC INTELLIGENCE DEVELOPMENT THROUGH COOPERATIVE LEARNING METHODOLOGY IN CLIL LESSONS

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ABSTRACT

Society and the educational system ask for potential changes in the traditional way of teaching. Because of globalization, people might communicate in a common language, English. Bilingualism is a solution to the need of learning the English language in an effective way, and educational politics have focused its attention on it. However, the problem lies in the way of implementation.

The purpose of this MA dissertation is to show an effective way of implementing the bilingual method CLIL based on the cooperative methodology. Using cooperative learning might enhance students' English proficiency through learners' interactions. Moreover, in order to keep students motivated, the cooperative methodology is worked together with the Multiple Intelligence Theory by Howard Gardner. Therefore students are able to discern which are their skills or powerful intelligence, while improving weaker intelligence through peer learning.

KEY WORDS: CLIL, cooperative learning, multiple intelligence theory, student-centered methodology, bilingualism

RESUMEN

La sociedad y el sistema educativo actual precisan de cambios orientados a romper con el modo tradicional de impartir las clases. Uno de esos cambios es promovido por la globalización y la necesidad de las personas de comunicarse en un lenguaje común, el inglés. Una solución es el bilingüismo, y las políticas de educación se han centrado en ello. Sin embargo el problema de estas propuestas surge en la implementación.

El objetivo del Trabajo Fin de Máster es mostrar una forma efectiva de implementación del método AICLE basado en la metodología cooperativa, que promueve el perfeccionamiento del inglés gracias a las interacciones entre los estudiantes. Además, para incrementar la motivación del alumnado se va trabajar con la Teoría de las Inteligencias Múltiples de

Horward Gardner. Así, los estudiantes serán capaces de averiguar cuáles son sus inteligencias potenciales, al mismo tiempo que mejorarán el resto de inteligencias mediante el aprendizaje entre iguales.

PALABRAS CLAVE: AICLE, aprendizaje cooperativo, teoría de las inteligencias múltiples, metodologías centradas en el alumnado, bilingüismo.

1. INTRODUCTION

In the current educational centers, the adaptation of the educational processes to students' reality is one of the necessities that most worries teachers. Schools are facing a society immersed in a process of continuous change, which in turn requires education to adapt to these transformations.

The main problem of the educational system is the speed at which society is developing. Experts in the field, such as Gerver (2010), define the current educational system as an anachronistic system that is not capable of adapting to society. There is a great obsession with achieving goals, and this is one of the main causes that Gerver relates to school drop-out by many students, because they do not feel any passion, nor emotion by the process, and the end is very far away (Gerver, 2010).

The second consequence of the ways the teaching-learning processes is carried out is the frustration that teachers suffer due, mainly, to the absence of support from society and from the educational system itself in its change from former methodologies to innovative ones (Gerver, 2010).

Today's school should undergo a radical change and integrate, as society has done, into the digital culture of communication. Making information and communication technologies part of the teaching methodologies would cause students not to feel that they are learning or studying the same way their parents and grandparents did. Little use of ICTs (Information and Communications Technologies) could provoke an increase in the levels of demotivation, with the consequent dropout from the educational system, because what students learn does not cause them interest, and the same happens with the scarce real application of these learnings in their daily life.

In this sense, Robinson (2013) argues that children who study in schools do not gain any real benefit from the education they receive, and the causes of the school failure that the author exhibits are not economic, or derived from the ratio of students to teacher, but those associated with the teaching-learning process, which is being directed and is going on the opposite direction.

According to this author, currently in the educational sector there are three principles that are usually not respected (Robinson, 2013):

- **We are all different and diverse**. Schools do not take that into account, and what they do is to establish "standard disciplines" in which students must obtain a particular result so that they can continue their studies year after year. This, according to Robinson, does not respect the diversity of potential that each student has, because it gives much more importance to mathematics than to the arts, and this way of seeking "equality" makes students who are not good in the standard disciplines fail.
- **We are all curious**. Robinson states that teaching would be effective if the interest and curiosity of the students were to be awakened, as it is the engine of the achievements in life. From this perspective, Robinson points out that standard tests and cross-country results are being used as a common method of teaching, so that obtaining an appropriate mark is the goal for which students learn. On the contrary, these results are well suited to diagnose specific problems in the educational system that may not be resolved in the right way. If you fall into the wrong use of standard tests as a teacher, you will stop teaching to be creative and to solve problems from different perspectives.
- **The personalization of education and learning**. As they do in Finland, the students' interest should be recognized in order to engage them and motivate them to continue, respecting their curiosity, creativity and imagination, because that is how they learn.

The role of the teacher in this new educational version is essential because he/she is the one that, with his professional tasks, will motivate students, will guide them, mediate in the process of teaching-learning, will orient them, etc., forgetting the more traditional method, where the teacher's function is to transmit information to the student, who receives it and memorizes it. Due to the reality of communication and multilingual society, the teacher has lost the role of being the one who had the knowledge, and has become the intermediary between the information that students receive from different sources and what they really need to turn it into knowledge.

The present Master's dissertation is intended to expose a didactic unit in biology, according to what students live in their daily life, in a multilingual and globalized society in which the language between non-Spanish-speaking countries is English.

To correctly establish a bilingual method in the classrooms, inside CLIL (Content and Language Integrated Learning, as coined by UNICOM, the University of Jyvärskyla (Finland) and the European Platform of Dutch education in 1994), a student-centered methodology must be carried out, which entails cooperative learning methodology.

However, in order to tackle the problem of lack of self-esteem or motivation, the multiple intelligence theory will be introduced in order to develop and strengthen skills among students. Hence, this proposal suggests a change of methodology based on multiple intelligences, and more specifically in naturalistic intelligence, by using work based on interactions, collaboration and participation of the students in the activities proposed as a means to achieve cooperative and meaningful learning.

Likewise, this transformation of the pedagogical methods used so far is a preponderant necessity aimed at achieving real inclusion in the classrooms of the knowledge-based society, where the jobs that are offered stand out by requiring, indispensably, the capacity of interaction with others in a formal environment, that is, to have an interpersonal intelligence that allows to be efficient working as a team, with a fluent English level. This methodology would achieve the ultimate goal of education to foster active citizenship, as it would develop, along naturalistic intelligence and interpersonal intelligence, the rest of them, so indispensable in the working lives to our students when facing tomorrow, together with a great command of the L2 (English language).

2. THEORETICAL BACKGROUND

2.1. CLIL

2.1.1. What is CLIL?

As mentioned above, the term CLIL (Content and Language Integrated Learning) was launched in 1996 by the University of Jyvärskyla, the European Platform for Dutch education and UNICOM (New York Times 1998, in Richards and Rodgers 2001: 204). Different authors have defined CLIL; nevertheless, the most cited definition of it is given by Marsh and Langé (2000: 2): “CLIL is a dual-focused educational approach in which an additional language is used for the learning and teaching of both content and language”. In other words,

it means that it is a method used both for learning content and the foreign language, which is used as the working language.

According to Coyle (2010), CLIL makes a substantial difference towards other bilingual educational initiatives, due to the 4C's framework integration: content (in the present MA dissertation, biology), communication (foreign language/L2 skills), cognition (learning processes), and cultural (global understanding) (Figure 1).

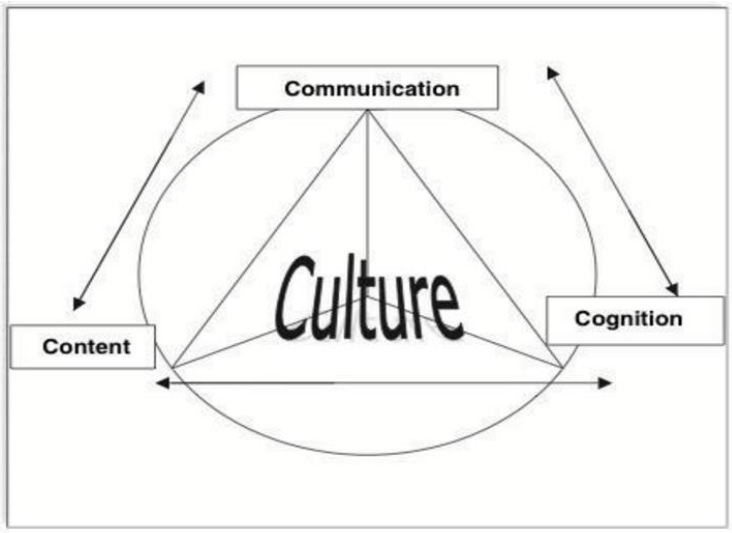

Figure 1: The 4C's framework for CLIL (Coyle 2007:551)

Owing to the well-recognized structure and the combination of different models of bilingual education, CLIL gets a meaningful exposure to the English language (Genesee and Hayaman 2016: 16), among other characteristics that are about to be discussed later. In addition, Met (1999) made the attempt to present different models of bilingual education, such as immersion programs, submersion programs, sheltered subject-matter teaching, adjunct language instruction, theme-based courses, and differentiated each model by having as a basis the content-driven or language-driven approach.

Besides, some other authors have added further approaches to the topic, such as the content-enriched foreign language instruction (Roldán Tapia, 2005), and the interdisciplinary module approach (Wolf 2005, Coyle et al. 2010).

There are, thus, different visions of CLIL, and in the case of Andalusia, the Andalusian model has been the result of the combination of content-enriched foreign language instruction,

theme-based courses, sheltered subject-matter teaching, or the interdisciplinary modular approach (Roldán Tapia, 2005; Jáimez Muñoz, 2007; Luque Agulló, 2009), being based upon the following:

- Content–enriched foreign language instruction (Roldán Tapia, 2005) is a result of a great coordination between content teachers and language teachers agreeing on common objectives, and it fosters the language over the content.
- Sheltered subject-matter teaching (Met, 1999), focuses on teaching in the English language by an English teacher to non-native students, who have been isolated from native speakers. It is considered a content driven model.
- Theme-based courses (Met, 1999) put a special interest on the language rather than the content. Moreover, it has another characteristic: the language curriculum it is built around selected topics.
- Interdisciplinary modular approach (Roldán Tapia, 2005; Jáimez Muñoz, 2007; Luque Agulló, 2009) is a method in which, for a short period of time non-native teachers teach their content subjects using a L2.

However, regardless of its heterogeneity, there are some common characteristics in CLIL:

- Theory of language: the foreign language is used as a means of communication. In other words, the focus is put on how students and teachers use the language to learn and teach the content, instead of focusing on the language rules. Therefore, the foreign language is the vehicle through which the content of the subject is taught (Dalton-Puffer et al., 2014).

  On the one hand, content is learnt and, on the other hand, communicative skills and vocabulary are learnt during the learning process, including what Cummins (1999) described as the every-day expressions and vocabulary, BICS (Basic Interpersonal Communication Skills), and the specific terms used in the content-subject: CALP (Cognitive Academic Language Proficiency). Consequently, CLIL lectures develop both CALP and BICS.

  On the other hand, other authors have denominated CLIL as "a triptych linguistic approach, which involves developing the language **of** learning, **for** learning, **through** learning" (Coyle and Baetens Beardsmore, 2007: 542). Finally, CLIL it is also related to the great amount of exposure to the L2 by students (Dalton-Puffer et al., 2014).

- Theory of learning: it is based on constructivist and cognitive theory; therefore CLIL fosters meaningful learning to students by scaffolding knowledge, skills, experiences and attitudes (Mehisto et al. 2008). Mehisto (2008) based his utterance on the idea that a foreign language is easier to be learnt successfully when students' learning processes and activities are based on their own experience.
- Roles: both teacher's and student's roles shift from a teacher-driven perspective to a student-centered methodology in which students are in charge of their own learning process, and teachers help they as a guide or facilitator of the process. So both parts might be highly committed and motivated (Richards and Rodgers, 2001).
- Coordination between content and language teachers: it is highly recommended to combine language and content, if students have learnt the specific vocabulary previously with the language teacher, it can help students in the content-subject understanding. To do so, both teachers might help each other, the content teacher should provide the academic language needed to the language teacher, and he/she should adapt or create materials so the language teacher can check it and supervise it. Besides, the language teacher can provide suitable linguistic input of both aspects, BICS and CALP. In this sense, he/she might guide or make sure that content teachers are keeping the suitable level in the chosen materials and activities (Nordmeyer and Barduhun, 2010).

To sum up, CLIL is a well-studied method to promote the meaningful learning of a foreign language, as it is English language in this dissertation. Together with the aforementioned CLIL's features it is necessary to highlight the methodology chosen to base the teaching-learning process and the evaluation.

2.1.2. Real life and CLIL

Nowadays educational system, as it was said in the introduction, does not help students to get ready for current job offers, due to the fact that the system just trains learners as they were searching for jobs in industrialized times, which means specific and repetitive tasks. Students are not asked about their interests, teachers deliver lessons with no students' interventions,

and teachers do not try to enhance students' imagination, creativity or cognitive skills (Roschelle and Teasley, 1995).

However, the society has changed, and according to *Forbes magazine,* contemporary business companies are asking for creative, emotional, enthusiastic, highly motivated, proactive, detail-oriented, autonomous, leader, good communicator, self-managed, team spirit and self-motivated workers, in order to fulfill society and business needs (Ryan, 2017).

Therefore, traditional teaching might shift its focus from teaching to learning, so that students are the center of their own learning process by applying student-centered methodologies, which will foster them to acquire enough cognitive skills to be prepared for their working life. Then, teachers might be the guide or the facilitator of students' process (Opdenakke and Van Damme, 2006).

Although the present Master's dissertation describes cooperative methodology in detail, there are more CLIL methodological aspects related to real life to be taken into consideration, which are going to be briefly itemized:

- Task-based learning: The aim of the methodology is to solve the task handed by the teacher. To fulfill it, it is necessary to follow three steps (Shehadeh and Coombe, 2010):
    - Pre-task: teacher gives the instruction, present the objectives and the language.
    - Task: students do the activity in small groups. Language accuracy is not important, but fluency.
    - Task assessment: students review their own progress, and the teacher checks the task fulfilment and the accuracy of the language.
- Project-based learning: The main feature is that it involves various content areas, and it can last from a term to a whole academic year. The aim of the project is to answer a question set at the very beginning, which students will answer by enquiring in different information sources. Finally, the project is finished with a reflection and it is published to an audience (Roschelle and Teasley, 1995).
- Flipped classroom: It changes the way the activities and lectures are done. To begin with, students might read at home, watch or listen to the teacher's instructions (content online), and assimilate it. Then, during class time students will do activities and the

teacher will help them more individually, or the learning-process will be hold by other peers. Therefore, this methodology enhances communicative and cognitive skills (Brame, 2013).

2.1.3. Evaluation

In the Spanish educational system, article 20 of *Royal Decree 1105/2014* sets out the basic curriculum in Compulsory Secondary Education, in which key competences are developed along the overall stage objectives. For their assessment, learning standards and assessment criteria referred in the Royal Decree are used. Likewise, the Royal Decree describes the three ways of evaluating the learning process: initial, formative/continuous and summative. In addition, in the *Order of July 14, 2016*, in Andalusia, article 15 specifies that the procedures, tools and strategies used for the students' evaluation must be varied in order to personalize as much as possible the learning process to the students.

Apart from what is established by law, and although the Andalusian legal regulations state that content teachers must not assess the language (in the *Order of June 28th, 2011)*, the authors who deal with evaluation in the CLIL method persevere in the need to evaluate with a double approach, since it is necessary not only to evaluate the contents but also the language (Massler, et al., 2014). Moreover, Pokrivcáková (2015) considers that students should be assessed considering both the criteria of the subject of content and the subject of foreign language.

Moreover, there is a need to differentiate between two concepts that tend to be misconceptions in the field of evaluation, evaluation itself and assessment. On the one hand, according to Norman E. Gronlund and Robert L. Linn (1994), evaluation is: "A systematic process of collecting, analyzing and interpreting information to determine the extent to which pupils achieve instructional objectives." On the other hand, Black and William (2011) define assessment as follows: "We use the general term assessment to refer to all those activities undertaken by teachers—and by their students in assessing themselves—that provide information to be used as feedback to modify teaching and learning activities".

Therefore, assessment entails an ongoing job with students, which is not always graded, and provides feedbacks to their everyday activities; so all in all, it is a process to orient them in

order to improve their learning process. However, evaluation provides closure to an activity, which may judge the process and the quality of their job. Students see marked results, because evaluation is graded, and the product is evaluated and oriented according with the shortfalls shown by students.

The ways to assess the students' learning process in this Master's Dissertation will be:

- Initial assessment:

  Its objective is to get to know the knowledge that students have at the beginning of the didactic unit, thus being able to detect lacunae and locate the weaknesses of each student as the first step of attention to diversity (Dale and Tanner, 2012: 31), while having as an ultimate goal to scaffold new knowledge above previous one. As it is well described by Pérez-Paredes and Rubio (2005: 610): "It should be clear, then, that when initial evaluation is carried out it is for the sake of adapting, or taking new decisions upon the class curriculum, otherwise it may result in a loss of time".

- Formative assessment:
  According to Llull et al. (2016: 84), formative assessment is called *"assessment for learning"*, and it is defined as a way to assess students by taking into account their continuous learning process. Therefore teachers will observe and analyze learners' performance, communicative competences, attitude (Rico-Vercher and Rico-Pérez, 1996: 469), and students' self-evaluation. Moreover, the effectiveness of formative assessment is described by Bachman (1990: 60) by getting feedback both for students and teachers.
- Summative assessment:

  It is complementary to formative assessment; it is given at the end of the didactic unit or the course by a grade or certificate (Seaton, 1982: 59). According to Lull et al. (2016: 84) is called *"assessment of learning"*, and its final objective is to check the acquisition of objectives and key competences. In other words, summative assessment shows if the curriculum outcomes have been met and in which degree (Regier, 2012).

  In order to assess so, rubrics will be used (see annex VIII), which will take into account both content and language (vocabulary, grammar, pronunciation, spelling). It

might be highlighted how the vocabulary will be assessed by checking CALPS (Cognitive Academic Language Proficiency) and BICS (Basic Interpersonal Communication Skills).

The European Language Portfolio is a tool developed by the Council of Europe (2001: 20) in order to make possible for students to record their progress in a language different from their mother tongue. The main objective of its use is to make the learning process more transparent to them and more motivating. Encouraging them to keep their portfolio updated of their self-assessed proficiency in each language. It is related to the Common European Framework of References for Languages by giving common guidelines to work in language education.

The portfolio has three documents: a language passport where the language competences or skills are described; the language biography, where learners describe their experience; and a dossier, where students store some examples of their work (Pérez-Paredes and Rubio, 2005: 627-628).

In the present MA dissertation, at the beginning of the unit, during initial assessment students will be assessed with a row of questions as a brainstorming in order to check the gaps in knowledge, misunderstandings, and so as to check the vocabulary that students know about ecology and so on, to scaffold and organize new knowledge according to the group level. Along the didactic unit, the content and the language competence will be assessed by means of formative assessment, by doing the activities proposed to students and giving them proper feedback. At the end of the unit, to get the summative assessment a project presentation will be carried out, which will be graded together with the overall activity marks achieved during the didactic unit, and the European Language Portfolio.

2.2. Multiple intelligences

The acceptance of the Multiple Intelligence Theory entails the understanding of intelligence as a completely newish way so far. According to this theory, intelligence cannot be defined as a measurable quality and unique to every human being, but as a set of eight abilities or skills (Gardner, 1983).

Furthermore, every individual has all of the intelligences. However, depending on their genetic make-up and its interaction with the environment, he or she will boost some more than others, as a result, a proper definition of intelligence, which might be personal, unique and incomparable to another human being, as well as dynamic. Which means that intelligence can be develop in a certain way.

This vision of intelligence as a multidimensional term and not one-dimensional, as it was thought in former times, allows teachers to respect and take into account students' diversity, so that if no student is equal to another, their teaching-learning process should also be different (Ander-Egg, 2006).

Eight types of intelligence have been identified and defined according to the Theory of Multiple Intelligences, as shown in Table 1, (Gardner, 1983):

INTELLIGENCES	**DESCRIPTION**
Linguistic-Verbal Intelligence	Skill that describes the ability to understand, and use words effectively, either written or spoken.
Logical-Mathematical Intelligence	People with the developed intelligence do think conceptually, abstractly and explore patterns and connection
Visual-Spatial Intelligence	Skill that describes the ability to understand and think about the physical space and use words effectively, either written or spoken.
Musical Intelligence	People who are highly sensitive to rhythm, sound, patterns and musical composition.
Bodily-Kinesthetic Intelligence	Shows completely control of the body movements and body awareness.
Intrapersonal Intelligence	People who are aware of their own emotions, feelings and show self-reflection of themselves.
Interpersonal Intelligence	People good at understanding other people thoughts or personal situations.
Naturalistic Intelligence	People interested in questioning themselves about their surroundings and exploring the environment.

Table 1: Eight intelligences (Gardner, 1983)

Gardner (1983) reiterates that every human being is born with certain abilities, and these can be developed. In other words, Gardner tried to explain that the eight intelligences are innate and therefore genetically inherited. Nevertheless, as with any other biological character, the environment, and the social and cultural context affect the individual's development of intelligences, so some intelligence will be developed with greater or lesser intensity, or simply will not be developed.

Multiple intelligence research has been published for more than three decades now; however, it was only in recent years that the theory has been taken seriously in the educational field, due to the fact that it has been shown as a new way to comprehend education, by understanding the possibilities of students' minds, in order to achieve their maximum academic performance (Armstrong, 2018: 43).

In terms of teaching biology, which is the matter that concerns this dissertation, studies have shown that nowadays the most enhanced intelligences among high school's subjects are both linguistic and logical-mathematical relegating the other intelligence, such as the naturalistic intelligence itself (Boldo, Herrero, Toledo and Zuloaga, 2012.).

2.2.1. Naturalistic Intelligence

Gardner (1983) describes naturalistic intelligence as that capacity some individuals possess to recognize, classify, and establish relationships between living beings or objects of everyday life.

The need to develop naturalistic intelligence has been thought to have arisen with the first human beings, because they should be skilled in the recognition of fauna and flora, climate observation, the contemplation of the firmament for orientation, the observation of the animal behaviour, etc., due to their link to their survival (Castro-Orbe and Guaman-Ramirez, 2012: 15-29). Therefore, all human beings are born naturalistics with full willingness to investigate and examine our environment through the senses, observation, reasoning, and the interaction with the environment. However, it is thought that the change that has occurred in human lifestyle makes children be less in contact with nature, so they have a lower development of this intelligence (Prieto, 2001: 55-57).

There is a problem to be faced regarding the misconception of the naturalistic concept. The widely spread idea of careers related to the intelligence itself, as a biologist, zoologist, ecologist, etc. However, Gardner (1999) tries to change this idea, explaining that the naturalistic intelligence is also very developed in farmers, hunters, gardeners… but also in politicians and even in himself (as a psychologist). These workers have some skills in common such as classifying and distinguishing patterns, knowing how to connect with their surroundings or environment, and this is not only in nature but in their social context too (Anger-Egg, 2006: 7).

In order to make an impartial classification based on the same criteria, Castro-Orbe and Guamán-Ramirez (2012: 28) proposed a list of features that people with well-developed naturalistic intelligence should have. These are:

- Showing interest on different environments where living beings are developed.

- Interacting with the environment and human beings.

- Classifying, categorizing and recognizing patterns of different natural elements, according to their qualities and characteristics, or members of different species.

- Asking yourself "how it works" to any object, process or mechanism.

- Feeling attraction for knowing: how living beings develop intraspecific and interspecific relationships.

- Feeling fascination about evolutionary patterns in nature.

2.2.2 Key Competences and multiple intelligences.

Integrating multiple intelligences in the curriculum is an easy task, due to the fact that these eight capabilities are closely related to key competences, which have to be integrated in the curriculum by law.

Key competences, according to the European Parliament and the Council of Europe (2006: 11), should be developed to ensure citizens a full and prosperous development of capabilities, a precise social inclusion and the possibility of accessing to a job from the acquired

knowledge. Key competences are defined by the Ministry of Education, Culture and Sport of Spain, in *BOE No. 106* as "knowing how to apply knowledge into real-life scenarios" (2015: 6986).

The origin of key competences dates back to 1996 when UNESCO (United Nations Educational, Scientific and Cultural Organization) brought to light a report where the educational pillars were set (Delors, 1996: 34):

• Learn to know

• Learn how to make

• Learn to be

• Learn how to live together

Nowadays, these mainstays have developed into the key competences collected in the *8/2013 Organic Law, December 9 (LOMCE)*. These competences are:

1. Competence in linguistic communication.
2. Competence in mathematics, science and technology.
3. Digital competence.
4. Learning to learn.
5. Social and civic competences.
6. Sense of initiative and entrepreneurship.
7. Cultural awareness and expression.

The introduction of key competences has shifted perception of the learning process. Nowadays in learning, the goal is not the most important objective, but the learning process itself, i.e. the way used by the student to accomplish the goal. All in all, the aim of introducing key competences as a mandatory item in the curriculum is to provide students with a wide variety of instruments to solve real life problems. Therefore, teaching content itself has to be replaced by bringing special interest in skills and attitudes. This change will turn learning into

meaningful learning. Thus, with this new practice, students will learn from the understanding, interpretation and implementation of the knowledge acquired in their daily lives.

Table 2 shows the correspondence between the key competences (referred to in the Royal Decree 1105 / 2014, of 26 December, which establishes the basic curriculum of compulsory secondary education and Baccalaureate) with each of the multiple intelligences that may be applied:

KEY COMPETENCES	MULTIPLE INTELLIGENCES
Competence in linguistic communication	Linguistic-Verbal Intelligence
Competence in mathematics, science and technology.	Logical-Mathematical-Intelligence Naturalistic Intelligence
Digital competence	Intrapersonal Intelligence Interpersonal Intelligence
Learning to learn	Intrapersonal Intelligence Interpersonal Intelligence
Social and civic competences	Interpersonal Intelligence
Sense of initiative and entrepreneurship	Intrapersonal Intelligence
Cultural awareness and expression	Visual-Spatial Intelligence Musical Intelligence Bodily-Kinesthetic Intelligence

Table 2: Key competences and multiple intelligences:

2.3. Cooperative Learning (CL)

The educational system has undergone a metamorphosis over time that goes from learning based on behaviorism, passes through constructivism, and ends in cooperative learning. The last methodology shows the convergence from prior thoughts with current ideas and conclusions (Moya and Zariquiey, 2008: 283). The aim of implementing cooperative learning methodology is to favor students' skill development by applying strategies such as working in heterogeneous groups and improving linkages among students, leading them to the conclusion that only in groups can they achieve the objectives proposed (Moruno-Torres, Sánchez-Reula

and Zariquiey-Biondi, 2011: 202). In this way, students will work on the curriculum and acquire the knowledge jointly, coordinated by the teacher.

Nevertheless, to make cooperative learning possible, eight basic elements might be taken into account when an activity is carried out (Moya and Zariquiey, 2008: 273):

- Heterogeneous groupings.
- Positive interdependence.
- Individual responsibility.
- Equal opportunities for success.
- Promoting interaction face to face.
- Cognitive information processing.
- Using cooperative skills.
- Group evaluation.

2.3.1. Theoretical foundation of cooperative learning.

Cooperative learning methodology has its theoretical foundation in pedagogical and psychological learning theories, which attempt to know how the learning process occurs in the individual. Bearing this in mind, a brief summary of what each pedagogical and psychological perspective contributes to cooperative learning is shown, according to what was established by Torrego-Seigo (2011: 172-181):

1) Behaviorism

The cooperative prospect has incorporated the behaviorism enhancers or incentives and punishments, which have been used to manage motivation and students' effort in cooperative tasks. The need of teamwork encouragement comes from the fact that students will have chances of success and, therefore, their reward (a good grade), which will be both individual and group, if they act in group.

2) Social learning theory

Cooperative learning model is based also on the processes of attention, retention, performance and motivation. Moreover, it is thought that pupils are in continuous interaction with other schoolmates, and therefore, students acquire new aptitudes through direct behavioral observations.

3) Humanistic theory

Cooperative model has brought from the humanistic theory the importance of meeting students' diversity and the affective factors that determine learning by students.

Likewise, as students might work in heterogeneous groups, this interaction facilitates intrapersonal knowledge. In this way, pupils will discover their capabilities and limitations while at the same time arising out an innate respect for the strengths and weaknesses of their companions, reducing the attitudes of rejection and competitiveness.

4) Psychogenetic theory

Cooperative learning is produced by the process of assimilation and accommodation. This is achieved by peer learning, since classmates provoke to each other cognitive conflicts between what students previously knew and what other mates introduced them. As a result, this should develop strategies to solve real life problems. Therefore, the dynamics of heterogeneous groupings produce many moments in which students must reset their own structure of knowledge when new information is added by their own classmates.

5) Constructivist theory

Working in a cooperative way, students build their own learning process from a base or "scaffolding", which is the previous knowledge to students. In the working groups, the previously established knowledge has been reconsidered, unconsciously, and learnt appropriately.

6) Multiple Intelligence Theory

The cooperative model offers students activities, and a wide variety of experiences that develop different intelligences. In this way, each student may get a successful outcome in any of them, which will lead to the success of the group.

At the same time, it facilitates attention to students' diversity by giving the appropriate tasks and contents depending on the needs of each student. Skills are evaluated, what makes students obtain recognition of their talent. As a result, it will boost self-esteem and the development of the different capacities in each individual.

2.3.2. Differences between traditional class and cooperative class

Nowadays, the social situation where students live surrounded by new technology tools and with a continuous harassment of information in attractive digital format causes apathy in conventional lectures where students' role is to be listeners. These traditional lectures are characterized by teachers transmitting information, and students memorizing it. This type of classes should be replaced for cooperative classes, in order to increase the motivation of the students, thus, leading to improve their academic performance.

In order to innovate in the methodological field, it is interesting and necessary to deeply know the initial situation, which is the traditional class, to be able to transform it into a lecture in which students feel motivated by the acquisition of new knowledge, as it is with cooperative learning. Therefore the differences between both types of class organization are the following.

In traditional lectures individualism, uniformity and passivity of students prevail (laboratory of educative innovation [LIE], 2009). Individualism in class leads students to carry out the whole learning process on an individual basis, with no need of teamwork, so the responsibility of what they learn is placed on the students themselves, who are involved in the learning process. The interaction between colleagues, helping each other, is almost inexistent (Quevedo-Blasco, 2016), with no promotion of social skills and, of course, it is not possible to develop interpersonal intelligence. In addition, former methodologies include the principle of uniformity, referred to the tendency to generalize, and ignoring the capabilities of students in the classroom, consequently the teaching-learning process does not fit to the diversity of students. With regard to the last principle, the passivity of the students in the classroom is a characteristic feature because students do not have any control over their own learning, since

the only thing the pupils need to do is to memorize the exposure that the teacher has done and what is written in the book. As a result, the textbook becomes the element from which the learning process occurs, preventing the emergence of motivation for the investigation on the subject (LIE, 2009).

On the contrary, lectures based on cooperative learning methodology give a new point of view about the educational appraisal. Lessons are based on the principle of heterogeneity, and students work the curriculum in mixed groups to achieve a common goal (Quevedo-Blasco, 2016). Besides, activities undertaken with this methodology must be very controlled by the teacher, so reaching the common objective that the group requires good organization, well-developed social skills and a clear delimitation of the objectives, so that it becomes a collaborative work (LIE, 2009).

2.3.3. What does Cooperative Learning mean?

According to Pujolàs (2008) cooperative learning is a method which uses team work to achieve a common objective, through the work of all members of the group at the same time.

In Table 3 the differences between students working in usual groups and in cooperative groups or teams are shown (Kagan, 2009; Pérez-Sánchez and Poveda-Sierra, 2008; Prieto, 2007; Pujolás, 2008).

GROUP WORK	**TEAM WORK OR COOPERATIVE LEARNING**
There is no involvement in the task, so that the participation of members of the group varies greatly according to their character and personality. In most of the cases it occurs that a participant works more than another.	There is involvement in the task and the components of the group work simultaneously and equally.
Individual work is not evaluated by the teacher; the evaluation is globally done with the delivered work.	The teacher evaluates the individual work of each individual as well as the final work delivered by the group.

The results of the learning process of the group are not better than those received individually. In other words, students do not learn more in group.	Learning outcomes in cooperative teams are beyond the individual marks of the components of the group, because capacities are shared.
Members of the group do not assume roles or responsibilities. Therefore there is not tasks' equitable distribution	Each component of the team assumes a role and responsibility in the task, and they are aware that their actions affect others, and that if he or she fails the group itself will also fail, and vice versa, if the opposite happen.
Every member in the group is worried about him/her received mark, and just their own learning.	Students working in cooperative care about the performance of their peers. It is said there is a commitment of support and reciprocity between the team members.
Members are not taught to work in group and neither to have social skills that allow them to achieve the best working performance in the group.	Firstly, in cooperative lectures students are taught to develop social skills, in order to reach the proposed goals as a team.
There is no group self-evaluation of the working-group' effectiveness.	There is team self-evaluation, thus enabling to promote learning improvements and cooperative work.

Table 3: Differences between Group work and Team work

As a conclusion, there is no need to say that creating a group to work does not mean working together as a team, and needless to say as well that a hard previous work is needed so that students are able to learn cooperatively (Fritz, 2019).

2.3.4. What are the advantages and disadvantages of cooperative methodology?

Every methodology has both positive and negative aspects for the teacher and the students. Hence, it is necessary to evaluate if it is worth or not to apply it, bearing in mind that the main function of the teacher might be about students' collaboration and assistance in their learning process.

BENEFITS

Several studies, such as those made by Johnson and Johnson (2000) and LIE (2009: 16-20), have focused on cooperative learning assessment and its implementation in the classroom. According to these studies, this approach fits very well to the multicultural society in which students are inserted, as society stands up to respect diversity and differences among students. Then, cooperative learning is engaged to the contemporary society thanks to the use of heterogeneous work groups or teams.

Below there are some of the most notable advantages of the way of understanding the process of teaching and learning cooperatively (LIE, 2009: 19-20):

- ☑ **Assists children's cognitive development:** due to the confrontations not between team members but between new knowledge and old one, occurring in work dynamics. Students are encouraged of restructuring their previous knowledge, with the consequent search and assimilation of the new learning. All cognitive processes that occur are increased due to greater diversity in the team. In addition, it involves regulation of the teaching-learning process between peers, which helps to learn other models of learning.

- ☑ **Promotes interaction:** it encourages communicative exchange between everyone in the classroom (teachers and students), which promotes greater cognitive conflicts from occurring.

- ☑ **Promotes the autonomy and increases self-esteem**: the distribution of roles carried out for the implementation of tasks allows students to make themselves more independent of the teacher, because they have some responsibilities and, in turn, increases their self-esteem. Besides the potential of growing students' self-esteem, it is necessary to add another benefit related to that one, getting common goals also promotes motivation towards learning.

☑ **Allows adapting the curriculum to students:** all students in a classroom do not have the same level of curriculum, by what, working in small heterogeneous groups can help by adapting levels of understanding, since the students are themselves who teach (LIE, 2009).

☑ **Promotes the development of critical thinking:** the tasks are organized to be resolved into cooperative groups, which promotes continuous communication, to express ideas, decision-making, argumentation, reflection, etc.

☑ **Encourages the development of interpersonal intelligence**: the learners will increase the time they interact with peers and the teacher (considering the change from a traditional and individualistic methodology to a cooperative one). This would increase the quality of their contributions and arguments, since they develop social and communicative skills (creation of linkages with colleagues, respect of the speaking time, speaking vocalizing, reducing the fear to speak in public, etc.).

☑ **Improves academic performance**: according to the LIE (2009: 20), students learn much more content and with higher quality with a cooperative methodology than with a competitive or individualistic methodology. The resolution of cognitive conflicts in a constructive way generates in cooperative working groups the promotion of an active search for new information and its retention, at the same time that students have to argue in favor or against their ideas. Moreover, to do so they might increase their levels of reasoning. At the same time, this search for controversy involves the active involvement of students in their own learning process.

DISADVANTAGES

Inevitably there are authors (Casal-Madinabeitia, 2008: 67-69; Gómez-Gutiérrez, 2007: 14) who also see difficulties in the use of cooperative learning. The most important points to be discussed are included as the following:

☒ Due to differences among students, there is **inequality in the pace of work** which must be taken into account.

- ☒ **Willingness to work in a group** is variable, depending on the personality of the students.
- ☒ **Lack of training** of teachers in new methods.
- ☒ **Lack of support** from colleagues of profession and family.
- ☒ **Complexity of the implementation** of this new methodology to the lectures.

2.3.5. Cooperative Learning evaluation.

As explained above in the table describing what is and what is not cooperative learning, it is specified that evaluation will be carried out both individually and at the group level, unlike in the case of group work, which does not have a cooperative structure in which the mark of the group is used to qualify all the members of the same group without taking into account the individual work done by each one.

This is one of the main reasons, according to some authors, that explains why cooperative learning methodology is successful, because the role of parasite students disappears, or in other words, students do not take advantage of the work of others, and all fight for a good qualification, knowing that they can only get it if all his/her peers also get it, because they only get a mark for the work group (Jiménez, 2006: 12).

In cooperative methodology, unlike in traditional methodology in which the teacher was the most important component, the principal element is the pupil, and the autonomy that is granted to him/her allows him/her to have control over his/her learning process.

Therefore there will be three levels of evaluation, evaluation by the teacher, peer assessment or co-evaluation, and self-evaluation (Educational Innovation Service (UPM), 2008: 18-19).

- Evaluation by the teacher:

The evaluation can be individual, group or both. It can be assessed individually by taking an oral or written test of the contents previously worked on the base-team. Group evaluation can be done through rubrics (see annex VIII), the correction of a group work, a portfolio in which

all the work and activities carried out during the cooperative sessions have been kept, the correction of a reflection, etc. (UPM, 2008: 18).

Grading a work group is a simple task, but to qualify the individual performance of a member of the group according to the work done is more complicated, that is why the teacher uses co-evaluation (Jiménez, 2006: 3).

- Peer assessment or co-evaluation:

In cooperative groups each one fulfills a responsibility, and if any of the members is not complying with it, the other members of the group must speak and negotiate with the team member who is not working cooperatively (Jiménez, 2006: 3-6), through the communicative skills that they have acquired during the time of implantation and perfection of the methodology of cooperative learning.

With co-evaluation two objectives are achieved: the grades of the individual performance of a student within the team-base, and the role of assessor that the student exerts on their peers (Mello, 1993: 253-259). In order to be able to carry it out effectively, it is necessary that the students are given a questionnaire periodically in which they evaluate interesting aspects that are indicators of having yielded or not, during the sessions of cooperative work in group (UPM, 2008: 18).

According to authors such as Lejk and Wyvill (2001a: 61-72), there are two co-evaluation techniques in base-teams: using a holistic technique, or using different features.

- Holistic co-evaluation: Each student gives an overall grade of to the job done by each of his/her peers on the team-base.

- Qualification using different features: each student gives a mark to each one of the features considered in a rubric (commitment, execution of the tasks, fulfillment of roles, respect for the materials, and respect of speaking time...). With the different mark, he or she will obtain a final grade, as a result of the average of these features taken into account, which expresses the contribution of each individual for each one of his/her peers. In order to obtain a final mark of the performance of each one of the

students, an average with each one of the marks obtained by his team-mates will be made.

- Self-evaluation

By means of self-reflection, students will be able to evaluate their own process of learning in an active way, and it complements the evaluation made by the other peers (Jiménez, 2006: 6-7).

Studies carried out by Johnston and Miles (2004: 756) and by Lejk and Wyvill (2001b) have demonstrated why it is necessary to carry out self-evaluation and co-evaluation jointly, since according to these authors students who have the best assessment from their colleagues for their high level of performance, those "more scholars" tend to value very positively to their peers, while their self-assessment is negative. On the contrary, those who have not so good ratings for their peers tend to be overvalued themselves.

2.4. Naturalistic Intelligence and Cooperative Learning. How to put them into practice?

There is not much scientific literature to address the issue concerning the integration of multiple intelligences, and therefore naturalistic intelligence, into cooperative methodology.

According to the theory of multiple intelligences, there is not a set of teaching strategies that suits all students with the same efficiency, so it is advisable to use a range of strategies with student-based methodologies. However, there are some authors who recommend the cooperative learning methodology as the most effective one (Aubert et al., 2010).

The implementation of cooperative learning methodology is not simple, due to the fact that students are not used to work in cooperative groups. To make it effective, there is the need to proceed by steps or fields from the presentation, such as cooperating and bringing together the group, to achieve meaningful learning through a cooperative educational project (LIE, 2009).

Continuing with the steps or fields discussed in the previous paragraph, there are four of them: the culture of cooperation, which aims to unite the group; the learning network, where teamwork is introduced as a resource and as content itself; the learning network to promote

the process of learning and the network of education, which is the implementation of cooperative learning in the school, which has the added difficulty that it depends on the educational project of the school and the involvement of all the teachers at that school (LIE, 2009: 21). In this case, we will focus on the third phase (implementation of a learning network), assuming, therefore, the purpose of this Master's dissertation, which is to develop a content unit based on cooperative learning methodology, in order to develop naturalistic intelligence.

In this way, and since the general aim is to implement a learning network, the process will be done gradually, because students do not have the necessary skills to develop learning through work in a collaborative team. This period of implementation must be rigorous in order to avoid problems arising from work group (excessive noise, distractions, lack of organization, etc.) that hampers the correct acquisition of knowledge, and which are some of the results coming from the lack of experience of the students in the use of cooperative techniques (Moruno-Torres et al., 2011: 102).

On the one hand, in order to prevent these problems, different cooperative techniques should be introduced with changes in the size of the group, time duration of group activities, and methods of learning, informal or formal. Thus, at the beginning, short duration activities would be carried out in small groups, and in pairs; homogeneous or heterogeneous, in terms of skills and academic performance; with informal activities that do not need of many cooperatives skills. Once students have improved their cooperative skills, formal activities, could be introduced, in groups of 4 to 5 people, which will form the Base-Team (Moruno-Torres et al., 2011: 206), This team structure is characterized by the heterogeneity of its components, and because this will be the group to which students will go for any activity, provided that the teacher does not state otherwise. The goal of base-teams is to make everyone feel part of it; therefore, a division of responsibilities and functions for each member might be established. In addition, once the role of each student is known, they will be required to fulfill their respective function to optimize the performance of the tasks, thus ensuring the success of the group action (Domingo et al., 2004).

The possibility of working in small groups of 2-4 components and, above all, the base-team, enables students to learn in a totally different environment from traditional lectures. Students find that co-working with peers decreases their anxiety level, and they no longer feel

vulnerable due to the fact of facing questions from the teacher or classmates, and thanks to the support from their group. These are the reasons why the involvement of all members of the group is very important in this methodology, along with the feeling of empathy and the desire to achieve the proposed goal, in order to achieve group success, which will be rewarded as individual success too (LIE 2009: 10; Quevedo-Blasco, 2016).

In addition to the change in the structure of work which moves the individual work by the group to achieve a common goal, there is a change in the organization of every session. These are divided into four times with the aim of improving the academic performance of students, being the following: activation of prior knowledge, processing the information, and overview and synthesis of the session (Moruno-Torres et al., 2011). During this sort of session, informal activities are performed. The session that includes formal tasks will be organized specifically according to the activity that is carried out (LIE, 2009).

On the one hand, as it has been briefly shown, the implementation of cooperative learning methodology is a hard task. On the other hand, the implementation of the theory of multiple intelligences in the classroom is a simple task, since these can be easily introduced to the curriculum by its direct relationship with key competences.

Enhancing the intelligences in students allows them to discover their skills, and to increase their motivation through the subjects more related to their potential. In other words, although each of the multiple intelligences is developed in each one of the subjects, there will always be a specific one that will boost more than the others. It is logical to think that in the subject of Spanish language and literature, linguistic intelligence will be more common than the naturalistic one; and the same happens when it comes to biology and geology, the naturalistic intelligence is enhanced above the rest. However, this does not exempt other intelligences from being developed.

Therefore, there are two intelligences implied in cooperative methodology that would be developed independently of the student's capacity involved, due to the nature of cooperative work. These intelligences are the following: intrapersonal, which is understood as the knowledge of oneself with the objective of get to know other personal capacities; and interpersonal intelligence, which is the ability to interact with others (Díaz-Pinto, 2009).

These two capabilities, which will be strengthened indirectly, are needed to ensure the success of the group activities carried out in the cooperative sessions.

The intrinsic relationship between naturalistic intelligence and cooperative learning underlies the notion that the skills developed with the cooperative methodology favor the necessary skills to develop naturalistic intelligence in students.

Among the characteristics needed to develop naturalistic intelligence, it is necessary to interact with the environment and with living beings, which is carried out with cooperative techniques when students are constantly involved in interaction with their peers, with materials and resources of the classroom, and with the environment in which the teaching-learning process is developed. This is also the case with the interest in intra-specific relationships, which can be extrapolated to the relationships that arise in the base-teams, among peers, and favored by the cooperative activities that are carried out. Finally, with the usual tasks of this methodology, cognitive skills are fostered as the capacity of analysis and synthesis (Fernández and Ruiz, 2007) that coincide with the naturalistic aptitudes of classification, categorization, analysis and recognition of patterns, which in this case is the environment in which students develop them during the process of meaningful learning.

Therefore, students will discover and enhance their naturalistic skills by helping each other through cooperative methodology, which implies an increase in their motivation and satisfaction with the teaching-learning process (Quevedo-Blasco, 2016).

3. OBJECTIVES

The purpose of the present educational project is the development of students' naturalistic intelligence in biology lectures through a cooperative methodology in a CLIL high school.

3.1. General Objective

According to *Royal Decree 1105/2014, of December 26th*, which establishes the basic curriculum of compulsory secondary education and baccalaureate (BOE No. 3, Saturday 3rd January 2015, p. 212), the general objectives to be achieved in year 4th in compulsory

secondary education are included in Block 3, which gathers all the contents related to ecology and the environment.

Once the objective to be achieved with this Master's dissertation has been set out, it is necessary to frame the Ecosystem didactic unit in the corresponding legislative framework. According to the above mentioned *Royal Decree*, and to the *Andalusian Decree 111/2016* and the Order from July 14th, 2016 (BOJA, 28th July 2016), the general and specific objectives that the 4th-year students of compulsory education must achieve at the end of the school year are outlined. However, this Master's dissertation will focus especially on five important objectives for the used methodology (Table 4):

GENERAL OBJECTIVES	SPECIFIC OBJECTIVES
b) Development and consolidation of habits of discipline, study and individual and teamwork habits as a necessary condition for the effective realization of learning tasks and as a means of personal development.	2. Implementation, in problem-solving, of strategies consistent with science procedures, such as discussing the interest of the problems raised, formulating hypotheses, developing resolution strategies and design analysis of results, consideration of applications and impacts of the study carried out and the search for global coherence.
d) Strengthening students' affective capacities in all areas of personality and in their relationship with others, as well as reject violence, prejudice of any kind, sexist behaviors and peacefully conflicts resolving	6. Development of attitudes and habits conducive to the promotion of personal and community health, facilitating strategies to address the risks of today's society in aspects related to food, consumption, drug dependence and Sexuality.
(e) Development of basic skills in the use of sources of information to, with critical sense, acquire new knowledge. Acquire a basic preparation in the field of technologies, especially those of information and communication.	5. Creation of critical knowledge-based attitudes to analyse scientific issues individually or as a group.

(f) Conception of scientific knowledge as an integrated knowledge that is structured in different disciplines, as well as to know and apply methods to identify problems in the various fields of knowledge and experience.	7. Understanding the importance of using knowledge of biology and geology to meet human needs and participate in the necessary decision-making around local and global problems that we face.

Table 4: The five most relevant objectives in the present didactic unit.

3.2. Didactic Objectives

The main objective of this project is settled on the following didactic objectives:

- Improvement of the teaching-learning process of the students in the subject of biology, in the unit related to ecosystems and the environment, showing particular interest on the development of naturalistic intelligence.
- Improvement in the coexistence in class, encouraging mutual support and co-working.
- Demonstration of skills and attitudes that promote cooperative work.
- Increase in the motivation of students in the field of biology.

4. METHODOLOGY

The purpose of the present dissertation is to develop the unit of ecosystems with a methodology based on cooperative learning, in order to enhance the naturalistic intelligence in the subject of biology.

This methodology will be put into practice through formal and informal cooperative activities in heterogeneous and homogeneous groupings.

Regarding the heterogeneity or homogeneity of the groups, it will be determined by the specific criterion of the teacher, according to the specific characteristics of the students. In this particular case, the criterion will be the school performance of each member of the group. Heterogeneous groups will be created to do some activities and to constitute the base-teams, which are the fixed groups of four or five students who will usually join to carry out the work

in the classroom. The importance of base-teams lies on trust and respect of roles given to the group of peers that constitute it, which facilitates the process of teaching and learning with the students.

Complementary to base-team, students will be set up in homogeneous sporadic groupings to carry out certain activities, as regards the aforementioned criterion.

During the progress of the sessions related with the unit about ecosystems, cooperative tasks to be carried out using informal methods will be the ones that do not involve complex cooperative skills, such as:

- I know, we know (Session 1, moment 1) (Torrego and Negro, 2012).
- Three-minute stop (Session 1, moment 2) (Pujolàs, 2008).
- Pens in the middle (Session 1, moment 3) (Varas-Mayoral and Zariquiey-Biondi, 2011).
- Crossword (Session 1, moment 4) (Adaptation from Pujolàs, 2008)
- One for all (Session 2, moment 2) (Adaptation from Pujolàs, 2008)
- Cooperative troubleshooting team (Session 2, moment 3; session 4, 5 and 6) (LIE, 2009)
- Blank mind map (session 2, moment 4) (Adaptation from Pujolàs, 2008)

The formal method to be used in the implementation of the cooperative methodology of this project will be the "Team Games Tournament", which will be held in the seventh, eighth, ninth and tenth session.

The project can serve as an example of the application of cooperative methodology with other biology content and with other subjects to enhance the different intelligences in students.

4.1. Project description

The project is planned to be applied in 4th level of compulsory secondary education, in order to respond to the situation of demotivation and low performance that students usually show in this level.

The methodology to be implemented is based, as mentioned above, on cooperative learning, with the ultimate objective of enhancing naturalistic intelligence among students in the subject of biology and geology, setting the activities to be carried out according to the contents related to the ecology and environment block, outlined in *Royal Decree 1105/2014, 26th December* (BOE No. 3, Saturday, 3rd January 2015, p. 212).

The above-mentioned block will be taught through cooperative sessions that are divided into four different moments and in which a wide range of cooperative activities are carried out. Students will be distributed in different groups: informal groups, which will develop simple techniques and reduced durability that do not require a high level of cooperative skills, in which small groupings are used (Torrego and Negro, 2012); and formal groups, which will fulfill techniques whose complexity and duration are greater, so students need a higher level of cooperative skills. The choice of the activities to be carried out will depend on the time of the session and the task to be performed.

The formal cooperative activity to be carried out to achieve the contents and the proposed objectives will be called "Team Games Tournament", and it will be divided into three parts:

1. Presentation of the contents by the teacher.
2. Student work in base-team.
3. Team Games Tournament.

4.1.1. Presentation of the contents by the teacher

The sessions whose objective is the explanation and presentation of the unit by the teacher will be carried out with the structure that Johnson and Johnson (1999) proposed, through informal techniques and sporadic groupings.

The plan proposed consists of 4 moments:

Moment 1: Activating previous knowledge.

Moment 2: Presentation of the contents.

Moment 3: Processing information.

Moment 4: Synthesis of the new information.

These moments correspond to sessions 1, 2, 3 and 4, presented later in the section "Session Development: Activities".

4.1.2. Student work in Base-Teams

Students will carry out the corresponding activities, gathered in base-teams, which are groups of 4 or 5 students. Grouping is heterogeneous, in other words, the students who constitute the groups have different levels of academic performance and skills. The activities to be accomplished in these sessions will be formal. These activities correspond to sessions 5 and 6.

4.1.3. Team Games Tournament

The students, gathered in homogeneous trios according to their level of academic performance and their abilities, will carry out a series of activities similar to those they have performed with their Base Teams in the previous sessions. The Team Games Tournament activity will take place in sessions 7 and 8.

The block of Ecology will be hold during the third term, once the students have acquired the cooperative routines along the first and the second term.

4.2. Contents

According to *Royal Decree 1105/2014, of December 26th*, which establishes the basic curriculum of compulsory secondary education and baccalaureate (BOE No. 3, Saturday 3rd January 2015, p. 212), the contents to be taught during the cooperative sessions for the course of 4th in compulsory secondary education, are included in Block 3, which gathers all the contents related to ecology and the environment, these are:

- Structure of ecosystems.
- Ecosystem components: community and biotope.
- Limiting factors and adaptations.
- Tolerance limit.

4.3. Session development: activities

The contents introduced in the previous section will be worked on for ten sessions set out in Annex I. In order to have a clear overview of the entire didactic unit, a table has been done, which comprises the objectives, contents, cooperative techniques used, moments at which sessions are divided, and how the groups are done, and the activities will be fulfilled during the lectures (see Annex II).

The content-containing cooperative sessions, which are the first and the second sessions, are divided into four different moments, and informal techniques will be used. In the following four sessions, 3rd, 4th, 5th and 6th, both informal and formal activities are carried out, while only formal activities associated with cooperative learning will be carried out in the last four sessions, as described in Table 5:

SESSIONS	**TECHNIQUES**
1st	Informal
2nd	
3rd	Informal and formal
4th	
5th	
6th	
7th	Formal
8th	
9th	

Table 5: Cooperative techniques

4.4. Timing

This project will be implemented during the third term of the school year. It will have 10 sessions of 60 minutes spread over 4 weeks, based on *Royal Decree 1105/2014*, which states that there are 3 hours of biology per week.

5. EVALUATION

5.1. Assessment criteria and learning standards

To assess the acquisition of the objectives and the development of the skills and the key competences, as well as to assess whether the students have integrated the contents, the following assessment criteria and learning standards are set out, based upon *Royal Decree 1105/2014, of December 26th, which establishes the basic curriculum of Compulsory secondary Education and Baccalaureate* (BOE No. 3, Saturday 3rd January 2015) (Table 6):

ASSESSMENT CRITERIA	LEARNING STANDARDS
1. To categorize environmental factors and their influence on living things.	1.1. Student recognizes the environmental factors that condition living things in a given environment, assessing their importance in conservation.
2. To recognize the concept of limiting factor and tolerance limit.	2.1. Student understands the adaptations of living beings to a given environment, linking adaptation with the factor or environmental triggers thereof.
3. To identify intra- and inter-specific relationships as ecosystem regulation factors	3.1. Student recognizes and describes different relationships between living beings and their influence on the regulation of ecosystems.

4. To explain the concepts of biotope, population, community, chains and trophic networks.	4.1. Student analyzes the relationship between biotope and biocenosis, assessing their importance in maintaining the balance of the ecosystem.
5. To interprets the adaptations of living beings to a given environment.	5.1. Student recognizes the different trophic levels and their relationships in ecosystems, assessing the importance of maintaining them.

Table 6: Assessment criteria related to learning standards

5.2. Students' assessment

Choosing the way in which students will be evaluated is essential for the proper performance of the cooperative methodology. It is impossible to get the idea of a class in which there are no students who take advantage of the work of others, and that can cause the demotivation of those who do work. If the most motivated and hard-working students realize that the difference in performance when working as a group is not reflected on marks, feelings of discomfort from much of the students in the class may appear.

To avoid situations of stress when it comes to grading time, students might be fully informed about how the assessment will be done. Therefore, once the methodology has been implemented, students will be evaluated at three different levels: through self-assessment, co-evaluation and evaluation by the teacher, to that the student becomes more autonomous and active in the teaching-learning process.

The percentage that each of the assessment parts contribute to the final mark is summarized in the following table 7.

ASSESSMENT UNIT: ECOSYSTEMS	PERCENTAGES
Activities and tasks in groups: - Activities in sporadic groups average (50%) - Activities in Base-team average (50%)	40%
Individual mark average	25%
Co-evaluation	10%
Self-assessment	10%
Attitude, behavior, participation	10%
European Language Portfolio (records)	5%

Table 7: Appraisal criteria

- Evaluation of activities and tasks in sporadic pairs or groups:

Every student has worked in heterogeneous groups, getting in these groups grades from the activities done. The grade that the group gets will be the mean of every student's marks (in the group).

- Evaluation of tasks in Base-Teams:

The final assessment of the base team will be determined by the average of the tasks they deliver. These activities will be uploaded to a Dropbox folder, and so they will complete an online portfolio. The person responsible for the group that has the "computer role" will upload all the tasks to the folder "Finished Tasks UNIT: ECOSYSTEMS. Base-team X", which will be shared with the other members of the group and with the teacher. At the end of the unit, the digital portfolio will be assessed, and the teacher will give a mark to the group, as well as to those non-digital activities, such as the assessment of oral exhibitions, evaluation of the activity Team Tournament, etc.

- Co-evaluation:

At the end of the unit, co-evaluation of some co-workers' features will be made (see Annex V) for each partner with which every student has worked. Therefore it will be made for:

- Session 1:
    - o Moment 3 and 4.
- Session 2:
    - o Moment 1, 2, 3 and 4.
- Session 3, 4, 5 and 6.
- Session 7, 8, 9 and 10 (Base-team members).

- Self-assessment:

At the end of the unit a single self-assessment sheet will be made (see Annex VI) reflecting on personal action in every group (couples, sporadic groups and base teams), including a brief assessment of attitude and behavior.

- Language assessment:

Language will be taken into account by checking the European Language Portfolio at the end of each unit, together with the communicative and language skills assessed in the rubrics used as an evaluation tool (see Table 7).

5.3. Teacher's assessment

For the assessment of teachers it would be useful to check educational practice by the teacher itself. Presenting closed-ended questions (yes/no), in which the answer will be given by a score, according to the degree of satisfaction by the teacher from 1 to 5 (where 1 is not satisfied and 5 is very satisfied) (Annex VII), and open-ended questions in which the teacher can answer his/her personal opinion.

6. CONCLUSIONS

On the one hand, the main problems in the current educational system is that lectures are not appropriate to the society in which our students' lives. This means that traditional lectures discourage young people, since they sense that what they learn in class is useless to their daily life.

On the other hand, the globalized world in which learners live has arisen to the need to include new methods that promote effective language learning. For this purpose, bilingual schools have been established using the CLIL method.

However, an error has been made in the establishment of bilingual lectures, since teachers are still using traditional methodology and the only change has been the vehicular language used in class, from Spanish to English language. That is why the present MA dissertation intends to develop a CLIL methodology where cooperative learning is the core of it and the multiple intelligence theory is applied focusing on the naturalistic intelligence.

The fact of promoting and developing naturalistic intelligence does not mean that other intelligences are not developed or not worked in the classroom, but the primary objective is to develop or enhance the skills that enable students to interact with the environment and with other living beings (humans are included in this area), by knowing how to classify, and learning how to identify patterns (human behavior, for example, with so much importance in careers such as Marketing, Law, Psychology, and so on).

An innovative way to enhance the intelligences is through cooperative learning, due to the fact that students might work in cooperative teams. The results according to the literature are good if the cooperative methodology is implemented correctly. There are four stages of implementation, which are progressively introduced in order to finally work in base-teams.

The difficulty of this methodology is attributed to two elements: the first one is the demotivation of teachers to leave the comfort zone where master classes take place, and enter the world of educational innovation, which requires effort, time, and more work; the second

element is the difficulty that arises from having to implement the fourth phase of the methodology or the teaching network, which includes all teachers in the school, all subjects, and therefore it has to be included in the educational project of the school. This involves training to every teacher in the high school, and not all practitioners are willing to do so.

One of the strengths of this methodology is the active role that is given to students in their own learning process. As they stop being simple receivers of information as in the traditional classroom, they become active parts in the task and activities done in the classroom, content and language assessment, etc.

In terms of the viability of the project, I think that it is a methodology that can easily fix into a Bilingual school, and which could be implemented in biology classrooms and in any other subject. However, it must be taken into account that implementing cooperative learning is a lengthy process because teachers not only have to teach students, but they must educate them to behave cooperatively, while learners should realize for themselves that if everyone wins, everybody wins, and on the contrary, if one of them loses, everybody does, too. This is also an added difficulty, since students, unfortunately, have always learned that their victory is achieved when others lose.

Finally, the following African proverb describes it very well:

If you want to go fast,

go alone.

If you want to go far,

go together.

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8. ANNEXES

ANNEX I

Development of the cooperative sessions:

***Session 1*:**

- *Contents*:

- Structure of ecosystems.

- Ecosystem components: community and biotope.

- Limiting factors and adaptations.

- *Objectives*:

- Improvement of the teaching-learning process of students in the subject of biology, in the unit of ecosystems and the environment, showing special interest to the development of naturalistic intelligence.

- Improvement of the daily coexistence of the classroom, encouraging mutual help.

- Demonstration of skills and attitudes that favor cooperative work.

- Increase in the motivation of students in the field of biology.

- *Informal Activity, moments:*

  Moment 1:

  Grouping: Individual and in pairs

  Strategy: Performing an introductory activity in which students, individually, complete a small sheet that exposes incomplete sentences that must be completed with what they have learnt about biology in previous courses. It is not allowed to talk to colleagues, or consult any kind of source.

Ecology:
What is it?
What does it study?
Ecosystem:
What is it?
It is formed:
Its dimensions are:

Once the sheet has been completed, students will join to a colleague and share what each one has written on their tables.

Resources:

- Data sheet prepared by the teacher with the terms ecology and ecosystem.

Moment 2:

Grouping: Individual and couples

Strategy: The teacher will explain, orally, that a new block has been launched, which is Ecology and the Environment block. He/she explains that the first topic will be worked on eight sessions in which the cooperative methodology will be used. From the viewing of a video, students will be introduced to what is ecology, an ecosystem, what constitutes it, the relationships that are established between living beings, making them know the balance that exists in ecosystems, and the risk of species' extinction. This video is available at the following link:

https://www.youtube.com/watch?v=GlnFylwdYH4

A blank mind map will then be made on the whiteboard, which captures the most interesting points of the whole video. It will be performed by a volunteer student, assisted by all his classmates and the teacher, who will guide the action of the students. The students will do it according to previous knowledge and what was watched in the video.

After the introduction, concepts such as ecology, ecosystem, biosphere, biotope, biocenosis, community, population, habitat, biotic factors and abiotic factors will be explained, which will be accompanied by illustrative photographs that will be projected on the screen of the class so that all students can see them, which will represent the definitions that will be developed, so that the definitions, processes and structures are associated with an image.

In order to develop the question of abiotic and biotic factors, a video will be screened, which is available at the link https://www.youtube.com/watch?v=FBypB0lSimI

This video will explain the question of abiotic and biotic factors, and in it their biological importance will be listed and emphasized, as they are factors that limit the life of living beings. The teacher will then differentiate what are eurioic and stenoic organisms, based on examples of living beings with these characteristics.

During the development of the contents, and after the viewing of each video, the session will be interrupted to take a three-minute pause in which students will comment in pairs on what has been explained to them, and they will ask any doubts they may have.

Resources:

-Whiteboard and pens.

- Computer system with computer, speakers, internet access and projector.

- Illustrative photographs.

- Video ecology: https://www.youtube.com/watch?v=GlnFylwdYH4

- Video abiotic and biotic factors: https://www.youtube.com/watch?v=FBypB0lSimI

- Student's own school material.

Moment 3:

Grouping: Base-Team (4-5 people)

Strategy: Grouped into base-teams, students are provided with a sheet with as many questions or tasks as components in the group. Each student will be responsible for one of the questions. This activity splits in two parts: in the first part, as a symbol, the components of the group place their pencils in the center of the table, no one can write, and the person responsible for the first question will act as a moderator, making sure his colleagues participate by answering the question; in the second part of the activity, each student takes his/her pencil and writes the answer that has been commented, argued and explained in the group. At that moment speaking is forbidden.

Resources:

- Sheet with printed tasks.

- Student's own school material.

Moment 4:

Grouping: Trios or Quartets

Strategy: Groups create a 5-word crossword, which the group components consider, and pass it on to another team. In turn, they receive another crossword by their peers.

The words that the crossword should contain are those learned during the subject.

Resources:

- Blank sheet.

- Student's own school material.

***Session 2*:**

- *Contents*:

- Limiting factors and adaptations.

- Tolerance limit.

- *Objectives*:

- Improvement of the teaching-learning process of students in the subject of biology, in the unit of ecosystems and the environment, showing special interest in the development of naturalistic intelligence.

- Improvement of the daily coexistence of the classroom, encouraging mutual help.

- Demonstration of skills and attitudes that favor cooperative work.

- Increase in the motivation of students in the field of biology.

- *Informal Activity, moments:*

Moment 1:

Grouping: Couples

Strategy: Conducting an activity in which students must apply creativity and their prior knowledge. In this activity they will have to choose a living being from the Animal Kingdom and use it as a model to modify their morphological and physiological structures with the aim of "artificially adapting" it to another habitat, such as the terrestrial environment, the marine environment, the neritic zone of a lake, parasitic life, living underground, etc. After drawing it and explaining it in his/her notebook, the student should expose it to his/her partner, who will correct what he/she thinks is not correct. After that, they will give it to the teacher, who will correct and grade it.

Resources:

- Student's own school material.

Moment 2:

Grouping: groups of 4 members (heterogeneous and sporadic)

Strategy: The teacher will show students a series of images obtained from the internet of living things. Students in sporadic heterogeneous groups should have to dialogue in

order to find out the contents. The photos will be displayed using the classroom projector, which will be automatically passed every 2 minutes. In this way, they will be able to obtain specific information about animal's adaptations.

The images will show living beings with adaptations to cold, excessive heat, to live in dark or light environments, with high humidity or dry habitat, in saline environments, etc., as well as animals relating intraspecifically and interspecifically.

After some time, the subgroup spokesperson (previously chosen by the components of the group themselves) will present orally to the other colleagues what his/her group has learnt from the pictures. After this, the teacher will inform them of what needs to be known about the relationships and the adaptations to the different media, by using the photographs that he/she had previously shown to the students, pointing out and highlighting the structures and characteristics that allow each living beings live in a particular habitat.

Resources:

- Illustrative pictures.

- Student's own school material.

- Computer system with computer and projector, with internet access.

Moment 3:

Grouping: groups of 4 members (heterogeneous and sporadic)

Strategy: The activity aims to review the content that has just been shown and to consolidate new concepts. Each student must write on strips of paper:

- I am (indicate a living being), and I can live in (indicate a habitat) because I have (indicate adaptations).

- I am (indicate a living being) and I interact with (indicate a living being) in a way (indicate inter- or intra-specific relationship and type) because (indicate benefit or prejudice).

Paper fragments must be inserted into a box, so that each student will randomly pick one up. The student who has taken the strip of paper will be responsible for coordinating his team so that, doing mimic, he/she exposes what it is written on the paper strip. The student who gets it right will pick up a new piece of paper and the mimicry exercise will be repeated.

Resources:

- Box.

- Sheets cut into strips.

- Student's own school material.

Moment 4:

Grouping: groups of 4 members (heterogeneous and sporadic)

Strategy: In groups of four, students will make a mind map that collects adaptations of the terrestrial environment, the aquatic environment and the inter- and intra-specific relationships. The teacher will separate each group into subgroups of two and distribute, to each couple, a content already discussed in class. For example: one couple has adaptations and another has the relationships of living beings. Separately, groups of two must make a mind map, eventually joining the two parts of the mind map to create a single schema that will synthesize what has been given in the session.

Resources:

- Student's own school material.

Session 3

- *Contents:*

- Structure of ecosystems.

- Ecosystem components: community and biotope.

- Limiting factors and adaptations.

- Tolerance limit.

- *Objectives:*

- Improvement of the teaching-learning process of students in the subject of biology, in the unit of ecosystems and the environment, showing special interest in the development of naturalistic intelligence.

- Improvement of the daily coexistence of the classroom, encouraging mutual help.

- Demonstration of skills and attitudes that favor cooperative work.

- Increase in the motivation of students in the field of biology.

- *School trip to an urban park (Informal technique):*

  Grouping: groups of 4 members (heterogeneous and sporadic)

  Justification: the high school is located near an urban park. This space offers a high biological interest, as it concentrates a large amount of biodiversity in plants and animals. You can also visit a small greenhouse with tropical vegetation, in which a lot of insects live (lepidoptera mostly). You can also observe a pond in which there are birds (geese, ducks, swans, etc.), amphibians (frogs, early frog stages, etc.), insects (mosquito larvae, dragonflies, devil's horses, mosquitoes, etc.), fish (barbels and carps), vegetables (water lilies, reeds, etc.), reptiles (Galapagos tortoise and terrestrial turtles), etc.

Strategy: In small groups, each member must complete a field sheet (Annex III) in which data will be collected concerning the living beings that they will observe in the park, the adaptations they have to live in that particular habitat, the existing relationships among living beings, the amount of total biocenosis observed, etc.

Resources:

- Field sheet (Annex III).

- Student's own school material.

Sessions 4, 5 and 6

- *Contents:*

- Structure of ecosystems.

- Ecosystem components: community and biotope.

- Limiting factors and adaptations.

- Tolerance limit.

- *Objectives*:

- Improvement of the teaching-learning process of students in the subject of biology, in the unit of ecosystems and the environment, showing special interest in the development of naturalistic intelligence.

- Improvement of the daily coexistence of the classroom, encouraging mutual help.

- Demonstration of skills and attitudes that favor cooperative work.

- Increase in the motivation of students in the field of biology.

- *Exhibition of data collected during the school trip (Informal technique):*

  Grouping: groups of 4 members (same as in the third session)

  Strategy: Based on the data collected during the third session and the observation of living beings, their relationships and their adaptations, students should creatively expose the group's experience, focusing on the content that has been worked on during the unit, both the relationships and adaptations, such as biotic, abiotic, biotope, biocenosis, etc. They will be able to use all the classroom's resources and those that they want to from home. They should also use ICT resources creatively (not only power-point). They will have two sessions in the computer classroom to prepare their work and one session for the groups to present what they have done. They will be granted seven minutes per group. Every time students need the teacher, he/she will be available, and they will have internet access to consult what the students want to, as far as it is related to the subject. Own photos should be provided for their presentation. In order to work cooperatively in the computer room, the members of the group should establish roles and share responsibilities such as the following:

  - Moderator: He/she is responsible for not wasting time, the tasks are equally distributed, he/she controls the speaking time.
  - Secretary: He/she encourages each member to do his/her job correctly, takes care of recapitulating what was spoken in the group, reminds the objectives that the team has to reach, takes care of everyone participating.
  - Understanding checker. He/she is in charge of checking if every member of the group has understood what should be done in the tasks.
  - Observer: He/she records the behavior and attitudes of the group members…

Resources:

- Students' illustrative photographs.

- Student's own school material.

- Field sheet completed by each student in session 3.

- Computer system with computer, projector and speakers.

- Two computers per group of students with internet access.

Sessions 7 and 8

- *Contents:*

- Structure of ecosystems.

- Ecosystem components: community and biotope.

- Limiting factors and adaptations.

- Tolerance limit.

- *Objectives:*

- Improvement of the teaching-learning process of students in the subject of biology, in the unit of ecosystems and the environment, showing special interest in the development of naturalistic intelligence.

- Improvement of the daily coexistence of the classroom, encouraging mutual help.

- Demonstration of skills and attitudes that favor cooperative work.

- Increase in the motivation of students in the field of biology.

- *Formal Activity, Team Tournament:*

  Grouping: Base-teams

  Strategy: Before performing the activity, the teacher has created a Dropbox/Google drive folder for each base-team in the classroom (that folder will be shared between the group members and the teacher). Base teams shall carry out an activity sheet provided by the teacher (Annex IV). In these two sessions they will work with roles, the same from sessions 4, 5 and 6, which will be determined by the students themselves. In this activity, the roles will rotate for each of the members of the group, since each exercise will be corrected and evaluated by a student who will play the role of understanding checker. In addition, there will be a student who will take care not just of the roles they have during the activity, but will have additional responsibility determined by the teacher (as he/she deems according to the characteristics of each

student): uploaded manager, who will take care of uploading to Dropbox the tasks that the teacher requests. Once all the members of the group have completed one of the exercises individually, they go on to check them in groups with a response sheet that the teacher has given to the person responsible for evaluating the first activity. Among all, they correct it, compare it, and argue what the correct answer may be. Once an agreement has been reached, each student adds or corrects their answers according to what has been discussed in the group. They will move on to the next activity only when the exercise has been comprised of all the components of the base equipment.

When they finish the activity, the group's ICT manager will need to upload their colleagues' listings to the shared Dropbox folder (they will act as a portfolio) with the teacher and other team members to be evaluated (it must be included in each student card both the answers that each has prepared before interacting with the group, and the responses drafted after the interaction with the team).

Resources:

- Activity sheet (Annex IV).

- Sheet with the solutions of the activities.

- Student's own school material.

- One computer per group of students with internet access.

Sessions 9 and 10

- *Contents:*

- Structure of ecosystems.

- Ecosystem components: community and biotope.

- Limiting factors and adaptations.

- Tolerance limit.

- *Objectives:*

- Improvement of the teaching-learning process of students in the subject of biology, in the unit of ecosystems and the environment, showing special interest in the development of naturalistic intelligence.

- Improvement of the daily coexistence of the classroom, encouraging mutual help.

- Demonstration of skills and attitudes that favor cooperative work.

- Increase in the motivation of students in the field of biology.

- *Formal Activity, Team Tournament:*

  Grouping: homogeneous trios according to academic performance.

  Strategy: Once the activity part of the previous two sessions is done, groups of three are made (each student will come from a different base-team). These new trios are homogeneous groups, that is, they will be grouped according to their academic performance level. Each group of three shall answer a questionnaire of 18 questions (6 for each member) that will be very similar to those answered on the base team (Annex IV). This activity will be worked with the same technique when they answered the questions grouped in the base-teams. Everyone answers the question individually, comments on it, adds supplementary information, and moves on to the next question. They will continue to work for roles as in previous sessions, but there will only be three responsibilities, the moderator, the secretary and the understanding checker. The most significant difference from the other sessions is that the answers will not be given to them.

  Once the exercise sheet is completed, a few points will be distributed as a mark. Thus, each student will be awarded as many points as correct answers have been said.

  Base-teams will earn points by making an average of each member's individual ratings that has earned his/her mark in the groups of three.

In order to evaluate the individual tasks, the same procedure will be performed as in the previous sessions, and the manager of each base-team will be responsible for uploading the documents to the Dropbox folder.

Resources:

- Activity sheet (Annex IV).

- Student's own school material.

- One computer per group (Base-team) of students with internet access.

ANNEX II

OBJECTIVES	CONTENT	SESSIONS	TECHNIQUE	MOMENTS	GROUPING	ACTIVITIES
- Improvement of the teaching-learning process of students in the subject of biology, in the unit of ecosystems and the environment, showing special interest in the development of naturalistic intelligence. - Improvement of the daily coexistence of the classroom, encouraging mutual help. - Demonstration of skills and attitudes that favor	- Structure of ecosystems. - Ecosystem components: community and biotope. - Limiting factors and adaptations.	1	Informal	1	Individual and in pairs	- To fill out a data table about Ecology and Ecosystems.
				2	Individual and in pairs	- Content explanation with pictures and video - Mind map about Ecology
				3	Base-team	- Pens in the middle
				4	Trios	- Crosswords
	- Limiting factors and adaptations. - Tolerance limit.	2	Informal	1	In pairs	- To create their own creature.
				2	Groups of four	- To guess what the pictures show.
				3	Groups of four	- To guess the living being by clues about its features.
				4	Groups of four	- Co-mind map about adaptations and inter-,

cooperative work. - Increase in the motivation of students in the field of biology.						intraspecific relationships.
	- Structure of ecosystems. - Ecosystem components: community and biotope. - Limiting factors and adaptations. - Tolerance limit.	3	Informal	*It is not divided in moments; due to it is a school trip.*	Groups of four	- School trip to an urban park, to observe living beings and apply what has been learnt in lectures.
		4, 5 & 6	Informal	*It is not divided in moments; due to it is group-working and presentation time.*	Groups of four	- Analysis of the adaptations, the ecosystem, biotopes have seen in the school trip. - Results' presentation by images and explanation.
		7 & 8	Formal	*It is a formal activity, so sessions are not divided into moments.*	Base-teams	- Team Tournament.
		9 & 10	Formal	*It is a formal activity, so sessions are not divided into moments.*	Base-teams	- Team Tournament.

ANNEX III

Material for the school trip.

Living beings involved in the relationship		Inter or Intra relationship	Type of relationship	Benefits and harms	Adaptations
Diversity observed					x

ANNEX IV

Possible exercises for activities in sessions 7, 8, 9 and 10.

- You win an award in a biology contest, the prize includes: tickets to a natural park in Alaska stay and flight included for you and your family. You get on the natural park's website and you see that it is famous for the abundance of grizzly bears that live on it, so they claim to see bears on any visit. When you arrive at Alaska Park you do not see any bear, but the views of the snowy landscapes are very beautiful. Your parents then ask you why you have not been able to see any bear. *Answer: lethargy/hibernation.*
- You are on the beach and you see a fish sail, you take a net and you catch a fish that you put into a beach bucket full of sea water. You take it into the house, not taking seriously your parents' warnings. You have to have lunch and forget to move the bucket with the fish away from the sun shine, and when you come back the fish is floating in the water. What happened to the fish? Why? *Answer: the fish has died because it is not adapted to high temperature waters. It can also be related to the decrease of oxygen in the water.*
- Your mother buys a plant to decorate the house, it's an orchid, you realize that the flowerpot is not black or brown as it usually is, but transparent. You see something weird about the roots, they're not yellow like other plants, they are green. The next day you see that your mother has bought a very nice ceramic flowerpot. Within a week, the flowers of the plant has fallen, the leaves are withered and the stem is no longer erect and ample. What happened to the orchid? Why? *Answer: orchids also do photosynthesis by the roots. It's an adaptation to the lack of light.*
- You go to the fish market and you see a flat fish (sole) that has both eyes "moved", which are placed on the head that appears to be crooked. You wonder what happened to the fish, Can fish have stiff neck? But you look at the other soles and they all have these symptoms. Why do you think they have their eyes set like that? Why are the eyes of toads and crocodiles placed in an outstanding structure on the head? Why do the eyes of humans and lions have "that" disposition? What about the gazelle? *Answer: adaptation to the environment in which they live, in the case of soles, predators can only proceed from above, as they are benthic fish. Toads and crocodiles have them in protuberant structures so they can have a view of what happens outside the water without having to expose their bodies. Humans and lions have eyes on the*

front of the face, because they are hunters. The gazelle has them located on the sides to be able to see the predators, they do not need eyes "looking in front" because they form groups.

- Your friend has told you that his hamsters have had 8 newborns, that afternoon you go to your friend's house to see them. When you arrive, there is blood in the cage and you only see 5 young. Shocked by the terrifying vision, you tell your friend's parents, and they answer that the hamster behavior is violent, so they might have slaughtered them. Give your friend's parents a reason to make them realize that it is a natural behavior. Give them an example of another species that does the same. *Answer: the female hamster has eaten the weakest or deformed offspring to ensure the survival of the other offspring considering the space and resources available. Another case, for example, it is the female scorpion that transports her young on the back, if any fall to the ground (because it will normally be weaker) it will be devoured by the parent itself. Another example is the famous collective suicide of the lemmings.*

ANNEX V

HOLISTIC COEVALUATION sheet:

Date:	
Name and surname:	
Mate's name and surname:	
Mate student's performance in my group	
Comments	

INTERPERSONAL SKILLS COEVALUATION SHEET:

Date:	
Name and surname:	
Mate's name and surname:	
Interpersonal skills	**MARKS**
He/she keeps speaking time	
He/she is respectful with others' personal space	
He/she helps in keeping the volumen down	
He/she provides help	
He/she asks for help	
He/she helps in solving conflicts	
He/she expresses his/her personal view	
He/she tries to not waste time	
He/she corrects politely other collages	
He/she fulfills his/her responsibility roles correctly	
He/she knows how to argue ideas	
He/she knows how to reject ideas	
He/she is agreed to be corrected by a collage	
He/she works every day	
Comments:	

ANNEX VI

SELF-EVALUATION sheet:

	STUDENT'S COMMENTS AND MARK	**TEACHER FEEDBACKS**
Risk-Taker All of my side-talk is in Spanish. I do not accept English. I sustain conversation (keep it flowing.)		
Takes Control of Learning I challenge myself to be the best I can be by completing tasks and finding a way to raise the bar. If I finish early, I challenge myself by…		
Supports Classmates I try to "bump up" my classmates when they struggle or hesitate because they don't know how to do an activity. I invest in others' work by listening to their risk-taking. I'm a team player!		

Expands with Extensions I "bump up" my language using extension words to add details/explanations, and to justify my choices or opinions.		
Understands Directions I take off into activities quickly and by myself. I REALLY watch and listen to get instructions.		
Vocabulary I incorporate past and new vocabulary, challenge words and "specialized" words I ask for or my teacher gives me.		
Eye Contact I engage partners by facing and looking at them.		
Conjugates Verbs with Accuracy Yo doy, Yo hago, Yo sé.		
Logic I would be understood by a sympathetic, native speaker.		
Accent I try to imitate my teacher/a native speaker and pay close attention to pronunciation		
Respectful I show consideration for myself and others.		
Persistent I stay on task and complete language activities, even when the work becomes challenging.		

ANNEX VII

Teacher self- assessment

QUESTIONNAIRE	MARK (*)
The settled objectives have been met	1 2 3 4 5
Activities suit students	1 2 3 4 5
There is time enough to do all the activities scheduled for the sessions.	1 2 3 4 5
Activities are useful to achieve the objectives set	1 2 3 4 5
Students use time effectively	1 2 3 4 5
Students understand contents	1 2 3 4 5
There is good communication between student and teacher	1 2 3 4 5
Students help each other	1 2 3 4 5
Students use English language along the lecture	1 2 3 4 5
The material and resources are adapted to the proposed activities	1 2 3 4 5
Problems or comments:	

(*) 1: not satisfied. 5: very satisfied

ANNEX VIII

Rubric to assess students work

ITEMS		0-3	4	5	6-7	8-9	10
CONTENTS		The student does not identify neither describes the studied unit.	The student identifies and describes the studied unit with the teacher's help.	The student hardly identifies and describes some parts of the studied unit.	The student identifies and describes some part of the studied unit.	The student identifies and describes without any doubt the unit studied.	The student identifies and describes perfectly and without any doubt the studied unit.
VOCABULARY	BICS	The student is not able to use BICs in class.	The student needs the teacher's help to use BICs in class.	The student uses BICs in class with many difficulties.	The student uses BICs in class with some difficulties.	The student uses BICs in class without difficulty	The student uses perfectly and without any difficulty BICs in class.
	CALPS	The student is not able to use the terminology of the unit (CALPS).	The student needs the teacher's help to use the terminology of the unit (CALPS).	The student uses with many difficulties the terminology of the unit (CALPS).	The student uses with some difficulties the terminology of the unit (CALPS).	The student uses without difficulty the terminology of the unit (CALPS).	The student uses perfectly and without any difficulty the terminology of the unit (CALPS).

FLUENCY AND INTERACTION	The student is not able to communicate in the foreign language.	The student must be helped by the teacher in order to communicate and interact with the others.	The student can manage the discourse and the interaction with effort and must be helped by the teacher.	The student is able to communicate in the foreign language and his/her mistakes do impeded the understanding of his/her discourse.	The student can express himself/herself and interact with fluency.	The student can express himself/herself with a good degree of fluency and interact easily.
COOPERATIVE LEARNING TECHNIQUES	The student never keeps to and follows all the rules, instructions and roles established to work cooperatively.	The student rarely keeps to and follows all the rules, instructions and roles established to work cooperatively.	The student occasionally keeps to and follows all the rules, instructions and roles established to work cooperatively.	The student often keeps to and follows all the rules, instructions and roles established to work cooperatively.	The student almost always keeps to and follows all the rules, instructions and roles established to work cooperatively.	The student always keeps to and follows all the rules, instructions and roles established to work cooperatively.

ATTITUDE, EFFORT AND BEHAVIOUR	The student shows terrible attitude, effort, commitment and behavior.	The student shows inadequate attitude, effort, commitment and behavior.	The student shows adequate attitude, effort, commitment and behavior.	The student shows appropriate attitude, effort, commitment and behavior.	The student shows very appropriate attitude, effort, commitment and behavior.	The student shows excellent attitude, effort, commitment and behavior.