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INGLESA Y CONTENIDOS: EDUCACIÓN INFANTIL Y PRIMARIA**

**CLIL AND OTHER INTERDISCIPLINARY APPROACHES: AN  
ENTREPRENEURIAL PROJECT FOR PRIMARY EDUCATION**

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## I. INTRODUCTION

This present paper begins analyzing diverse initiatives taken by the Ministry of Education and other institutions to promote the interdisciplinary education in Primary Education along with the measures taken to foster an entrepreneurial culture among young students. Moreover, the reasons why both of them should be cultivated are explained. The theoretical framework describes different interdisciplinary approaches and how they can be joined to the CLIL approach. All this serves as the support for the innovation project which aims that the children develop cross-curricular links, an entrepreneurial spirit and improve their English competence.

## 1.1. Project justification

The curriculum is a document which includes the objectives, the content, the methodology and the assessment criteria that guide the academic activity. In Spain the Primary Education Curriculum is divided in three cycles and eight areas of content. Even though the curriculum is divided into disciplines, there are some paragraphs that address the interdisciplinary and the cross-curricular approaches.

The curriculum explicates that the knowledge and skills developed by the children in different disciplines have to rely on each other so that the children can achieve a meaningful learning (Ministerio de Educación, Cultura y Deporte, 2014<sup>1</sup>). The Curriculum aims that the children perceive reality as an overarching whole through the means of projects, centres of interest or cooperative learning. These holistic approaches contribute to relate the different contents, procedures and attitudes across the curriculum. In this way, learning becomes more meaningful, more functional and participates in the acquisition of the basic competences. Moreover, Asturias' Curriculum makes clear that any didactic proposal has to be linked with children's interests and experiences; it has to consider their previous experiences, and to foster their motivation and active participation in their learning process (Consejería de Educación, Cultura y Deporte, 2007<sup>2</sup>).

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<sup>1</sup> Ministerio de Educación, Cultura y Deporte (2014) <http://www.boe.es/boe/dias/2014/03/01/pdfs/BOE-A-2014-2222.pdf>

<sup>2</sup> Consejería de Educación, Cultura y Deporte (2007) established the outline procedure that should be followed in Primary Education [http://www.educastur.es/media/centros/curriculo/decreto\\_56\\_primaria/d56\\_articulado\\_primaria\\_20070614.pdf](http://www.educastur.es/media/centros/curriculo/decreto_56_primaria/d56_articulado_primaria_20070614.pdf)

On the subject of entrepreneurial education, the Ministry of Education, as well as the different Autonomous Communities, has promoted the entrepreneurship education. They have established regulations on education and they have designed and implemented different initiatives to promote it.

At a regional level there is a range of initiatives to promote the entrepreneurial culture among the youngsters, such as:

“the sharing of methodologies and educational materials for entrepreneurial education, curricular and extracurricular activities, collaboration with Regional Ministries and other associations” (Education, Audiovisual and Culture Executive Agency, 2012<sup>3</sup>).

In 2006 the Ministry of Education included entrepreneurship education as one of the basic aims of the education system. Thus, goals related to entrepreneurial education were included in every educational level. In Early Years and Primary Education one of the eight competences is “Autonomy and personal initiative”, it makes possible a cross-curricular approach to address an entrepreneurial education (Education, Audiovisual and Culture Executive Agency, 2012).

Across the Autonomous Communities there are several programmes which aim promoting the entrepreneurial culture by connecting school subjects between each other and to real world issues.

In Asturias the foundation Valnalón<sup>4</sup> proposes a programme for Primary Education, called Empresa Joven Europea, through which the students make up and manage a business where they make up products to be sold in a market. For Secondary Education, the same foundation suggests adapting the subject “Citizenship Education”, so the students create an NGDO (Non-Governmental Development Organisation). The contents and the goals addressed for this subject are achieved through this class-project.

Despite these specific references to the need to create cross-curricular links, use a meaningful, active and individualised learning approach and the efforts to promote an entrepreneurial education, Spanish students have not improved their performance

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<sup>3</sup> Education, Audiovisual and Culture Executive Agency (EACEA) is responsible for the management of certain parts of the EU's funding programmes in the fields of education, culture, audiovisual, sport, citizenship and volunteering.

<sup>4</sup> Valnalón is a foundation created in 1987 to promote the entrepreneurial culture and education.

according to the PISA<sup>5</sup> report (2014). As Andreas Schleicher<sup>6</sup> (2014) pointed out that, most of Spanish schools keep using outdated teaching methodologies based on remembering formulas and data, without considering the individual aptitudes of each student. Schleicher clarified that PISA tests are not based on remembering information but on applying that knowledge to real problems or putting it into practice.

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<sup>5</sup> Programme for International Student Assessment (PISA) is an international assessment which tests 15-year-old students' competence in reading, mathematics, and science literacy. PISA also measures cross-curricular competences and functional skills.

<sup>6</sup> Division head and coordinator of the Programme for International Student Assessment.

## 1.2. The status of the issue

In 1933, John Dewey put forward a new teaching method that involved the students in projects that required the application of a range of school disciplines. Dewey believed that an adequate education should “present problems that awaken new curiosity and create a demand of information” (Gyles and Eyler, 1994). Despite the fact that Dewey’s method and interdisciplinary teaching are not identical, both are problem centred approaches that aim the connection across disciplines.

Even though the interdisciplinary approaches are not new, they have never been widely practice (Wood, 2010). Today, however, there is a renewed interest in these approaches because of the need to find alternative ways to address standards, to improve the quality of education and to reach a meaningful learning. As a result, many interdisciplinary initiatives have arisen.

One of the most drastic approaches is advocated by Marion Brady (1995). He proposes a “Supradisciplinary” curriculum for Primary Education, in which the disciplines are not divided into subjects and all of them are integrated in a complex and coherent network of knowledge. On the other hand, there are other authors such as Duerr, Haynes or Rodriguez-Valls, who find a middle path between the traditional and the modern methodologies. They stand for providing students with experiences to activate their prior knowledge to build new one, and connect it with the real life. These experiences are meant to be multidimensional practices which need real understanding and connections across disciplines to be resolved.

These different interdisciplinary approaches will be widely described in the theoretical framework of this project.

### 1.3. Interest of the proposal

The most demanded skill in most of the schools around the world is learning by heart. Students are required to memorize data from textbooks and write it down on exams, just as it is written in the book. But those ideas they have to recall are the final conclusion of someone else (Brady, 2004). This way, students are just repeating someone's conclusions; they are not developing any High Order Thinking Skill. Taking a look to Bloom's Taxonomy<sup>7</sup> (1956), remembering is the foundation on which understanding, applying, analyzing, evaluating and creating skills are built. If teachers want the students to develop a complete understanding and a critical view of reality, it is required the development of all the thinking skills. The current static nature of the curriculum should move onto a dynamic production of knowledge.

According to Brady, in the established curriculum there is also a lack of coherence. It is divided into subjects, these subjects are focused on diverse facts of reality, those facts are approached from diverse perspectives, they have different objectives, they employ different conceptual frameworks and different levels of abstraction; so that it can not provide a "coherent, holistic, comprehensive, hard-edged, and intellectually manageable conceptual framework to make more sense of daily life" (Brady, 2004). Each subject is not thought as a fraction of a whole framework to examine and analyze reality, and consequently any coherent connections can be made between them (Brady, 1999). The real world cannot be divided and studied in independent chunks. There are multiple connections between disciplines, and without them, the isolated subjects are not coherent, neither useful to help the youngsters understand human experiences. The upholders of interdisciplinary approaches propose studying the interrelationships between the traditional subjects in order to create a net of useful knowledge to face life.

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<sup>7</sup> Bloom's Taxonomy, is a scheme of learning levels to support and provide a path to an educational project design and assessment.



## 1.4. Objectives

This present paper describes and analyses the importance of an interdisciplinary approach in today's education. It introduces different perspectives toward interdisciplinary education and shows different levels of implementation. Another issue addressed is how the Content and Language Integrated Learning approach can be easily related to other interdisciplinary approaches, and how they can be used to foster an entrepreneurial culture among students.

The second part of this document is an effort to combine these approaches in an innovation project, *The School Market*. Hence, the principal objective of this paper is to elaborate and to expound an innovation CLIL project to foster an interdisciplinary learning and to promote an entrepreneurial spirit among the students of the third cycle of Primary Education.

For this purpose the specific objectives are:

- Apply the core skills of communication, numeracy, literacy, science, mathematics, art, problem-solving and collaborative-working from an interdisciplinary approach, using English as a mean of communication.
- Form links across disciplines.
- Promote enterprising and innovating attitudes through *realia*<sup>8</sup> and meaningful activities.
- Develop successful independent learning-by-doing attitude.
- Demonstrate personal and social abilities to work as a part of a team.

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<sup>8</sup> The use of *realia* in a classroom, means using objects or artefacts from real life.

## II. THEORETICAL FRAMEWORK

## 2.1. An interdisciplinary approach to update the current system

A distinction between the “multidisciplinary” and the “interdisciplinary” approach is necessary to be made. The first term does not refer to the combination of disciplines (Yang, 2009) but the teaching of the same topic from more than one discipline in parallel to each other. Whereas the “interdisciplinary” approach goes beyond the multidisciplinary technique; it refers to subjects which include knowledge, understandings, methodologies and perspectives derived from different disciplines (Jones, 2009).

Interdisciplinary teaching can constitute diverse pedagogical challenges to teachers that have been enumerated by several authors (Allen, 2005; Lindgren, 1977; Morrison, 2006; Oliver and Plewes 2002). The main disadvantage is that teachers are used to the fragmented structure of knowledge presented in the curriculum subjects. Covering several disciplines as one could be a challenge for them. Thus, it would be difficult maintaining a balance between disciplines. In addition, some teachers would face a lack of academic vocabulary and discourse; since some of them would not have the methods of inquiry needed for teaching and studying disciplines they are not specialists at.

However, when an interdisciplinary programme is well designed and developed, it can provide the students not only with interdisciplinary approaches, but also give them the chance to integrate different knowledge and skills from one discipline into the dynamics of another. Yang (2009) has dealt with the benefits of the interdisciplinary approach. The learning process can be improved by the use of several teaching methods flexibly. It goes beyond the facts, and in so doing, it fosters children to take an independent rather than a passive learning style. Apart from increasing students' vocabulary and exposure to the language of discipline, this approach helps students create a complex network of knowledge that allows them to expand their perception and understanding of the world.

In order to successfully obtain the benefits of interdisciplinary teaching, there are three conditions that should be met (Yang, 2009). Firstly, the teacher has to consider disciplines as “interactive means of dealing with a problem or activity”. The second condition is that the teacher should be willing to learn from other disciplines, about their

theory and about how to put them into practice. And third, when designing interdisciplinary projects, the same consideration has to be given to all areas of knowledge. Furthermore, what is most necessary to reach a successful learning experience is that the teacher “inspires a love of learning and a thirst for knowledge in students, must love the subject and reflect passion to students” (Duerr, 2008).

## 2.2. The “Supradisciplinary” approach

One of the most radical approaches about Interdisciplinary teaching is given by Marion Brady. This author proposes a complete reversal of what we already know as Primary Education. He suggests a “Supradisciplinary” approach: the study of the different disciplines across the curriculum as a whole network of knowledge, so that a complete and coherent view of the reality will be reached.

The actual disclosure of the disciplines across most of the curriculums provides the students with an artificial view of the reality, instead of an integrated view of knowledge (Goodlad, 1984). They are taught chunks of different disciplines, but they are not shown how it all is linked. As Brady (1995) says about disciplines, “individually, they lack comprehensiveness. Collectively, they lack coherence”. In the real world we cannot find any discipline disconnected from each other. Moreover, one of the biggest matters within the established curriculum is the “lack of an understandable, practical, primary purpose” (Brady, 1986). If we want to approach the curriculum in a comprehensive and coherent way we should take into account the relationships and intersections across the subjects. Brady (1995) has listed thirteen problems of the current established curriculum that have persisted over time:

1. “The disciplines are not comprehensive.” Students are required to memorize a vast of facts and data, but they are not encouraged to think about the effects and dynamics of those facts.
2. “The disciplines segment reality in awkward, artificial ways.” In the real world any discipline can be found in a way that is not connected to another one.
3. “The disciplines provide no comprehensive conceptual structure for organizing either “school knowledge” or ordinary experience.” Students have already integrated a network of knowledge and ideas, and the new school-knowledge, in order to be remembered and understood, should relate to this network whether to expand it or to mend it.
4. “The present curriculum lacks universal, overarching goals.” Since the disciplines are not coherently linked, no consistent goals can emerge from

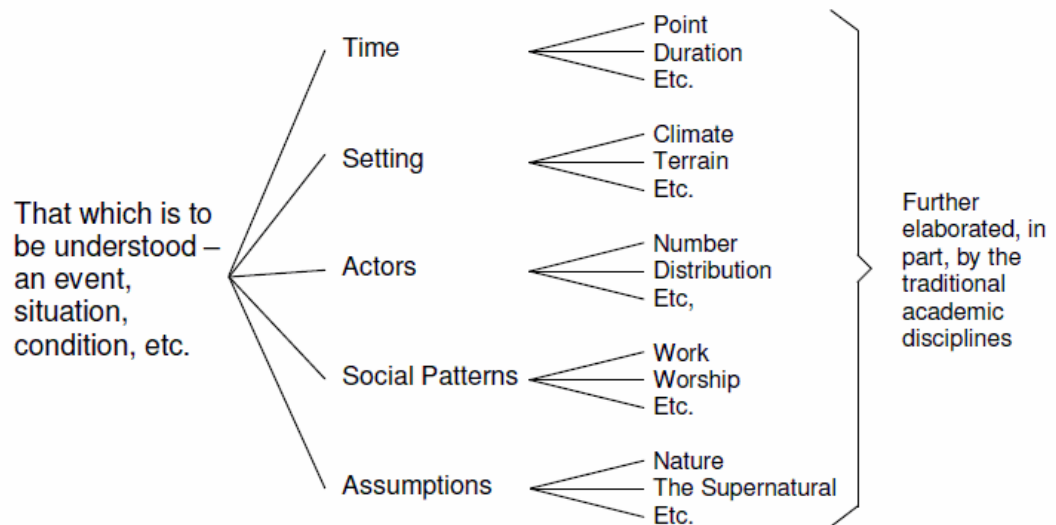
them. Several statements can be found in the curriculum such as “Prepare students for meaningful, satisfying work” or “Create democratic citizens”, but the disciplines worked in the classrooms have nothing to do with these goals. And since the disciplines are not combined to constitute a consistent structure of knowledge, it is not possible to achieve a set of common goals.

5. “The disciplines do not disclose the systemic nature of reality.” In a well integrated curriculum every discipline has to be connected to each other.
6. “Discipline-based curricula provide no criteria for determining the relative significance of various kinds of knowledge.” Each discipline provides its own approach to reality.
7. “The present discipline-based curriculum does not disclose the subjective nature of perceptions of reality.” The reality is approached from the perspectives of each subject, without taking into account its limitations.
8. “The present curriculum is bulky, time-consuming and inefficient.”
9. “Discipline-based curricula disregard basic principles of learning.” Little of the content of the subjects will make useful sense or have lasting impact.
10. “The traditional, discipline-based curriculum puts students in passive, information-storing rather than information-creating roles.” The most demanded skill is memorizing. The students hardly ever develop High Order Thinking skills such as hypothesize, generalize, classify or synthesize.
11. “The traditional curriculum is inherently static, with few built-in mechanisms that help it adapt to change.”
12. “Much of the traditional curriculum is irrelevant, and the practicality of that which is not irrelevant is rarely apparent to students.” The curriculum does not provide students with immediately useful knowledge or tools to understand the reality.
13. “The present discipline-based curriculum is institutionalized.” The importance given to the disciplines is bigger than the reality they were originally created to model.

Brady also proposes several ideas to renovate or create a meaningful and coherent curriculum. First, the different disciplines should not be separated; they should be integrated in a general education department. The main purpose of general education is not to cover the understanding of the whole reality, but help the students create an integrated structure of thinking skills to perceive it. In order to help children understand the present experience, the teacher has to choose different significant experiences, and on this basis, create a framework of knowledge (Brady, 1996). This way, anything is excluded, everything can be related to meaningful experiences and to other knowledge. It is about “bringing what is already known into consciousness and organizing it formally” (Brady, 1986). Students improve their current knowledge and make it more useful, consistent and reliable; moreover, they acquire perspectives and skills that will help them reach a complete understanding of reality. The world should be seen from a holistic perspective, everything learned in the school and in life should be integrated in a single and consistent framework.

As said before, the current curriculum splits the reality, and does not show students how everything is connected. Reality can not be understood by classifying its elements, locating them in a framework and studying them. An adequate education has to show the connections of all its elements to help students give meaning to life. There are multiple connections, and the more we are conscious about them, the more our perception of reality makes sense. There cannot be a coherent curriculum without a “coherent framework of logically related organizing ideas” (Brady, 2004). The “Supradisciplinary” approach proposed by Brady consists of five concepts: (1) time frame, (2) setting, (3) participant actors, (4) physical action, and (5) the states that explain the action. These concepts are the starting points of an enormous net of knowledge, considering that

“The relationships between them are the mainstays of the conceptual framework that structures our language, organizes our thought, directs our action, shapes creations, and allows us to dream. Upon this foundation can be built a vastly superior general education curriculum” (Brady, 1986).



(Brady, 2004)

This five element scheme provides criteria for a logical selection of content and facilitates the development of knowledge “by helping students envision possible relationships between various aspects of reality” (Brady, 2004). This “Supradisciplinary” structure is already rooted and implicit in our minds, what Brady’s proposal is about is to make this framework explicit, in a way that this framework is represented in a coherent and completely integrated curriculum.

If the proposal given by Marion Brady is intended to be reached, there should be a progressive change. There are many authors who have written about interdisciplinary teaching but from a less harsh perspective. Duerr, Yang, Rodriguez-Valls, Haynes... among other authors, have talked about the junction of two disciplines of the curriculum, or even three if they are taught in a second language. Their suggestions will enable the students to acquire a more complex view of reality and to make transversal connexions between disciplines. Moreover, these proposals could be the starting point to reach a whole interdisciplinary curriculum.



## 2.3. Interdisciplinary subjects

The interdisciplinary approach has been defined by William H. Newell and William Green (1982) as “inquiries which critically draw upon two or more disciplines and which lead to an integration of disciplinary insights” (Haynes, 2002). The interdisciplinary curriculum should be organized coherently. This way, students create a complex net of related knowledge and skills that will enable them to reach a more real and interconnected perspective to face their lives.

An effective teaching methodology should balance traditional and modern methods through interdisciplinary instruction and provide experiences to help students become more sophisticated and versatile (Duerr, 2008). Youngsters’ learning process should be enriched with a variety of first-hand, challenging experiences and relevant readings. Moreover, the teacher has to activate prior knowledge through different resources, such as books, texts or web sites to reach a long-lasting and consistent learning and to foster an active construction of meaning.

Fernando Rodriguez-Valls (2011) explains that, creating multidimensional practices widens the borders among different subjects, as it originates “an open body of knowledge fed by other disciplines”. This means that subjects should be approached from a holistic viewpoint to enhance each other. Also Rodriguez-Valls goes on to suggest that the interdisciplinary methodologies help the students construct language at a multidimensional level and improve their academic performance. Acquiring a proper communicative competence in a language means being able to use the language at several levels and at a variety of topics; and not just reducing the use of the language to one area of knowledge. Fink (2003) adds that the interdisciplinary learning is “a process where students are engaged in activities that promote and require competency in different levels of knowledge and skills”. Consequently, a progression along the six levels within the cognitive domain of Bloom Taxonomy (1956) needs to be done by the learners:

- The first step is Remembering, it represents the lowest level of learning outcomes in the cognitive domain. It is about remembering and repeating;

- The next step is Understanding, it is the ability to grasp the meaning of a piece of information, interpreting it and estimating future trends;
- Applying, learners are able to apply previously learned material or skills to new situations;
- Analysing is concerned with the ability to break down information into its primary components, and find evidence to support generalizations;
- Evaluating, it is about judging the value of the material following a coherent criterion.
- The last level within the cognitive domain is Creating. This step is related with creativity. It refers to the ability to use the previous knowledge to support and produce a new whole.

Seeing that, the interdisciplinary approaches should aim that students reach the last level of Bloom Taxonomy in order to enrich their lifelong learning habits, their academic skills, and personal growth. Laura Duerr (2008) explains that, “with interdisciplinary instruction, students can become more involved in their leaning and teachers can work toward eliminating discipline lines. Students can become independent, confident individuals who ‘learn how to learn’ and develop lifelong learning skills”. The students’ cognitive development should enable them to see the relationships among disciplines and understand the principles which cross curricular lines. And their psychosocial development should provide them with the ability to look at situations from different approaches (Duerr, 2008). Haynes (2002) stresses that an interdisciplinary pedagogy provides the students with two-fold knowledge: on the one hand, it provides the students with critical and reasoning skills to connect different content areas, and on the other hand, it helps the students to favourably achieve the established objectives.

As Burns (2007) said, teachers should “teach for understanding, so that students build a foundation of multidimensional knowledge”. Each lesson should provide the students with opportunities to create links between the skills connected with specific areas. Students will be enabled to shift and blend different knowledge and skills across disciplines (Turnbull, 1999). Thus, the “Zone of Common Skills (ZCS)” is originated, and the multidimensional knowledge is promoted (Schommer-Aikins, Mau, Brookhart

and Hutter, 2000). In addition, using an interdisciplinary approach contributes to develop critical skills to actively judge and take part in the society (Jones, 2002).

When designing an interdisciplinary project, the project-based and the problem-solving oriented methodologies are extremely valuable to make the students create meaningful knowledge through hands-on experiences. It is necessary to create the learning conditions where the students feel the need and appreciate the importance of the content and the skills they are working on.

“Effective teaching should balance depth with breadth so that the students can create a coherent, holistic, comprehensive, and intellectually manageable conceptual framework of knowledge” (Rodriguez-Valls, 2011).

Furthermore, interdisciplinary teaching practice elicits a confident and ease atmosphere in the classroom, as it creates a balance between the students’ strengths and weaknesses in different disciplines (Rodriguez-Valls, 2011).

To develop learning skills across the curriculum and provide students with a life-long learning, teachers should enrich the learning experience by making it vivid, developing understanding through enquiry, encouraging children to be creative and promoting collaborative work through problem-solving tasks. Teachers should also stimulate learning through matching teaching to different learning styles.

## 2.4. Interdisciplinary approach and CLIL

### 2.4.1. What is CLIL?

Content and Language Integrated Learning (CLIL) is a methodological approach that intends to create environments where a subject is taught through the mean of a foreign language, therefore it has dual-focused aims: on the one hand, students learn the subject content, and on the other hand, students learn the additional language (Marsh, 1994). This approach can be very positive for involving students in their learning and developing a can-do attitude towards it (Marsh, 2000).

CLIL main characteristics are:

- It is student centred.
- It follows constructivism approach.
- It promotes holistic approach.
- It is dual focused –content and language-.
- It raises cultural awareness and understanding.
- It promotes the use of problem solving and inquiry activities.
- It fosters the creation of synergies; it shows the connections between disciplines.

CLIL aims using the language to learn, and learning to use the language, so that it is dual focused. It takes into consideration students' previous knowledge, on which the new information relies –Constructivism and student centred approaches-. And it promotes the use of different teaching strategies to suit different learning styles.

### 2.4.2. CLIL and other interdisciplinary approaches

Sonia Casal (2007) discusses the features that connect interdisciplinary approaches and CLIL. All approaches integrate various fields of knowledge. CLIL upholds that a second language is better acquired when it is contextualized by a content-subject, and the interdisciplinary approaches link two or more content subjects. This way, all approaches intend to reach a “relevant cognitive association” (Casal, 2007)

through the connection of different disciplines. These connections “allow better association of different concepts and help the learner go toward a more sophisticated level of learning in general” (Marsh, 2003). And, in addition, these approaches are concerned with relating the learning content with real life, so the students will realize the helpfulness of what they are learning (Casal, 2007).

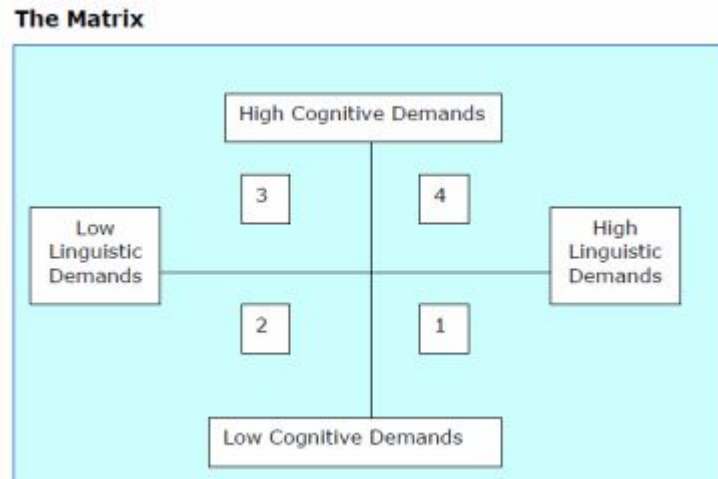
When approaching an interdisciplinary project in a CLIL section it should be taken into account that the students should learn English in order to read, write, speak and listen, but also they should “concern themselves with issues that give rise to a need for reading, writing, speaking and listening” (Tchudi and Lafer, 1997). The use of the problem-based approach in interdisciplinary lessons facilitates the use of the foreign language with a real purpose. The use of English

“benefits from bordering its own borders to allow for interdisciplinary explorations into the issues generated by literature, the media, and students’ minds make sensitive to the significance of all the passes” (Tchudi and Lafer, 1997).

A well designed interdisciplinary project has to challenge the intellectual curiosity and empower students’ minds to create their own knowledge and view of the world.

The relationship between content and language is complicated. Fountas and Pinnell (2006) disclose that when students are learning a second language in combination with a subject content, they are being cognitively challenged at three different levels: first, they have to command the language used by the teacher (Tobin, 2005); Secondly, owing to the fact that “the language of any content area has a content itself” (Johnston, 2004), the students have to manage the “content-area-language” contained in each lesson; And thirdly, they have to assimilate the subject-content objectives (Espino-Calderon, 2007).

Therefore, as Cummins (1986) upholds, the relationship between content and language load needs to be balanced. High Cognitive Demanding and challenging activities are required for learning, but they have to balance with Low Linguistic Demands; Teachers should assure that the additional language is not an obstacle to meaningful and functional knowledge. Likewise, the additional language should be demanding itself; therefore, the High Linguistic Demands have to balance with Low Cognitive Demands. Cummins designed The Matrix, where the progression of Cognitive and Language Demands is shown:



(Do Coyle, 2005)

Consequently, using the CLIL approach means that the students have to deal with new content through a second language. Due to this fact, the teacher should design balanced lessons; the Language Cognitive Demands and the Content Cognitive Demand have to be equilibrated. As Coyle, Hood and Marsh (2010) said “The content and language familiarity and novelty continuum whereby language remains accessible as new concepts are introduced”. Thus, “natural scaffolding” is built: the unknown content is built upon familiar language, and at the same time the known content scaffolds the unfamiliar language.

In some subjects the lexical load could be a big challenge for the students, even though they are using their mother tongue language. This difficulty can be increased when the students are learning through the means of a foreign language. The CLIL teacher has to analyse the linguistic load of the subject, and provide the students with the adequate scaffolding and materials to reach a meaningful learning process.

“When tasks are properly scaffold between the content and language cognitive loads, learners can actively collaborate and construct not only new understandings regarding content but also cultivate academic language competence” (Grandinetti, Langelotti and Ting 2013).

Teresa Ting (2011) has defined a three step *modus operandi*. First, the teacher has to assure that the input-language is comprehensible and the linguistic load is accessible to every student. The second step is related to the academic discourse and literacy; the students need to be able to use the foreign language in order to “obtain information,

negotiate meaning, discuss hypotheses, construct knowledge and communicate understanding”. Grandinetti, Langellotti and Ting (2013), specify that:

“The first and the second steps regard the language instruction, as they catalyse an important change in content education: when a teacher becomes aware that the input language must be comprehensible, he naturally considers whether the input content is comprehensible”.

And the third step concerns the content itself, it must be presented to the students in accessible and manageable pieces.

However, becoming proficient in an additional language is not only being able to manage a range variety of vocabulary related to different disciplines, but also being able to put into practice High Order Thinking Skills through the means of a second language. It is necessary to create learning situations where the students are engaged in their learning process through the connection of different disciplines. In this way, the students’ reasoning skills are enhanced and their performance on standardised tests is improved (Boaler, 2009). Moreover, Brinton, Wesche, and Snow (2003) add that restricting the acquisition of a language to one area of knowledge has negative influences in the development of the content and of the additional language. The richer the student’s vocabulary is in a foreign language, the more situations he will be able to adapt to.

One of the most common ways to introduce an interdisciplinary project is by using a story. Because as Butzow, Butzow and Ben-Zvi (2000) said

“A story puts facts and concepts into a form that encourages children to build a hypothesis, predict events, gather data, and test the validity of the events. Using fiction, the lesson becomes relevant and conceptually in tune with the child’s abilities”.

The teacher should draw the attention to the unknown words and connect the story with different areas. It is appropriate to divide the reading in several chunks in order to achieve a better understanding and contextualization, by doing activities, working on the vocabulary or using visuals (Brooks and Brooks, 2001). So that, the students are extending their learning experiences beyond the reading, and maximizing their attitudes and aptitudes across the curriculum (Fredericks, 2006).

It is always valuable to allow time for “teachable moments” (Kohn, 2000); time where students and teachers can carry out interdisciplinary talks: connecting what they have already learnt with previous knowledge or with a other subjects, discovering its

real utilisation. The students “appreciate the use of examples from everyday life, the importance of personal learning, and the new view of the world that shows how everything is related” (Gardner and Southerland, 1997). Moreover, providing the students with a range of learning activities is beneficial to promote all learning styles in the class.

It is very effective working with *realia*, it contributes to create a stimulating learning environment, “in which children can observe, explore and think about different phenomena, interacting with other children, and with adults” (Johnston, 2007) who support their learning process. These enable children develop a life-long and meaningful knowledge. Leading children to use all their senses to build their own observation, classification and interpretation skills will help them reach a long lasting learning.

Providing the curriculum and CLIL with an interdisciplinary approach can help students create links across disciplines and develop their creativity. The knowledge and skills learnt can be applied to real contexts. Creativity can be particularly benefited from the use of an interdisciplinary approach as “it involves taking risks in thinking and acting, and so be creative not only involves develop new ideas, models and applications, but challenge different views and theories” (Johnston, 2007). Furthermore, creating interdisciplinary links make students aware of the relevance of each discipline’s ideas so that learning becomes more interesting for them, and the teaching-learning process becomes more effective. Another reason why students become more engaged in their learning could be that the more areas of content are covered, the more students can find appealing each lesson. It is an indispensable task of teachers to work as a guide of every activity and conversation, providing the accurate materials and information, but the children are the ones who have to do most of the class work and build their own knowledge, because as Galileo Galilei said once: *We cannot teach people anything; we can only help them discover it within themselves.*



### III. INNOVATION PROJECT: AN ENTREPRENEURIAL PROJECT TO JOIN CLIL AND AN INTERDISCIPLINARY APPROACH

### 3.1. Entrepreneurship at school

Today's and future society and the dynamic economy face several challenges that can only be met if there are people who think in new ways, people able to adapt to changes and to face challenges. Here is where education comes in, it has to "shape people's attitudes, skills and culture, it is vital that entrepreneurship education is addressed from early age" (Education, Audiovisual and Culture Executive Agency, 2012)

A school market can be an opportunity to contextualize the learning process and to implement an interdisciplinary or cross-curricular approach, as well as to foster an entrepreneurial culture among children. It can be a vehicle to connect different disciplines such as literacy, numeracy, art and science, and to develop all of the skills related to entrepreneurship, such as "innovation, creativity, risk-management and risk-taking, can-do attitude and the drive to make ideas happen" (Specialist Schools and Academies Trust, 2010).

Students learn skills that they will use throughout their lives to cope with a rapidly changing world. Besides improving their understanding of the market chain, they are going to experiment each step of it -in a controlled environment- from manufacturing and marketing to selling and purchasing. Students are given the chance to apply in real-life settings the content related to different disciplines.

All this leads students to develop an entrepreneur spirit, that they will need to face their adulthood, not only if they want to become innovators and launch their commercial ventures, but also to become innovators as employees. Nowadays, skills such as creativity, leadership or a problem-solving attitude are extremely important to face the adult life, as well as a perfect command of a second language.

In addition, this project relies on the basic competences of the Spanish curriculum. The basic competences are the skills that have to be developed by the students by the end of the compulsory education. Thus, youngsters will be able to be responsible citizens, life-long learners and find their personal fulfilment.

The two main basic competences that this project aims to develop are The linguistic competence and Sense of initiative and entrepreneurship competence. However, the eight competences are addressed in various degrees.

Linguistic competence: if the project is properly implemented, students should be able to use the language as a mean of oral and written communication and representation, to interpret and comprehend the reality. Moreover, a proper linguistic competence creates bonds between people and brings students closer to other cultures. Developing a linguistic competence in a second language entails enriching and enhancing students' competence in their mother tongue as well as in their second language.

The second basic competence addressed in this project is Sense of initiative and entrepreneurship. Students need to demonstrate a set of values and attitudes such as responsibility, determination, self esteem, creativity, self-criticism, risk taking, risk management and learn from mistakes. Children should be able to use their own judgement, to conceive projects and to make them happen responsibly, whether in the personal, social or professional context.

## 3.2. Outcomes

Learning outcomes (what learners are able to do at the end of the lesson/project).

- Manifest skills in numeracy, literacy, science, mathematics, problem-solving and collaborative-working in different situations across disciplines using English as a mean of communication.
- Show a knowledge and understanding of the disciplines worked across the project relating them to the real world.
- Develop writing, speaking, listening and reading English skills in range of different situations.
- Develop creative and innovating skills across disciplines.
- Demonstrate healthy, hygiene and safety awareness in different contexts.
- Take part actively in enterprise activities demonstrating good communicative abilities, problem-solving and team work skills.

- Reach decisions as a group effort.
- Make personal and creative contributions and work as a part of a team to produce quality end products.
- Value the hand-made products and other's effort.
- Be able to use their research skills, critical thinking and exploring meaning to produce quality essays and class presentations.

### 3.3. Coordination

In order to carry out effectively the project all the teachers of the sixth level of Primary Education and all the students are involved, in collaboration with the specialist teachers and the families.

Teamwork is a key factor to successfully carry out the whole project. The coordination and communication between the teachers involved are essential since the collaborative work enables the exchange and contrast of ideas, and is fundamental to accomplish the project with coherence and consistency. This way, the project is provided with different approaches, the responsibilities and tasks are distributed, and all the decisions are jointly taken. Moreover coordination between teachers is highly important to ensure the learning of the second language, as it should be integrated in every lesson and linked to the different disciplines. The teachers have to take into consideration the previous English level of the student. It has to be demanding, the students should be able to use their previous knowledge and broaden it, but at the same time the English demand cannot hinder the learning of the content. Teachers should foster an enterprising approach in all areas and provide opportunities for children to take responsibility for their own learning through problem solving activities and allow them to take relevant decisions.

After the project has been presented to the teachers implicated on it, and it has been approved by the head teacher and the management team, it is introduced to the students and families.

Families should work in partnership with the school and make every effort to promote the development of the children, whether reinforce the skills and knowledge learnt at school, attend to meetings to become informed about students work and help organizing the market.

This project is addressed to students of the 6<sup>th</sup> grade of Primary Education. The content they are going to learn in each lesson is included in the areas of the Curriculum delivered for the third cycle. Therefore, students are going to learn the content they are required to learn in contextualized manner and from an interdisciplinary approach.

### 3.4. The school market project

The School Market project is introduced by the lecture of the book *6<sup>th</sup> Grade Entrepreneurs* by Laura S. Perricone. The book tells the story of a girl who bring together her classmates in an entrepreneur project putting into practice what they have learned in school, so she can help her family solve their money problems.

The students will have a week to read the book, and then the activities will start. Through the first part of the project students get to learn about what an entrepreneur is and his attributes and some relevant entrepreneurs. They are encouraged to foster their creativity to become one of them. In the second part of the project the students learn content related to the areas of Science, Art, Literacy or Mathematics, and then they put into practice these knowledge realizing the practical use of it. They make several products that are going to be sold in the last step of the project which consists on advertising and implementing the School Market.

Each student has to write a logbook where he has to reflect on his every day's work and what he is learning, record new vocabulary or write down ideas for future entrepreneur projects. The teacher should not forget this logbook when carrying out the assessment.

### 3.5. Activities outline

The project is introduced by several activities to foster an entrepreneurial culture among the students. They are followed by five blocks of activities through which the children learn content required

by the Curriculum and produce items related to that content, while their entrepreneurial spirit is reinforced. The next step of the project is related to advertisement. The children design an advertisement campaign to sell the products they have made in a School Market. Lastly, the students are called to reflect about the whole process. As a result, children experiment all the levels of the market chain.

Entrepreneurship				
<p>- Warm up: 6<sup>th</sup> grade <i>Entrepreneurs</i></p> <p>- Activity1: Who are entrepreneurs?</p> <p>- Activity 2: Becoming entrepreneurs</p> <p><b>Basic competences:</b> Linguistic competence, Sense of initiative and entrepreneurship, Cultural awareness competence, Digital competence, Social and civic competence, Learning to learn.</p>				
Nutrition	Plants	Pollution	Lets make some perfume	States of matter
<p>- Warm up: The food guide pyramid</p> <p>- Activity 1: Nutrients and healthy life definition</p> <p>- Activity 2: Design a diet plan</p> <p>- <a href="#">Bakery workshop</a></p> <p><b>Basic competences:</b> Competence in science, Linguistic competence, Mathematical competence, Social competence, Sense of initiative and entrepreneurship competence, Learning to learn.</p>	<p>- Warm up: Gloria Fuertes poem</p> <p>- Activity 1: Flower dissection</p> <p>- <a href="#">Gardening workshop</a></p> <p><b>Basic competences:</b> Linguistic competence, Cultural awareness and expression competence, Competence in science, Sense of initiative and entrepreneurship competence, Learning to learn.</p>	<p>- Warm up: Plastic pollution reading</p> <p>Activity 1: Class discussion (Bioplastic advantages and disadvantages)</p> <p>- <a href="#">Canvas bags workshop</a></p> <p><b>Basic competences:</b> Competence in science, Linguistic competence, Cultural awareness and expression competence, Sense of initiative competence, Social and civic competence</p>	<p>- Warm up: Let's make some perfume! reading</p> <p>- Activity 1: smell-related adjectives</p> <p>- <a href="#">Perfume workshop</a></p> <p>- <a href="#">Glass jar decoration workshop</a></p> <p><b>Basic competences:</b> Linguistic competence, Science competence, Cultural awareness and expression competence, Mathematical competence, Social competence, Sense of initiative and entrepreneurship competence.</p>	<p>- Warm up: States of matter video</p> <p>- Activity 1: Liquids and solids worksheet</p> <p>- <a href="#">Ice-cream workshop</a></p> <p><b>Basic competences:</b> Linguistic competence, Competence in science and interaction with the physical environment, Mathematical competence, Social competence, Sense of initiative and entrepreneurship competence, learning to learn.</p>
Advertising				
<p>- Warm up: Advertisements strategies and colours</p> <p>- Activity 1: Advertisement analysis</p> <p>- <a href="#">Advertisement proposal design workshop</a></p> <p><b>Basic competences:</b> Linguistic competences, Sense of initiative and entrepreneurship competence, Cultural awareness and expression competence, Digital competence, Interaction in the physical environment competence, Social competence and Learning to learn competence.</p>				
The School Market day				
<p>- The market is organized and the items produced in the workshops are sold out.</p> <p><b>Basic competences:</b> Linguistic competence, Social and civic competence, Mathematical competence Cultural awareness competence, Interaction in the physical world competence, Sense of initiative and entrepreneurship competence, Learning to learn competence.</p>				
After School Market day				
<p>- Crunch numbers</p> <p>- Reflect on the success and the mistakes</p> <p><b>Basic competences:</b> Mathematical competence, Linguistic competence, Sense of initiative and entrepreneurship competence, Learning to learn competence.</p>				

### 3.6. Activities

#### Lesson 1: **Entrepreneurs**

- Warm up:

The teacher presents the project by asking the students if they have ever heard the word *entrepreneur*, he asks them if they know the meaning, if they know anyone who is considered an entrepreneur... (If the students cannot guess the meaning of the word he can tell them that it is like to enterprise). The teacher writes on the board some of the words used by the students to describe an *entrepreneur*.

An *entrepreneur* is someone who organizes a business. It is someone who detects a need and tries to cover it by taking risks and being imaginative. As Saira Khan explains in *Trade your way: schools challenge*, “enterprise is all about making things happened”. It is about having the skills, attitudes and abilities to turn creative ideas into business success. People who are good at this are called *entrepreneurs*”.

- Activity 1

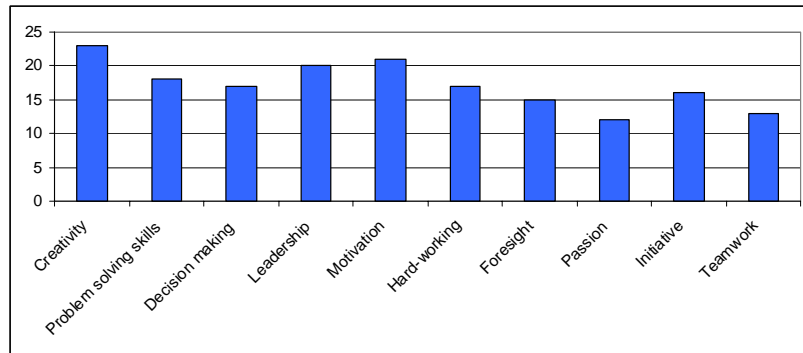
There are *entrepreneurs* in many different industries. The students are provided with the means to investigate about the following business people.

	Name: Steve Jobs Industry: computer technology Why was he an entrepreneur?
	Name: Coco Chanel Industry: Fashion and perfumes Why was she an entrepreneur?

	Name: Walt Disney Industry: Entertainment Why was he an entrepreneur?
	Name: Oprah Winfrey Industry: TV host and producer, magazine founder, NGO Why was she an entrepreneur?
	Name: Howard Hughes Industry: Cinema, aviation, economy, engineering. Why was he an entrepreneur?

Once every student has finished the teacher encourages the students to brainstorm five words to describe these people. The teacher gives them three minutes to write them on their notebooks. The teacher then asks one of the students for one of the words he has associated with these business people. The teacher asks the class if any of the other students have written that word and records the number of times that the word has been used. Once all the words have been collected and written on the board with the number of times repeated for each word, the students are asked to make a bar chart to represent the data collected.





## - Activity 2

The teacher stresses that creativity is one of the most important skills to become a successful *entrepreneur*, whether if you invent a brand new product or if you improve or find a new way to sell something already invented.

In this activity students are paired up and encouraged to be creative and think at least five ways to sell apples and write them down on an essay. It is important that they describe their hypothetical business in detail. They can use the following questions as guidance:

- How is your product going to be sold? (Chopped, smoothie, nice package...)
- Who are the consumers you want to attract to your product? (Children, families...)
- Where and when are you going to sell your product?

Once every pair has finished, some of the essays are read out loud. The teacher collects them so he will give the feedback on the following lessons.

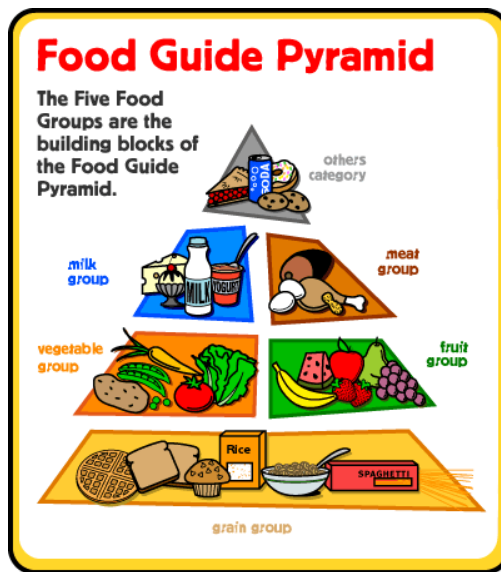
## Lesson 1: **The Food Guide Pyramid**

### - Warm up:

The lesson starts when The Food Guide Pyramid is presented to the students. The teacher explains that in order to stay healthy we have to eat a variety of nutrients that are found in every food. He clarifies that in the bottom of the pyramid are placed the food that we should eat every day, and at the top, the ones that we should eat

occasionally. The students should be encouraged to talk about which food they eat every day, how often they eat fruit, vegetables, sweets... They should use the adverbs of frequency provided in the following Language Pattern 1:

- I eat \_\_\_\_\_ occasionally/ sometimes/usually/every day.
- I should eat \_\_\_\_\_ occasionally/ sometimes/usually/every day.
- My dad/mum cooks \_\_\_\_\_ occasionally/ sometimes/usually/every day.



(Pike, 2003)

- Activity 1

The teacher explains that there are five main groups of nutrients, and each food can be classified in one of the groups, even though every food has more than one nutrient. These groups are: Carbohydrates, Protein, Vitamins, Calcium and Fats and sugar.

- Carbohydrates: are found in pasta, potatoes, cereals, rice or bread. They are body's fuel as they provide it with energy. Every time we play sports, run, make exercise... we are wasting energy that should be replace by eating food rich in carbohydrates and drinking water. The 33% of what we eat should be carbohydrates.

- Vitamins: are found in fruits and vegetables. They keep our bodies protected from illness. The 33% of what we eat should be fruits and vegetables.
- Calcium: is found in milk, cheese, yoghurt. It is good to keep our bones and teeth strong. The 15% of what we eat should be food rich in calcium.
- Protein: is found in meat, chicken, fish, eggs or beans. It helps build and repair our cells and muscles. The 12% of what we eat should be proteins.
- Fats and sugar: they can be found in a huge range of food, such as chocolate, cake, biscuits but also meat, milk or cheese. They provide our body with energy, but too much fat can be unhealthy for us. The 7% of our intakes should be food rich in fats and sugar.

After talking about the different nutrients and showing the information above in the board, the healthy diet worksheet is distributed (Annex 1). Individually children have to make a *word storming* about healthy diet. And then use this vocabulary to write their own definition of healthy diet. Later on, a whole class brain storming is carried out, and the words are written on the board. The students are encouraged to read their definitions out loud. The teacher should use this activity to revise students' knowledge and understanding.

#### - Activity 2

Teacher should highlight that most of the dishes include a variety of food from the five groups. He should encourage the students to identify the ingredients of different dishes, such as: paella, sandwich, lasagne...

The students are divided in groups of four in order to design a five days diet plan, taking into account the percentages previously shown. Each group has to prepare a short presentation of their menu and explain why it illustrates a healthy and balanced diet.

## Lesson 2: Bakery workshop

### - Warm up:

The lesson begins with the presentations of the groups' menus. Once they are all finished, every student has to vote for one of the menus proposed by the different groups, taking into consideration not only the menu, but also the way it was presented to the class.

Later on, the teacher leads the children to observe where the bread is located in the Food Guide Pyramid. Once the attention is focused on the bread, he lunches a debate about its benefits, its ingredients... The teacher encourages the students to use full sentences and provides them with Language Pattern 2. The teacher highlights the importance of numbers when cooking: the ingredients' quantities and their proper mix, the adequate temperature and timing...

### Language Pattern 2:

- Bread is made of \_\_\_\_\_
- Bread is good for \_\_\_\_\_

The students are provided with cooking books to illustrate the explanations. The teacher leads them to observe how the information is displayed on them (timing, ingredients, steps...) and to look for the words they do not know in the dictionary in order to fill the Word bank (Annex 2).

### - Activity 1:

Students are divided in groups of four. Each group is given the bread's recipe (Annex 3). Once read, students are encouraged talk in English about the vocabulary, the baking process... for a few minutes to check understanding.

Students are informed of cooking hygiene measures, such as: washing their hands before touching any food, make sure that the surface and the cooking utensils are clean...

Then, each group is provided with the following ingredients and materials:

- 1kilogram package of whole-wheat or flour

- 10grames package of yeast
- A bottle of olive oil
- A package of salt
- A bottle of water
- A kitchen scale
- A teaspoon
- A tablespoon
- A large plastic food bag
- A tin
- An apron for each student

Under the overall supervision of the teacher, students have to mix the ingredients following the recipe and paying special attention to the measures and quantities. Once all the groups are finished, they bring the dough to the school's oven. The teacher has to aware the children of the safety measures required in the kitchen (kitchen gloves, keep the oven door closed...).

Once the lesson is finished, the teacher has to be in charge of the oven, and turn it off after 35 minutes. As soon as the bread is baked, is given to the students so they can have it as a snack in the break.

### Lesson 3: Flower dissection

- Warm up:

The lesson starts when the teacher hands out a paper with a poem in Spanish by Gloria Fuertes. Once they have read it out loud two or three times the teacher discusses about the poem's content explaining the literary figure used by the author is called *personification*, he should also ask the children to name the different types of flowers in the poem, and name other flowers they know in English or in Spanish.

### **La maestra de las flores**

En medio del prado  
hay una escuela,  
adonde van las flores  
y las abejas.

Amapolas y lirios,  
margaritas pequeñas,  
campanillas azules  
que, con el aire, suenan;  
rosas enanas, rosas.  
Tulipanes de seda.

En el centro del prado  
hay una Escuela  
y a ella van las rosas  
en Primavera.

En el recreo  
cantan las flores  
a las ovejas.

En el recreo  
saltan las flores  
sobre la hierba.

Y si llueve,  
se ponen contentas  
y crecen camino  
de las estrellas.

En el centro del prado  
hay una escuela,  
y una mariquita  
es la maestra.

(Gloria Fuertes, 1975)

- Activity 1:

The teacher distributes the following materials for each student:

- A variety of flowers (tulips, daffodils, gladiolus...)
- Scissors
- A magnifying glass
- A cardboard
- A glue stick

Under the overall supervision of the teacher, the group will go through all the steps together following this procedure:

1. Starting with the *sepals* and *petals*, students have to carefully pull them apart the flower. The teacher points out that the sepals protect and support the flower. Often they are the same colour as the petals
2. Select one of the *stamens* of the flower (male part), the teacher should encourage the students to open it and observe the *pollen* inside using the magnifying glass.
3. Cut out the *pistil* (female part). Students are encouraged to feel the top part, *stigma*, to check if it is sticky.



(Anthem, 2008)

While the students are carrying out the flower dissection, they have to stick and write down the name of each part of the flower in the cardboard provided.

Once everyone has finished, the teacher should check understanding by pointing at different parts of the flower and asking for their name and function.

#### **Lesson 4: Gardening workshop**

- Warm up:

Students are given some time to review the previous lesson. After a few minutes students are paired up to explain each other the flower's parts and their functions. They use the poster they have made to illustrate the explanation. Once everyone has finished, the teacher randomly chooses some children to repeat their explanation in front of the whole class.

- Activity 1:

Materials:

- A flowering plant for each student (daffodil, tulips, gladiolus, geranium...)
- Plastic gloves.
- A terracotta plant pot for each student
- A shovel for each student
- A sack of soil
- Some watering cans

The children are provided with the materials needed to accomplish the activity. They have to put a layer of soil in the bottom of the plant pot. Then, they place the plant in the middle of the plant pot and backfill soil around the plant. Lastly, they water their plants.

The teacher stresses that each student will be in charge of his plant's day-to-day watering and care. At the end of the project, the plants will be sold in the school market.





(Houseofanais, 2011)

### Lesson 5: Customize canvas bags

#### - Warm up:

The teacher distributes the reading “Plastic Pollution” (Annex 4), and gives the students some time to read it individually. Then, it is read out loud in order to correct possible pronunciation mistakes and check understanding.

The teacher focuses the attention on the bioplastic chart below that also appears on the reading provided. Students are divided in two groups to hold a debate. Group A will be in favour of bioplastic and group B against its use. The teacher should allow some time for the groups to work out some relevant arguments and strategies to defend and support the position assigned. Later on, in an orderly manner, each group presents its arguments and refutes the other team’s arguments.

Bioplastic An examination of a solution that creates plastic from plant sources.	
Advantages	Disadvantages
Made from renewable plant sources.	Often recycle centers have to sort the bioplastic from the petroleum-based plastic.
Use less energy to produce than plastic made from petroleum.	Risk food shortages if crops are grown for bioplastic instead of food.
Bioplastics can be recyclable, compostable, and/or biodegradable.	Many bioplastics have a low melting point.
Bioplastics are non-toxic and will not leach toxins into the soil and water.	

After that, the teacher fosters the students to suggest different alternatives to using plastic in our daily life. Moreover, the 3R's principles -Reduce, Reuse, Recycled- should be highlighted. The children should be encouraged to make up diverse steps we can take in order to help cut out the production of plastics.

The teacher tells the students that one of the plastic items more used are plastic bags. Recently, there are some alternatives to plastic bags that are becoming more popular, such as canvas bags, which are made of recycled fabric. So in order to promote this eco-friendly alternative, students are going to decorate them and sell them in the School Market.

- Activity 1:

Materials:

- Canvas bag
- Acrylic paints
- Acrylic crayons
- Acrylic glue
- Bottoms
- Glitter
- Laces
- Cardboard papers
- Scissors
- Craft knife
- Paint brushes
- A range of different shaped moulds

The desks are placed around the classroom so the students will be in groups of five. The work surfaces are covered with craft paper to protect them. The materials

required are distributed so that each group will have every thing they need in their work table.

Under the overall supervision of the teacher, students decorate their canvas bag freely. Thus, everyone will use their creativity to produce a personal and unique design.

Before beginning the activity, the teacher gives some instructions about how to use the materials provided.

1. To create your own shaped moulds the students design their pictures in the cardboard paper and cut it carefully the outline with the craft knife and set the paper scraps aside.
2. Place the mould (the provided or the self-designed) in the canvas bag where you would like the final placement to be.
3. Apply the paint delicately or colour it with the acrylic crayons. Be careful not pour too much paint.
4. To apply glitter, follow the same procedure, applying glue instead of paint and once it has been properly spread cautiously the glued surface with glitter.



(Marotz, 2012)



(Ez, 2013)

Once the pieces of work are finished they have to be hanged out until they dry.

## Lesson 6: Perfumes workshop I

- Warm up:

The teacher shares out the reading “Let’s make some perfume!” (Annex 5), and allows some time to read it individually. Then, it is read out loud in order to correct pronunciation mistakes. After the reading, the teacher launches some questions to the classroom to check understanding, such as:

- Who invented the perfumes?
- What does the word perfume mean in Latin?
- What was the original use of perfumes?
- How many smelling notes does a perfume have?

Later on, the teacher encourages the children to say different adjectives to describe smells and write them down on the blackboard and on their loc books.

Positive	Negative
Acid	Foul
Floral	Musty
Fresh	Stinky
Fruity	Strong
Scent	Rancid
Spicy	
Sweet	

- Activity 1:

Materials:

- Flower petals (roses and lavenders)
- Plates
- Scissors
- Cardboard
- Aluminium foil
- Knives
- Vegetable shortening
- Tablespoons
- Paper towels
- Measuring cup
- Ethyl alcohol
- Paper coffee cup
- Boiler
- Glass jars

Procedure day 1:

Children are divided in groups of three. One half of the groups will make lavender perfume and the other half rose perfume. Under the overall supervision and guidance, the students have to follow the steps below:

1. Remove the petals from the flowers and fill with them about two cups. Cut out two panels of cardboard of equal size – Each measuring 40x40cm –. Wrap tight each piece of cardboard with aluminium foil covering all the cardboard.
2. Spread four tablespoons of vegetable shortening over one of the sides of the cardboard pieces wrapped with aluminium foil. Next, cut into small pieces the flower petals and cover all of the shortening evenly with them. Press the two pieces of cardboard together in a manner that the shortening and the petals on each piece touch each other as it was a sandwich.
3. Wrap the “sandwich” with paper towel and place it under some heavy books. Let it settle for a day. The flower’s fragrance will spread throughout the shortening.

## Lesson 7: Perfumes workshop II

### Procedure day 2:

4. Unwrap the “sandwich” and separate the two cardboards. Then, remove all the petals from the shortening. Gather all the shortening into a ball. Put the dough in the pot and with the help of the teacher, melt the shortening in a water bath.
5. Once the shortening is melted, add the alcohol and stir the mixture and let it cool down. Later on, pour the liquid into glass jars and store it in a dark place for ten days.

### Activity 2:

To make the perfumes more appealing for buyers, the glass jars are decorated by the children.

#### Materials:

- Paint
- Brushes
- Paint trays

Each student paints his jar freely with floral motifs. Once the paint has dried, the perfume is purred inside and the jars are stored in a dark place.



Chelsea (2013)



Yean (2008-2014)

## Lesson 8: States of matter

### - Warm up:

The video “Kids Cooking TV: States of Matter” is played (until minute 3:50). After that the teacher highlights that *solids* can hold their own shape because their particles are very close to each other. *Liquids* can flow and take the shape of their container because they are not as close as the ones in solids. And *gases* are spread out to fill up spaces because their particles are separated. The teacher makes some questions to check understanding, such as:

- How a solid material can be turned into liquid?
- How can I turn gas into liquid?
- Ask for examples in the every day life...

The teacher asks the students to stand up and put themselves as they were gas particles, then like solid particles and like liquid particles.

### - Activity 1:

The teacher explains that water turns into gas at 100°C, and freezes at 0°C, as seen in the video, but different materials turn into liquids at different temperatures. The worksheet “Liquids and solids” (Annex 6) is distributed. The teacher asks the students to look at the chart on it, and make statements using the comparative and superlative forms of the adjectives *high* and *low*.

#### Language Pattern 3:

- Mercury has *the lowest* melting point.
- Silver melting point is *higher than* aluminium.

Subsequently students answer the questions on the worksheet and they are corrected out loud.

### - Activity 2:

Each student is provided with the following materials:

- 1 cup of milk
- 1 teaspoon of vanilla powder
- 1 tablespoon of sugar
- 4 cups of ice
- 4 tablespoons of salt
- 2 small freezer bags
- 1 big freezer bag

Under the overall supervision of the teacher, students have to follow the procedure explained in the “Ice-cream recipe worksheet” (Annex 7) paying special attention to the measures and quantities.



(Jenae, 2012)

The teacher has to explain that when salt is mixed with ice, the freezing point of ice is lowered, and it melts faster. As seen in the previous activity, milk freezing point is  $-0,54^{\circ}\text{C}$ , so when the milk comes into contact with the ice freezes.

It is important that the teacher stresses some hygiene and safety measures before and during the procedure, such as:

- Wash your hands before and after handling food.
- Keep clean the surface where you are cooking.



- Do not run around the room where food is being prepared.
- Once you are finished wash all the utensils you have used.

### Lesson 9: Advertising I

- Warm up:

The teacher introduces the topic by asking the students about their favourite advertisements and the reasons (music, rhymes, slogans, colours, famous people...). If they have ever wanted to buy something just because the advertisement, or if they think advertisements always tell the truth. The teacher highlights that as consumers, we should distinguish between what we want and what we need when we want to buy anything, because sometimes the companies use different strategies to persuade us to buy products that we do not really need.

<b>Jingle or slogan</b>	A song or phrase that helps you remember the product
<b>Cartoon character</b>	A character which advertises the product
<b>Celebrity</b>	A famous person who says that he uses the product
<b>Image appeal</b>	The product helps you feel better, been healthier, happier...
<b>Comparison</b>	This brand is better than other ones that sale the same product
<b>Nostalgia</b>	The product evokes the past times, it is traditional...
<b>Humour</b>	Jokes are used to help you remember the product
<b>Statistics</b>	Statistics are used to impress the consumer

There are many different types of advertisements, the teacher encourages the students to make a brainstorm of the different types and writes them on the blackboard (billboards, TV, radio, internet, brochures...).

Colours are also very important in advertising, as each colour is able to convey different sensations:

- **Red:** power, energy, vitality, stimulates appetite, love and hate.
- **Green:** nature, get-green, vitality and money.
- **Blue:** serenity, intelligent, precision, water, clean, elegance and masculinity.
- **Yellow:** happiness and energy.
- **Orange:** energy, stimulates appetite.
- **Purple:** elegance, femininity.
- **Pink:** femininity and sweet.
- **Black:** very formal, traditional.
- **White:** purity, clean, calm and modern.

- Activity 1:

The worksheet “Advertisement analysis” (Annex 8) is distributed. Each student has to choose an advertisement they have seen whether in television or anywhere else, and analyse it following the steps provided in the worksheet. The students should take into account everything discussed in the warm up and the information provided by the teacher.

Later on, children are divided in groups of four. Each one describes the advertisement he has chosen and the advertising techniques used on it.

### Lesson 10-11: Advertising II

During two lessons the students are going to become advertising agents. They are going to form groups to design an advertising proposal for the School Market. They can make prototype posters, write songs, make up slogans, design a logo...

They have to fill in a worksheet “Advertising proposal” (Annex 9) to describe their project. Moreover, they have to prepare a presentation to display their advertising proposal and present it to the whole class. If they need access to internet or any other material the teacher provides the means. Once every group has presented their work, the

students will vote anonymously which proposal is the most suitable and original for the School Market, the most voted will be carried out by the whole class.

The students have to organise themselves and form work teams to divide up the tasks and accomplish all the elements of the advertising proposal selected.

### **Lessons 12-x: Advertising III**

For some lessons students are left time to put into effect the advertising proposal. They work in the teams formed in the previous lesson to make the advertisement posters, promotional flyers, decoration for the market... The work should be equally distributed, so everyone takes an important role in the process. Each lesson starts with a review of the work done at the last session and the designation of what is needed to do next. It is expected to start advertising The School Market at least for three to five days before the market day.

Children have to set the prices of each product sold at the market. The teacher should advise them to set a reasonable prices. Students should be encouraged to consider the price of the materials used and the time taken to make it.

The students have to plan how are they going to be distributed in the market stalls and who are going to be in charge of arrange all the products.

### **The School Market day**

The market day students have to work according to the plan arranged in the previous sessions, so everyone knows what he has to do and takes a part in setting up and organising the stalls.

The children on each stall have to make a record of every item they sell. Customers are suggested to ask the students about how the products were made, their ingredients, how to take care of it... This is an opportunity for the children to explain themselves, whether in English or in Spanish, and share what they have learnt with others.

Parents help and assistance are required for helping organise the market stalls. During the market the adults should help the children on the stalls and participate in the

development of the whole activity in a secure and peaceful manner. Each stall is supervised at least by one adult, but is fundamental that they allow students to take responsibility for accounting the money and making a record of every item sold.

### **After the Market day**

The lesson after the market is used to do the calculations of the profits and the items sold. Students are organised in the same groups they were on market's day. Working as a group, children have to calculate the money earned in their stall, the number of products sold and calculate the sales percentage.

Once all the groups have finished, they share the results with the whole class and write the information on the board. Then, each student makes a bar chart on his logbook using the percentages and calculates the total earnings. The teacher can give them the cost of the raw materials, so they can calculate if the market has been profitable or not.

The teacher boosts the children to reflect on the success and mistakes of the market. Children should think about which adjustments they would make to the prices, the way the products were displayed...etc.

Deciding how to spend the profit generated is in charge of the students. The teacher should advise them to divide the money, and spend one half on items for the school or the classroom, and give the other half to a charity of their choice. It would be desirable established contact with the charity organization so they can show students what they have done with the money raised.

## 3.7. Evaluation

### 3.7.1. Student assessment

As the CLIL approach upholds there must be a formative assessment. In every lesson, the teacher has to take into account and make a record of the student's proficiency in every skill: the language, the content and the procedural skills.

The teacher has to assess English and Content at the same time. On the one hand, the L2 is going to be evaluated through the use of the content language patterns, the vocabulary provided and the grammatical structures worked in class. One of the main aims is that the students foster their comprehensive, expressive, reading and writing skills. On the other hand, Content is related to three different disciplines that children should be able to interconnect and establish links across them with teacher's guidance.

Moreover, the students are working in groups most of the time, so the collaborative work and the active participation in every activity needs to be taken into account positively. The students' willingness and their motivation to learn are also recorded by the teacher.

The following chart includes the content that should be learnt and the skills that should be developed by each student in each lesson. Furthermore, if the content and skills of each lesson has been fully acquired, students have to be able to apply this knowledge to produce something with a real purpose.

Moreover, students' logbooks have to be assessed; during the whole projects they have to write a diary and reflections about every lesson. The adequate use of the language, the content, the writing skills and the creativity must be assessed.

LESSON	CONTENT	SKILLS	APPLICATION
Entrepreneurs	<p><b>Literacy:</b> lecture, adjectives, definitions and writing.</p> <p><b>Social Sciences:</b> famous entrepreneurs.</p> <p><b>Maths:</b> Bar charts.</p>	<p>Comprehension</p> <p>Inquiry</p> <p>Communication</p> <p>Team-work</p> <p>Creativity</p> <p>Writing</p>	<p>- Research information.</p> <p>- Be able to make a bar chart.</p> <p>- Work collaboratively to produce a creative essay.</p>

Food Guide Pyramid	<p><b>Science:</b> health and nutrition.</p> <p><b>Literacy:</b> adverbs, definitions and writing.</p>	<p>Organization of ideas</p> <p>Understanding</p> <p>Creativity</p> <p>Team-work</p> <p>Designing</p> <p>Writing</p> <p>Presentation</p>	<ul style="list-style-type: none"> <li>- Make up a “healthy diet” definition.</li> <li>- Design a healthy diet plan.</li> <li>- Present the diet plan to the classroom.</li> </ul>
Bakery Workshop	<p><b>Literacy:</b> “... is made of” structure and lecture.</p> <p><b>Maths:</b> measures: quantity and time.</p> <p><b>Science:</b> mix ingredients and heat.</p> <p><b>Hygiene and safety measures</b> when cooking</p>	<p>Comprehension</p> <p>Communication</p> <p>Follow instructions</p> <p>Use measures of quantity and time</p> <p>Team-work</p>	<ul style="list-style-type: none"> <li>- Understand a recipe written in English and be able to follow the steps to bake bread.</li> </ul>
Flower dissection	<p><b>Literacy:</b> Poem and literary figure (personification).</p> <p><b>Science:</b> Flowers’ parts.</p>	<p>Reading</p> <p>Comprehension</p> <p>Understanding of concepts</p> <p>Follow instructions</p> <p>Communication</p>	<ul style="list-style-type: none"> <li>- Identify personifications in a poem.</li> <li>- Perform the flower dissection following the instructions.</li> <li>- Be able to explain the functions of flowers’ parts.</li> </ul>
Gardening workshop	<p><b>Science:</b> Flowers’s parts and take care of plants.</p> <p><b>Art:</b> Decorate plant pots.</p>	<p>Communication</p> <p>Display information</p> <p>Follow instructions</p> <p>Creativity</p> <p>Design</p>	<ul style="list-style-type: none"> <li>- Be able to display information to the class.</li> <li>- Be able to transplant a plant.</li> <li>- Be able to take care of a plant.</li> <li>- Design a plant pot.</li> </ul>
Customize canvas bags	<p><b>Science:</b> Pollution.</p> <p><b>Literacy:</b> Reading.</p> <p><b>Art:</b> Decorate canvas bags.</p>	<p>Comprehension</p> <p>Understanding of concepts</p> <p>Discussion and explanation skills</p> <p>Reasoning</p>	<ul style="list-style-type: none"> <li>- Understand and be concern about pollution as a social issue.</li> <li>- Be able to defend an idea using valuable points.</li> <li>- Produce a creative canvas bag design.</li> </ul>
Let’s make some perfume	<p><b>Literacy:</b> Reading and adjectives.</p> <p><b>Science:</b> Make perfume following a scientific procedure.</p>	<p>Reading comprehension</p> <p>Classify</p> <p>Understanding a scientific procedure</p>	<ul style="list-style-type: none"> <li>- Classify adjectives (positive and negative).</li> <li>- Be able to follow a scientific procedure to make perfume.</li> </ul>

	<p><b>Maths:</b> Measures: quantity and time. <b>Art:</b> Glass painting.</p>	<p>Reasoning Follow instructions Measure</p>	<p>- Design an appealing perfume bottle.</p>
States of matter	<p><b>Literacy:</b> Listening, adjectives (comparatives and superlatives) <b>Sciences:</b> States and changes of matter. <b>Maths:</b> Quantities. <b>Hygiene and safety measures</b></p>	<p>Oral comprehension Reasoning Inquiry Problem solving Follow instruction Measure Team-work</p>	<p>- Be able to use correctly the comparative and the superlative form of the adjectives. - Understand how matter can change its state. - Produce ice-cream and understand the process.</p>
Advertising I	<p><b>Social Science:</b> Advertising: characteristics and techniques. <b>Literacy:</b> Writing.</p>	<p>Understanding of concepts Reasoning Application of concepts Critical analysis Writing</p>	<p>- Analyse an advertisement and apply the concepts explained in class. - Be able to display information to other classmates.</p>
Advertising II	<p><b>Social Sciences:</b> Advertising <b>Literacy:</b> Writing <b>Art:</b> Design advertisements</p>	<p>Team-work Communication Organization Apply concepts Creativity Design Display information</p>	<p>- Working collaboratively to design an advertising campaign for the school market. - Present the advertising proposal to the whole class. - Make decisions as a group.</p>
Advertising III	<p><b>Social Sciences</b> <b>Literacy</b> <b>Art</b></p>	<p>Organization Team-work Communication Task distribution Problem solving</p>	<p>- Put into effect the advertising proposal selected. - Coordinate the whole class to carry out the campaign effectively. - Organize the students and the stalls for Market's Day.</p>
The School Market Day	<p><b>Social Sciences, Sciences:</b> all the content worked in previous lessons. <b>Literacy:</b> Oral communication <b>Maths:</b> Money <b>Hygiene and safety</b></p>	<p>Organization Team work Task distribution Communication Display information Apply concepts</p>	<p>- Set up the market according to the plan previously designed. - Explain, whether in English or in Spanish, the products ingredients, qualities... Manage money.</p>

	measures.	Use money	
After Market' Day	<b>Maths:</b> Money, percentages, charts.	Team work Calculations Represent quantities Display information Communication Reasoning Critical analysis	- Calculate the profits and number of items sold. - Make percentages. - Reflect on market's success and mistakes. - Take decisions as a group effort.

### 3.7.2. Project assessment

The evaluation is a key element of the project that cannot be isolated from the teaching-learning process. It allows gathering information to judge and make decisions related to the project during its implementation. Therefore, the evaluation should be carried out consistently in every lesson. Hence, while the objectives reached have to be considered, the problems that arise should be analysed and solved.

The evaluation has several functions:

- Anticipate events in order to solve future problems.
- Provide information about the development of the project, students and teachers.
- Adjust the methodology, materials or resources to the different learning styles and students' needs to reach a personalized education.
- Gather information about students' achievements.

The project has to be analysed in two different ways. The formative assessment is carried out from the beginning of the project. The teacher has to record students individual and group achievements and needs in each activity, the suitability of the resources used, the timing...etc. This way, the project can be adjusted and improved along the way, so the students' achievements will progressively increase. The assessment of the results, the summative assessment, takes place at the end of the project. The information collected is related to the objectives achieved. The unexpected achievements of interest for the project can be taken into account.



The observation and reflection on the students' every day work and the objectives reached leads to assess the everyday teaching practice, as well as the effectiveness and the suitability of the project. There are several issues that have to be considered in each lesson:

ISSUES TO BE CONSIDERED	
Pedagogy	<ul style="list-style-type: none"> <li>- <u>Methodology</u> (Is it adequate for students' age and need? Does it engage the students?)</li> <li>- <u>Motivation</u> (Is the methodology used motivating to the students?)</li> <li>- <u>Activity types</u> (Are they varied in order to develop different learning styles? Are they meant to develop different skills? Are they suitable for students' age?)</li> <li>- <u>Interaction</u> (Do the activities promote the interaction between students? Do they promote different types of grouping?)</li> <li>- <u>Materials and resources</u> (Were they adequate for students' age? Did the school provide all the means needed?)</li> <li>- <u>Staff involved</u> (Do they work collaboratively? Do everyone develop effectively their tasks? Do they provide feedback to the students?)</li> </ul>
Content	<ul style="list-style-type: none"> <li>- <u>Objectives</u> (Is there a clear purpose? Are the students aware of them?)</li> <li>- <u>Information</u> (Are the students informed of what are they required to do? Is this information adequate and understandable for them?)</li> <li>- <u>Disciplines' content</u> (Is the content adequate for students? Do they find it interesting? Is it included in the curriculum?)</li> </ul>

The teachers involved should gather information qualitatively, as they observe and participate in the teaching-learning process. They have to write notes about what happens, describe the situation and the results, and then reflect on what has happened. The teacher has to pay attention to his conversation with the students, as well as the students' conversations with each other. And of course, the teacher has to assess the students' work. Unexpected achievements or events can be taken into account as long as they are enriching for the evaluation and future improvement of the project.

## IV. CONCLUSION

This present paper begins with an overview of the different initiatives taken by the Ministry of Education and other institutions to establish interconnections among disciplines along with the measures adopted to foster an entrepreneurial culture among the students of Primary Education. The theoretical framework is used as a springboard to describe different interdisciplinary approaches and how they can be joined to the CLIL approach. All this serves as the foundation and support for the innovation project which aims that the children develop cross-curricular links, an entrepreneurial spirit and improve their English competence.

The innovation project follows a coherent and constructivist educative strategy. The diverse warm-up activities, such as brainstorming, readings or class discussions are meant to activate prior knowledge useful in the creation of links with the new content which is about to be introduced. The core activities: researches, hands-on activities or experiments intent to promote a higher cognitive and linguistic competence.

A lecture introduces the project which gives rise to some activities through which the children become aware of what an entrepreneur is and which his features are. Moreover, they accomplish some activities to use their entrepreneurial skills. In the following lessons throughout the project the children learn content related to the subjects required by the Spanish Curriculum, science, art, social sciences, mathematics or art;. This is put into practice through different workshops. This way, the children will learn the real usefulness of it by creating real and useful products. In addition, in order to successfully perform all the tasks proposed, children need to effectively use and develop a wide range of skills such as team-work, communication, organization of ideas, reasoning, problem solving or creativity. These skills will enable them to successfully face the last three lessons, which are dedicated to advertisement. They are designed to give the students an introduction about different advertisement techniques while they provide the children with the chance to create their own advertisement proposal for the School Market which culminates the project. As a last step, children are called to reflect about their accomplishments and failures and to crunch numbers, thus they find out whether the market has been profitable or not.

Overall, this project is an effort to illustrate the three features that characterize the Interdisciplinary approach, CLIL and the combination of both of them: “integration of

knowledge, relevant cognitive associations and connection between life inside and outside school” (Casal, 2007). It has been widely asserted that children have to construct their knowledge actively by making connections between areas of knowledge as well as between previous and new information and experiences. Therefore, all the sessions designed in the project aim to create a cognitive conflict that will allow the students to acquire a higher level of understanding. And besides, foster a higher linguistic competence as well as cognitive. To tie this all together, every interdisciplinary and CLIL teacher should keep in mind this Native American saying: *“Tell me and I will forget. Show me and I may not remember. Involve me and I will understand”*.

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## VI. ANNEX

# Healthy diet

List all the words you associate with healthy diet and life style:

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Now use these words to make a definition of healthy diet:

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# Word bank: Cookbooks

English	Spanish
Tip Stir Flour Whole-wheat Dough	

# Bread in four steps

Preparation: 15 minutes

Cook: 35 minutes

Ingredients:

- 500grams whole-wheat or white bread flour
- 7grams yeast
- 1 teaspoon salt
- 2 tablespoons olive oil



Method:

- 1- Tip the flour, yeast and salt into a large bowl and mix together with your hands. Stir 300ml hand-hot water with the oil, then stir into the dry ingredients to make a soft dough.
- 2- Turn the dough out onto a lightly floured surface and knead for 5 minutes, until the dough no longer feels sticky, sprinkling with a little more flour if you need it.
- 3- Oil the loaf tin and put the dough in the tin, pressing it in evenly. Put in a large plastic food bag and leave to rise, until the dough has risen to fill the tin and it no longer springs back when you press it with your finger.
- 4- Heat oven to 200°C. Make several slashes across the top of the loaf with a knife; then, bake for 30-35 minutes until the loaf is risen and golden. Tip it out onto a cooling rack and tap the base of the bread to check it is cooked. It should sound hollow. Leave to cool.

<http://www.bbcgoodfood.com/recipes/10121/bread-in-four-easy-steps>



TechnoKids Inc.  
TechnoEnvironment

# Plastic Pollution

## What is Plastic Pollution?

Plastic is a material used in the manufacturing of products. It is often created from polymers and various chemicals. Plastic is used to make items such as clothing, eyeglasses, shopping bags, toothbrushes, water bottles, electronics, dishes, utensils, toys, and packaging. Plastic pollution is created when people throw plastic items away instead of recycling.



Plastic waste can entangle or entrap animals. Often this causes them to be unable to eat or move.

## Harmful Effects

- **Toxic Landfill Waste:** Plastic waste buried deep in landfills can leach harmful chemicals that can spread into groundwater.
- **Pollutes Oceans:** Plastic that was not recycled often gets washed into a stream, river, or lake, which empties into the ocean. The ocean currents carry the plastic into gyres, which are circular flows, that trap the plastic in one location. The gyres become large watery garbage dumps.
- **Strangle Animals:** Animals are often found entangled or trapped in plastic debris. They often cannot move or eat, resulting in a slow painful death.
- **Toxic to Animals:** Plastic waste breaks down into nurdles, which are small plastic pieces. Fish, turtles, and birds mistake the pieces for food and when they eat it they often die as a result of the toxins in the plastic. If they survive, humans eat the animals, which allows toxins to enter the body.
- **Human Health Risks:** Items made from plastic have harmful chemicals added during the manufacturing process to soften the material to make it easier to mold. Plastic packaging used to store food or drinks, as well as toys, have chemicals that are believed to contribute to cancer.

## Interesting Facts

- The average person uses an average of 200 pounds of plastic each year.
- Less than 10% of plastics produced are recycled.
- Plastics can be manufactured to meet almost any requirement. It can be rigid, flexible, colored, or fire-resistant.
- Mass production of plastic began in the 1940's because it was economical to make.
- Many plastics are made from petroleum, which is a fossil fuel.
- Plastic in waterways allows foreign species such as barnacles, tubeworms, and algae to travel on the debris to new locations threatening the local area's biodiversity.

## Solutions

- **Reduce:** Purchase products that use less packaging or use alternative packaging such as paper or glass.
- **Recycle:** Transform plastic items into new products.
- **Recover:** Clean up plastic waste. Pick up discarded water bottles, shopping bags, and food packaging from the ground and waterways and recycle the items.
- **Bio-Based Plastics:** Develop biodegradable plastic from renewable plant sources such as vegetable oil, corn, wheat, soy, potatoes, beets, and sugar cane.
- **Green Chemistry:** Develop safer chemicals to use in the manufacturing process of plastics that are not toxic.
- **Regulations:** Establish and enforce laws that manage waste in the community and encourage companies to alter their manufacturing process.

## Bioplastic

An examination of a solution that creates plastic from plant sources.

Advantages	Disadvantages
Made from renewable plant sources.	Often recycle centers have to sort the bioplastic from the petroleum-based plastic.
Use less energy to produce than plastic made from petroleum.	Risk food shortages if crops are grown for bioplastic instead of food.
Bioplastics can be recyclable, compostable, and/or biodegradable.	Many bioplastics have a low melting point.
Bioplastics are non-toxic and will not leach toxins into the soil and water.	

<http://www.technokids.com/documents/intermediate/environment-plastic-pollution-fact-sheet.pdf>

# Let's make some perfume!

Have you ever walked into the cosmetics section of a department store and smelled all of the different kinds of perfumes? Smelling can be fun! Some perfumes are floral, some spicy, and some can even smell citrusy. It can be interesting to try to identify the different components that make up a typical perfume. But did you know that the art and science of making perfume is an ancient one that is about 4,000 years old?

The word perfume comes from Latin where *per* means through and *fumum* means smoke. Initially, perfumes were used in religious ceremonies, in the form of incense, but eventually, they were used by people to make themselves smell good. The Egyptian pharaohs used perfume. Perfumes were found in King Tutankhamen's tomb, and amazingly, the containers still had a fragrance when they were discovered, even though the liquid had evaporated away! The Greeks and Romans also delighted in perfume—wealthy Romans took baths in perfumed water. In the court of Louis XIV, King of France, bathing in water too often was thought to be unhealthy, so perfumes were used obsessively in order to mask the disagreeable smell in the royal palace.

Perfumes release their fragrances in three steps. The first step is the head note, which is the first impression that you get when you initially smell the fragrance. The heart note, the second step, forms the character of the perfume and is perceivable for 3–4 hours. The third step is the base note, which forms the foundation of the perfume and can last a whole day. Fragrances can have a wide range of volatility. Volatility defines how a substance vaporizes. For instance, in a perfume made from lavender and vanilla fragrances, you will smell the lavender as part of the head note and the vanilla as part of the base note, since lavender has a higher volatility than vanilla. There are also many natural sources for fragrances. For example, rose oil is extracted from the flower's petals, geranium oil is extracted from the plant's leaves... Many of the scents that are used to make up a perfume are synthetic. That is because extracting natural scents from flowers is time-consuming and expensive. It can take several pounds of raw plant material to extract just a few ounces of natural oil.

There are several methods for extracting scents, such as distillation, maceration, expression, and *enfleurage*. In this science project, you will experiment with the *enfleurage* method of extraction. You will extract the fragrance from roses or lavender into vegetable shortening, and then use alcohol to extract the fragrance from the vegetable shortening. And then test your perfume using the noses of several volunteers. Let your noses do your work for you! Bet you never thought that chemistry could smell so good!

[http://www.sciencebuddies.org/science-fair-projects/project\\_ideas/Chem\\_p083.shtml#background](http://www.sciencebuddies.org/science-fair-projects/project_ideas/Chem_p083.shtml#background)

# Liquids and Solids

Using the information provided in the following chart, answer the questions below:

MATERIAL	MELTING POINT
Gold	1064 °C
Silver	962 °C
Iron	1525 °C
Aluminium	660 °C
Mercury	-39 °C
Tin	232 °C
Salt	800 °C
Sugar	185 °C
Chocolate	35 °C
Olive oil	-20 °C
Candle wax	60 °C
Ice	0 °C
Glass	1400 °C
Milk	-0,54°C

1- Which material has the highest melting point?

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2- Which material has the lowest melting point?

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3- If the classroom temperature is 20°C, which materials would be liquids?

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4- Which materials have a melting point higher than salt?

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5- The average temperature in the Arctic is -30°C, which materials would still be liquids?

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6- Write sentences about different materials using the comparative and superlative forms of *high* and *low*:

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# Ice-cream recipe

Preparation: 20-30 minutes

Ingredients:

- 1 cup of milk
- 1 teaspoon of vanilla powder
- 1 tablespoon of sugar
- 4 cups of ice
- 4 tablespoon of salt
- 2 small freezer bags
- 1 big freezer bags
- 1 towel



(Amy G, 2012)

Method:

- 1- Put the milk, the vanilla and the sugar in one of the small freezer bags and mix them together.
- 2- Seal the bag tightly, allowing as little air as possible to remain inside the bag.
- 3- Place the bag with the mixture inside the other small freezer bag again trying to squeeze out all the air.
- 4- Place these bags inside the big one and fill it with ice, and sprinkle it with salt.
- 5- Seal the bag trying to leave no air inside.
- 6- Wrap the bag in the towel or put your gloves on, and shake and massage the bag, making sure the ice surrounds the cream mixture.
- 7- Wait for five to eight minutes to allow the mixture to freeze into ice cream.

<http://teachnet.com/lessonplans/science/plastic-bag-ice-cream-recipe/>

# Advertisement analysis

What product is advertised?

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Who are the consumers?

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What kind of advertisement is it?

TV  Magazine  Billboard  Radio  Internet

Which techniques are used to persuade buyers? (Music, slogans, celebrities...)

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Which colours does it use? Why do you think those colours were chosen?

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Do you think this advertisement is honest? Or do you think that the qualities of the product are exaggerated?

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Would you buy this product?

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Do you think it is a good advertisement? Why?

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# Advertising proposal

CLIENT	
PRODUCT What are you trying to sell?	
POTENTIAL CONSUMERS	
SLOGAN/JINGLE	
LOGO	
MATERIALS NEEDED	
APPROXIMATE COST	
WHERE THE CAMPAIGN WILL BE DISPLAYED?	