

Master's Dissertation/
Trabajo Fin de Máster

Teaching Science in a Bilingual and
Multicultural Context: A didactic
proposal for a school in Delaware
(USA)

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Abbreviations Index

- L2: Second language
- PCIC: Cervantes Institute Curricular Plan (Plan Curricular del Instituto Cervantes)
- ACTFUL: The American Council on the Teaching of Foreign Languages
- FLES: Foreign Language in Elementary Schools
- ATDLE: The Association of Two-Way and Dual Language Education

ABSTRACT

This dissertation has, as its main objective, to reflect about bilingual education in Delaware and more specifically, on how science is taught in dual schools. The school we are focusing on is a multicultural place where students from different backgrounds learn together. This work has as a goal to understand and contemplate how much culture is involved in science teaching. The didactic unit in this investigation has as a main purpose to name culture as the benchmark from which all the knowledge the students acquire is connected to. In doing so, the teaching learning process will become more accessible and meaningful for the little ones. As important as culture, this thesis has the intention to review the current material available for this task in order to assure that the tools and resources at hand are the necessary ones for a successful development of the bilingual education program.

Key words: bilingualism, multicultural, culture, United States, Dual Language programs, children.

RESUMEN

Este trabajo de fin de máster tiene como principal objetivo, reflexionar sobre la educación bilingüe en Delaware y más concretamente, sobre cómo se enseña ciencias en las escuelas duales. La escuela en la que nos estamos basando es un lugar multicultural donde estudiantes de diferentes orígenes aprenden juntos. Esta disertación tiene como meta entender y contemplar cuánta cultura hay presente en la enseñanza de ciencias. La unidad didáctica en esta investigación tiene como principal propósito nombrar la cultura como punto de referencia del que emane todo el conocimiento que los estudiantes adquieren. Haciendo eso, el proceso de enseñanza aprendizaje será más accesible y significativo para los pequeños. Tan importante como la cultura, este papel tiene la intención de revisar el material actual disponible para esta tarea para asegurar que las herramientas y fuentes al alcance son las necesarias para un desarrollo exitoso del programa de educación bilingüe.

Palabras clave: bilingüismo, multicultural, cultura, Estados Unidos, programas de educación dual, niños.

1. INTRODUCTION

1.1. Justification

Our society is defined as a global, multicultural and fast-growing entity. We make the effort daily to adapt as fast as we can to this dynamic system in which we are considered key pieces. In this context in which relationships and connections are more and more important, the need of speaking a second language becomes paramount. Some authors even refer to this adding that teaching through only one language will be considered “drip-feed education” (Vez, 2009:8) and “second-rate education” (Lorenzo 2007:35). Some others even dare to say that doing so would be considered illiteracy of the 21st century.

Even more important is the fact that the new generations, we shape every day in our classrooms, are the future of this unsteady and varying community we will be granting them with. As educators, we need to care about what we are sharing with our students and how we are conveying the ideas about important concepts such as culture or multiculturalism while teaching a specific subject. In this challenging endeavor, we need to reflect on how we plan to teach them throughout their path in elementary school.

In this thesis, we will reflect on the specific characteristics of each of our students as well as on their realities and backgrounds to support their own and personal way to approach the learning of, more concretely, the science subject. As part of the process, we will make sure to analyze the materials and resources available for the science teachers and the organization of those tools to make them be used as successfully as possible.

Once the study of the actual situation is done, the focus will be the creation of a teaching plan aiming to achieve the prior objectives proposed by this work and to include improvements in this process.

1.2. Contextualization

The setting for this dissertation is a multicultural scenario where the teaching and learning of a second language is becoming more and more important. The United States has different centers and organizations focused only in promoting and supporting the acquisition of different languages. To name one of the most important ones, ACTFUL is the abbreviation

of American Council on the Teaching of Foreign Languages. This national organization safeguards the expansion of teaching and learning languages in the country. They held an annual conference where updates and reflections are made to keep improving in this matter. They also have a Special Interest Group (SIG) for dual language and immersion educators.

This is not the only association that watches over the different language programs. In this context, the primary goal of this dissertation is to explain what is the actual situation in the country and, more specifically, in Delaware and focus deeply into the science teaching and how much that is affected by the culture of the different stakeholders. Another reference in the field is CARLA, the Center for Advanced Research on Language, whose main objective is to improve the ability to teach different languages in this specific location. It is a national language resource center not only for teachers but also for families and any other person interested in the immersion programs.

All of these entities show the interest of this country, in the last decades, to keep up with the new reality and global situation. The United States has been receiving more and more immigrants from different areas of the Caribbean and South America in need of a system that includes them as an important social group in society. It does not come as a surprise to hear that currently there are more Spanish speakers in the United States than in Spain. Taking as a reference an article in *America Reads Spanish* website by Nancy Rhodes and Ingrid Pufahl (2010), we can mention Spanish as the most popular language offered in schools and highschools (Draper, 1991). However, the authors mention the insufficient options for students to get to advanced levels of the language. Another interesting point revealed in this reading is that even though the position of the Spanish language in the world continues to be sturdy, the selection of languages promoted in different schools appears to come from political decisions depending on socio-political events around the world.

All in all, Spanish continues to be the reference language for most schools in the country as a second language/foreign language. Therefore, the creation of more groups enrolled in bilingual programs in the United States is constant. If we focus on elementary education, we can mention three different variants in foreign language teaching. There are still some traditional programs in use such as FLES (Foreign Language in Elementary Schools) where the main goal for students is to develop different levels of proficiency in Spanish and appreciate the culture of the Spanish-speaking countries. The purpose is to prepare the

students to develop functional skills in the four abilities of a language: listening, speaking, reading and writing. We can also name some of the introductory programs such as FLEX (Foreign Language Experience) in which the students are given an opportunity to have a first contact with a second language (L2).

Finally the third option, would be the one we will be focusing on in this didactic proposal, is the Two Way Immersion Dual Language Programs where the students have curricular contents of different subjects taught through the second language. To comply this goal and supporting this third variation, we can find the Association of Two-Way and Dual Language Education (ATDLE) which is led by educators and administrators in California that offers professional support for the whole country.

2. THEORETICAL FRAMEWORK

2.1. Science as a subject taught in a second language

Exploring the interesting reading *“Teaching science in multilingual contexts: an exploratory study into the experiences and insights of Maltese science teachers as they learn about teaching in multilingual scenarios”* by Charles Bonello (2018), it is very interesting for our work to highlight some of the findings in it. As schools prepare to teach science through a second language, it is essential to assess the students’ level of language before they enroll with the school. This reading probes into the relevance of teaching science because it is a subject in which the presence of concepts considered abstract is constant. To acquire this knowledge, the students will need to understand the no tangible idea the teacher is explaining. Piaget (1970) supported the idea of students in elementary school being in a cognitive development moment in which they are capable of form abstract ideas, do formal operations and work with formal thought.

As language educators we always support the learning with techniques and strategies that promote understanding but, in certain cases, the students will have to cope with the abstract concept with no more help than their mental capacity and their experiences. Facciol et al, (2015) cited in this article by Bonello (2018) states that the language barrier for understanding can come from different factors: student mobility, poor teacher-student interaction, lack of support at home or cultural stereotyping. With all, the educator will have to establish a safe and comfortable environment for the students to be able to work on science

concepts and encourage families to volunteer and be part of the school community. All of these aspects in the kids' different ecosystems (Bronfenbrenner, 1979) are emphasized by this author who talks about the importance of the students' different environments and how those affect every aspect of the students' lives. If the students' individual experiences are used as an educational resource, the students' commitment and empowerment tend to increase dramatically (Tan, Calabrese, Turner, and Gutiérrez, 2012). It is said that to enhance science education, teachers need to make hybrid language spaces and merge students' everyday worlds with the language of science.

Apart from the kids' experiences and backgrounds, teaching and learning science are forms of cultural production and enactment (Moore, Evnitskaya & Ramos-de Robles, 2019). These authors explained that learning science should be understood as a process in which the students slowly make interpretations of natural phenomena in socially learning communities, such as classrooms. They explained the importance of choosing science to be taught through a L2 alluding to Roth (2007): "knowing a language is indistinguishable from knowing your way around the world more generally". For them someone literate is a person that is prepared to create new cultural and communicative forms and to expand possibilities for acting and interacting with others (pp. 392-393).

With the goal of teaching and learning science through the L2, in our case Spanish, it is very thought-inspiring the idea of the perfect bilingual student that Uriel Weinreich (1953) wrote and is explained in Moore, Evnitskaya & Ramos-de Robles's article (2019): "the ideal bilingual switches from one language to the other according to appropriate changes in the speech situation (interlocutors, topics, etc.) but not within a single sentence. It is therefore necessary for the students to clearly understand that some of the subjects are in a different language (L2) and that they should use their abilities, techniques and repertoire to make sense of it and accomplish the different tasks that are proposed. To avoid confusion or opacity, there has to be a process of clarification and remediation. One of the techniques the authors mention is Classroom Interactional Competence (Walsh 2006) which refers to the ability in the teaching and learning process to be able to use assisting learning techniques such as extra time, modeling or clarification.

The authors explained the teaching of science from a pragmatic perspective in which scientific content moves on between the students' experiences and interest (the everyday

discourse) and the subject matter knowledge (the academic discourse). In this long and ongoing process of making meaning in the science language, Cummins (2008) explains the dual task of relating natural and academic discourses. Some years before, the same author stated his Theory of the Iceberg (1999) in which he differentiates between the grade of academic proficiency in the same language. On the one hand, we have the Basic Interpersonal Communication Skills (BICS) known as the daily language students would use in a social interaction while doing the daily activities students perform at school: eating in the cafeteria, playing in the playground, meeting a friend in the bathroom... On the other hand, we have the Cognitive Academic Language Proficiency (CALP) which refers to the core abstract variety of language used in academic purposes. The author explains that it normally takes up to two years for students to be proficient in the here-and-now language while CALP will unravel over the course of 5 to 7 years.

2.2. Bilingual students

Learning a second language could be a steep learning curve especially when the program or materials are not designed for the specific characteristics of the students. We need to mention the first and most traditional approach to L2 teaching and learning (Grammar translation method) in which the students are considered a steady factor with general abilities. In this method, the teacher is the voice and the process is educator led. The students are considered a passive receiver whose successful qualities will be to memorize the grammatical rules, repetition and eradication of mistakes (Martín, 2009). With time, the second language teaching moved away from this and focused mainly on the student putting him as the center of attention (Student-centered methodologies, henceforth, SMC). This happened because people like the Swiss psychologist Jean Piaget (1930) with his theory of education stated that the apprentice was the most important factor and the whole learning process must be focused on his/her needs. Therefore, there is a change that will take the student's psychological, cognitive and external characteristics as a reference to create a methodology that will teach them in an easier and more successful way.

In turn, and following the aforementioned models, we need to talk about the level of education this investigation is centering its attention to: elementary education. In this educational level, following Piaget cognitive development theory (1936, 1950), the students move from the preoperational stage (2-7 years old) to concrete operational stage (7-11 years

old) so they become more mentally developed and therefore, the language acquisition can happen easily. The author states that without enough mental development, children will not be able to understand a concept and if they cannot understand a concept they will not acquire the particular form that expresses that concept. The aforementioned conceptions bring us to think that the students at the end of their elementary school experience move from a characteristic egocentrism to a more open vision of the reality around them. They will still need to understand the concept before they acquire it but they will show more awareness of the context.

As important as the latter is for our students, we need to mention the theory of Second Language Acquisition by Krashen (1983). The author claims in his five different hypotheses that “Language acquisition does not require extensive use of conscious grammatical rules, and does not require tedious drill”, therefore “Acquisition requires meaningful interaction in the target language - natural communication - in which speakers are concerned not with the form of their utterances but with the messages they are conveying and understanding.” He then suggests that the best methods teachers can use are those that do not push the students to just produce language for the simple fact of doing it but allow them to create it when they are ready.

In the first hypothesis (Acquisition-Learning) Krashen states that the learners of a language have two systems: one helps them to acquire the language whereas the second one allows them to learn it. The latter is considered the less important since learning a language implies knowing the rules and it works in a conscious way. On the other hand, the system to acquire language works unconsciously and it needs the interaction with the L2 in a real context. It will be extremely important for the educators of science through a non native language to encourage the system to acquire language. We can do that through games, role plays and making our classroom a small micro-society where real needs for the use of the language are created.

The Monitor hypothesis relates to the learned language. For Krashen and Terrell (1980) it is the conscious learning and should be only used as an editor and with specific purposes such as making a “cleaner” speech. In this hypothesis it is suggested that students will be classified in three groups depending on their use of the monitor. There are some students that lack confidence in the process and are considered “over-users”. Another group would be the

students that are extroverts and prefer not to use the conscious language called “under-users” and the ones that the author called “optimal users” that just use it correctly and when needed.

The third hypothesis (Natural Order) is explained by the author as the tendency of having an organization when it comes to learning the grammatical structures. He explains that the natural order has nothing to do with the students' age or language background and it is also relevant that he considers it to have little importance if focusing on language acquisition.

When it comes to the four hypotheses about the Input, it has to be remarked that Krashen clarifies that this one has to do with acquisition of the language. While the students are in the process of acquiring a language and following the natural order, they improve faster if given an appropriate input that is not at their exact level but a little bit higher; it is called “comprehensive input” and it is represented by “ $i + 1$ ”. It is embedded then, in this idea, that every student has their own pace in learning a L2 and therefore the materials and tools to help them should respond to this comprehensible input for each of them to keep motivated.

Finally, he mentions the Affective Filter hypothesis. This is explained as the need for the background of the student to be taken into account: feelings, emotions, affection. For a student to perform well and show improvement in the language acquisition, their affective filter should stand low and to achieve that, the student needs to feel motivated and confident.

There are some premises that we can take from the theory that need to be used when planning to teach a second language. As educators, we should think about our students as independent individuals with experiences and backgrounds. When these students are ready to learn, we should make sure we create the right environment in our classroom for them to feel comfortable and safe to produce language when they become ready. We should make sure that there is plenty of comprehensible input in our lesson and that the students' affective filter is low. The activities we propose should promote interaction and the need for communication to encourage production.

It is of great importance when teaching students and for that we consider the theory by the neurologist Wilder Penfield and Lamar Roberts (1959) and most known in years after by Eric Lenneberg (1967) called the Critical Period Hypothesis (CPI). The hypothesis claims that the acquisition of the L2 definitely depends on the student's age and how early they are exposed

to it. In bilingual education the goal is to start with students at an early stage in their lives and it is being proved that the consequence will be that immersion kids will outperform other students in the program that had a later beginning. In our context, we want to understand from this hypothesis that learning a second language after a certain age is not impossible but it will require a bigger effort and maybe not a successful outcome.

2.3. Bilingual education

It is internationally recognized that learning a second language is a gift for the students that enroll in these kinds of programs because the level of effort they have to put in compared to learning a language when being an adult is much less. UNESCO (1989) encourages forms of bilingual education that support students' home language. Thus, it is as important as learning a L2 to recognize and appreciate all the languages and backgrounds of our students. In this multiplicity of cultures and languages society that we live in, having the opportunity to choose a program that encourages your growth is a real legacy. Cummins (2008) as cited in Annika Karlsson, Pia Nygård Larsson & Anders Jakobsson's article (2019) emphasizes the importance of the new opportunities for cultural and language development, which may be understood as an important educational asset and resource in education.

2.3. 1. Bilingual education in USA

The immersion programs in the United States are a well established model thanks to some of the Canadian experience from 1965 onwards. They offer content instruction in the language target and they can be divided into total (90-100%) or partial (50-50%). Another important aspect of these programs is that the native teachers understand the students' mother tongue and adapt their teaching methods to make it more accessible for the learners.

As aforementioned, the United States has suffered a change of mind as far as languages are concerned. The reality of this country is that being so vast the national legislation was not allowing every state to really answer to their own needs. The last years of the 20th century helped the system to become less centralized and give the different states the power to legislate according to their own realities in their schools. However, there are still some national regulations that make an effort to connect with every educational department in the

different areas of the country to create a minimum guaranteed quality in the learning and teaching of L2.

One of the most important entities, previously cited in this work, is ACTFL. This association, as we said before, was created to support the foreign language teachers and the improvement and expansion of the L2 teaching. Some of the most important documents the organization has created are the Proficiency Guidelines (2012) which are instructions on how to determine the level of linguistic competence. The different levels are based on what the students “can do” in the language from the receptive skill (listening and reading) to the productive ones (speaking and writing).

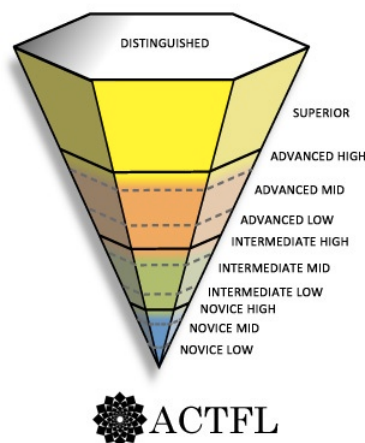


Figure 1. Inverted pyramid representing ACTFL rating scale for language levels (2012)

In the above figure with the different levels of the language, we can see how the first bottom part is the *Novice* level divided in three: *Novice low*, *Novice mid* and *Novice High*. The next level has three more different sections: *Intermediate low*, *Intermediate mid* and *Intermediate High*. As we escalate to the advanced level, we find three more: *Advance low*, *mid* and *high*. Finally, on the top part of the pyramid, we can see the *Superior* and *Distinguished* levels. The *Descriptors for Language Learners* describe the different levels of communicative language that the students will show in different educational environments such as classrooms, online teaching, independent project-based learning or in those with a mix of the previous ones.

Another document created by ACTFL is the one that comprises the National Standards in Foreign Language Education Project (1999).



Figure 2. ACTFL Performance Descriptors for Language Learning (2012)

Those are standards known as the “5 Cs” (*Communication, Culture, Connexions, Comparisons, Communities*). They were designed to describe the students' performances in the settings for learning a second language. Their goal was to create a common rubric for students to know the different levels of performance demands and to gain understanding of what a high performance in the language means. They are organized according to three Ranges of Performance (*Novice, Intermediate and Advanced*) and three Modes of Communication (*Interpersonal, Interpretive and Presentational*).

2.3.2. Bilingual education in Delaware

Delaware is a state located in the Mid-Atlantic area that has borders with Maryland to its south and west, Pennsylvania to its north and New Jersey and the Atlantic Ocean to the east. It takes part of the Delmarva Peninsula and it is the second smallest state and the six most-densely populated. The two biggest cities are Wilmington and Dover, the latest being its capital and it is divided in three different counties: New Castle, Kent and Sussex in order from north to south.

The state is committed to the immersion programs since that capacity of mastering a second language is very important to keep its domestic economy flourishing. In February 2022, the governor John. C. Carney decided to start a campaign in support of the immersion schools and the communities where they were located and started a tour of visits to get to know the functioning of the schools and the teachers that teach every day trying to improve them. Referencing the Delaware Department of Education page (Delaware.org) the previous governor of the state spoke to the public praising the ability of young Delawareans to speak a second language and pointing to the importance of starting a new job with the skill of a L2.

He also started a World Language Expansion initiative, back in 2011, that promoted and expanded world language education to prepare future generations for a global economy on the move.

The idea that the Department of Education wants to convey is that the state will create competent future citizens with the ability to use a L2 in a proficient way. That will also impact their “economic advantage” in a multicultural society. A consequence of this initiative was the start of immersion programs from early states like kindergarten in all schools across the state. Thus, and after years of research, many dual language immersion programs were set in motion by the state. When thinking about the benefits of establishing these types of programs, they realized how children successfully acquire a second language when it becomes part of their daily routines and lives. The state page also suggests that one of the reasons for them to promote them is because it is also the most affordable way for the schools to foster a high quality education.

The Delaware Dual Language Immersion curriculum model gives the students the possibility to learn a second language in their time in elementary school. The different programs provide English and the option of Mandarin Chinese or Spanish. These students have their school day divided in two parts: half of their days, they use English as the language for communication and learn English Language Arts (ELA), support for math (Content transfer) and Social Studies. On the other hand, the other half of the day is in Spanish, in the school that this thesis is based on, where they use Spanish to learn math, Spanish Language Arts (SPA) and science. The teachers for both parts of the program are native speakers of the language they teach so they are able to use different strategies and scaffolding techniques for the students to engage and enjoy while acquiring the language. Some of these are: songs, tongue twisters, gestures, pictures, real photos, different accents, recognition, puns, jokes...among others.

Delaware state has made a big effort to improve and support these programs. Talking about the immersion programs in Spanish, the state has an agreement with the Ministry of Education of Spain to, throughout the Spanish Visiting Teachers program, encourage the stay of native speakers teachers in Delaware schools. Some of the objectives of the Visiting Teachers’ program are: the cross-cultural exchange and high level instruction from native teachers that are highly qualified. One of the requirements for the visiting teachers is to do two different projects, one inside the school context and another one with the community, in

which the main goals are the cultural exchange between the teacher's hometown and the school and the spread of Spanish culture here and the American culture in Spain. The program tries to boost the knowledge of the US pedagogy and methodology as well as enrich the Spanish teachers' professional practice when they return to Spain. It also promotes the increase of global awareness of the different cultures and the importance of respecting all of them.

2.4. Definition of culture and its role in a multicultural context

In compliance with the foregoing, we need to reflect about how the concept of culture has been treated over the years. As we mentioned before, the time when the teaching and learning of a second language was based on how much grammar you knew was accompanied with a total lack of culture in manuals and lesson plans. However, in the last decades of the 20th century, with the change that located the student as the center of the teaching learning process and the communicative approach, culture and language began to be the two main objectives of the language programs.

Culture has become an essential part of the teaching process of a second/foreign language considering that if a student does not learn about the culture of the language s/he is trying to acquire, the possibility of success is much less in achieving the goal. According to Condon (1973) cited in the work *The Impact of Culture on Second Language Learning* by Ming-Mu Kuo and Cheng-Chieh Lai, “culture can be defined as a way of life. No matter where people live, their behaviors and thoughts follow and are generally based on their own cultures. Culture has many different dimensions. It includes ideas, customs, skills, arts and tools that characterize a group of people in a given period of time; it is also the beliefs, values, and material objects that create our way of life “.

Culture is also defined as “a system of behaviors and modes that depend on unconsciousness” (Edward Sapir, 1956) and “a connection of ideas and feelings accepted by the majority of people in a society” (Rocher, 1972, 2004). According to the National Standards for Foreign Language Education project (1996), the students “use the language to investigate, explain, and reflect on the relationship between the practices and perspectives of the cultures studied”. We can therefore conclude that students will not be successful in the learning of the L2 unless they study the culture of the country/ies where the language is spoken.

2.5. Culture in official documents for bilingual education

When thinking about one of the objectives of this dissertation, plan a didactic proposal for the science subject in a bilingual school with a multicultural context, it is necessary to review some of the official documents and indications for the correct understanding of culture in elementary education curriculums.

Taking into account the National Standards (1996) and the article by Cutshall (2012) *Integrating “Cultures” in your language instruction*, the standard of Culture in the official document of ACTFL is: “gaining knowledge and understanding of other cultures”. The two substandards that she points out are: 2.1. Students demonstrate an understanding of the relationship between the practices and perspectives of the culture studied and 2.2. Students demonstrate an understanding of the relationship between the products and perspectives of the culture studied.

We can add, from the reading of her article (Cutshall, 2012) that culture is commonly referred to as three main aspects that are generally represented as a triangle: perspectives (meanings, ideas, values), practice (social interaction clues) and products (books, games, food). Cutshall shows that the three Ps or components of culture are closely related. It is then manifest that it is in our best interest to plan our lesson according to the students’ need of knowing the culture of the language.

Another interesting aspect is that, Cutshall states in her paper, some educators will refuse the opportunity to teach culture depending on how old the students are. Thus, they think that the correct thing to do is to “save” culture for upper grades. She adds that Dali Tan, Chinese instructor at Landon School in Bethesda, MD, and Northern Virginia Community College, believes that culture and language belong together “you really cannot separate the two—so how can you wait to discuss culture?”. “Culture is a gateway to the language.”

To mention another official entity that enhances cultural diversity and it is closely related to the context of this thesis, it is necessary to add the work done by the Curricular Plan of the Cervantes Institute (PCIC, 2006). This is a document that some of the Spanish native teachers can use to boost the Spanish language in their lesson plans. Among all the inventories, we

will mention number ten (Cultural References), eleven (Sociocultural knowledge and behaviors) and twelve (Intercultural abilities and attitudes). Some of the remarkable aspects in the inventory number ten make reference to the need to develop the cultural dimension through the linguistic aspects and other ones closely related to the communication act. In regard to the inventory eleven, this includes the way of living from experience, daily aspects, the social organization and the personal relationships. Needless to say that this document refers to the Spanish reality instead of the hispanic. However, it is also specified in the paper the reason why of that decision. Spanish is a language that is spoken in 21 countries in different continents and therefore, it is difficult to know and name all the specifications of every cultural environment where Spanish is spoken. Finally, in inventory number twelve the intercultural competence refers to the ability of the students to open their minds and become a successful citizen that is capable of adapting and embracing different cultures and different ways of thinking.

3. METHODOLOGY

The main objective of this study is to reflect on the practice of teaching science in a bilingual classroom where students come from different multicultural backgrounds. To accomplish this goal we will need to review the current materials that have been used in the specific context where this paper is focusing on. We will also evaluate if the recommendations and indications of the official documents can help to design the perfect materials that will encourage and facilitate the learning process for our kids.

3.1. Objectives

The main aim of this document is to propose different activities that encourage and promote cultural awareness among the multicultural group of students where science is the unifying thread that gives sense to the whole plan. Inside this big objective we can find some other goals that will help accomplish the general one:

1. Understanding the importance of science as a subject that will promote BICS and CALP for the students.
2. Creating a classroom environment where students feel comfortable, motivated and ready to use the L2 as a vehicle for learning the science contents.

3. Determining the importance of culture in the teaching and learning of science for students in their elementary school stage.
4. Supporting the educators and giving them tools and resources to foster cultural knowledge of the students while learning elementary science concepts.

3.2. Study of the guidebook

The guidebook we use for the teaching of third grade Spanish science is called Amplify. All the resources are online and the kids have access to the application while using their chrome books. We have been using the app for three years now and the Spanish translations and tools have improved.

The syllabus for the students is divided in four units, which have a main objective:

1. *Balancing forces* (modeling)
2. *Inheritance and traits* (investigation)
3. *Environments and survival* (engineering design)
4. *Weather and climate* (argumentation)

Every unit is designed to be taught in four chapters with a different number of sessions depending on the unit. Amplify's curriculum for science has as a main goal to develop real understanding and higher cognitive skills for the students. Referencing Bloom's taxonomy (1956), this syllabus is inspired by the distinction of the different levels of human cognition that the author created to categorize educational goals. The idea of Amplify is to develop in the science students the necessary skills to not only remember and understand but also to apply and analyze the knowledge they learn in the different units. The ultimate goal for the planning would be to help students develop the abilities to justify a stand or decision and produce new or original work which would be included at the top of the Bloom's pyramid as "evaluate" and "create". The program refers to this important objective with the following explanation.

The Next Generation Science Standards (NGSS) set a higher bar for students' understanding (...) While in the past, elementary students were expected to simply know that plants and animals inherit traits from their parents, the NGSS expect that students should be able to provide evidence to support this idea. Similarly, while in the past, students were expected to simply know that traits can be influenced by the environment, the NGSS expect that students should be able to say how they know by gathering evidence.

Moreover, this material gives the teacher, in each unit, a unit overview, an explanation of what should be covered in every chapter, a planning for the unit, teacher references and an offline preparation.

In the first resource, the unit overview, it gives an answer to what is in the unit, why and how the contents should be taught. As far as the chapters are concerned, they include the quantity of lessons suggested and each one has a different number of activities, generally in between 2 and 4. The activities are designed with the objective to make students think and reflect about the concepts they are learning. Then, some printable resources are shared.

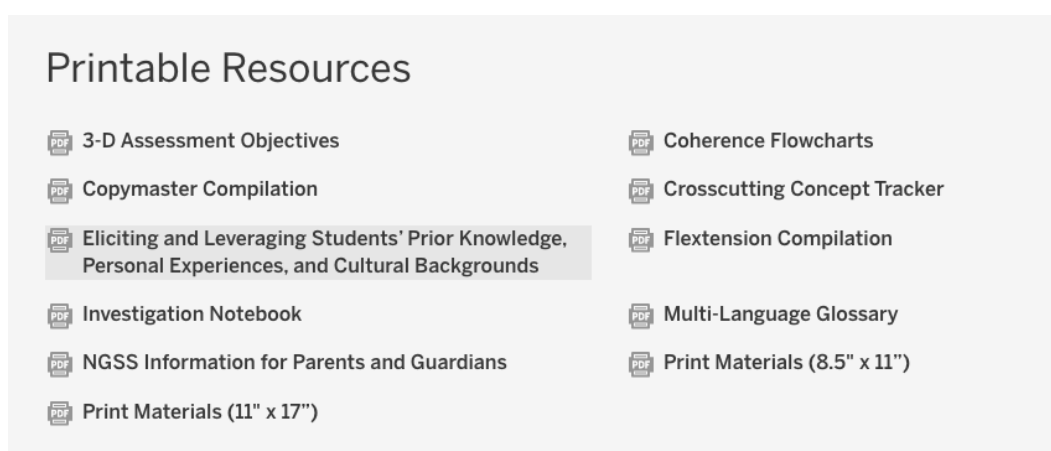


Figure 3. Printable resources of the unit Inheritance and Traits (Amplify)

The resources offered, as shown in the above table, are very varied and some of the ones that are indicated to be used for the development of the unit are: the objectives, the connection with student’s prior knowledge, the investigation notebook, the glossary and some of the printable materials. Another important part is the Planning for the unit. This is divided into 6 different categories with specific information in each one.

Unit Map	Quick overview
Progress Build	Describes the way in which students’ explanations of the central phenomenon should develop and deepen over the course of the unit. It is an important tool in understanding the design of the unit and in supporting students’ learning.
Getting Ready to Teach	Hands-on activities, reading, writing and discussion, firsthand activities.

Materials and Preparation	The units come with kit-provided materials needed to present.
Science Background	Background information about the disciplinary core ideas, science and engineering practices and crosscutting concepts.
Standards at a glance	Organisms have observable traits. (1.3) Organisms in a species have many similar traits, but for each trait there can be variation. (1.6)

Figure 4. Planning for the unit Inheritance and Traits (Amplify)

In Teacher References, we can find: a lesson overview compilation, standards and goals, 3-D statements, assessment system, embedded formative assessment, books in this unit, apps in this unit and *flexextension* in this unit. Finally, in the area of Offline preparation, it gives the educators the possibility to download the resources in case they do not have reliable classroom Internet.

As relevant as the latter, the approach of the Amplify materials is very interesting to our work since it focuses on literacy.

“Literacy is an integral part of science. Scientists read, write, listen, and speak in order to obtain, evaluate, and communicate information about the natural world. They explain their findings, conduct research, connect to the work of other scientists, and communicate ideas to a variety of audiences. In the Amplify Science program, students learn to read, write, and speak as scientists do as they acquire facility with the academic language and vocabulary of science (...)”

This didactic syllabus also emphasizes on the benefits of teaching science through language.

“Situating literacy instruction in a content area like science has several benefits. First, it helps students develop ways of thinking that are characteristic to the discipline. Second, building background knowledge in a discipline also helps students access complex content in texts that can be difficult to grasp. Finally, situating literacy in a

content area like science provides an authentic reason for reading, writing, and talking — to better understand the science ideas under study (...)"

4. DIDACTIC PROPOSAL

4.1. Educational context

The main intention of this work is to improve the resources available for bilingual teaching in the subject of science. After a thorough review of the material of the current publisher (Amplify), the following didactic proposal intends to enrich said curriculum with some multicultural activities and a more second language teaching approach for the presentation of the contents.

4.1.1. Students

When planning this didactic syllabus, we thought about our students who are in third grade. Most of them are between 8 and 9 years old and they profoundly love animals and anything related to the environment and nature. They also show specific characteristics being students of a dual language school in a big city in Delaware. Some of those characteristics are: they come from different cultural backgrounds, different economic status families, diverse familiar organizations and unique values, beliefs and attitudes. The distribution of my students can be explained as follows: 17 students with Hispanic background and 5 with African-American ethnicity.

Nevertheless, students in our classroom have some other aspects in common. They all came to our school in kindergarten so this will be in their four year. They have also gone through two peculiar years, the first one being 2019-2020. That is the year when they started kindergarten and suddenly, in mid March, they had to go home because of the outbreak of COVID-19. During that time, students remained at home and practically lost half of their year since neither the district nor the country were ready to satisfy their educational needs with the technological resources necessary for online education.

The year after, 2020-2021, they started at home and were given a chrome book to be able to access the zoom lessons the school told the teachers to start doing. Teachers were a bit lost, as this was something that never happened before, but they engaged in all the applications

and distance learning resources they could to help their students keep up with the syllabuses. Luckily, by the end of 2020, there was an intention to bring the students back to school but the cold season and the flu did not help with the duty. It was not until 2021 when the students come back fully in person to school. Even though they were excited to come back, it was also complicated with the masks mandate and all the health department recommendations of having students sitting apart from each other and the restrictions with close contact conversations.

All of these circumstances mark some of the attitudes and behaviors of our students since their early years in the dual language program where they were able to do exactly the opposite of what a bilingual program suggests: contact, interaction, dialogue and grouping students.

4.1.2. School

Our school is located in the downtown area of the second largest city in Delaware: Wilmington. The school has a big building where there are four classrooms of each level of elementary education. They go from kindergarten to fifth grade, which makes 20 elementary education units. It also has rooms for the different specials the kids get during the week: art, physical education, music, guidance and library. The school also possesses different professionals whose main goal is to support the students: two counselors, student advisor, speech therapist, special education teachers, psychologist and behavior interventionists. We also count on two secretaries, the vice principal and principal of the school.

All of these professionals work together to follow a schedule that is similar for every level but with different timing regarding the classroom teaching, specials, recess and cafeteria (lunch time). We are going to explain in more detail the one the students in this investigation follow.

Horario español	
8:45-9:20	Llegada y Reunión de la mañana
9:20-10:15	Español
10:15-11:05	Especiales
11:10-11:55	Matemáticas
12:00-12:30	Patio
12:30-1:00	Cafetería- almuerzo
1:00-1:30	Respuesta de intervención
1:35-2:30	Matemáticas
2:30-3:00	Ciencias
3:00-3:40	Español
3:40-3:50	Despedida

English Daily Schedule	
8:45-9:20	Arrival & Morning Mtg
9:20-10:15	ELA
10:15-11:05	Specials
11:10-11:40	Reading Groups
11:40-11:55	Content Transfer
12:00-12:30	Recess
12:30-1:00	Lunch
1:00-1:30	RTI
1:35-2:30	ELA
2:30-3:00	Social Studies
3:00-3:40	Writing
3:40-3:50	Closing Mtg & Dismissal

Figure 5. Example of Spanish and English daily schedule for bilingual education in third grade

Both schedules mark the time for the language switch with a black line (1:30pm). Students' routines depend on A and B day combination known as rollercoaster learning. This kind of planning is designed for the students to start the morning with the English teacher, switch at 1:30pm, have their lesson with the Spanish teacher and then start the next day with the teacher they finished the day.

4.1.3. Science classroom

In compliance with the foregoing, students in third grade get 30 minutes of science every other day since they follow the A, B day schedule presented above. The classroom is divided into four corners: math information corner, Spanish, library/small group area and science corner. In the specific space for science, there is a bookshelf with all the available reading materials for every unit in Spanish. We also have a board in which the learning objective is always present. There, it is also written the unit and lesson the students are working on. Moreover, the publisher gives all the Spanish teachers a kit with the manipulatives and print materials for the classroom wall.

Quantity needed	Manipulatives	Used in lesson
36 oz.	clay, green*	2.4
36 oz.	clay, red*	2.4
36 oz.	clay, yellow*	2.4
30	cups, clear, plastic	2.4, 3.3
18	food coloring, blue, bottles*	3.3
18	food coloring, red, bottles*	3.3
224	stickers, round, blue*	3.3
224	stickers, round, red*	3.3

Figure 6. Example of the items provided in the kit for unit Inheritance and Traits

These kits are delivered and picked up before and after the unit is explained. Some of the items are consumable so there is no need for the students to give them back and therefore, they can use them in class or take them home when the project requires it.

4.2. Didactic application

4.2.1. Objectives

This planning has been thought for the students, previously described, in third grade that learn science for one hour a week or one hour and a half depending on the week. The objectives this work proposes for the improvement of the science materials are very focused on the multicultural environment of the learners and the fact that the science subject is delivered in Spanish in this specific school setting. They are the following:

- To be able to understand the reality and environment of some animals that live and grow in specific countries.
- To learn the differences in weather conditions, natural environments, measurements and scientific tools in different Hispanic countries compared with the USA.
- To recognize how culture frames the values, knowledge and beliefs of specific countries regarding scientific terms and concepts.
- To value the differences in ways of thinking depending on background and the richness of sharing experiences.

4.2.2. Competences and contents

When designing the contents and competences we want our students to acquire, we need to take into account the framework for the science classes. The 4 C's stated by Coyle (2007) are going to be taken as a reference for our didactic program:

1. Context (subject matter: science)

The student will use the science class to practice and learn vocabulary and contents about nature and the environment.

2. Communication (language learning and usage)

The learners will learn the Spanish language both BICS and CALP to successfully answer any need they will encounter in their real life.

3. Cognition (learning and thinking process)

The kids will be encouraged to think critically, investigate, analyze and create information with a critical point of view and attitude.

4. Culture (intercultural understanding and global citizenship)

The students will show respect for other ways of thinking, realities and environments around the world. They will not only respect it but also show appreciation and embrace other cultures.

These four aspects will be the basis of the competences we want our students to acquire. The syllabus will promote students' academic language growth and will make them able to do any given task in science. As the authors Coyle, Hood & Marsh (2010:41) highlighted, some of the aims for this plan will be for our learners to show a progression in knowledge, engagement and cognitive processing, interaction in the communicative context, development of appropriate language knowledge and skills, and acquisition of deepening intercultural awareness of the "self and others". Students will appreciate, understand and embrace different cultures and become a global citizen of the world that respects and is part of the different realities around them.

Furthermore, we will focus on the student-centered methodology (SCM), previously introduced, that promotes autonomy, extrinsic motivation and relates to life long learning. It is also important to mention that our proposal will follow a communicative approach where the language is not the aim but a means of communication and knowledge learning. As John

Nordmeyer & Barduhn (2010) explained, we will make sure that the students that follow this plan will get systematic language input of both BICS and CALP while being in the science classroom. They will also be provided with scaffolding, giving them the linguistic help they may need. Some of the scaffolding techniques used in this planning are verbal and procedural. On the one hand, we can name: paraphrasing, slowing speech, increasing pauses, prompting, questioning and elaboration. On the other hand, we will be using procedural scaffolding techniques such as: teaching for autonomy, one-on-one teaching, modeling and coaching.

4.2.3. Materials and resources

As far as materials and resources are concerned, we need to name Nunan (1992:227) who explained, “teaching materials are often the most substantial and observable component of pedagogy”. They determine the quality of language input and the language practices during the learning process in the classroom”. This tells us how important the use of practical and useful materials is going to be to develop a successful teaching plan for our bilingual students. The materials are going to be carefully selected to accomplish the goal of creating real linguistically demanding situations in our science classroom where our students feel comfortable and motivated to produce a relevant amount of comprehensible output.

While thinking all the possibilities we have to supply our students with the necessary help to grow in the science subject and the Spanish language, it is impossible not to think about taking into account any little thing we may share with them that could be an unforgettable experience or the key that opens their minds to the second language: “materials development refers to anything which is done by writers, teachers or learners to provide sources of language input in ways which maximize the likelihood of intake” (Tomlinson, 1998:2). Therefore, we will recognize as materials, tools and resources anything that helps our students’ development in the second language acquisition process.

Finally, as mentioned by Mehisto (2012:15), learning materials can be understood as “information and knowledge that are represented in a variety of media and formats, and that support the achievement of intended learning outcomes”. Thus, we will make sure our materials come from all different types of sources: written, digital, manipulative, audio, audiovisual, handmade, adopted, adapted and real.

4.2.4. Transversality and interdisciplinary

This dissertation tries to give support and improvement of the actual curriculum used in science for third grade dual language education students. One of the remarkable points of this work is how the didactic proposal uses science as the main thread for the learners to engage in second language learning. The truth is science is the predominant subject but it does not mean that other school subjects are not going to be included in a more direct or indirect way. Some of the ones we work with are: physical education (with some of our role plays, games, group projects), music (when we play songs and use music as a tool for learning), art (when we draw, design, create, sketch) and mathematics (counting, creative problem solving, critical thinking, logic and reasoning).

4.2.5. Evaluation

In regards to evaluation, we need to clarify that evaluation is not always a test whereas testing has pedagogical purposes and we use the results to make a decision (Bachman, 1990: 22). For our evaluation, we should take into consideration both the declarative and non- declarative knowledge. The declarative makes reference to vocabulary (receptive and productive), grammar and pronunciation whereas the non-declarative knowledge refers to the development of the communicative skills (listening, speaking, reading, writing and mediation). As important as the latter, we will answer three main questions: what, why and when to evaluate.

Answering the first question (what), it will include the objectives and contents previously explained. The students will show understanding and domain of the knowledge acquired in the science classroom. Moreover, and answering the second question (why), the assessment in this didactic proposal will respond to: the need of the students to keep motivated as they see their own progress with the content subject and the target language (affective reasons), the students' understanding of personal progress and realization (self-concept), the need for third grades to acquire certain contents and skills related to their grade level and age (instructional); all of these being objectives of the language testing by Seaton (1982: 172). Last but not least, the answer for when in assessment will be tackled by saying that it should be done at least in three important moments: before (diagnostic), during (formative and summative) and end (final).

Furthermore, we will be using some specific tools such as rubrics, correction codes and self-evaluation. All of them will be the perfect support for the constructive evaluation that will give the students a reason to improve and be their better version (see annexes 7 and 8 for examples).

4.2.6. Planning and activities

In this unit, we used the specific objectives, contents, reinforcement and extension, materials and transversality from the publisher Amplify but adapted to the multicultural approach we are giving in this didactic proposal. However, we created cultural competence goals and specific cultural contents to learn through the science unit, specifically for the general aims of this work.

Students will develop a year project in which they will apply all the knowledge they learn throughout the 4 different units. Moreover, they will be divided into 5 different groups and they will be assigned a continent: America, Africa, Europe, Oceania, and Antarctica. As they go through the units, they will complete a task that will become a part of the class year project (See annex 5 and 6 for an example). Next, we will explain what the specific task in each unit will be and how those tasks will become parts of the final project that the whole class as a group will present to the science fair in May.

Unit 1: Inheritance and traits			
Specific objectives	Contents	Cultural competence	Specific cultural contents
<ul style="list-style-type: none"> Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction and death. Use evidence to support the explanation that traits can be influenced by the environment. 	<ul style="list-style-type: none"> Growth and development of organisms. Social interaction and group behavior. The environment affects the traits. 	<ul style="list-style-type: none"> Demonstrate an understanding of cultural diversity in the animal world. Demonstrate an understanding of how global differences influence other countries' realities. 	<ul style="list-style-type: none"> Animals in different countries around the world. Consequences of diversity in the world.

Reinforcement and extension	Materials	Transversality	Evaluation
<ul style="list-style-type: none"> • Observation of photographs of many different organisms. • Multiple opportunities for student-to- student talk. • Different visual patterns in the animals' traits. 	<ul style="list-style-type: none"> • Investigation notebooks. • Vocabulary cards. • Visual aids to support learning. • Online videos and apps. • Online games. 	<ul style="list-style-type: none"> • Ask and answer questions (Spanish). • Describe relationship between different animals (Spanish). • Use text features and search tools (technology). • Use information gained from illustrations (art). • Make sense of problems and persevere (math). • Reason abstractly and quantitatively. 	<ul style="list-style-type: none"> • Shows proficiency (language). • Shows habits of work (attitude). • Shows growth (science contents).

Activity 1	
Objectives	<ul style="list-style-type: none"> • Demonstrate an understanding of cultural diversity in the animal world.
Contents	<ul style="list-style-type: none"> • Animals in different countries around the world.
Description	<ul style="list-style-type: none"> • The students will develop part 1 of the year project. In their continent group, they will draw the animals with its specific characteristics. (Example: annex number 1.)
Resources	<ul style="list-style-type: none"> • Color pencils, markers, construction paper, the information they are learning in the unit and scissors.
Evaluation	<ul style="list-style-type: none"> • The teacher will evaluate the accuracy of the traits designed for each animal depending on the knowledge they acquired.

Unit 2: Weather and climate			
Specific objectives	Contents	Cultural competence	Specific cultural contents
<ul style="list-style-type: none"> • Record patterns of the weather across different times and areas and make predictions about what kind of weather might happen next. • Describe a range of 	<ul style="list-style-type: none"> • Weather conditions. • Time zones. • The affect of the weather on people's lives. 	<ul style="list-style-type: none"> • Understand how cultural diversity can be affected by the weather. • Show awareness of the different time zones and how that affects people's routines. 	<ul style="list-style-type: none"> • Weather patterns in different countries around the world. • Consequences of weather in the characteristics of certain areas around the world.

an area's typical weather conditions and the extent to which those conditions vary over years.		<ul style="list-style-type: none"> • Demonstrate an understanding of how global differences influence other countries' realities. 	
Reinforcement and extension	Materials	Transversality	Evaluation
<ul style="list-style-type: none"> • Observation of photographs and examples of weather patterns in different areas. • Multiple opportunities for student-to- student talk. • Different visual patterns in the weather patterns. 	<ul style="list-style-type: none"> • Investigation notebooks. • Vocabulary cards. • Visual aids to support learning. • Online videos and apps. • Online games. 	<ul style="list-style-type: none"> • Ask and answer questions (Spanish). • Describe relationship between different weather patterns (Spanish). • Use text features and search tools (technology). • Use information gained from illustrations and understand of graphics (art). • Make sense of problems and persevere (math). • Reason abstractly and quantitatively. 	<ul style="list-style-type: none"> • Shows proficiency (language). • Shows habits of work (attitude). • Shows growth (science contents).

Activity 2	
Objectives	<ul style="list-style-type: none"> • Understand how cultural diversity can be affected by the weather.
Contents	<ul style="list-style-type: none"> • Consequences of weather in the characteristics of certain areas around the world.
Description	<ul style="list-style-type: none"> • The students will develop part 2 of the year project. In their continent group, they will draw the specific characteristics of the continent assigned to them influenced by the weather (Example: annex number 2.)
Resources	<ul style="list-style-type: none"> • Color pencils, markers, construction paper, the information they are learning in the unit and scissors.
Evaluation	<ul style="list-style-type: none"> • The teacher will evaluate the accuracy of the climate and weather reflected in the continent they are assigned.

Unit 3: Environments and survival			
Specific objectives	Contents	Cultural competence	Specific cultural contents
<ul style="list-style-type: none"> • Develop understanding of the differences in characteristics between individuals of the same species and advantages in surviving. • Show awareness of the fact that populations live in a variety of habitats and change in those habitats affects the organisms living there. 	<ul style="list-style-type: none"> • Characteristics between individuals of the same species. • The change in the habitats affects those individuals that live there. 	<ul style="list-style-type: none"> • Understand the different habitats and traits of the individuals living in that place. • Demonstrate awareness of the way individuals adapt to their habitats. • Describe how individuals adapt to their environment to survive. 	<ul style="list-style-type: none"> • Habitats and traits. • Understand how individual develop certain characteristics to better adapt to their environment. • Changes in living organisms.
Reinforcement and extension	Materials	Transversality	Evaluation
<ul style="list-style-type: none"> • Observation of photographs of many different habitats. • Multiple opportunities for student-to- student talk. • Different visual patterns in habitats and traits to survive. 	<ul style="list-style-type: none"> • Investigation notebooks. • Vocabulary cards. • Visual aids to support learning. • Online videos and apps. • Online games. 	<ul style="list-style-type: none"> • Ask and answer questions (Spanish). • Describe relationship between individuals in the same habitat or different (Spanish). • Use text features and search tools (technology). • Use information gained from illustrations (art). • Make sense of problems and persevere (math). • Reason abstractly and quantitatively. 	<ul style="list-style-type: none"> • Shows proficiency (language). • Shows habits of work (attitude). • Shows growth (science contents).

Activity 3	
Objectives	<ul style="list-style-type: none"> Understand the different habitats and be able to explain how the habitat affected those animals.
Contents	<ul style="list-style-type: none"> Habitats and traits in the five continents.
Description	<ul style="list-style-type: none"> The students will develop part 3 of the year project. In their continent group, they will draw the specific characteristics of the landscape in different areas of the continent and explain how those habitats affected the different animals they have designed previously. (Example: annex number 3.)
Resources	<ul style="list-style-type: none"> Color pencils, markers, construction paper, the information they are learning in the unit and scissors.
Evaluation	<ul style="list-style-type: none"> The teacher will evaluate the accuracy of the characteristics of the habitats drawn for the different animals.

Unit 4: Balancing forces			
Specific objectives	Contents	Cultural competence	Specific cultural contents
<ul style="list-style-type: none"> Demonstrate understanding of how some forces happen between objects that are touching and that aren't touching. Investigate how two forces can be exerted between two objects. 	<ul style="list-style-type: none"> Touching forces. Non-touching forces. Magnets: attract or repel. 	<ul style="list-style-type: none"> Show understanding of the different measurements in different areas of the world. Demonstrate an understanding how engineering and architecture depend on characteristics of environments. 	<ul style="list-style-type: none"> Different measurements. Differences in engineering and architecture among places in the world.
Reinforcement and extension	Materials	Transversality	Evaluation
<ul style="list-style-type: none"> Observation of photographs of many different buildings and engineering constructions. Multiple opportunities for student-to- student talk. Different visual 	<ul style="list-style-type: none"> Investigation notebooks. Vocabulary cards. Visual aids to support learning. Online videos and apps. Online games. 	<ul style="list-style-type: none"> Ask and answer questions (Spanish). Describe relationship between different measurements. (Spanish). Use text features and search tools (technology). Use information 	<ul style="list-style-type: none"> Shows proficiency (language). Shows habits of work (attitude). Shows growth (science contents).

support for understanding.		gained from illustrations (art). <ul style="list-style-type: none"> • Make sense of problems and persevere (math). • Reason abstractly and quantitatively. 	
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Activity 4	
Objectives	<ul style="list-style-type: none"> • Demonstrate an understanding how engineering and architecture depend on characteristics of environments.
Contents	<ul style="list-style-type: none"> • Differences in engineering and architecture among different continents depending on the weather and climate patterns.
Description	<ul style="list-style-type: none"> • The students will develop part 4 of the year project. In their continent group, they will draw the specific building and examples of engineering depending on the climate and weather patterns of that area. (Example: annex number 4.)
Resources	<ul style="list-style-type: none"> • Color pencils, markers, construction paper, the information they are learning in the unit and scissors.
Evaluation	<ul style="list-style-type: none"> • The teacher will evaluate the accuracy when drawing the architecture and engineering of the area and the explanation of how the weather influenced that creation.

Activity 5	
Objectives	<ul style="list-style-type: none"> • Demonstrate understanding and growth by putting the project together and presenting their part.
Contents	<ul style="list-style-type: none"> • All contents learned throughout the development of the 4 units and the different parts of the final project.
Description	<ul style="list-style-type: none"> • The students will put the final project together, by the end of the year (May), and present their parts in the science fair to represent the third graders from our school. (Example: annex number 5.)
Resources	<ul style="list-style-type: none"> • Color pencils, markers, construction paper, the information they are learning in the unit and scissors.
Evaluation	<ul style="list-style-type: none"> • The teacher will support and guide the final touches to put the project together. The educator will practice with each group to rehearse the presentation of their part and will make sure all the information shared is accurate and comes from the students' hard work.

4.2.7. Reinforcement and extension activities

As important as all the other aspects, we have to talk about the attention to our class diversity. We need to realize the fact that a good didactic planning that does not include differentiated instruction will not be fruitful. One of the first things we will bear in mind

while planning is that procedures should be highly based in scaffolding, the assessment should integrate language and content and different skills, it should implement a variety of subjects, a variety of grouping configurations and interactions and the promotion of different intelligences and learning styles.

Going deeply into the support and encouragement of the different intelligences, we need to mention Gardner (2011: XXVIII) and his explanation of the concept: “an intelligence is the ability to solve problems, or to create products, that are valued within one or more cultural settings”. He fosters the idea of every human having a potential and how the kids should be more than an IQ test.

5. CONCLUSIONS

5.1. Evaluation of the proposal

This work has kept the objectives very present throughout the whole development of the dissertation. Consequently, it is a didactic proposal presents and complements the actual guidance with different activities that help students: understand and get familiar with the different living organisms around the globe; allows learners to get awareness of different weather conditions, environments and tools shared among different cultures; encourages students to acquire a rich variety of academic concepts related to science; promotes interaction and exchange of experiences; and enhance the respect and admiration towards people’s backgrounds.

This improvement was possible thanks to, among other things, the possibility to use technology. It is very healthy for the students to learn different and productive ways to use technologies and the Internet. The reality is that they were born in a technological era but, some of them, have not been trained how to correctly enjoy and use the huge variety of resources available.

5.1.1. Assets and pitfalls

In the elaboration of this thesis, we have focused on the objectives proposed and the materials available that third grade students were using already. Thus, the didactic proposal has been carefully created with the final goal of providing the Amplify syllabus with a more

multicultural vision of the science contents. It has also proposed a way for the students to share, with families and friends, everything they learned with the presentation of the final project in the science fair in May.

This work has its support in the analysis of the current syllabus for third grade science. Thanks to the study of that material, we could observe how it is well addressed to the students' age and the contents they should learn. However, we found that this curriculum has not been thought primarily for bilingual students so it does not completely respond to those kinds of learners. For the same reason, we could see how the pace and focus is not fully addressed to their specific needs.

On the other hand, it was very interesting to be able to use most of the objectives and contents proposed since they were related to the third grade level. The Amplify curriculum is well designed and has many resources and tools ready to use for the teachers. Another positive point about this publisher is that the manipulatives for the lesson come on time to the school and the quantity is normally enough for the students in the classroom.

However, to name some of the pitfalls we found in the process of creation of this work, we can say that it would have been very productive to be able to analyze any other materials from the same publisher and compare the different grades' materials to see if the progression of content and language is significant throughout the years. Another downside is the fact that we could not share other third grade Spanish science teachers' opinions since the only other person in the building is new in the grade and has barely started using and learning the Amplify materials. Likewise, it would have been recommendable to interview the district science coordinator to have another professional view about the syllabus. This person was working as a science mentor for teachers in the district and knew a lot about it. However, he just retired and a new coordinator just started in the science department.

This investigation's hope is to help other Spanish science teachers in third grade that feel a bit overwhelmed with the Amplify curriculum and need another point of view of it. The desire is for them to be able to get encouraged with the activities suggested and inspired to "think outside the box" and always complement whatever guidance they are given with their own ideas and improvements. Another big wish for this investigation is to bring some of the multicultural competence to any classroom teacher that is currently using this plan by Amplify and has felt that there is not much of a real connection to the culture, diversity and variety present in different countries.

Nevertheless, it is not an intention of this didactic proposal to tell teachers to blindly follow every activity or idea shared since we promote criticism, free thinking and personal and professional touch. It would also be very difficult for other teachers to completely follow these activities proposed since they have been created and thought for a specific context and group of students. With all of these limitations, this would be the perfect start for upcoming investigation and research that could improve and promote the teaching of science through the L2 and the involvement of culture.

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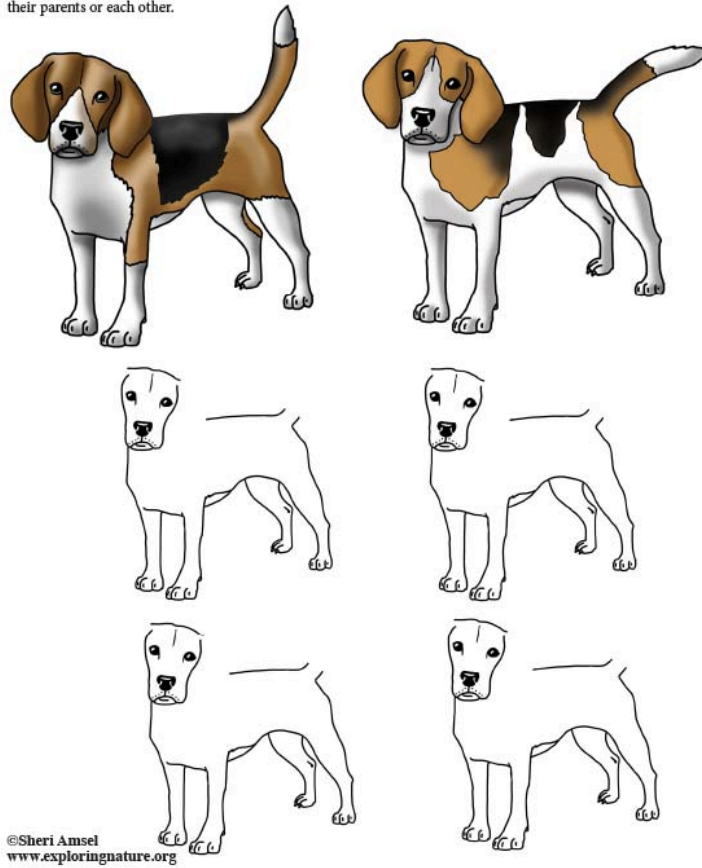
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7. ANNEXES

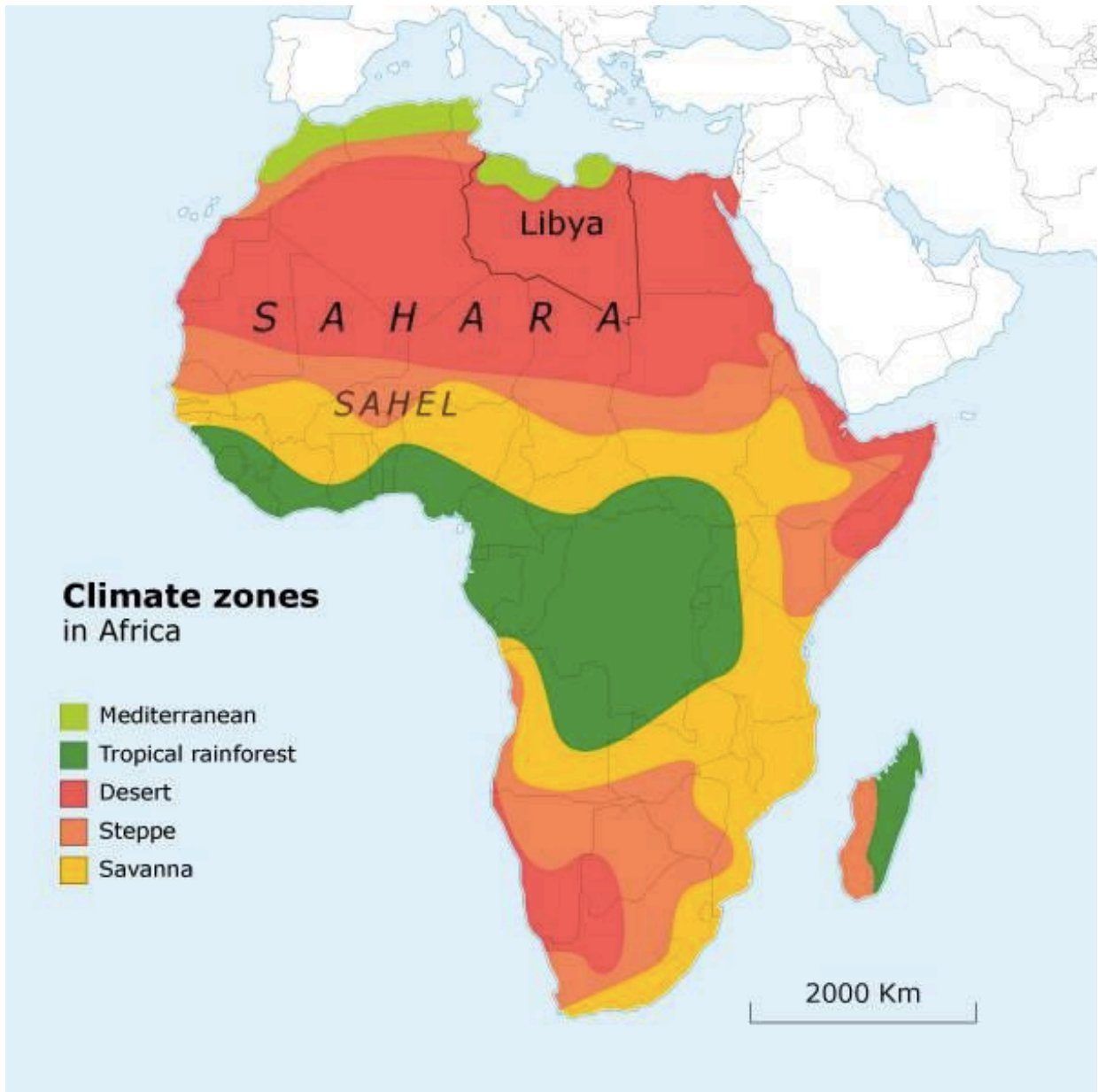
Annex 1: Examples of the process of drawing an animal with its traits of inheritance by <https://www.exploringnature.org/db/view/Drawing-Inherited-Traits-in-Beagles-PerformanceTask-2>

Drawing Inherited Traits in Beagles - Performance Task 2

Using their parents as a guide, draw each of the beagle puppy's tail and ears. Then draw their spot patterns and color them to show how they have inherited traits from their parents, BUT are not exact copies (variations) of their parents or each other.



Annex 2: Group Africa. Example drawn taking into account its weather and climate characteristics by <https://ilovevaquero.com/obrazovanie/89706-klimaticheskie-poyasa-afriki-karta-klimaticheskikh-poyasov-afriki.html>



Annex 3: Group Oceania. Example of the continent drawn with the nature characteristics of the different areas by

<https://www.alamy.com/australia-map-with-cute-animals-vector-poster-with-australia-map-australian-animals-image247061973.html>



Annex 4: Examples of architecture and engineering that respond to weather conditions in different continents. Asia by <https://www.bloomberg.com/news/features/2021-01-13/japan-earthquakes-typhoons-disaster-proofing-lessons-for-the-world>

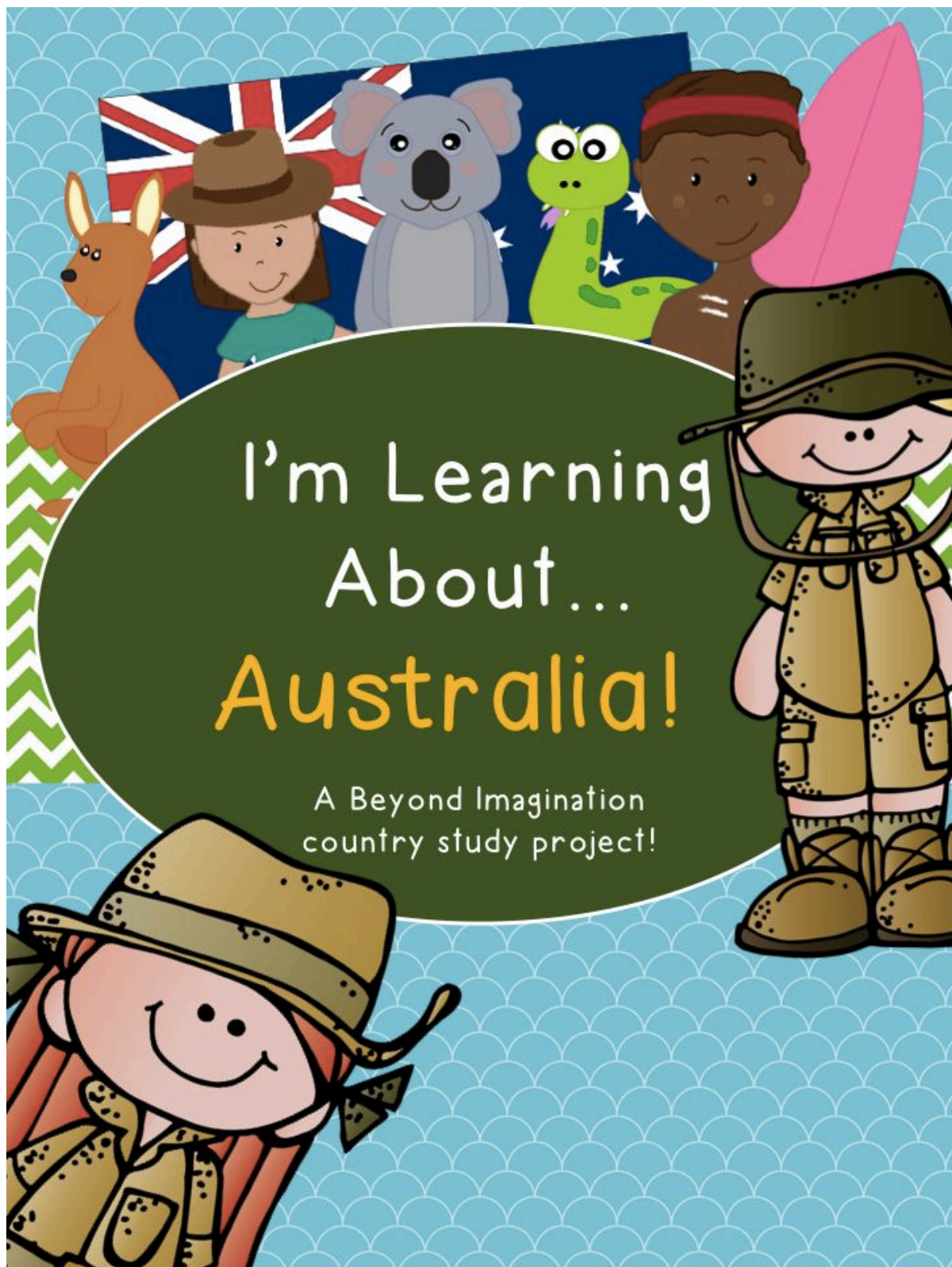


Tokyo Skytree is designed to let strong wind pass through the gaps between trusses. At its base, rubber dampers are used to reduce movement. Photographer: Toru Hanai/Bloomberg

Annex 5: Examples of the final project by Freepick
https://www.freepik.com/premium-vector/cartoon-world-map-kids-nursery-with-forest-animals-children-geography-education-with-europe-asia-australia-america-vector-poster_22584524.htm



Annex 6: Examples of the final project by
<https://www.pinterest.com.mx/pin/321303754642344375/>



Annex 7: Example of the evaluation rubric for the continents project.

Science project rubric

Area of scoring	1	2	3	4
Content knowledge	Project shows minimum content knowledge	Project shows some content knowledge	Project shows enough content knowledge	Project shows detailed content knowledge
Language	Use of the science language is minimal	Use of the science language is fine	Use of the science language is enough	Use of the science language is detailed and fluent
Visuals	Visuals are minimal	Visuals are fine	Visuals are well done	Visuals are excellent
Data collection	Data collection is incomplete	Data collection is fine with some missing pieces	Data collection is well displayed	Data collection is thoroughly done and accurate
Procedures	Procedures are incomplete	Procedures are missing information	Procedures are well explained	Procedures are outlined in an excellent and organized way
Group work	The group jobs were not clearly shared and done	The group jobs were shared but not completely fulfilled	The group jobs were shared and done	The group jobs were clearly shared and completely done
Presentation	The delivery was linguistically poor and incomplete	The delivery missed important information and language	The delivery was well done	The delivery showed great effort and was outstanding

Annex 8: Example of the self- evaluation for the students participating in the classroom project.

Student self reflection of the work done	No ×	Yes √
1. I showed the appropriate amount of content in the project.		
2. I use the science language to do and present the project.		
3. I worked hard drawing for the project.		
4. I demonstrate a good job collecting data for the project.		
5. I was organized and careful with procedures.		
6. I accomplished my job in the group and work with my classmates.		
7. I used all the knowledge acquired to deliver the project and showed effort in it.		