FACULTAD DE EDUCACIÓN DE PALENCIA

UNIVERSIDAD DE VALLADOLID

ENHANCING FOREIGN LANGUAGE ACQUISITION THROUGH STEAM AND MULTIPLE INTELLIGENCES IN INFANT EDUCATION

MEJORAR LA ADQUISICIÓN DE LA LENGUA EXTRANJERA A TRAVÉS DE *STEAM* Y LAS INTELIGENCIAS MÚLTIPLES EN EDUCACIÓN INFANTIL

TRABAJO FIN DE GRADO

EN EDUCACIÓN INFANTIL

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ABSTRACT

In recent years, the rapid pace of social change and increasing globalization have made it necessary to prepare new generations to deal with the world's issues through critical thinking, effective communication, and cooperation. Therefore, this project intends to investigate STEAM, which stands for stands for Science, Technology, Engineering, Arts, and Mathematics; and Multiple Intelligences (MI), approaches that focus on the mentioned issues, and combining them as a way to foreign language acquisition in Infant Education.

In order to do so, the project contains a suggested proposal design whose main goal is enhancing foreign language acquisition through STEAM and Multiple Intelligences in Infant Education. The proposal follows the project topic "wild animals" and aims to approach the oral use of the foreign language in communicative situations in the classroom.

KEY WORDS: STEAM, Multiple Intelligences, foreign language, acquisition, Infant Education.

RESUMEN

En los últimos años la rapidez en los cambios sociales y la creciente globalización han hecho necesario preparar a las nuevas generaciones para afrontar los problemas del mundo mediante el pensamiento crítico, la comunicación eficaz y la cooperación. Por ello, este trabajo pretende investigar *STEAM,* que significa Ciencia, Tecnología, Ingeniería, Arte, y Matemáticas; y las Inteligencias Múltiples, métodos que se centran en los temas mencionados, combinándolos como una vía para la adquisición de la lengua extranjera en Educación Infantil.

Para ello, el trabajo contiene una sugerencia de propuesta cuyo objetivo principal es potenciar la adquisición de la lengua extranjera a través de *STEAM* y las Inteligencias Múltiples en Educación Infantil. La propuesta sigue el tema "animales salvajes" y pretende abordar el uso de la lengua extranjera en situaciones comunicativas en el aula.

PALABRAS CLAVE: *STEAM*, Inteligencias Múltiples, lengua extranjera, adquisición, Educación Infantil.

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1. INTRODUCTION

This document contains the research conducted whose main aim is investigate STEAM methodology, which stands for stands for Science, Technology, Engineering, Arts, and Mathematics; and Multiple Intelligences (MI) to acquire skills, knowledge, and strategies. Additionally, these two spheres are combined as a motivating way for the acquisition of the foreign language in Infant Education.

These days things change very fast, and it is important to prepare students for the world they are living in, as well as to consider that each person has different qualities. Therefore, STEAM and Multiple Intelligences are interesting approaches as they address these issues since STEAM-based education intends to prepare children to deal with the world's issues through creative and critical thinking, innovation, effective communication according to new information, and cooperation (Quigley & Herro, 2016) and MI fundamental basis is that not all children learn in the exact same way (Gardner, 1983).

The project is divided into sections, having general and specific objectives related to the topic of the research, and a justification in which can be founded the rationale of the topic and the relationship with the competences of the Infant Education Degree. Then, the theoretical framework in which the research is developed, and all the information is collected. There is data related to STEAM and Multiple Intelligences (MI) Theory, but also about different authors and theories that not only do they have a strong connection and relevance to the project, but also to STEAM and MI.

After that, there is a proposal design that has been planned according to the previous sections of the project and where the focus is on enhancing pupils' motivation in foreign language acquisition through STEAM and Multiple Intelligences in Infant Education. Afterward, the conclusions of the project as an overview and reflection of it. And, finally, the references used for the development of the project and the annexes.

The project is developed with the same goal throughout all the sections, as a meaningful development is sought and therefore, all parts are interconnected.

2. OBJECTIVES

2.1. GENERAL OBJECTIVES

The main objectives this Final Degree Project pretends to achieve are acquiring skills, knowledge, and strategies related to STEAM methodology and multiple intelligences (MI) and combining both spheres with the acquisition of a foreign language in Infant Education. According to this, the general objectives intended to be reached are as follows:

- To investigate about STEAM methodology (Science, Technology, Engineering, Arts, and Mathematics) and the Multiple Intelligences (MI) theory.
- To research on theories and authors that support the use of STEAM methodology (Science, Technology, Engineering, Arts, and Mathematics) and Multiple Intelligences (MI) in Infant Education.
- To enhance foreign language acquisition through STEAM methodology and MI.

2.2. SPECIFIC OBJECTIVES

As a consequence of the general objectives mentioned above, there are some specific objectives:

- To acquire and develop skills, strategies, and knowledge based on the use of STEAM and MI in Infant Education contexts.
- To design a proposal founded on the development of STEAM through multiple intelligences in Infant Education as a means to acquire the target foreign language.
- To promote the use of the foreign language as a communicative tool.
- To enhance the relish of foreign language acquisition.
- To arouse enjoyment and pleasure in STEAM fields through the proposal.
- To use STEAM and MI as a motivational tool for foreign language acquisition.
- To reflect on classroom interventions, to continue improving and innovating in the teaching-learning process.
- To follow the main lines of inclusion and attention considering three levels of expectation in the proposal.
- To foster key competences and Common European Framework of References for languages' (CEFR) competences.

3. JUSTIFICATION

3.1. RATIONALE OF THE TOPIC

The current educative law along with other official documents stand up for some core ideas that relate to the topic of this Final Degree Project, *enhancing foreign language acquisition through STEAM and multiple intelligences in Infant Education*. Those fundamental ideas are as follows:

The Royal Decree 1630/2006, which establishes the requirements for Infant Education; and the Decree 122/2007, which regulates Infant Education in the Autonomous Community of Castilla y León defend the use of audiovisual productions and information and communication technologies to approach the foreign language, the oral use of the foreign language to communicate in classroom activities and show interest and enjoyment in participating in these communicative exchanges, and the consideration of the diversity of pupils, adapting the educational practice given the importance of the rhythm and maturation processes at this age. According to this, using STEAM to enhance foreign language acquisition facilitates the connection between information and communication technologies with the foreign language. Moreover, multiple intelligences consider the diversity of pupils as it wants to widen the scope of individual potential (Gardner, 1983). Therefore, the combination of both fields aims to approach the use of foreign language in an interesting and enjoyable way.

The Order ECD/65/2015, which establishes the key competences in Education defines key competences as those that all people need for their personal fulfillment and development, as well as for active citizenship, social inclusion, and employment. In addition, DeSeCo (2003) states that a competence involves a combination of practical skills, knowledge, motivation, ethical values, attitudes, emotions, and other social and behavioral components that are mobilized together to achieve effective action. As well as that, the Common European Framework of Reference for Languages: Learning, teaching, assessment (CEFR) (2001) claim that "Language use, embracing language learning, comprises the actions performed by persons who as individuals and as social agents develop a range of competences" (p.18). Consequently, as STEAM-based education' objective is preparing children to deal with the world's issues through creative and critical thinking, innovation, effective communication according to new information, and cooperation (Quigley & Herro, 2016), key competences are an important part.

Besides, the Common European Framework of Reference for Languages: Learning, teaching, assessment (CEFR) which founds the guideline for a communicative approach in language acquisition considering the skills and knowledge needed to be developed to be able to act effectively. Accordingly, the combination of STEAM and multiple intelligences aims to approach the use of foreign language as a communicative tool.

Hence, these educative documents support the topic of *foreign language acquisition through STEAM and multiple intelligences in Infant Education* as it combines the relevance of offering pupils a motivating approach to the foreign language; preparing pupils for the world they live in through STEAM; and considering the diversity of students adapting the educational practice to the personal characteristics, needs, interests and cognitive styles through multiple intelligences.

3.2. RELATIONSHIP WITH THE DEGREE IN INFANT EDUCATION AND WITH THE AREA OF ENGLISH AS A FOREIGN LANGUAGE

This research study is related to the competences established in the Infant Education Degree, which are divided into general and specific; and with the specific competences connected to the area of English Language in Infant Education. Hence, in this section are highlighted the ones that are intended to be achieved according to the topic and purposes of this project.

3.2.1. General competences
- Possess and comprehend knowledge in an area of study -Education- that builds on the base of Secondary Education, and is usually found at a level in which, although supported by advanced textbooks, includes some aspects that imply knowledge from the forefront of the field of study.
- Apply knowledge to the work or vocation in a professional manner and command the competences usually demonstrated through the development and defense of arguments and problem-solving in the field of study -Education-.
- Gather and interpret fundamental data to emit judgements that include a reflection on essential issues of social, scientific or ethic nature.

- Transmit information, ideas, problems, and solutions to a specialized and nonspecialized public.
- Develop an ethical commitment in the shaping as professionals, a commitment that should strengthen the idea of integral education, with critical and responsible attitude, ensuring the effective equality of women and men, equal opportunities, universal accessibility for people with disabilities and the values of a culture of peace and democratic values.

3.2.2. Specific competences
- Understand the educational and learning processes in the 0-6 period, in the family, social and school context.
- Ability to know how to promote the acquisition of habits based on autonomy, freedom, curiosity, observation, experimentation, imitation, acceptance of rules and limits, and symbolic and heuristic play.
- Understand that the daily dynamic in Infant Education is changeable depending on each student, group, and situation and have the ability to be flexible in the exercise of teaching.
- Value the importance of teamwork.
- Ability to understand that systematic observation is a basic tool to be able to reflect on practice and reality, as well as to contribute to innovation and improvement.
- Transmit to pupils the learning of a foreign language.
- Ability to elaborate didactic proposals that promote expression, motor skills, creativity, logical-mathematical and science experiences.

3.2.3. English language competences
- Know and apply the didactics of communicative competence in its different components: linguistic, sociolinguistic, and pragmatic competence.
- Master the foreign language curriculum (English) in Infant Education.
- Design a didactic proposal according to CLIL.

4. THEORETICAL FRAMEWORK

4.1. AUTHORS AND THEORIES

4.1.1. Content and Language Integrated Learning (CLIL)

Schools in which the teaching of some areas in the curriculum might be offered in a foreign, regional or minority language have existed in Europe for several decades. During the 1990s, the acronym CLIL developed to the most used term for this kind of provision. The European Framework (2010) defines CLIL as "a dual-focused educational approach in which an additional language is used for the learning and teaching of content and language with the objective of promoting both content and language mastery to pre-defined."

CLIL aims for an innovative methodological approach reaching a far deeper scope than language teaching. As a result, its supporters emphasize how it seeks to achieve expertise in both the non-language subject and the language in which it is taught, providing equivalent importance to each. Additionally, accomplishing this two in one aim seeks for the development of a particular approach to teaching in which the non-language content is not taught in a foreign language but *with* and *through* a foreign language. This involves more unified approach to both learning and teaching, demanding that teachers should dedicate special thought not just to how languages should be taught, but to the educational process in general.

Apart from the two main aims mentioned above, as stated by Marsh (2006) CLIL places an importance on:

- Learning content effectively through a language that is no contemplated as the common one.
- Transmitting to pupils values of respect and tolerance, via the use of the CLIL target language and preparing them for life in a more internationalized society, offering them better possibilities on the labor market;
- Empowering pupils to develop language skills which underline productive communication, encouraging the assimilation of content, and stimulating pupils to learn languages. (p.27)

In order to plan and teach based on CLIL there are limited practical guidance and methodological resources. However, there are some theoretical and methodological foundation for planning, the 4Cs-Framework (Coyle 1999, 2006), based on some principles:

- Content: it is focused on reaching learners that create their own knowledge and understanding and develop skills, not only on acquiring knowledge.
- Cognition: content is interconnected to learning and thinking. Therefore, learners are enabled to create their own interpretations of content.
- Communication: in order to acquire a language, it is essential interacting with others.
- Culture: there is a complex relationship among languages and cultures. Hence, intercultural awareness is fundamental.

The theory behind CLIL has its foundations in cross-curricular/interdisciplinary teaching which provides significant learning where students can use learned knowledge. As it is based on interdisciplinary teaching, it encourages pupils to apply, integrate and transfer knowledge, what promotes thinking skills. As mentioned before, learners construct their own learning through their cognitive skills (cognition), what means that they are challenged to solve problems, transform information, and discover meaning through creative thinking. This type of learning provides a context in which linguistic and non-linguistic skills as well as thinking skills are developed. The most significant incentive for the development of real interaction in CLIL lessons arises from using constructive questions that develop the learner' thinking skills. Gondová (2011) states that "the existence of various communicative structures and productive questions open the space for interaction among pupils and they are one of the decisive factors contributing to acquiring higher cognitive skills and communicative competence" (p.36). Cameron and McKay (2010) remark in their methodology of creative teaching the importance of problem-solving and open-ended questions like "How" or "Why" even with young learners. Since through these cognitively challenging tasks pupils are provoked to employ more language and to include knowledge.

4.1.2. Daniel Goleman: Emotional Intelligence (EI) - (1995)

Salovey and Mayer (1990) first used the expression *emotional intelligence (EI)* and explained it as knowing and handling one's own and others' emotions. Later, the expression was popularized by Goleman in his book *Emotional intelligence* in 1995, which describes the capacity to recognize and manage our own feelings, and to recognize and respond efficiently to other people' ones. Goleman's model (2002) is structured in four domains: self-awareness, social awareness, self-management, and relationship management.

- Self-awareness: explained as the ability to read and understand your emotions and also recognize their effect on others.
- Social awareness: ability to rigorously notice the emotions of others and understand situations properly, using the capacity of empathy.
- Self-management or self-regulation: described as the ability to manage one's actions, feelings, and thoughts in modifiable manners to get the desired results.
- Relationship management: ability to manage one's own emotions, the emotions of others, and the context to deal with social interactions appropriately. This last dimension usually appears naturally if the other three are together.

The book *Emotional Intelligence* (1995) argued that schools would better prepare children for life if the curriculum involved not just academic basis, but also teaching in the basics of social and emotional competence. An enhanced self-awareness, higher sensitivity to how others feel, greater ability to handle distressing emotions, and managing relationships well which are essential competences throughout life, whose foundation is laid in childhood. Accordingly, guiding children construct good social and emotional skills in their early years makes a big difference in their long-term well-being and health.

Lantieri (2008) states that studies have manifested that children's social and emotional performances can foretell the state of their mental health and behavior later in life. That is to say, if children learn to communicate and display emotions effectively and become involved in respectful and caring relationships before and while they are in the lower school grades, they are more bound to avoid violence, depression and other significant mental health problems as they grow older.

Goleman (1995) emphasized emotional intelligence as being as significant as IQ in terms of children's future life success and healthy development. Goleman's workplaces

emotional intelligence as a basic condition for the efficient use of one's IQ. He made the relation within our feelings and our thinking more straightforward by highlighting how the brain's executive and emotional areas are interrelated physiologically, particularly as these areas have a connection to teaching and learning.

When social and emotional skills are taught and mastered, they ease children' success not just in school, but in all areas of life. This is directly connected with Multiple Intelligences Theory (MI) by Howard Gardner, which wanted to expand the scope of children potential beyond the limitations of the IQ proposing eight different intelligences among which are interpersonal and intrapersonal intelligences, closely connected to emotional intelligence.

4.1.3. Thinking skills

There has been a significant change during the last century since information and communication technology is reconstructing how we learn, the significance of social relationships, and the essence of how work is managed. The 21st century requires students with the ability to engage in reflective thought, collaboration, innovation, speed, being able to adapt to new necessities and varying circumstances, being able to manage and widen the scope of technology to create new knowledge, and being able to communicate, share and use information to solve complex problems. Consequently, the basic skills, knowledge, and competencies of the past are being replaced by new standards. In order to do so, schools must undergo a transformation that will allow students to acquire problem solving, creative thinking, innovative, and collaborative skills to be successful in life and work. It is argued that the 21st century learning skills are crucial to achieve that transformation. Gough (1991) states that "Perhaps most importantly in today's information age, thinking skills are viewed as crucial for educated persons to cope with a rapidly changing world. Many educators believe that specific knowledge will not be as important to tomorrow's workers and citizens as the ability to learn and make sense of new information." (p. 3).

Alvino (1990) defines thinking skills as "the set of basic and advanced skills and subskills that govern a person's mental processes. These skills consist of knowledge, dispositions, and cognitive and metacognitive operations.".

The National Curriculum for England presents the thinking skills divided as follow:

- Reasoning skills: enable pupils to give the rationale of actions and opinions, to make deductions and inferences, to use specific language to explain themselves, and to make decisions and judgements based on evidence.
- Enquiry skills: enable pupils to ask relevant questions, to make predictions and anticipate consequences, to define problems, to plan what to do and how to investigate, and to analyze conclusions and develop ideas.
- Creative thinking skills: enable pupils to produce and expand ideas, to propose hypothesis, to employ imagination, and to search for alternative innovative outcomes.
- Evaluation skills: enable pupils to evaluate information, to reason the usefulness of what they hear, read, and do, to elaborate foundation for judging the value of others and their own ideas or work, and to feel confident with their judgements.

Likewise, the Northern Ireland Curriculum proposes five strands:

- Managing information: develop pupils' abilities in an information-intensive environment so as to comprehend the utility and potential of accessing, selecting and integrating information.
- Thinking, problem-solving, and decision-making: engage students in active learning in order to go beyond the basic recall of factual information. As a means to be critical, make reasoned decisions and judgements, and seeing and making connection.
- Being creative: encourage pupils' inner responses like exploration, curiosity, invention, and experimentation.
- Working with others: engage pupils in collaborative tasks and making the most of their learning when working with others.
- Self-management: help students become more self-directed in such a manner that they can lead their learning in inexperienced situations.

Having said that, even though the thinking skills are grouped, it is relevant recognizing that the limits between them are ambiguous, as the skills are related and support and complement each other. Developing thinking skills demands an approach to teaching that expands beyond traditional didactic methods. With a view to pupils developing thinking skills, they need to be entirely engaged with their own learning, to reflect on their accomplishments, to be given opportunities to train their skills, and to identify their

weaknesses and strengths. The approach employed to develop and assess thinking skills is called *infusion* and is based on the idea that skills cannot be taught separately from the areas of the curriculum, it should be across the curriculum. Therefore, it is easier for pupils to make connections, see relationships, and obtain a deeper and better understanding and can apply it.

Additionally, there is a fundamental concept in the development of thinking skills, metacognition, which refers to the process of planning, monitoring, and assessing one's own thinking. There are numerous definitions, however there are two key words in most of them: knowledge and control. Knowledge about thinking in general - understanding, problem-solving, memorizing, reasoning -, and about their own thinking - consciousness of what mental strategies they find easy/difficult; and control of thinking - be able to select strategies to deal with different tasks. This perception of personal control helps pupils to accomplish tasks efficiently.

4.1.1.1. Creative thinking and creativity

Creativity is innate to the human being, and nowadays is becoming more and more associated with the future of humans. Our future is going to be determined by how many creative people able of producing ideas and discovering alternatives there are in the world (Daujotytè, 2010). Creativity is related to an individual, a product, or a process, and it is described as a characteristic of an individual considering its cognitive features (intellect) and personal features (motivation). Creative thinking implies be impartial and receptive, take creative risks, be opened to new-fashioned and unreal notions, and make mistakes.

As mentioned before, our future depends on humans' creativity to produce new ideas, alternatives, creating future prosperity and deal with the world we live in, what is directly connected with the main purposes of STEAM education. Creative thinking is an essential skill for 21st century classrooms to prepare pupils for the world they are living, and they are going to live in.

4.2. MULTIPLE INTELLIGENCES

4.2.1. Howard Gardner: Multiple Intelligences Theory (MI) - (1983)

Almost 80 years later than the pioneer intelligence tests were developed, Howard Gardner, Harvard psychologist, questioned this generally held principle, stating that intelligence had been delimited too narrowly in our culture. Consequently, in the book *Frames of Mind* (Gardner, 1983) he suggested the existence of no less than seven basic intelligences. Afterwards, he added an eighth one and argued the possibility of a ninth.

With the Multiple Intelligences Theory (MI), Gardner wanted to widen the scope of individual potential over the limits of the IQ score, questioning the conventional notion of general intelligence as a unique entity. Alternatively, Gardner proposed that intelligence has more to do with the ability for problem-solving and creating products in context-rich, culturally supported, and naturalistic settings.

The concept of intelligence began to be seen in a variety of ways in people's lives and Gardner provided eight independents but interacting intelligences:

- Linguistic intelligence: The capacity to use words efficiently, orally or in writing. This intelligence entails the ability to manipulate the phonology, syntax, pragmatics, and semantics, as well as using rhetoric (use of language to convince others), metalanguage (use of language to discuss language), and mnemonics (use of language to remember information).
- Logical-mathematical intelligence: The ability to use numbers efficiently, and to reason well. This intelligence involves consideration of logical patterns and relationships, statements and propositions, and functions, as well as processes like classification, categorizations, calculation, generalization, inference, and hypothesis testing.
- Spatial intelligence: The capacity to perceive the visual-spatial world rigorously, and to accomplish transformations on those perceptions. This intelligence entails consideration of line, color, shape, space, form, and the relationships among them. It involves the ability to visualize, to orient oneself competently, and to graphically represent visual or spatial ideas.
- Bodily-kinesthetic intelligence: The ability to skillfully use one's complete body to express feelings and ideas, and ease in using oneself hands to transform or produce things. This intelligence involves specific physical skills as balance,

strength, coordination, flexibility, dexterity, and speed, and haptic, tactile, and proprioceptive capacities.

- Musical intelligence: The capacity to perceive, express, transform, and discriminate between musical forms. This intelligence entails consideration of pitch, rhythm, and timbre or tone of a musical piece.

- Interpersonal intelligence: The capacity to perceive and differentiate between intentions, moods, feelings, and motivations of other people. This can involve consideration of voice, facial expressions, and gestures; discrimination between diverse kinds of interpersonal prompts; and the ability to reply efficiently to those prompts in a pragmatic way.

- Intrapersonal intelligence: This intelligence entails self-knowledge and the capacity to respond adaptively based on that knowledge. It also involves holding a precise picture of oneself; recognition of one's inner motivations, moods, intentions, desires, and temperaments; and the ability to self-understanding, self-esteem, and self-discipline.

- Naturalist intelligence: The ability to skillfully recognize and classify the various species, fauna, and flora, of an individual's environment. This also involves consideration of other natural phenomena.

The key points of the intelligences are:

- All eight intelligences are possessed by each person. MI is a theory of cognitive functioning, and it suggests that every person has capacities in all the intelligences. Certainly, the eight intelligences operate jointly in exclusive ways to each person.

- Each intelligence can be developed to a reasonable level of competency. Gardner proposes that individuals usually have the aptitude to develop all eight intelligences to an adequate level of performance if the proper instruction, enrichment, and encouragement is given.

- Intelligences generally work altogether in complicated ways. Gardner highlights that no individual intelligence exists by itself, they are continuously interacting with each other.

- Inside each category, there is a variety of ways to be intelligent. There is no rule set of features that a person must have to be considered intelligent in a particular area.

4.2.2. MI Theory and Education

The main contribution of MI Theory towards education is proposing that it should expand the collection of strategies, techniques, and tools beyond the usual logical and linguistic ones mainly used. Multiple Intelligences as a philosophy is barely a new notion, in the 20th century, innovators like John Dewey and Maria Montessori developed systems of instructions stand on MI, as Dewey's vision of the classroom as a microcosm of society and Montessori's self-paced materials. In like manner, numerous current alternative educational models fundamentally are MI systems applicating different terminologies, like cooperative learning.

In a MI classroom, the teacher differs from a teacher in a traditional logical-mathematical/linguistic classroom. The MI teacher regularly varies the method of presentation from spatial, to linguistic, to musical and so on, frequently integrating intelligences. According to this, the MI theory illustrates a model of instruction in which there are no specific rules other than the requirements of the cognitive components of the intelligences and the concrete demands of the taught area. The fundamental basis is that not all children learn in the exact same way, that is why the theory contemplates eight different intelligences. Basically, MI theory provides a vehicle to build daily lesson plans, weekly units, and programs so that all intelligences are addressed at some point and students strongest' intelligences are worked on. The most effective procedure to integrate curriculum development and the MI theory is by contemplating how one can convert the material to be taught from one intelligence to another. That is to say, how the teacher can take a linguistic symbol and change it into another intelligence, with pictures, musical or physical expressions, logical symbols, etc.

4.3. STEAM EDUCATION

4.3.1. From STEM to STEAM education

To discuss STEAM education, it is fundamental going back to the starting point, STEM. STEM stands for Science, Technology, Engineering and Mathematics disciplines which are interconnected. As a consequence of the economic decline and increasing competition between developing economies, STEM education was introduced in the USA throughout the 1990s by the National Science Foundation (NSF) as an educational reform. The main purpose of this reform has intended to qualify pupils for the 21st century's global economy and hence has become the center of attention of researchers and educators in recent years.

STEM education aims to provide students with the required competences, critical knowledge, and interdisciplinary point of view concerning problems (Şahin, Ayar & Adıgüzel, 2014) by discarding the obstacles of the conventional education system in which STEM disciplines are presented separate from each other. Rather than presenting content and assuming from students to comprehend the relations to real-life, STEM education combines related disciplines into lessons or units which are conditioned on the interrelation between the topics and real-life problems (Moore et al., 2014). Consequently, pupils have the opportunity to put their theoretical knowledge into practice, make decisions, improve their academic achievements, and develop their critical thinking, fulfilling practical and theoretical education.

Having said that, some researchers stated that STEM is conformed of multiple disciplines, however, there is a missing part, Arts (Kim & Park, 2012). According to Spector (2015), STEAM is defined as "the inclusion of the liberal Arts and humanities in STEM education" (p.5). STEAM education introduces an "A" for Arts in the teaching-learning process and has arisen lately as a variant of STEM, having the intention of enhancing students' creativity. STEAM-based education' objective is preparing children to deal with the world's issues through creative and critical thinking, innovation, effective communication according to new information, and cooperation (Quigley & Herro, 2016).

4.3.2. STEM vs. STEAM – The role of Arts education and creativity

Sousa and Pilecki (2013) state that STEM and Arts are contemplated as two independent areas in some points. STEM disciplines are repeatable, analytical, objective, and logical, whereas Arts are intuitive, related to feelings, subjective and unique. Despite this, Arts and Science are two indispensable and incomparable parts of education which counterpart each other. There are some skills like observing exactly, drawing on wonder, perceiving an item with diverse dimensions, working efficaciously with others, and thinking spatially considered as scientific tools, that are the essence of fields of Arts. Even more, in order to prepare children for the future world, Arts education is essential to creativity supporting innovation, and innovation is crucial to create modern industries in the future which offer the grounds for future economic prosperity (Sochacka et al., 2016). The interest of investigators towards creativity is based on its properties, so that encouraging the younger generations to develop their creativity has been thought as one of the most suitable manners of preparing them for an uncertain future, so that promoting potential creativity in the educational fields has been transformed into a main objective that is still to materialize. Thus, some authors assert that schools do not allow creativity to flourish, and others emphasize that creativity is inherent to the nature of humankind and therefore it cannot be exterminated, only enhanced, or diminished.

The definition of creativity has been defined by most researchers based on two main elements, novelty or originality and utility. The first concept, novelty, or originality refers to the creation of something different and new; and the second one, utility, the creation should conform to set specifications and criteria on utility in the circumstances for which it was designed. Having said that, stating if something is appropriate or original is connected to specific cultural, social, and historic context, and therefore, creativity can be interpreted. Even more, this interpretation is influenced by interaction, social and educational experiences; and its level of expression, "the fourth C" model (Beghetto & Kaufman, 2013) whose levels of creative expression are interpretative creativity, daily creativity, creativity expert, and legendary creativity.

With a view to taking didactic and pedagogic actions to strengthen the development of the creative potential of students Davies et al. (2013) remark the subsequent aspects:

- Ensure freedom of utilization and displacement among spaces,
- Reserve enough time and prevent hurrying into the development of the activities,

- Prepare and incorporate a wide range of educational resources,
- Plan innovative and inspiring tasks,
- Center learning from a perspective of play, lessening pressures and allowing an organized yet adaptable and self-directed learning experience,
- Promote cooperative work, respect, and dialogue,
- Rely on external experts and bodies' participation with the school (research centers, museums, etc.).

4.3.3. STEAM in Infant Education

Preschool children are wrongly presupposed as ineligible in terms of fundamental intellectual dispositions as predicting, hypothesizing, and analyzing (Katz, 2010). On the contrary, preschoolers wonder, reason, and generate ideas about the world that surrounds them. Indeed, they are continuously exploring, comparing things, solving problems, experimenting, and questioning rules and facts. Consequently, regardless their ability, preschoolers are ready, able, and eager to cope with STEM education. According to this, children should be initiated to STEM ideas and concepts since their younger ages. To do so, mathematical, and scientific connections are constructed through experimentation and exploration by preschoolers, hence providing them significant learning (Moomav and Davis, 2010).

As mentioned before, it is difficult to consider the world without Arts, and so it is to conceive an early childhood education deprived of Arts. In fact, Arts are a natural element of early childhood classrooms. As Edwards (2006) emphasizes, the area of Visual Arts is one of the five key parts of Art (Literature, Music, Dance, Drama, and Visual Arts), and include the creation of two-dimensional visual works, like painting or drawing, and three-dimensional visual works, like creating sculptures or models, as an expression of feelings and thoughts. Additionally, Visual Arts boost pupils' fine motor and manipulative skills, and their visual spatial thinking abilities indispensable for achievement in scientific areas. Therefore, some researchers claim that in order to be more successful in STEM areas in Infant Education, Arts should be included, as it improves their motivation and commitment, and productive learning in STEM, what leads to STEAM education.

5. PROPOSAL DESIGN

5.1. *WALKING IN THE JUNGLE*: A PROJECT BASED ON STEAM AND MULTIPLE INTELLIGENCES

Walking in the jungle is a project that was partially implemented in Infant Education, in 5 years old. It was done in the English area in the internship of this author. This project arises from an interest in multiple intelligences, but with the focus on current methodologies like STEAM. According to this, the unit is planned with the objective of involving infant pupils in STEAM tasks through multiple intelligences to enhance foreign language acquisition, and the main topic of the project is *animals*.

5.2. CONTEXT

5.2.1. The school

The proposal has been partially implemented in a school located in Palencia, in the city center. It is a charter school with Infant, Primary and Secondary Education, having two lines per level in Infant Education.

In relation to the bilingual program, it does not apply in Infant Education, however, the school prepares pupils for it offering them 2 hours per week of English, instead of 1 hour per week as the curriculum establishes as compulsory.

5.2.2. The groups

The proposal was put into practice in two groups of 5 years old, one with 23 students and the other one with 22; both groups have 2 hours of English per week, one hour on Monday and one on Friday, and follow an English book with the projects for each term. According to pupils on each classroom, students in group A are more talkative in general terms what leads to more conversation among them but also more interaction with the teacher. However, the students in group B are quieter, so there is less interaction with the teacher, but things are more fluent as there are not many interruptions.

5.3. METHODOLOGY

5.3.1. Official documents

The proposal is based on the official documents of Castile and Leon: *ORDEN ECI/3960/2007, de 19 de diciembre, por la que se establece el currículo y se regula la ordenación de la educación infantil.* The line of action and objectives have been followed to fulfil the requirements of the community in which the proposal has been developed.

It is also based on the *Common European Framework of Reference for Languages: learning, teaching, assessment* (CEFR), which position towards language acquisition, teaching, and learning is providing a common foundation for content, objectives, and methods in foreign language education.

5.3.2. Project-based learning and other methodologies

Regarding the methodology, it is going to be founded on Project Based Learning (PBL) which seeks for students acquiring knowledge and skills through the development of a project; STEAM which prepares students for the 21st century and the future world, enhancing students' critical thinking, collaboration, creativity, innovation, and interpersonal communicative skills; and the Multiple Intelligences (MI) Theory based on the notion that there is more than one intelligence and pupils have a wide range of abilities, which can be observe from different perspectives, considering different types of intelligence.

Firstly, Project Based Learning (PBL), a methodology based on all the pedagogical foundations believed as essential in Infant Education, as positive attitude towards learning, meaningful learning, globality, functionality, diversity and identity, interpersonal and active learning, and learning by doing (Gorgoso et al., 2016).

As mentioned in the theoretical framework, pupils are continuously exploring, comparing things, solving problems, experimenting, and questioning rules and facts. Consequently, they are ready, able, and eager to cope with STEAM education. Hence, scientific and mathematical connections are constructed through exploration and experimentation by preschoolers, providing them significant learning (Moomav and Davis, 2010).

Finally, as referred to in the theoretical framework, the MI theory which illustrates a model of instruction in which there are no specific rules other than the requirements of the cognitive components of the intelligences and the concrete demands of the taught

area. The fundamental basis is that not all children learn in the exact same way, that is why the theory contemplates eight different intelligences

Additionally, the methodology is also based on globalizing, active, cooperative, hands-in, and playful approaches since all of them integrate the teaching-learning process with an active and positive environment in which pupils feel secure and willing to learn, providing the most suitable learning environment for them.

5.4. COMPETENCES

The proposal contributes to the development of key and CEFR competences in Infant Education students.

5.4.1. Key competences

- Linguistic competence: pupils widen their English language and use their speaking and listening skills through different games along the project and during the Science Fair.
- Mathematical competence and basic competences in Science and Technology: pupils use and develop their knowledge of numbers, measuring through non-conventional units, puzzles, and oriented displacements.
- Digital competence: pupils' use of and experience with the Interactive Digital Board during different tasks.
- Social and Civic competence: pupils respect turn-taking, and social interaction games.
- Cultural awareness and expression: pupils express themselves through their own body.
- Learning to learn: observing and exploring, and during the Science Fair where pupils share their own learning with other pupils.
- Sense of initiative and entrepreneurship: pupils develop their initiative through games where they must explain things to others, start the game, or transmit knowledge during the Science Fair.

5.4.2. Common European Framework of References for languages (CEFR) competences

General competences

- Skills and know-how: developed with the use of the robot and the template.
- Existential competence: developed during the Science Fair as pupils share their ideas and knowledge with other pupils.
- Ability to learn: developed throughout the project.

Communicative language competences

- Linguistic: developed throughout the project when pupils use the language related to the topic.
- Sociolinguistic: developed when pupils play games where others must guess, or during the Science Fair.
- Pragmatic: developed when pupils play different games and others interpret what they are saying or doing.

5.5. OBJECTIVES

The general objectives of the proposal are based on the ORDEN ECI/3960/2007 and are as follows:

- To approach the oral use of the foreign language in communicative situations in the classroom.
- To show interest and enjoyment when participating in communicative situations in the foreign language.
- To use audiovisual productions and ICTs for the approach to the foreign language.
- To learn key language of specific new topic areas.
- To associate gestures, images, and objects to linguistic expressions and key language in the foreign language to promote language acquisition and communication.
- To develop basic strategies to support comprehension and oral expression of messages in the foreign language: use of visual and non-verbal context and previous knowledge.

The specific objectives are detailed in each lesson.

5.6.   THE PROJECT

5.6.1.   Features

The proposal is planned for the English area, lasting 4 weeks, April 18th to May 16th (May 2nd is Labor Day), and being developed during 8 lessons, two per week one on Monday and one on Friday. The proposal is going to follow the project topic "wild animals", considering pupils' prior learning, so as to keep building significant learning. Their prior learning is based on domestic and farm animals, some wild animals, numbers, and sizes. In addition, the previous project developed was related to clothes, therefore this project is going to start with a story that combines clothes and animals, *Hippo has a hat*. During this project we are going to work on different animals, their speed, and actions that animals do.

Having said that, it is going to be based on the development of STEAM through multiple intelligences. Hence, the topic is going to be connected with STEAM and multiple intelligences so that the three aspects are developed in the same project. According to this, the final task of this project is going to be a Science Fair. (*Annex I – About the unit and Lesson overview*).

5.6.2.   Lessons

There are 8 lessons and all of them follow the same pattern: 10 minutes for the assembly and the routines, 40 minutes for the development of the different tasks, and 10' minutes for cleaning up. Each day the English lesson starts with the assembly where the routines are done: there is interaction with the pupils, singing the songs for the date and the weather, and asking the "leading pupil of the week" to change the mediators of the date and the weather. And it finishes cleaning up everything used during the lesson with a song.

<u>Lesson 1</u>

Specific objectives:

- To show an interest in listening to stories.
- To identify animals.
- To actively participate in the song.

Main intelligences involved: linguistic, and musical.

Activity 1: Story *Hippo has a hat*

- Grouping: Big group – Assembly.
- Timing: 10'.
- Resources: [story](#) *Hippo has a hat.*

This story combines clothes and animals, and it is a good option to connect this project with the previous one of clothes, so that pupils remember clothes after Easter holidays, and start to identify animals. The teacher approaches the front cover, ask pupils questions, while telling the story interact with them, finally, ask them questions about the story.

Activity 2: Approach to the figures of the animals

- Grouping: Big group – Circle on the floor.
- Timing: 5'.
- Resources: figures of the animals (*Annex II – Figures of the animals*).

The teacher introduces the figures of the different animals to let pupils identify them, there is also an association to the sound of the animal. Their prior knowledge is based on the animals that appear in the story *Hippo has a hat* (hippo, pig, duck, frog, tiger, leopard, cat, monkey), and the animals introduced are sheep, lion, snake, snail, fly, and elephant.

Activity 3 – Leading task: Hot potato

- Grouping: Big group – Circle on the floor.
- Timing: 11'.
- Resources: hot potato and figures of the animals.

The teacher introduces the hot potato to play. Pupils make a circle on the floor, the pupil that has the hot potato when the music stops, takes the animal in the middle that the teacher is asking for.

Activity 4 – Leading task: Game of the telephone

- Grouping: Big group – Circle on the floor.
- Timing: 11'.
- Resources: figures of the animals.

The teacher introduces the game of telephone, where pupils say to each other, whispering, the animal that the teacher said to the first pupil. When the teacher says "stop" the pupil takes the animal in the middle that he/she has understood.

Activity 5: Song *Walking in the jungle*

- Grouping: Big group – Stand up.
- Timing: 3'.
- Resources: smartboard, and <u>song</u>.

The teacher introduces the song singing and doing the gestures. Then, with the video everyone in a line follows the teacher acting out the song with the identifying gestures and singing/humming.

Lesson 2

Specific objectives:

- To recognize animals and identify their name.
- To understand the question "Is it fast or slow?, "Is it big or small?"
- To identify some verbs: walking, running, swimming, flying, or eating.
- To recognize language related to the animals.
- To actively participate in the song.

Main intelligences involved: linguistic, spatial, and musical.

Activity 1: Approach to the figures of the animals

- Grouping: Big group – Circle on the floor.
- Timing: 5'.
- Resources: figures of the animals.

The teacher introduces the figures of the different animals to let pupils identify them, there is also an association to the sound of the animal. Their prior knowledge is based on the animals that appear in the story *Hippo has a hat* (hippo, pig, duck, frog, tiger, leopard, cat, monkey) and the previous lesson (sheep, lion, snake, snail, fly, and elephant) and the animals introduced are turtle, chicken, mouse, rabbit, horse, and cow.

Activity 2 – Leading task: Identifying animals – Smartboard' game

- Grouping: Big group – Assembly on the smartboard.
- Timing: 10'.
- Resources: smartboard and game.

The teacher introduces the game where pupils choose the animal asked for between four pictures. The teacher reads the question and asks pupils to identify the name of the four animals and choose the one asked for.

Activity 3 - Leading task: Memory – Smartboard' game

- Grouping: Big group – Assembly on the smartboard.
- Timing: 12'.
- Resources: smartboard and game.

The teacher introduces the game, a memory with pictures of animals. Asks pupils to identify each card that they touch, and when a pair is found say: the animal, if it is big or small, if it is fast or slow, if it is walking, running, swimming, flying, or eating.

Activity 4: Shadow drawing

- Grouping: Big group – Stand up.
- Timing: 10'.
- Resources: figures of the animals, and paper (*Annex III – Shadow drawing*).

The teacher explains the activity in which pupils are going to shadow drawing animals in the playground. They need to put on a piece of paper one of the figures of the animals and the sun makes the shadow of the animal on the paper, so that they can draw it.

Activity 5: Song *Walking in the jungle*

- Grouping: Big group – Stand up.
- Timing: 3'.
- Resources: smartboard, and song.

Everyone in a line follows the teacher acting out the song with the identifying gestures and singing/humming.

Lesson 3

Specific objectives:

- To strengthen animal language.
- To show a greater awareness of the characteristics of the animals.
- To participate in the game through movement.
- To explore their body through movement.

Main intelligences involved: linguistic, bodily-kinesthetic, interpersonal, and musical.

Activity 1: Approach to the figures of the animals

- Grouping: Big group – Circle on the floor.
- Timing: 5'.
- Resources: figures of the animals.

The teacher introduces the figures of the different animals to let pupils identify them, there is also an association to the sound of the animal. Their prior knowledge is based on the animals that appear in the story *Hippo has a hat* (hippo, pig, duck, frog, tiger, leopard, cat, monkey) and the previous lessons (sheep, lion, snake, snail, fly, elephant, turtle, chicken, mouse, rabbit, horse, and cow).

Activity 2 – Leading activity: Game *What's up*

- Grouping: Big group – Circle on the floor.
- Timing: 15'.
- Resources: figures of the animals, and game *What's up* (*Annex IV* – *What's up game).*

The teacher introduces the game *What's up?,* where one person has to guess the animal that is the card of his head, and the other pupils give him/her clues.

Activity 3 – Leading activity: Game *Mimic, sound, and discover*

- Grouping: Big group – Circle on the floor.
- Timing: 15'.
- Resources: figures of the animals, and bag.

The teacher introduces the game *Mimic, sound, and discover*. One pupil takes an animal from the bag, the others have to guess the animal. In order to guess it, the pupil with the animal is going to do mimic and the sound of the animal.

Activity 4: Song *Walking in the jungle*

- Grouping: Big group – Stand up.
- Timing: 3'.
- Resources: smartboard, and song.

Everyone in a line follows the teacher acting out the song with the identifying gestures and singing/humming.

Lesson 4

Specific objectives:

- To enhance logical-mathematical skills: experimentation and measurement.
- To strengthen key language of the topic.
- To explore animals through different tasks.

Main intelligences involved: logical-mathematical, and spatial.

Activity 1: Measuring animals

- Grouping: Small groups – Tables.
- Timing: 20' (activities 1 and 2 are developed at the same time).
- Resources: drawings of the animals, cubes (*Annex V – Measuring animals).*

In small groups, pupils measure different animals with cubes, then they write how long is the animal (how many cubes).

Activity 2: Animals' puzzles

- Grouping: Small groups – Tables // Big group – Smartboard.
- Timing: 20' (activities 1 and 2 are developed at the same time).
- Resources: puzzles of animals (for example elephant' puzzle).

In small groups, pupils make the puzzles of different animals, and in big group on the smartboard all together make another puzzle.

Activity 3 – Leading task: Animals' tracks symmetry

- Grouping: Small groups – Tables.
- Timing: 20'.
- Resources: animal tracks, paint, and paintbrushes (*Annex VI – Animals' tracks symmetry).*

In small groups, pupils have a paper with the track of an animal, they paint and then fold the paper to get the other track and talk about symmetry.

Lesson 5

Specific objectives:

- To strengthen manipulative skills.
- To manipulate materials, textures, and objects to the approach to Arts&Crafts and expressive productions.
- To stimulate the acquisition of new skills and abilities to awaken aesthetic sensitivity and creativity.

Main intelligences involved: linguistic, bodily-kinesthetic, and naturalist.

Activity 1 – Animal skin

- Grouping: Small groups – Tables.
- Timing: 10'.
- Resources: figures of the animals, and cards with the pattern and texture of the skin of each animal (*Annex VII – Animals' skin).*

Pupils touch the card, identify the pattern, and connect the card with one animal. Then, they put the figure of the corresponding animal on the card.

Activity 2 – Leading task: Chromatography butterflies

- Grouping: Small groups – Tables.
- Timing: 15'.
- Resources: markers, white coffee filters, glasses with water, and pipe cleaners (*Annex VIII – Chromatography butterflies).*

Each pupil has a white coffee filter where they are going to draw a circle in the middle with the marker. Then, fold it twice (following the teacher' instructions) and putting it into the glass with water. When the water finishes flowing up the paper, take them out to dry. The following day, when they are dry, pupils put a pipe cleaner in the middle simulating a butterfly.

Activity 3 – Leading task: Recycled animals

- Grouping: Small groups – Tables.
- Timing: 15'.
- Resources: egg carton, carton, markers, paint, and paintbrushes (*Annex IX – Recycled animals*).

The egg carton is divided into individual pieces, pupils paint the egg carton with the desired color according to the animal they are creating. Then, with the markers they draw the eyes, and with the carton they paste the legs/arms/wings/fins of the animal.

Lesson 6

Specific objectives:

- To explore through verbal and non-verbal language the different structures.
- To identify language previously learnt related to animals.

Main intelligences involved: linguistic, bodily-kinesthetic, naturalist, and intrapersonal.

Activity 1 – Coloring animals

- Grouping: Individual – Tables.
- Timing: 10'.
- Resources: drawings of animals, crayons, and scissors (*Annex X – Drawings of animals*).

Pupils color the drawing of the animals as they want, and the cut them. They are going to use them in the following activities.

Activity 2 – Leading task: Automat

- Grouping: Big group – Circle on the floor.
- Timing: 15'.

- Resources: automat, and drawings of the animals (*Annex XI – Automat).*

The teacher provides the structure of the automat. Pupils paste two of their animals with tape, turn the handle and observe which animal is moving faster or slower. They explore with different animals.

Activity 3 – Leading task: Wind powered tower

- Grouping: Big group – Circle on the floor.
- Timing: 15'.
- Resources: wind powered tower, and drawings of the animals *(Annex XII – Wind powered tower).*

The teacher provides the structure of the wind powered tower. Pupils paste four of their animals (maximum) with tape and go to the playground (if there is wind) or blow (if there is not) and observe if the animals are walking, running, swimming, or flying. They explore with different animals.

Lesson 7

Specific objectives:

- To review animal language.
- To listen and identify animals.
- To use the robot for the approach to the foreign language.
- To follow the instructions according to the template of the robot.

Main intelligences involved: linguistic, and spatial.

Activity 1: Approach to the figures of the animals

- Grouping: Big group – Circle on the floor.
- Timing: 5'.
- Resources: figures of the animals.

The teacher shows the figures of the different animals to let pupils identify them.

Activity 2: Approach to the robot

- Grouping: Big group – Circle on the floor.
- Timing: 10'.

- Resources: robot, template, and images for the template *(Annex XIII – Robot, template, and images).*

The teacher shows the robot, the template, and the images for the template, and remind the commands of the robot and how it works.

Activity 3 – Leading task: Travelling with the robot

- Grouping: Big group – Circle on the floor.
- Timing: 25'.
- Resources: robot, template, and images for the template.

The teacher asks *Where's the elephant?,* then one pupil points the elephant, identifies the route that the robot is going to follow to the elephant, and prepares the commands for the robot. After that, the teacher introduces the variation for the activity in which pupils are going to move the robot to the animal asked for, but they cannot pass through one of the squares of the template, *Where's the lion?* and *We cannot go through the duck.*

Lesson 8

Specific objectives:

- To use verbal and non-verbal language as a tool for exploring, expressing, and communicating ideas and facts.
- To strengthen positive attitudes towards foreign language as a communicative tool.

Main intelligences involved: linguistic, interpersonal, and intrapersonal.

Final task: Science Fair

- Grouping: Small groups.
- Timing: 40'.
- Resources: animal traces, chromatography butterflies, recycled animals, automat, wind powered tower, and robot and template.

The final of the project is a Science Fair where pupils do a show and tell with the productions they have made during the project, the show and tell is for other classrooms of Infant Education. The productions are divided into six different spaces, they show their

productions and tell what happened, with the automat, the wind powered tower and the robot and the template they make demonstrations and let other pupils test them.

5.7. EXPECTATIONS

To follow the main lines of inclusion and attention, this proposal is designed following three levels of expectation. The first level of expectation would be 10% of the students (all children must), the second level of expectation would be 70% of the students (most of the children will), and the third level of expectation would be 20% of the students (some of the children could). The expectations for this proposal divided into the three levels are as follows:

First level of expectation: All children must

- Identify most of the animals, with support.
- Demonstrate through appropriate non-verbal or simple verbal response, (single words), that they understand basic classroom language, songs, and texts.
- Initiative to learn new skills and desire for self-improvement, with support.
- Follow simple instructions for movement, although they may require support at times.
- Use language as a tool for exploring, expressing, and communicating their ideas and facts, with support.

Second level of expectation: Most of the children will

- Identify most of the animals.
- Demonstrate through simple verbal response, (single words and short phrases), that they understand a wide range of classroom language, statements, and questions, songs, and texts.
- Initiative to learn new skills and desire for self-improvement, with progressive initiative.
- Follow simple instructions for movement.
- Use language as a tool for exploring, expressing, and communicating their ideas and facts, with progressive initiative.

Third level of expectation: Some of the children could

- Identify all the animals.
- Demonstrate non-verbally and with a growing use of memorized oral response, (short, simple phrases), that they understand a wide range of classroom language, songs, and texts.
- Initiative to learn new skills and desire for self-improvement.
- Follow instructions for movement.
- Use language as a tool for exploring, expressing, and communicating their ideas and facts.

5.8.   ASSESSMENT AND EVALUATION

The teacher' assessment of the pupils during this project is based on rubrics. In order to do so, there are some significant rubrics that allow the assessment of the pupils: the direct observation of the teacher rubric (*Annex XIV – Teacher's direct observation rubric*), games rubric (*Annex XV – Games rubric*), use of the robot rubric (*Annex XVI – Use of the robot rubric*) and show&tell rubric (*Annex XVII – Show&tell rubric*). Rubrics allow assessing the level of performance or achievement of tasks and projects, and that is why it is a useful assessment tool. Moreover, as mentioned in the previous section, pupils are assessed on the basis of the three levels of expectation to follow the main lines of inclusion and attention.

In order to make the evaluation of the teacher and the proposal implemented there is the evaluation of the teacher and the project implemented rubric (*Annex XVIII – Evaluation of the teacher and the project implemented rubric)*. Which allows evaluating the unit itself: design, adequacy, skill balance, aim and content selection, techniques used, etc., as well as the teacher to assess it, the results obtained and possible adjustments. Having an overall balance of the project' development.

5.9.   DATA ANALYSIS AND REFLECTIONS

As mentioned before, this project has been partially implemented in a school. On the basis of observation of lessons 1 to 3, and 7, this proposal has been designed.

During lessons 1 to 3, pupils' involvement and participation was exceptional, they were eager to get involved in every task and their achievements were perceptible from one lesson to the following one. The tasks proposed had a positive impact on pupils as they were gradually improving, and their use of the foreign language as communicative tool was widening as they were involved in different tasks that required them to use verbal and non-verbal language. Additionally, lesson 7 approached students with robotics and the use of the foreign language, so that there was a connection with STEAM education, showing that infant pupils are eager to explore, experiment, and solve problems, in this case with the robot.

According to these observations and in order to widen the scope of the project deepening in STEAM education and multiple intelligences, this proposal has been designed. Therefore, four lessons have been added allowing the proposal to expand its horizons and possibilities and focus more deeply on the two key methodologies mentioned before. Hence, lessons 4 to 6 and 8 provide the proposal a higher reach to approach STEAM through multiple intelligences in Infant Education due to the incorporation of logical-mathematical tasks, manipulative tasks, experiments, engineering tasks, and all of this together in the final task, the Science Fair where pupils' use of verbal and non-verbal language as a tool for exploring, expressing, and communicating is essential.

Consequently, it is possible to infer that the scope of this proposal design would be more effective as there is a higher implication of STEAM and multiple intelligences, which has proven to be useful in the lessons implemented. Having said that, the proposal design might also have some limitations as the final task, the Science Fair, is a demanding task that requires time and involvement to coordinate and organize it. Moreover, it is also challenging for pupils if they are not used to doing show&tell or expressing themselves in the foreign language.

All in all, the part of the project implemented has proved to be effective and reached pupils, allowing them to approach the foreign language and enjoy the project as a way of learning and developing their personal autonomy, social skills, and knowledge of the world. Besides, the complete proposal offers a better approach to the development of STEAM through multiple intelligences in Infant Education, enabling the project to be completer and more efficient for pupils and for the purposes of this final degree project.

6. CONCLUSIONS

In light of the development of the project, there are several factors to consider and inquire into so as to establish constructive conclusions about the project. It aims to follow a line of development from the beginning to the end.

Considering the objectives set, the main one, based on acquiring skills, knowledge, and strategies related to STEAM and multiple intelligences (MI), has been reached throughout the whole process, from the investigation for the theoretical foundation to the design and the partial implementation of the proposal. Furthermore, the specific objectives related to the proposal sought to motivate pupils to acquire the foreign language which can be achieved as a result of the combination of STEAM and multiple intelligences as both together create a learning space where it is possible working in different ways so that all students feel comfortable and achieve their goals. Additionally, both seek to prepare children to be creative and critical thinkers, innovative, cooperative, and effective communicators, preparing them for the world.

The above-mentioned, relates to the justification of the project as the topic is supported by several official educational documents (such as The Royal Decree 1630/2006 or the Decree 122/2007) according to which STEAM strengthens foreign language acquisition as it interconnects information and communication technologies with the foreign language. Along with multiple intelligences which considers the diversity of pupils as it proposes that intelligence has more to do with abilities, and every person has capacities in all the intelligences. The two of them together aim to approach the use of the foreign language as a communicative tool following the Common European Framework of Reference for Languages (CEFR) which guideline for a communicative approach in language acquisition is based on considering the skills and knowledge required to act effectively. In addition, the proposal is connected with the Infant Education Degree and the area of English language in Infant Education developing mainly the competences mentioned all through the proposal as it is focused on Infant Education and the design of a proposal for the English area in Infant Education.

Regarding the theoretical framework, it is the basis of the project as the research accomplished has made it possible to attain the main objectives set and designing a proposal appropriate and based on investigations, what leads to achieving the specific

objectives of the project. Broadening the scope, it cannot be disregarded the connection among the theories and authors, as CLIL has its foundations in teaching that provides significant learning where students can use learned knowledge, what is the base of the acquisition of the foreign language sought in the project.

Besides, this is connected with the importance of basing the teaching-learning process on pupils' necessities as well as Emotional Intelligence, where Goleman (1995) emphasized emotional intelligence as being as significant as IQ in terms of children's future life success and healthy development; which connects with Multiple Intelligences (MI) theory where Gardner (1983) suggested the existence of no less than seven basic intelligences, and proposing that intelligence has more to do with the ability for problem-solving and creating products in context-rich, culturally supported, and naturalistic settings.

This is related to STEAM as STEAM-based education' objective is preparing children to deal with the world's issues through creative and critical thinking, innovation, effective communication according to new information, and cooperation (Quigley & Herro, 2016). Moreover, mathematical, and scientific connections are constructed through experimentation and exploration by preschoolers, hence providing them significant learning (Moomav and Davis, 2010), as well as CLIL methodology seeks to. Lastly, thinking skills that are involved in each theory and methodology mentioned above, as they are defined by Alvino (1990) as "the set of basic and advanced skills and subskills that govern a person's mental processes. These skills consist of knowledge, dispositions, and cognitive and metacognitive operations.".

All this leads to the proposal design that has been plan according to the objectives set, the justification, and the theoretical framework to provide a suitable proposal based on research and where the use of STEAM and multiple intelligences allow to approach the foreign language to the pupils. Consequently, it can be inferred that with the proposal design the approach to the foreign language through STEAM and multiple intelligences will be more effective.

All in all, there is a connection followed along the project where each section relates to the following and previous one. As a result, STEAM and multiple intelligences have a key role in order to enhance pupils' motivation to acquire the foreign language, and thus it would be stimulating to continue working in this direction.

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8. ANNEXES

ANNEX I – ABOUT THE UNIT AND LESSONS OVERVIEW

About the unit/ Where this unit fits

PROJECT: *WALKING IN THE JUNGLE*

INTRODUCTION

This project is planned for 5-year-old pupils, and it fits in the third term, from the 18th of April to the 16th of May (May 2nd is Labor Day). It consists of eight lessons developed in four weeks, two lessons per week, 45min/1h on Mondays and 45min/1h on Fridays and it has been partially implemented in two 5-years-old classes. In order to develop this project, and reach a better understanding from the pupils, it is going to be used non-verbal language during the lessons, such as illustrators and emblems. Additionally, diverse forms of paralanguage as intonation, tone, pitch, or volume, so as to highlight the most important parts of the speech.

JUSTIFICATION

The previous weeks, pupils have been working on clothes for different seasons and some prepositions. At the end of the second term, they worked with clothes but using two books where animals were introduced, *"Froggy gets dressed"* and *"Hippo has a hat"*. This allows a transition between clothes and animals following a connection, so as to start working on wild animals and speeds. The project of wild animals will be introduced with one the stories used, *"Hippo has a hat"*. All the project is based on the development of STEAM education through multiple intelligences; therefore, lessons are focused on different intelligences. The aim of the proposal is enhancing foreign language acquisition through STEAM and Multiple Intelligences in Infant Education.

FINAL TASK

The final task of the project is making a Science Fair. Pupils do a show and tell with the productions they have made during the project, the show and tell is for other classrooms of Infant Education. The productions are divided into six different spaces (tracks symmetry, recycled animals, chromatography butterflies, automat, wind powered tower, and robot and template), they show their productions and tell what happened, with the automat, the wind powered tower and the robot and the template they make demonstrations and let other pupils test them.

OFFICIAL DOCUMENTS

This project is based on the official documents of Castile and Leon: *ORDEN ECI/3960/2007, de 19 de diciembre, por la que se establece el currículo y se regula la ordenación de la educación infantil;* and the *Common European Framework of References for languages (CEFR).*

COMPETENCES

Key competences

- Linguistic competence: pupils widen their English language and use their speaking and listening skills through different games along the project and during the Science Fair.
- Mathematical competence and basic competences in Science and Technology: pupils use and develop their knowledge of numbers, measuring through non-conventional units, puzzles, and oriented displacements.
- Digital competence: pupils' use of and experience with the Interactive Digital Board during different tasks.
- Social and Civic competence: pupils respect turn-taking, and social interaction games.
- Cultural awareness and expression: pupils express themselves through their own body.
- Learning to learn: observing and exploring, and during the Science Fair where pupils share their own learning with other pupils.
- Sense of initiative and entrepreneurship: pupils develop their initiative through games where they have to explain things to others, start the game, or transmit knowledge during the Science Fair.

Common European Framework of References for languages (CEFR):

General competences

- Skills and know-how: developed with the use of the robot and the template.

- Existential competence: developed during the Science Fair as pupils share their ideas and knowledge with other pupils.

- Ability to learn: developed throughout the project.

Communicative language competences

- Linguistic: developed throughout the project when pupils use the language related to the topic.

- Sociolinguistic: developed when pupils play games where others have to guess, or during the Science Fair.

- Pragmatic: developed when pupils play different games and others interpret what they are saying or doing.

Prior Learning	Language used in the unit	Important Resources
This project is related to the previous one as pupils have been working on a connection between clothes and animals. However, the most significant prior learning of the pupils is connected to the animals that they have already seen in the previous year, farm animals, and some sizes. Therefore, farm animals are the connection with wild animals, so as to keep building on their knowledge and work on significant learning.	In order to develop this project, it is going to be used non-verbal language as well as paralanguage, as emblems and illustrators; or tone, volume, and pitch. It is also going to be used verbal language related to the topic: sheep, lion, monkey, snake, snail, fly, elephant, horse, cow, turtle, duck, pig, leopard, chicken, frog, tiger, mouse, rabbit, fast, slow, walk, jump, swim, eat, fly, run, stop; and commands, like stop, listen, fingers up.	- Story Hippo has a hat. - Figures of the animals. - Hot potato. - Interactive digital board. - Cards with the animals (*What's up?* game). - Bag. - Drawings of the animals, cubes. - Puzzles of animals.

Additionally, pupils have interiorized some routines like the date and the weather; and some commands as fingers up, show me your crayon/sticker, stop, or listen.		- Animal tracks, paint, and paintbrushes. - Cards with the pattern and texture of the skin of each animal. - Markers, white coffee filters, glasses with water, and pipe cleaners. - Egg carton, carton, markers, paint, and paintbrushes. - Drawings of animals, crayons, and scissors. - Automat, wind powered tower, and drawings of the animals. - Robot, template, images.

Expectations

At the end of this unit all the children must	- Identify most of the animals, with support. - Demonstrate through appropriate non-verbal or simple verbal response, (single words), that they understand basic classroom language, songs, and texts. - Initiative to learn new skills and desire for self-improvement, with support. - Use language as a tool for exploring, expressing, and communicating their ideas and facts, with support.

	- Follow simple instructions for movement, although they may require support at times. - Participate in the game through movement although they require support and encouragement. - Explore and appreciate the perceptual, motor, and expressive possibilities and limitations of self and others.
At the end of this unit most of the children should	- Identify most of the animals. - Demonstrate through simple verbal response, (single words and short phrases), that they understand a wide range of classroom language, statements, and questions, songs, and texts. - Initiative to learn new skills and desire for self-improvement, with progressive initiative. - Use language as a tool for exploring, expressing, and communicating their ideas and facts, with progressive initiative. - Follow simple instructions for movement. - Participate in the game through movement and producing sounds. - Explore and appreciate the perceptual, motor and expressive possibilities and limitations of self and others.
At the end of this unit some of the children could	- Identify all the animals. - Demonstrate non-verbally and with a growing use of memorized oral response, (short, simple phrases), that they understand a wide range of classroom language, songs, and texts. - Initiative to learn new skills and desire for self-improvement. - Use language as a tool for exploring, expressing, and communicating their ideas and facts. - Follow instructions for movement.

	- Participate confidently in the game through movement and producing sounds, or occasionally their own spontaneous input. - Explore and appreciate the perceptual, motor and expressive possibilities and limitations of self and others.

Lessons Overview				
Lesson	Learning goals	Learning outcomes	Main activity	Assessment criteria
1	- To show an interest in listening to stories. - To identify animals. - To actively participate in the song. - To identify and respond to sound patterns in teacher led activities.	- Show an interest in listening to stories. - Identify the animals on the figures. - Participate in the song, doing the gestures and humming. - Identify and respond to the song.	Story *"Hippo has a hat"* and game.	- Observation rubric
2	- To recognize animals and identify their name. - To understand the question "Is it fast or slow?, "Is it big or small?" - To identify some verbs: walking, running, swimming, flying, or eating. - To recognize language related to the animals. - To actively participate in the song.	- Recognize the figures of the animals and identify their name. - Understand the question "Is it fast or slow?, "Is it big or small?" - Identify some verbs: walking, running, swimming, flying, or eating. - Recognize language related to the animals. - Participate in the song, doing the gestures and humming.	Game (smartboard): Identifying animals and game (smartboard): Memory	- Observation rubric

3	- To strengthen animal language. - To strengthen the adjectives fast and slow. - To recognize language previously learnt. - To show a greater awareness of the characteristics of the animals. - To participate in the game through movement. - To explore their body through movement.	- Listen and follow the story, interact while reading. - Strengthen the language related to the animals. - Strengthen language previously learnt like colors, adjectives, numbers. - Show a greater awareness of the characteristics of the animals. - Participate in the game through different movements according to it.	Game: *What's up?* Game: Mimic, sound and discover.	- Observation rubric - Games rubric
4	- To enhance logical-mathematical skills: experimentation and measurement. - To strengthen key language of the topic. - To explore animals through different tasks.	- Enhance logical-mathematical skills: experimentation and measurement. - Strengthen key language of the topic. - Explore animals through different tasks.	Animals' tracks symmetry	- Observation rubric

5	- To strengthen manipulative skills. - To manipulate materials, textures, and objects to the approach to Arts&Crafts and expressive productions. - To stimulate the acquisition of new skills and abilities to awaken aesthetic sensitivity and creativity.	- Strengthen manipulative skills. - Manipulate materials, textures, and objects to the approach to Arts&Crafts and expressive productions. - Stimulate the acquisition of new skills and abilities to awaken aesthetic sensitivity and creativity.	Chromatography butterflies and recycled animals.	- Observation rubric
6	- To explore through verbal and non-verbal language the different structures. - To identify language previously learnt related to animals.	- Explore through verbal and non-verbal language the different structures. - Identify language previously learnt related to animals.	Automat and wind powered tower.	- Observation rubric
7	- To review animal language. - To listen and identify animals. - To use the robot for the approach to the foreign language. - To follow the instructions	- Review animal language. - Listen and identify animals. - Use the robot for the approach to the foreign language. - Follow simple instructions to	Travelling with the robot.	- Observation rubric - Use of the robot rubric

	according to the template of the robot.	move around the template with the robot.		
8	- To use verbal and non-verbal language as a tool for exploring, expressing, and communicating ideas and facts. - To strengthen positive attitudes towards foreign language as a communicative tool.	- Use verbal and non-verbal language as a tool for exploring, expressing, and communicating ideas and facts. - Strengthen positive attitudes towards foreign language as a communicative tool.	Science Fair.	- Observation rubric - Show&tell rubric

ANNEX II – FIGURES OF THE ANIMALS

ANNEX III – SHADOW DRAWING

ANNEX IV – WHAT'S UP GAME

ANNEX V – MEASURING ANIMALS
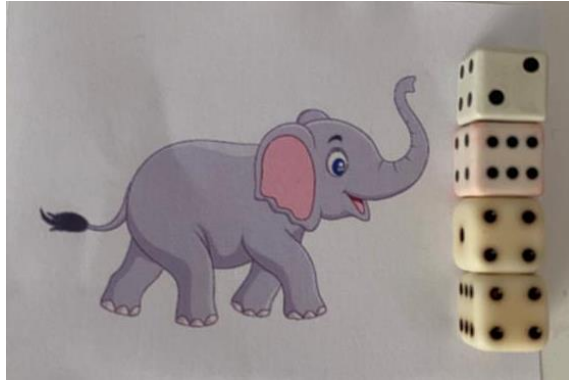
ANNEX VI – ANIMALS' TRACKS SYMMETRY
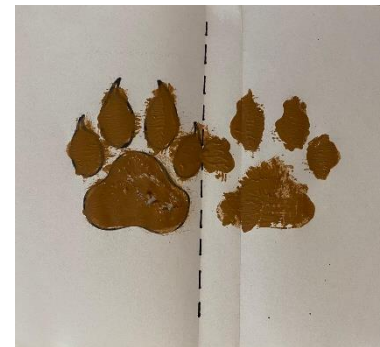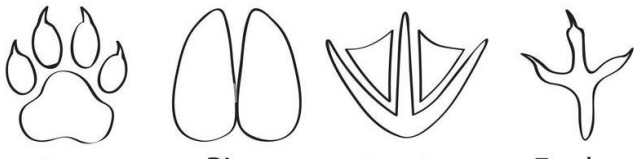
ANNEX VII – ANIMALS' SKIN

(Example of animals' skin. Designed by Christian Montessori network)

ANNEX VIII – CHROMATOGRAPHY BUTTERFLIES

(Example of chromatography butterflies. Designed by Buggy and Buddy)

ANNEX IX – RECYCLED ANIMALS

ANNEX X – DRAWINGS OF ANIMALS
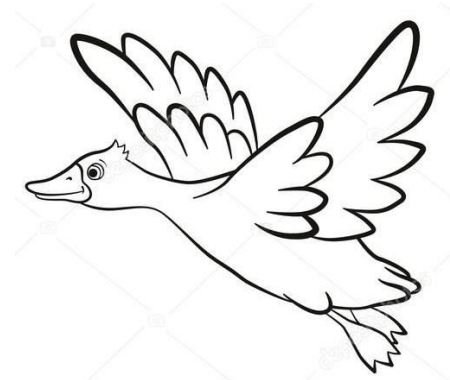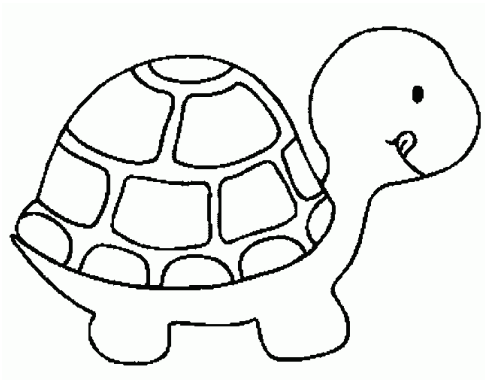
ANNEX XI – AUTOMAT

ANNEX XII – WIND POWERED TOWER

ANNEX XIII – ROBOT, TEMPLATE, AND IMAGES

ANNEX XIV – TEACHER'S DIRECT OBSERVATION RUBRIC

Evaluation criteria: 1-needs improvement (first level of expectation); 2-good (second level of expectation); 3-excellent (third level of expectation).

RUBRIC OF THE TEACHER'S DIRECT OBSERVATION				
Name of the student:				
Criteria	**Assessment criteria**			**Observations**
	1	**2**	**3**	
Pay attention to the teacher.				
Work in an individual way in the classroom.				
Work in a collaborative way in the classroom.				
Use nonverbal language.				
Use proper language to communicate.				
Help its classmates.				

Use proper language to communicate.			
Communicate their opinions and ideas.			
Respect the speaking/silence times.			
Identify the animals.			
Differentiate *fast* and *slow*.			
Identify the verbs: walking, running, and swimming.			
Recognize and express the characteristics of an animal (color, fast or slow, big, or small).			
Participate in the game through movement and producing sounds.			
FINAL ASSESSMENT	**/3**		
FINAL ASSESSMENT (/10)	**/10**		

ANNEX XV – GAMES RUBRIC

Evaluation criteria: 1-needs improvement (first level of expectation); 2-good (second level of expectation); 3-excellent (third level of expectation).

RUBRIC FOR "GOOD BEHAVIOR GAME"				
Name of the student:				
Criteria	**Assessment criteria**			**Observations**
	1	**2**	**3**	
Pays attention and respect the teacher' explanations.				
Plays confidently with self and peers.				
Actively participates in games and moments of reflection and respects turn taking.				
Identifies and respects the rules.				
Respects, helps, accepts, and plays with all classmates.				
Enjoys playing.				
Plays safely.				
Participates in the different games				

Plays with attitude and desire.				
FINAL ASSESSMENT	**/3**			
FINAL ASSESSMENT (/10)	**/10**			

ANNEX XVI – USE OF THE ROBOT RUBRIC

Evaluation criteria: 1-needs improvement (first level of expectation); 2-good (second level of expectation); 3-excellent (third level of expectation).

RUBRIC FOR THE USE OF THE ROBOT				
Name of the student:				
Criteria	**Assessment criteria**			**Observations**
	1	**2**	**3**	
Programs the robot in the necessary pattern to complete the desired task.				
Moves forwards and backwards.				
Moves left and right.				

Identify the elements of the template.				
Plans where to direct the robot.				
Takes care of the robot.				
Identify a pattern on the template.				
Recognizes and takes the shortest route.				
Respect the turns of use of their classmates.				
FINAL ASSESSMENT	**/3**			
FINAL ASSESSMENT (/10)	**/10**			

ANNEX XVII – SHOW&TELL RUBRIC

Evaluation criteria: 1-needs improvement (first level of expectation); 2-good (second level of expectation); 3-excellent (third level of expectation).

RUBRIC FOR SHOW&TELL
Name of the student:

	Criteria	Assessment criteria			Observations
		1	2	3	
Listening	Eyes stay on the person speaking.				
	Asks questions that are on topic.				
	Shows active listening.				
	Respects the person speaking (not talking with others or playing).				
Speaking	Stays on topic.				
	Uses a loud and clear voice.				
	Makes eye contact with the audience.				
FINAL ASSESSMENT		/3			
FINAL ASSESSMENT (/10)		/10			

ANNEX XVIII – EVALUATION OF THE TEACHER AND THE PROJECT IMPLEMENTED RUBRIC

Evaluation criteria: 1- not achieved; 2-needs improvement; 3-fair; 4-excellent.

RUBRIC OF THE TEACHER AND THE PROJECT IMPLEMENTED							
ITEM	**Criteria**	**Assessment criteria**				**Observations**	
		1	**2**	**3**	**4**		
Design	The lessons followed an adequate, logical, planned, and structured sequence.						
	The lessons had clear objectives.						
	A variety of tasks and techniques were used.						
	In the proposed tasks there is a balance between the individual tasks and group tasks.						
	The methodologies chosen were appropriate.						

Adequacy	The teacher facilitated learning strategies for the students.					
	The teacher programmed the tasks taking as a reference the features of the school, the stage, and the classroom.					
	The teacher made effective use of resources offered by the school and the classroom. And of the resources offered by the natural and social environment.					
	The teacher made effective use of time.					
	The pace of the lesson was appropriate.					
	Expectation of the standard of work required was high.					
	Appropriate feedback was given to students.					
	The teacher showed good content knowledge.					
	The teacher achieved the suggested goals.					

Skill balance	The teacher intervened to effectively support students.					
	The teacher proposed tasks that ensure the acquisition of the learning objectives and basic instrumental skills and techniques.					
	The teacher facilitated the acquisition of new knowledge by following the different levels necessary to achieve it.					
	If the teacher didn't achieve the objectives, the teacher proposed new tasks/ alternatives for their reinforcement.					
	Students were challenged and inspired by the work.					
	Students understood how they could improve.					
	Tasks were appropriate and understood.					
	The objectives were understood by the students.					
	Students showed progress in relation to the lesson objectives.					

Aim selection	The teacher accepted pupils' suggestions and contributions, both for the organization of the classes and for the learning tasks.					
Evaluation	The teacher adequately applied the assessment and evaluation criteria established in the unit.					
	The teacher used different assessment and evaluation criteria to ensure a balanced evaluation of the different contents.					
Social aspects	Students were well behaved.					
	The teacher's approach was positive and encouraging.					
	The teacher maintained the interest of the students based on their experiences and their previous knowledge using clear, adapted, and precise language.					
	The teacher created an effective learning environment.					
	The teacher encouraged cooperative work within the classroom.					

FINAL ASSESSMENT	**/4**	
FINAL ASSESSMENT (/10)	**/10**	