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ICT IN STEM EDUCATION IN THE CLIL CLASSROOM

Annual Syllabus for Natural Science in 4th Year of Primary Education

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Resumen:

Este Trabajo Fin de Grado se trata de una Programación anual en el área de las Ciencias Naturales para el cuarto curso de Educación Primaria. En su creación el enfoque de Aprendizaje Integrado de Contenidos y Lengua (AICLE) se ha utilizado para introducir la educación en Ciencia, Tecnología, Ingeniería y Matemáticas (STEM). Estos dos enfoques han sido relacionados gracias al uso de las Tecnologías de la Información y la Comunicación (TIC), y el inglés, como lengua extranjera, es usado como conector. El proyecto se divide en dos partes. En la primera de ellas se incluye el marco teórico y legislativo que justifica la implementación del enfoque AICLE para introducir la educación STEM mediante el uso de las TIC. Para ello, estos enfoques han sido desarrollados, incluyendo la definición de STEM y la repercusión de la competencia digital y las TIC en el siglo XXI. Además, esta primera parte también incluye el contexto escolar en el que se aplica la Programación, las características de los niños y niñas de diez años, así como las actividades complementarias, medidas de atención a la diversidad, un Plan de Acción Tutorial (PAT), o un programa de colaboración con las familias. La segunda parte está conformada por quince unidades didácticas divididas en tres proyectos. Una unidad ha sido desarrollada al completo, incluyendo los materiales y recursos necesarios para ponerla en práctica. Los proyectos se centran en los alumnos y en su relación con el entorno. Para ello, se proponen actividades de investigación y experimentos que tratan desde el cuerpo humano hasta conceptos más abstractos. Finalmente, el uso de las TIC permite a los alumnos comunicarse, entender, compartir ideas o fomenta la metacognición.

Palabras clave: Educación Primaria, Educación STEM, CLIL, TIC, Aprendizaje cooperativo.

Abstract:

This End-of-Degree Project is an Annual Syllabus designed for the area of Natural Science targeted at the fourth year of Primary Education. On its creation, the Content and Language Integrated Learning (CLIL) approach has been used to introduce Science, Technology, Engineering and Mathematics (STEM) education. These two approaches to education have been interrelated using Information and Communication Technology (ICT) tools, and English, as a foreign language, is used as a connector. The Project is divided into two interrelated parts. The first one includes the theoretical and legislative framework that justifies the implementation of the CLIL approach to introduce STEM education using ICT tools. For that, these approaches have been developed, focusing on the concept of STEM and the importance of the digital competence and the use of ICT tools in the 21st century. Furthermore, this part also includes the school context where the syllabus will be applied, the main characteristics of ten-year-old children, as well as complementary activities, strategies for meeting diversity, or a Tutorial Action Plan (TAP) and program for promoting collaboration with families. The second part of this syllabus is formed by fifteen didactic units divided into three projects. For their creation, the theoretical ideas covered in part one have been taken into practice. Out of all the units, one has been further developed and includes the resources and materials needed to carry it out. The projects focus on the students and their relation with the environment. For that, several inquiry activities and experiments have been designed, starting with the human body, and progressing to more abstract concepts. Finally, the implementation of ICT tools allows students to communicate, understand, share ideas, as well as promotes self- and peer assessment.

Key words: Primary Education, STEM Education, CLIL, ICT, Cooperative learning.

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1. GENERAL PRESENTATION

This End-of-Degree Project is an annual syllabus for Natural Science designed for the fourth year of Primary Education where the Content and Language Integrated Learning (CLIL) approach will be used to introduce Science, Technology, Engineering and Mathematics (STEM) education, underscoring the use of Information and Communication Technology (ICT) tools. This combination seeks to provide a response to the need for future citizens to master content knowledge as well as language to become skilled workers in an increasingly digitalised context. The Project is divided into two interrelated parts. The first one consists of a compilation of the theoretical and legislative framework that justifies the implementation of these methodological approaches. It is important to consider that we are at a transition moment where the new educational framework (Organic Law 3/2020; Royal Decree 157/2022) is being created. As such, the Community of Madrid, Community to which this syllabus is designed, and to which regulations in force it must adhere, has not yet published its new Decree based on the national educational framework. Thus, this Project will be based on the current legislative framework, including the framework for schools belonging to the Bilingual Program. For this reason, the first part includes the school context in which the syllabus is applied, the psychoevolutive characteristics of ten-year-old children, as well as the established contents, learning objectives or evaluation criteria as stated in the Royal Decree 126/2014 and the Decree 89/2014. Furthermore, this part also contains the activities and resources needed to work on the content and meet the objectives, in addition to complementary activities, means for attending diversity, or a Tutorial Action Plan and collaboration with families.

The second part of the syllabus is made up of fifteen didactic units organised in three projects: *Getting to know our bodies! Exploring nature!* and *Everything changes!* Out of all the didactic units, one of them has been further developed and includes all the resources and materials needed to carry out the activities. As part of the methodological principles used when designing the projects, it should be stated that the learning process is student-centred, referring to how the educational scenarios provided allow for learners to construct their knowledge, as well as reflect on their learning experiences. In that sense, the activities presented respect the characteristics and learning needs of the students, by allowing the teacher to acquire a secondary

role, creating learning scenarios that enable students to merge the knowledge they acquire by working with the STEM approach. The projects revolve around the students and their relation with the environment. Therefore, it starts with inquiry activities about the human body and its protection, followed by those related to their characteristics and their relation with living-things, with a focus on animals and plants. Progressively, the last project works on more abstract concepts and allows for a combination of inquiry and experimentation both individually and in groups by exploring the properties of the environment. The guiding methodological thread used throughout the projects enable students to learn STEM contents within the CLIL approach. Together with that, different ICT tools are used throughout the project, opening for new ways of communication, understanding, as well as easing the self-reflection process and the give of feedback both by the teacher and the peers. In that sense, the use of ICT tools also facilitates cooperative and collaborative work, where students can rely on their peers, allowing an easier sharing of ideas and interests, in addition to assisting the scaffolding process and attention to diversity.

2. THEORETICAL JUSTIFICATION

2.1. Bilingual education

According to the Commission of the European Communities (2003), the European Union is formed by a wide range of diverse cultures, hence the need to boost the language skills of the population, starting at an early age, to promote social inclusion and understanding. Nonetheless, being competent in just one language is not enough as the goal is to develop significant communicative skills in at least two languages (Council of Europe, 2022).

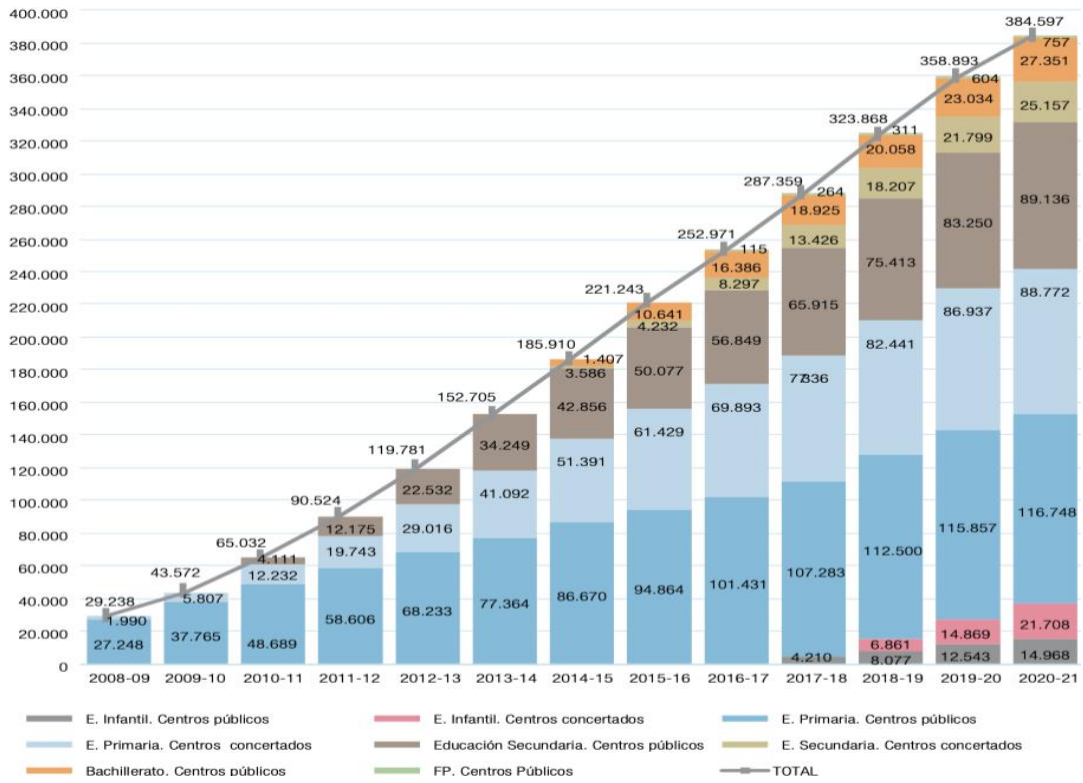
Bilingual education started in Madrid in 1996 when the British Council and the Ministry of Education and Science created a curriculum that was applied in several schools, starting from age three. This event highlighted the need to increase the exposure to the language, in this case English, to ensure the proper development of foreign language skills. Some of the aims that were sought with this curriculum included: to facilitate the development of communicative skills by increasing the exposure to English, to gain knowledge and get in contact with both cultures, to promote the

exchange of students and teachers, or to support the use of technologies in language learning (Dobson et al., 2010).

This educational policy from the European Union that fosters bilingual and multilingual education continued in 2004 when the Community of Madrid started a Bilingual Program that has been gradually applied and extended. The programme was first introduced in Primary Education, to later be established in Secondary Education in the year 2010 and, finally, broaden to the second stage of pre-Primary in the year 2017. As seen in Figure 1, the Program has progressively expanded and currently offers Bilingual education in all mandatory educational stages.

Figure 1

Students' evolution from the Bilingual Program Spanish-English from the Community of Madrid.



***Note*.** The figure represents the gradually increase in the number of students of the Community of Madrid Bilingual Program. It should be underlined the growth in students in semi-concert schools, from less than 2.000 students in the school year 2008-09, to more than 88.000 students in the year 2020-21.

Source: Datos y Cifras de la Educación 2021-2022. Dirección General de Bilingüismo y Calidad de la Enseñanza. Consejería de Educación, Universidades, Ciencia y Portavocía (Community of Madrid, 2021).

The methodology chosen was the CLIL approach, with the main objective of using the foreign language as a form of communication and a learning tool. Particularly, the Order 5958/2010 states that at least one third of the school time should be taught in English. This Order aims to develop progressive language proficiency in students as an essential tool to enable them to compete in the labour market and secure a promising personal and professional future. As part of the Order, among others, schools are equipped with ICT tools to facilitate the Program development, underscoring their relevance for language learning. Furthermore, one of the main objectives is for students to increase their autonomy in their use to obtain information, as well as a means for communicating in English.

2.2. Science, Technology, Engineering and Mathematics (STEM) Education

The Sustainable Development Goals (United Nations, 2016) create an action plan where countries work together to eradicate some of the major issues on a global scale. Among them, Goal four reads: “Ensure inclusive and equitable education and promote lifelong learning opportunities for all”. For this purpose, the United Nations aims to increase the percentage of population that have relevant skills that will allow them to succeed in their future. The 21st century entails vital issues that citizens, as a society, need to face. Thus, the need to develop specific skills and knowledge. The increasing pace of change and the rapid need of response, the interdependency of the population, the mobility of citizens, or the disruption that the unprecedented technological revolution causes are some of the major challenges the current and future societies will have to face daily.

In this context, STEM education has become a priority with a foresight of the growing number of high-skill STEM jobs expected in the future and the decreasing number of girls and people from humble backgrounds who opt for STEM careers. However, a thorough review of the educational literature does not provide an accurate definition of what STEM education is, or establishes a specific methodology, leaving teachers to create their own approaches (Lamberg & Trzynadlowski, 2015). Nonetheless, it can

be asserted that a real, significant STEM education will not address each discipline separately. As such, Tsupros, et al. (2009) describe the need to understand STEM as an interdisciplinary approach where science, technology, engineering, and mathematics concepts are applied in real contexts, allowing the creation of a meta-discipline. To this end, STEM allows students to understand the world by providing an interdisciplinary knowledge, over an isolated, divided understanding (Morrison, 2006).

As Martín (2020) describes, STEM literacy is a requirement as it enables citizens to actively participate in society, to have continuous access to information or learning processes and the development of critical and reflective thinking or values. Hence, the need for all students to be faced with STEM education, not just those characterised for their scientific or mathematical abilities. In this respect, the United Nations (2016) emphasise the need to strengthen STEM education practices and provide students with meaningful learning scenarios where they can apply their knowledge. Special emphasis is placed on the necessity to involve young girls in STEM, with a focus on the decreasing number of young people whose initial studies choice are mathematics or science, or the increasingly number of population who abandon them. In this respect, Martín et al. (2019) agree that is during Primary that children begin to consider a STEM itinerary and that there is a strong link between the mathematics and science experiences students have to they wanting to choose STEM related degrees. Nonetheless, Martín (2020) underscores how the detachment to these studies are a consequence of decontextualised teaching practices in Primary Education, where the prevailing teaching model is based on reproduction and memorisation, and the curriculum and the teacher are the two sources of information. That is where the need to encourage inquiry approaches stems from. Besides that, STEM education seeks to provide students with meaningful learning experiences in an engaging, relevant, and dynamic way, with a focus on inquiry-based learning and context-based teaching. That is why there is a need to take advantage of the natural students' sense of curiosity that will motivate them to engage in STEM related activities, as well as seek to reduce the gender gap (Kearney, 2016).

The implementation of STEM education in Primary has various aims, which include helping students understand the different disciplines, fight against the barriers that

prevent students from finding STEM related employment or improve and influence their attitudes toward science. However, there are three obstacles to effectively implement STEM teaching in Primary education. These are: high quality teacher training, with the underlying issue of teacher confidence in teaching science; access to high quality teacher resources, with a need to equally distribute materials, especially technological ones; or the need to create a "STEM culture", which promotes adequate collaboration between institutions (Nistor et al., 2019).

It is important to highlight how the Organic Law 8/2013 and the new law 3/2020 determine the central role the competency approach acquires, and the need to link learning to everyday life. As Martín (2020) describes, this approach to learning provides a patron that guides STEM education, emphasising the need to develop all competencies in an interdisciplinary way. As the author mentions, these approaches have a close relation as every STEM learning practice will enable the development of skills in students. Moreover, the author emphasises the need to use active methodological approaches where real learning takes place. To this respect, the implementation of a STEM-based curriculum can develop mandatory skills for 21st Century citizens, such as, social skills, complex communication, problem solving, self-management, as well as enabling them to accurately make decisions in their daily tasks (Bybee, 2010). These ideas are complemented by Güllen's (2019) study, which shows that STEM education can also develop analytical, independent, skeptical, and creative thinking. In this sense, STEM disciplines have a positive effect in enabling people to easily solve daily problems.

2.3. CLIL Approach

CLIL is a dual educational approach where content and language are taught using an additional language. In this integrative approach, language is seen as a means for learning and communicating, with the objective of fostering language and content proficiency at predefined levels (Marsh et al., 2010). Throughout the different subheadings, the main characteristics of this educational approach will be described.

2.3.1. Methodological principles

In this section we will describe the main methodological principles that must be present in successful CLIL lesson plans, followed by a brief comparison with the current bilingual education legislation.

Table 1

Main methodological principles. Adapted from: Custodio-Espinar (2019b)

Content	Pedagogical, conceptual, and linguistic aspects must be considered when planning and selecting learning objectives. Determines the linguistic demands. Rooted on the curriculum.
Communication	Language is selected from content, later analysed to determine language demands. It should promote the development of the 4 basic skills (speaking, listening, writing, and reading). Language demand analysis must support interaction. It enables the development of reception, transformation, and production scaffolding. Basic Interpersonal Communication Skills (BICS) and Cognitive Academic Language Proficiency (CALP) need to be identified. Use of the Common European Framework of Reference (CEFR) to ascertain the level of proficiency and develop language assessment strategies.
Cognition	Use of cognitive taxonomies, such as Bloom´s Taxonomy. Adapt activities to the cognitive development of students.
Culture	Aims to develop intercultural understanding.
Attention to diversity	Progression from Lower-Order Thinking Skills (LOTS) to Higher-Order Thinking Skills (HOTS). Multimodal input: present information in various ways to enable deeper understanding and consider multiple intelligences.
Methodological strategies	Must follow a student-centred strategy, promote autonomy, and flexible learning processes. Must promote the development of key competences.
Activities	Must be connected to curricular objectives. Must be open, flexible, and connected to student´s interests. Also, allow an integrative evaluation of content, process, and language.
Learning materials	Create rich learning spaces. ICT tools enable autonomy in the learning process.
Assessment	Must cover language and content progress. Individual and group assessment with oral and written tasks. Combine summative and formative assessment.

Classroom organisation	Promote intensity and reiteration. Classroom arrangement must be rich on visual resources, foster interaction and decrease student´s anxiety to learning.

These methodological principles coincide with those exposed in the Order 5958/2010, 7th December, for bilingual state schools in the Community of Madrid. English is seen as a working language and is learned throughout different subjects of the curriculum, with a focus on content teaching over language. It is recommended that Natural and Social Science are taught in English. The aim is to promote students' active participation with appealing learning processes, a balanced development of basic skills and oral communication, and provide regular, positive feedback to students.

2.3.2. ICT use in STEM Education in the CLIL classroom

Technologies are a key component of the Primary curriculum. The legislative framework (Royal Decree 126/2014; Decree 89/2014; Order ECD/65/2015) states the need to develop the digital competence in students. To this end, the Decree 89/2014 emphasises the need to improve students' digital skills. For it, the Community of Madrid has free configuration subjects, including Technology and digital resources for improved learning. STEM education needs to be part of the digital revolution and promote the use of ICT tools, by which it can enhance students' participation and reinforce learning. It is by this tools that a dual approach to learning takes place: digital education to promote learning and teaching activities to develop digital skills (López et al., 2020). These authors reinforce the idea that real STEM education takes place when students "do" science, mathematics, or engineering activities, with a hands-on approach and a real understanding of the learning process.

The use of ICT tools can offer significant opportunities to enhance learning. These include: inquiry learning processes, facilitating the access to data and its analysis, as well as adapting the learning situation to students' needs; supporting the creation of theories and explanations, making abstract concepts understandable and allowing students to create their own ideas and scientific models; or to create and defend arguments, and for evaluation processes, by facilitating the access to different means of communication, and allow learning success by an engaging immersive learning

process (López et al., 2020).

It cannot be denied that ICT resources also have a positive impact in CLIL learning processes. As such, Custodio-Espinar (2019b) described the main methodological principles that need to be present in CLIL classes. Among them, the use of ICT materials play an important role, as they contribute to the creation of tasks and materials that foster the learning processes needed in CLIL, as well as a progressive autonomy, according to the individual´s characteristics.

2.3.3. The 4C´s

The Four C´s Framework (Coyle, 1999) represents the foundations of CLIL. This term illustrates its interrelated nature, which allows the creation of coherent and meaningful learning scenarios. Marsh (2012) describes the principles these pillars are based on:

- **Content**: refers to curricular subjects and the need to acquire knowledge and skills. It also touches on the need for students to develop their own knowledge through different thinking strategies. It must be analysed to identify the linguistic demands.
- **Cognition**: it is linked with the need to develop cognitive and thinking skills.
- **Communication**: it is the language related to the context. It needs to be transparent and accessible, with a focus on interaction. In this sense, students learn using the language, while learning the language. We can distinguish three types of language: *language of learning*, directly related to the context; *language for learning*, content compatible language which allows students to carry out tasks; and *language through learning*, which emerges from the language planned.
- **Culture**: it adds perspective to the learning process. It refers to looking critically to one´s and other´s cultures to promote understanding, underscoring the need to develop the intercultural competence.

2.3.4. Scaffolding

CLIL learning processes include studying subject concepts and language through an additional language. In this context, students are faced with challenges and in need of scaffolding processes. This concept was first described using a building metaphor (Bruner, 1999) where scaffolds are placed around buildings to assist the building

process and being removed once the building can support itself. Scaffolding refers to the support given to students in their process of developing the skills needed to become independent, self-regulated learners. In Hammond´s (2001) reviews of this concept its key features are described. Scaffolding is meant to increase students´ independence and better supports learning when tasks provide high challenge and high support is given. The temporary nature of scaffolding is tied to the need to gradually remove the support given as students' knowledge increases, providing it just when needed. Additionally, scaffolding can be understood at a micro-level, in relation to teacher and student interaction, or a macro-level, related to program goals.

Scaffolding is built upon Vygotsky´s concept of the Zone of Proximal Development (ZPD) (Vygotsky, 1978). This key component of the learning process can be defined as the distance between an individual´s level of potential development and the level of actual development. This definition outlines the need of support given by someone who is more proficient in the task (either the teacher or peers). Hence, the importance of interaction to promote the development of the ZPD. In practice, scaffolding is a key component of CLIL and is needed throughout the whole process as it is critical for students' success. In this sense, scaffolding should address the cognitive and linguistic challenges raised by content, with the language level of students, and the cognitive and linguistic demands of the subject being the indicators as to what degree scaffolding is needed.

2.3.5. Teacher´s and student´s role

One of the pillars of CLIL are teachers. That is why their role in CLIL classrooms is vital to ensure success in learning. CLIL teachers must have the ability to teach one or more subjects in the curriculum in a language other than the usual language of instruction, thus teach that language by itself (Eurydice, 2006). The nature of CLIL teaching processes implies the need of a methodological shift to adjust to this approach. In this respect, Pérez Cañado (2017) proposes a list of competences CLIL teachers must acquire and develop. One of the main ones is the *linguistic competence*, related to intercultural aspects, referring also to Basic Interpersonal Communication Skills (BICS) and Cognitive Academic Language Proficiency (CALP) language, that is, everyday used language and more specialised language to be used for academic

purposes. This is linked to the *pedagogical competence*, with the need to promote student-centred methodologies, flexible learning environments and resources (implementing, for example, ICT tools), or a holistic and formative evaluation. Simultaneously, teachers must develop *scientific knowledge*, with the need to master the content taught and the fundamentals of CLIL. This knowledge should be accompanied by the *organisational competence*, as teachers must keep up to date with the new methodological principles, as well as classroom management strategies. Moreover, teachers should develop *interpersonal and collaborative competence*, in addition to the *reflective and developmental competence*. These teacher competences create a proficient profile that will promote the development of specialised CLIL teachers.

To this end, teachers should opt for more CLIL-connected methodologies. In this respect, there is a need to shift to more participative classes, where teachers are not the only source of information, and students are free to manipulate the knowledge through communication, cooperation, and cooperative work (Pavón & Ellison, 2013). Furthermore, the role of teachers also refers to the need to adjust to the dual nature of CLIL, creating activities for both content and language and be able to assess them correctly. Moreover, they should adjust the input to students' characteristics, as well as work with learners from various cultural and linguistic backgrounds.

The second pillar are students. In a CLIL context students must have an active role and be involved in activities. Their engagement can be enhanced by an active interaction among students, as well as with the teacher, which can be promoted using technology by creating a communication channel. This is imperative as students need to work together and exchange ideas to complete their STEM projects. Moreover, their role goes beyond learning new content as they also need to reflect on their learning processes. These ideas are complemented by Dale and Tanner (2012) who describe the main benefits of CLIL for learners. These include cognitive development, and motivation, development of communication skills and intercultural awareness, new personal meanings in other languages, or a meaningful interaction among students.

2.3.6. Attention to diversity through CLIL

As described in Decree 89/2014, article 17, we can distinguish between ordinary and extraordinary measures to attend diversity in Primary Education. Ordinary measures are linked to modifications and organisation of groupings, methodologies, activities, or evaluation, where the prescriptive elements of the curriculum are not altered. The ordinary measures for the 4th year class are:

- Activities are suited to students' needs and adapted to their academic competences going from LOTS to HOTS, or from HOTS to LOTS.
- The methodological approach combines STEM project-based learning with the CLIL approach which makes learning motivating and engaging for students, by developing learning strategies in contextualised learning scenarios.
- Active participation is encouraged, with a focus on individual and group work, as well on debates and sharing of discoveries.
- Spaces and materials will be arranged and selected bearing in mind students' characteristics, interests, and difficulties.
- Evaluation techniques, procedures and tools will be tailored to students' characteristics.

As part of the ordinary measures, the Universal Design for Leaning (UDL) (CAST, 2018) will be implemented. This framework takes students' variability into account by organising flexible learning pathways. The framework is divided into three main principles with the objective to systematically cope with individual differences.

Table 2

Basic principles of the Universal Design for Learning (UDL)

Principle	Rationale
I. Provide multiple means of engagement	Each student´s motivation and engagement to learning is different. Thus, various engagement options must be offered to meet learners in all contexts.
II. Provide multiple means of representation	Information must be provided through different forms and in a format that can be adjusted to students' needs, as there is no unique optimal model to present information.
III. Provide multiple means of	Each student has different learning preferences and means of

action and expression	expression. Therefore, alternative options to carry out and present tasks must be available.

Note. Adapted from Center for Applied Special Technology (CAST) (2018).

Lastly, extraordinary measures are aimed at meeting the individual educational demands of students and are implemented when ordinary measures are not enough. They refer to the individual actions that require the creation of personal and material resources, where the prescriptive elements of the curriculum are altered. In this sense, the extraordinary measures for the class are destined for a child with High Intellectual Abilities. The actions to be implemented are:

- Adjust activities to the student´s characteristics, by offering tasks that target HOTS.
- Provide optional activities drawn from student´s interests (such as research projects).
- Encourage the student´s active participation in the learning process.
- Promote group and cooperative work where the student can bond with their classmates.
- Enhance research and creativity in activities.

3. ANNUAL SYLLABUS

3.1. Socio cultural context

This Project is contextualised in a semi-private school called Elmstree, located in *Vallehermoso* in Madrid. Traditionally, the area is known for its ageing population, but in recent years it has renewed and attracted more young families with children. The school is close to residential areas, where most of the students live. *Vallehermoso* is known for being popular among college students as the area is close to *Ciudad Universitaria,* the university district. Moreover, this zone has many green and recreational areas that make it an ideal spot for families. Elmstree school has a privileged location, being close to green and sport areas or major institutions as *Instituto Geográfico Nacional, Estadio Vallehermoso, Parque de Santander,* or *Centro Cultural Galileo,* enabling outside-school activities that enrich what is being learnt and

connects it to real learning scenarios. The area can, also, easily be accessed by public transportation, which allows families from other residential areas to attend the school.

The school was founded in the year 2000 and since has sought to improve the learning processes of students. That is why they opted to include the CLIL approach as a vital part of the learning process. In this respect, this approach is now included in most of the educational stages the school offers, from pre-Primary to Secondary Education. Apart from that, each grade (three in pre-Primary Education, six in Primary Education, four in Secondary Education and two in Baccalaureate) is divided into three groups, with a total of 45 classes attended by a wide range of professionals. The socio-economic status of the families is medium-high, being common for them to enrol all their children in the school. In general, family's cultural level is high as they have attended university or have master's degrees and work in the tertiary sector. They are actively engaged in their children´s education and are keen on participating on workshops and activities programmed by the school.

3.2. Teaching staff context

The Primary Education section is comprised of 24 teachers and 440 students organised in three lines, per year, of around twenty-two students. Among professionals, we can find 18 form teachers, a counsellor, a nurse, language assistants or Physical Education teachers. All of them work together to create learning scenarios that ensure meaningful learning processes, by following a methodology based on cooperative work, problem solving and experimenting activities, as well as initiating students in the importance of metacognition processes. For that purpose, the school is committed to applying technology as a pivotal element to learning. As such, ICT tools are used throughout the whole learning process. To this end, each student has access to a private computer, monitored by teachers, as well as a WI-FI network for the school.

The school is a bilingual centre and part of the Bilingual English Development and Assessment (BEDA) programme, managed by *Federación de Escuelas Católicas de Madrid* in collaboration with Cambridge English Language Assessment, which promotes and ensures quality bilingual education. As such, in Primary one third of the

classes are taught in English, including the subjects English, Science and Arts and Crafts. Moreover, language assistants help teachers in the classroom three times per week, teaching students about their culture, as well as assisting with grammar, pronunciation, or conversation. In accordance with the school´s educational approach, the methodology focuses on experiential and discovery learning.

This annual syllabus has been created for a Year 4 classroom with 24 students. Most of them have attended the school since pre-Primary and are, therefore, familiar with the school´s educational approach. The group is homogeneous, and no significant differences can be found in students' level. However, there is a student who has special needs as he has High Intellectual Abilities. For this reason, scaffolding practices will be used to guide the student in its learning process.

3.3. Psychoevolutive characteristics of students

Throughout their development students display a wide range of characteristics that need to be considered when organising learning scenarios. In this regard, we can find the stages of cognitive and affective development specified by Piaget (1963). In accordance with the age of students, we will describe the concrete operations stage, ranging from age 7 to 11. Some of the cognitive characteristics of these children include concrete thinking processes, increase in the logical manipulation of numbers and symbols, as well as inductive logic processes, decrease of egocentric practises, changes in their social interactions or a greater ease to distinguish between fantasy and reality.

As described by Piaget and Inhelder (1975), socialization processes are affected by the biological development and the social experiences the person has lived. Children in the concrete operations stage begin to create more structured social relationships among children their own age and start to develop a stronger sense of individuality. They start to understand the world around them by using logical thinking processes and begin to manipulate their surroundings. They also outgrow their egocentric nature and begin to create meaningful social relationships with others.

As for the moral development of ten-year-old children, Fuentes et al. (2012), picking up on Kohlberg´s and Piaget´s ideas, describe how children cannot deliver moral

judgements until they reach a sufficiently high level of cognitive maturity. In this sense, children go from passively receiving external stimuli to actively modifying it. As such, children´s moral principles progress from a stage where morality is imposed by others, with defined laws and principles that cannot be changed, as their infringement leads to punishment, forcing children to act according to them, to being in accordance with social norms to maintain a social order.

Another aspect to be taken into consideration is the need to examine the emotional wellbeing of children, an essential aspect of their development. As Gottman (1997) describes, the social relationships that children start to develop play an important role in meeting their emotional needs. He goes on to detail how kids in their middle childhood start to relate to larger social groups, begin to feel social pressure, try to repress their emotions to prevent embarrassing situations, or enhance their ability to read social clues. Throughout this syllabus these general characteristics will be taken into consideration when organising the different activities and learning strategies. However, it is important to bear in mind that each individual is different and that their unique characteristics must be considered when organising the activities.

3.4. Objectives

3.4.1. Educational stage objectives

The general objectives are included at the Royal Decree 126/2014, of 28 of February, by which the core elements of the Primary Education curriculum are established. They are included at Annex 1.

As reflected in the Royal Decree, Primary Education seeks to develop the child's holistic development by working on oral expression and communication, reading, writing, calculation, acquisition of basic cultural knowledge, peaceful coexistence, study and work habits, artistic sense, creativity, and affectivity. This knowledge will prepare students for Secondary Education. For that purpose, Primary Education is organised in six school years, ranging from age six to twelve, divided in different areas.

3.4.2. Natural Science objectives

This syllabus has been created for the subject of Natural Science and its objectives are included in the Decree 89/2014, 24th July, that organises the Primary Education curriculum for the Community of Madrid. They are included at Annex 2. These objectives are divided into blocks, as stated in the Royal Decree 126/2014. The blocks are Block 1: Initiation to scientific activity; Block 2: Human beings and health; Block 3: Living beings; Block 4: Matter and energy; and Block 5: Technology.

3.5. Competences

The European Commission (2019) created a document describing the key competences every citizen should acquire. This document stemmed from the need to create a framework that both described and provided examples on how to reach the goal of creating engaged and independent citizens. The organisation described competences as a combination of knowledge, skills and attitudes each person acquires throughout their lives that are applied daily, allowing the person to actively participate in society. In this respect, this syllabus has been designed to be aligned with the current legislative framework (Decree 89/2014). However, the new set of key competences contained in the Organic Law 3/2020 and the Royal Decree 157/2022, article 9, have been taken into consideration due to their connection to our aim to use the CLIL approach to introduce STEM education, underscoring the use of ICT tools. Thus, the documents give a main role to competences as necessary elements of the 21st century, describing their importance in lifelong learning processes. Among them, they underscore the key competences as essential elements that allow personal development, active citizenship, social inclusion, or employment. As such, these key competences are:

Figure 2

Key competences

Linguistic competence	Plurilingual competence
Mathematical competence and core competences in science, technology, and engineering.	Digital competence
Personal and social competence and learning to learn	Citizenship competence
Initiative and entrepreneurship competence	Cultural and artistic competence

These key competences are an essential element to achieve a complete personal, social, and professional development of students. They refer to the need to engage in conversations and interpret texts, to describe, explain and respect our surroundings, to use technology creatively and critically, as well as understand and take control over our own learning processes. They also refer to the need to comprehend and respect artistic and cultural manifestations, or how to actively participate in society and respect each other. This competency-based education is enhanced by CLIL. In this approach students are actively engaged and acquire a central role, multimodal input is provided so that every student can take part in the learning process, several grouping and space strategies are offered, or flexible learning takes place. It also refers to how CLIL emphasises the importance of taking advantage of the benefits of using various resources, including ICT tools, or to relate what is being learnt in the class with our daily lives. In this Project, these competences will be considered and enable the creation of a competence orientated approach. By doing so, we seek to create meaningful learning scenarios that improve learning and create student-centred methodologies that promote engagement and active participation.

3.6. Contents

3.6.1. Official curriculum

The syllabus is organised to work on contents of Natural Science, according to the Decree 89/2014, 24th July. These contents, previously described, are included in the Annex 1.

3.6.2. Sequence in the Annual Syllabus

In this section, the contents will be sequenced according to their organization in the three projects: Getting to know our bodies! Exploring Nature! And Everything changes! in the order they will be done. The aim of these projects is for students to gain knowledge and understanding of their own body and the world around them. For this purpose, the STEM perspective and CLIL methodology will be implemented, with a focus on the use of technology. Table 5 presents the organization of the contents.

Table 5.

Sequence and temporalization of the contents in the Annual Syllabus.

Term	Project	Content	Dates
First	Getting to know our bodies!	• Health and sickness • Circulatory system • Respiratory system • Reproductive system	6th September to 19th September 21st September to 5th October 10th October to 24th October 26th October to 9th November
First/ Second	Exploring nature!	• Vertebrate animals • Invertebrate animals • Plant nutrition • Plant reproduction	14th November to 28th November 30th November to 14th December 19th December to 16th January 18th January to 1st February
Second/ third	Everything changes!	• General material properties • Materials and their properties • Effects of forces in objects • Buoyancy of objects • Simple and complex machines • Stages of aggregation • Inventions and discoveries	6th February to 20th February 22nd February to 8th March 13th March to 27/29th March 11th April to 24th April 26th April to 17th May 22nd May to 1st June 5th June to 19th June

3.7. Tutorial Action Plan and Collaboration with Families

One of the key elements of the syllabus is the Tutorial Action Plan (TAP), created taken into account the Community of Madrid recommendations. This document seeks to identify obstacles and promote communication among students and teachers, along with school and family cooperation. The TAP is one of the main pillars that enables understanding, guidance and directs the daily educational practice. It has been created emphasizing the importance of an active family implication in the learning process with the objective of promoting a real comprehension of the materials covered, together with the aim of easing the implementation of the learning methodology. For that purpose, the difficulties and doubts that may arise in families as a result of combining the CLIL approach with STEM education and focus on technology have been considered. This plays a major role as the L2, in this case English, is used as a tool for learning. In this regard, the TAP addresses the need to provide individual guidance for each student to promote the complete development of the individual. To this end, students are offered the chance to ask for individual tutorials when needed, as a supplement to the group tutorials that take place each week. These meetings are organised within school hours and attempt to respond to the emotional, socialization or coexistence problems that may arise throughout the school year. It also seeks to support students in their learning process, as well as focusing on their emotional wellbeing and development. For this reason, the document reflects on the need to develop knowledge on students, as well as a deeper emotional understanding that will allow them to succeed in the 21st century. Furthermore, it also touches on the importance of creating adequate studying methods that facilitate the understanding of the materials, the creation of age-appropriate means of socialization, including digital use, the implementation of peaceful conflict resolution strategies, or promotes social inclusion by portraying individual differences as an enriching aspect of human diversity. For doing so, different workshops have been created to encourage a practical implementation of these learning goals. Nevertheless, with the intention of adjusting the TAP to the real needs of families and students, new workshops could be organised, prior request from families.

Another pivotal element is the collaboration with families, as it is believed that they are

a key element and their participation enriches the learning process, as well as an active communication is crucial for a correct implementation and development of activities. For this reason, the school provides various communication channels that seek to facilitate the connection between the school and families. Thus, several group tutorials with families are organised, as well as individual tutorials, at least one at the beginning and end of the school year, where families are invited to share their doubts about their children´s learning processes, as well as they allow cooperation and understanding among families and the school.

3.8. Methodological development

As the European Commission (2019) describes, there is a need to create teaching and learning environments that promote competence development. This answers to the need to improve learning outcomes and promote student engagement. The Institution goes on to describe the need to create student-centred approaches that promote an active participation, underscoring the benefits of the use of digital technologies as a reality for individuals. The dual nature of CLIL compels the creation of resources that focus on and evaluate both content and language. The materials used in the classroom need to be meaningful, authentic, and challenging for students. These quality materials should promote autonomy in learning, critical thinking, and discussions about the topic. That is why resources need to be cognitively demanding to promote higher order thinking, as well interaction (Mehisto, 2010). This author also explains the characteristics quality CLIL materials have. These include create clear and meaningful tasks for students, making their process visible; promote academic language proficiency; develop skills and autonomy in learners; include formative assessment and self and peer evaluation strategies; create safe environment where students can practice language; enable cooperative learning; introduce authentic language; foster critical thinking; include scaffolding strategies; or make learning meaningful.

In this respect, ICT tools have become meaningful resources to promote quality in learning. Custodio-Espinar and Caballero-García (2016) support the integration of ICT tools as essential resources in CLIL scenarios. These materials help to motivate students and foster autonomy in learning. Furthermore, they promote learning processes in creative ways, encourage interaction, meet the needs of diversity by

promoting self-learning processes, enhance interaction between students and teachers, develop reflection strategies, or contribute to the development of key skills, such as the linguistic and digital competence.

This Project aims to combine the dual nature of CLIL to introduce the STEM approach. Accordingly, resources must comply with STEM characteristics. To this end, Peña-Martínez and Muñoz-Muñoz (2019) describe the main features of this approach: promote scientific and engineering research, implement a collaborative approach to learning and researching in STEM scenarios, incorporate technology and engineering in math and science settings, or provide a global and interdisciplinary perspective. Activities need to be planned considering the characteristics of the group and the context to be applied on. Moreover, CLIL activities start with a diagnostic activity that connects with students´ previous knowledge and their interests. Also, various tasks should be introduced, including analysis, evaluation, and production ones, to be done in pairs or groups. In this syllabus, several methodological approaches will be included.

- **Information and Communication Technology (ICT)**

The reality of the 21st century is that technology can be found everywhere and that individuals must learn to use it. In this sense, ICT tools, as part of the digital competence, also become essential elements in education, creating meaningful learning scenarios. Ten-year-old students, therefore, need to dive into this reality. That is why this syllabus seeks to answer this necessity by implementing the use of ICT tools in all aspects of learning. For this purpose, each student will have access to a computer and a WI-FI network that will be used throughout the learning process. Due to its importance in STEM, emphasis will be placed on the need to develop an adequate digital competence. As such, work will target cooperation, critical attitudes towards technology, or the importance of complying with their ethical principles. For this reason, this syllabus will work on the acquisition of specific language and understanding the dangers of the online world, the correct use of technological resources (such as applications or websites) and creation of content, or the importance of developing a critical attitude towards the information found online. For doing so, students may be asked to seek information about a topic using different sources, selecting only relevant information, or to use different applications and websites to

organise information and present conclusions.

- **Science, Technology, Engineering and Mathematics (STEM)**

This syllabus will implement STEM education in all aspects of the learning process. To this end, different learning situation will be created, relating real life situations, relevant to students, with what is being learnt. As Martín and Santaolalla (2020) describe, STEM education aims to integrate the ways of doing, thinking, and describing of science, technology, engineering, and mathematics. However, as the authors mention, traditionally students have been taught how to answer questions, but not much emphasis has been placed on how to formulate them, a core element of STEM education. Another pivotal element is the need to facilitate the access to STEM-related practices to all students, not just those who stand out for their scientific or mathematical abilities. Bearing this in mind, recommendations from the authors about the best method to implement STEM have been considered and the Project-based learning approach has been chosen. The aim is to promote the development of thinking strategies, discussion, and collaboration among students. As such, in this syllabus the teacher will not be the only source of information as students will be encouraged to collaborate and, using inquiry-related practices, formulate questions throughout the learning process and work together to find answers. For that purpose, throughout the projects students will be faced with several hands-on activities where they will have to cooperate and apply their knowledge, using technology to find a solution. Furthermore, emphasis will be placed on the need to acquire and use scientific knowledge (specific words like experiment, plan, design, brainstorm, or observation, as well as the parts of the scientific method), together with formulating accurate questions in relation to the topics.

- **Inquiry method**

Together with STEM education, inquiry-based learning will also be introduced. By doing so, students will have a central role in the learning process. In this case, the teacher's role will be to arouse curiosity and trigger reflection about the activities presented. Students will be encouraged to cooperate and offer creative ideas to solve problems. For this purpose, student´s natural curiosity will be exploited, and they will

be faced with different problems, having to cooperate, share ideas, investigate, formulate questions, observe their surroundings, or apply new information to previous tasks. In doing so, students will be encouraged to use the scientific method to organise their ideas and inquiry methods. The inquiry process does not end with the investigation and explanation of the information discovered, as students will also be asked to share their finding using appropriate language and vocabulary.

- **Problem solving**

Another strategy to be implemented is problem solving. The main characteristic of this approach to learning is that students will be presented with different problematic situations, and they will have to analyse the context, investigate about the situation, and evaluate the problem presented in order to propose a solution. In doing so, they will have to collaborate with their peers and reach an agreement on how to solve the problem most effectively. For this purpose, students will be given visual organisers and other tools that will facilitate this learning process, as well as focusing on creativity, teamwork, or leadership principles. In order to ease the learning process, they can apply their knowledge, and their active participation and understanding of the task is encouraged. For this purpose, students will be asked to organise the information, describing the problem, determining their previous knowledge about the situation, select topics they need to research on and the tools they will used to investigate, offer solutions to the task, or assess whether their proposition are or not accurate.

3.9. Evaluation strategy

The dual nature of CLIL implies the need to assess both content and language. Nevertheless, when planning assessment strategies many challenges arise. Wewer (2014) describes some standards that must be present in quality assessment, such as the need to focus on both language and content, integrate assessment strategies that work on the four language skills, base language assessment on inferences built on evidence, the need for inferences to be based on previous determined criteria, or to provide students with frequent and sufficient information on evaluation and feedback.

When organising assessment strategies, we can opt for different methods according to our aim. In order to create personalised and individual tasks that allow us to oversee

the process of learning where content and language are assessed in an integrated way, we can choose formative assessment. However, as Custodio-Espinar (2019a) describes, this should not be the only assessment strategy as it must be combined with others. These include summative assessment, which enables us to measure what has been learnt, together with alternative assessment tools such as random selection tools, exit slips, or white boards, as well as introducing self- and peer assessment strategies to initiate students on taking responsibility for their own learning. By introducing all these assessment strategies, we will be able to acquire a general understanding and scaffold the learning process, instead of just focusing on the final product. Furthermore, it is crucial to include learner-centred assessment techniques that develop metacognitive skills and promote ownership of the learning process.

When planning assessment activities, we must balance linguistic complexity with cognitive load to ensure that none of these demands are too high or too low and that students can show their content knowledge without language becoming a barrier. Apart from that, it is important to determine students' previous knowledge by conducting initial evaluations that allow us to shape the learning process. In this respect, assessment tasks should be analysed for their cognitive demands and language complexity to assure students' characteristics are met.

In this syllabus, these general evaluation strategies will be considered when creating the activities. For this purpose, there will be a focus on initiating students on peer-evaluation, by asking them to provide constructive criticism about other people´s performance. Moreover, different assessment tasks will be given to students. These include concept maps to summarise the information, creation of prototypes or models, journals, KWL charts, or oral and written feedback on activities. The Royal Decree 126/2014 outlines the assessment criteria that must be addressed when evaluating students. They can be found in Annex 3. Additionally, the Decree 89/2014 describes the learning standards. These are detailed in Annex 4. As for the qualification criteria, this syllabus will follow a numerical benchmark: 0-4,9 (fail), 5-5,9 (sufficient), 6-6,9 (satisfactory), 7-8,9 (good) and 9-10 (excellent). In order to obtain a sufficient mark, students will need to have acquired at least half of the assessment criteria included in Annex 3. Finally, in the case of students not obtaining a sufficient mark in the projects,

extraordinary measures will be implemented. These include a written exam at the end of the term for those students who have not been able to successfully acquire the assessment criteria. However, this test may be complemented by other means of formative assessment, choosing the most appropriate one in each case.

3.10. Contribution to school general programs and activities

Learning does not only take place inside the classroom. That is why it is important to create meaningful activities that will allow students to connect and apply what is being learnt inside the classroom with their daily lives. This is a crucial element of STEM education and, as such, it will be exploited in this syllabus. For that purpose, several activities will be organised that will allow students to observe their surroundings, formulate hypothesis, involve in experimental learning activities, or cooperate to solve problematic situations. Table 6 shows the extracurricular activities organised for this syllabus.

Table 8.

Extracurricular activities for the Annual Syllabus.

Project	Extracurricular activity
Project 1: Getting to know our bodies!	Visit to the museum of Public Health (*Museo de Sanidad e Higiene Pública*) where students will get to know the main characteristics and practices that lead to a healthy lifestyle.
Project 2: Exploring Nature!	Visit to *Faunia* to learn about animals in their natural habitat. Visit to the *Real Jardín Botánico* where students will learn about the plant life cycle, the process of photosynthesis or the importance of plants for the planet.
Project 3: Everything changes!	Visit to the school´s physics laboratory to investigate about the property of materials.

Together with extracurricular activities, complementary activities have been organised in order to engage and motivate students in the learning process as well as creating new contexts where to apply the knowledge. Some of the activities organised include inviting an expert in sports to create some sport-related activities where students can learn about the heart, lungs, or how to measure the pulse. It will also teach students about the importance of a healthy lifestyle. With the purpose of experimenting and reflecting about the importance of photosynthesis, students will plant seeds and take

care of plants and observe its development. Also, they will take part in several experimental activities organised in the physics' laboratory of the school where they will have to enquire and cooperate to solve the experiments presented. All of these activities are an example of how STEM education can be applied in Primary and will provide students with scenarios where to use the knowledge they are learning.

3.10.1. Extensive Reading Programme

This syllabus aims to use the CLIL approach by implementing STEM education. As such, reading plans become essential to strengthen the linguistic demands needed when using the CLIL approach. To this effect, the extensive reading programme created promotes the development of essential literacy skills. As Selfa (2020) describes, reading programmes are a source of entertainment and pleasure that connects students with the world around them. To that end, there needs to be a variety of texts, from scientific and general books or stories to encyclopaedias or texts created by students. As Selfa (2020) underlines, an ideal reading programme should also implement ICT tools, which will allow students to practice with them, analyse information or familiarise them with digital readings in a critical and functional manner. The texts presented will be in accordance with the contents of the curriculum, thus promoting the understanding and acquisition of contents, but will also foster creativity and self-development by enabling students to combine their ideas to create their own texts. As part of the programme a classroom library will be accessible for students, allowing them to use the books for reference and investigation, becoming one more tool in their learning. Nonetheless, it must be underlined that the programme is not exclusive and must be open to families and the educational community enabling them to take part in the process and for students to continue their learning process at home.

3.10.2. Plan for Coexistence

One of the main characteristics of STEM education is the need for students to collaborate to do the activities. That is a reality in this syllabus as students will have to cooperate, consider other people´s ideas or defend their opinions. As part of the TAP, emphasis will be placed on the need to provide students with peaceful conflict resolution strategies and effective ways of communicating with teachers. To this end,

the school has a mediating team where some selected students mediate conflicts and have periodic meetings with teachers where they inform them about the main school problems and come up with new ideas to improve community relations in the school.

4. DIDACTIC UNITS

4.1. First Term Project: Getting to know our bodies!

In this first Project the CLIL approach will be combined with STEM education to work on different contents in the area of Natural Science for the 4th year of Primary Education. The Project is made up of four didactic units addressing the circulatory, respiratory, and reproductive system, together with health and sickness, respectively. Throughout them, different ICT tools will be implemented to assist the process of learning.

<table>
<tr><td colspan="2">4.1.1. Didactic Unit 1: A drop of blood</td></tr>
<tr><td colspan="2">Timing: 2.5 weeks of the first term; 5 sessions of 45 minutes.
Description: Students understand the function of the circulatory system and describe its main characteristics.
Final product: Model of the circulatory system with recycled materials.</td></tr>
<tr><td colspan="2">CONTENT</td></tr>
<tr><td>Conceptual
• The circulatory system
• Relationship between the pulmonary and circulatory system.
Procedural
• Description of the main characteristics and parts of the circulatory system (heart, veins, arteries, and capillary).
• Explanation of the process the blood follows when it leaves the heart.
Attitudinal
• Become aware of the importance of a healthy heart for overall health.
Language content
• Description of the path of blood when leaving the heart</td><td>STEM related skills developed:
• Cooperative work.
• Researching for information from different sources.
• Analysing and summarising information.
• Fostering research skills.
• Transferring information into graphs or models.
• Constructive criticism about ways of improvement.
• Work with models of the human body.</td></tr>
<tr><td colspan="2">Contribution to key competences:
1. Linguistic competence: Developed by active communication among students, by researching information, reading, discussion of ideas and oral and written presentation of results.
2. Mathematics, Science and Technology competence: Activities related to the path of blood throughout the body and the cells and its relation with oxygen.
3. Digital competence: Use of ICT tools to seek information and present conclusions. Main role as it will be the main source of information.
4. Learning to learn: Developed by selecting information from various sources, analyse it and be critical with it. Use of different visual organisers and strategies to organise information.
5. Social and civic competence: Promoted by active cooperation among students, respect for different ideas, take part in the social context or take responsibility for our choices.
6. Cultural awareness and expression: Encouraging creativity in the presentations of models.</td></tr>
<tr><td colspan="2">COGNITION</td></tr>
</table>

Learning goals	Learning standards
Educational stage goals: a), f), i), j) 1. To identify the main parts of the circulatory system. 2. To research on the main characteristics of the circulatory system. 3. To place organs in its correct position in a model (veins, heart, artery, and caterpillars). 4. To assess one´s and other´s models by using rubrics and justifying decisions. 5. To describe the path of blood in a model (Language learning goal (LLG)).	1.1 Students locate the parts of the circulatory system, labelling them. 2.1 Students investigate about the difference between blood and oxygen-rich blood. 3.1. Students distinguish between veins, arteries, and caterpillars, using appropriate and colours to represent them. 3.2. Students relate all the organs that are part of the circulatory system. 4.1 Students assess models and give realistic ways of improvement using a rubric. 5.1. Students name/label/classify adjectives to describe different parts of the model. 5.2. Students describe a scientific model.

CULTURE	
Learning goal	**Learning standard**
To investigate about ways to maintain a healthy circulatory system.	1. Students explain different activities to have a healthy heart. 2. Students present ways to implement these practices in their daily life.

COMMUNICATION

Language of learning:

-Key words and concepts: heart, vein, artery, caterpillar, circulation, oxygen, colour, haemoglobin, heartbeat, pump, blood, lungs, cycle, waste product.

-Descriptive language: adjectives (thick, thin, small, fast), verbs (go inside, go down, go up).

-Explaining concepts: This is…, it connects…, the circulatory system carries blood throughout the body.

-Connectors: besides, moreover, and, but, because, for example.

-Language related to a healthy heart: diet, exercise, healthy weight, medical check-ups.

-Sport related concepts: pulse, beats per minute, walk, jump, run, my pulse is high when…

Language for learning:

-Cooperative language: where does the heart go in the model? What materials should we use? I think…, maybe we should…

-Description of activities that lead to a healthy heart: It is important to have a healthy diet because…, we need to exercise to…

-Instructive language: stand up, listen up, run around, …

-Relating parts of the system to their functions: heart to pump blood, veins, and arteries to transport blood.

-STEM Language: model language (scale, parts, materials).

-Classroom language: I didn´t understand, can you say it again? I have a question.

Language through learning:

Language through ICT use, language through making the model, language through searching for information, language through interacting with peers, teacher, and language assistant.

ASSESSMENT

Evaluation criteria:	STEM evaluation criteria:
• To identify the parts of the circulatory system (heart, veins, arteries, and caterpillars) (Block 2, 2)	• To carry out cooperative hands-on activities and experiments, respecting the opinions of others and exhibiting an attitude of care of the materials.

• To correctly use different ICT tools to seek information about a specific topic (Block 1,3) • To describe the relationship between all the parts of the circulatory system (Block 2, 2) • To explain simple ways of keeping a healthy heart that can be done daily (Block 2, 3) • To describe the path of blood using simple sentences with adequate vocabulary and appropriate connectors.	• To use different sources of information (both technological or on paper) to learn about the circulatory system, relating the information found and communicating the results. • To orally communicate the results found in experiential activities explaining the process followed.

ASSESSMENT STRATEGIES AND RESOURCES:

Formative assessment:	**Summative assessment:**
-Rubric given to students at the beginning of the Unit. -Self-evaluation checklist. -Written feedback on two short sentences where students describe the path of blood using appropriate vocabulary and connectors. -Teacher and peer feedback on activities. -Random selection tool. -Metacognition activities by exit slips.	-End of unit quiz on the materials covered. -Self-assessment tasks for students. -Worksheets related to the circulatory system. -Description of the circulatory system and its parts using the model. -Students' representation of the parts of the circulatory system in the models.

ATTENTION TO DIVERSITY

High Intellectual Abilities: the student will have a dual role. She will be in charge of helping other students throughout the process of creating the model, as well as having to investigate about how daily practices can have a negative impact on the overall health of the circulatory system. An example of a practice will be smoking, but she will have total freedom to choose one as well as the mode of presenting it to the class.

LOTS to HOTS:	**HOTS to LOTS:**
A. Students investigate about the most common blood and heart illnesses. **B.** Students seek and name 3 veins and arteries, labelling them in the model.	**A.** Students copy from a picture the name of the parts of the circulatory system in an already drawn paper.

4.1.2. Didactic Unit 2: The breath-taking work of lungs

Timing: 2.5 weeks of the first term; 5 sessions of 45 minutes.
Description: Students will understand the breathing process and describe its main characteristics using virtual reality.
Final product: Model of pulmonary ventilation using everyday materials.

CONTENT

Conceptual	**STEM related skills developed:**
• The respiratory system. • Pulmonary ventilation **Procedural** • Description of the characteristics and parts of the respiratory system (airway, lungs). • Explanation of the breathing process and its elements with the model. **Attitudinal** • Become interested in practices that maintain a healthy respiratory system. **Language content**	• Cooperative work • Use of technologies through virtual reality (ICT literacy). • Problem-solving strategies. • Creation of a model of the pulmonary ventilation. • Labelling and naming of the elements of the model. • Use of thinking routines to organise ideas. • Establishing hypothesis.

• Description of the process of pulmonary ventilation.	• Self and peer evaluation.

Contribution to key competences:

1. Linguistic competence: Promoted by active communication among students, by researching and explaining information in oral and written forms.
2. Mathematics, Science and Technology competence: Activities related to the creation of the model and description and explanation of the respiratory system.
3. Digital competence: Developed using virtual reality and electronic devices, with the need to coin accurate vocabulary.
4. Learning to learn: Promoted using thinking routines to organise information, as well as self and peer assessment strategies for the development of metacognition skills.
5.Social and civic competence: Developed by cooperating with peers and offering constructive criticism about other people´s work.

COGNITION

Learning goals:	**Learning standards:**
Educational stage goals: a), b), e) f), i), j) 1. To identify the main parts of the respiratory system. 2. To use virtual reality to explore and investigate about the respiratory system. 3. To assess classmates' models according to the model provided, justifying the corrections. 4. To describe the pulmonary ventilation process (LLG).	1.1. Students locate the main parts of the respiratory system, labelling them in a worksheet. 1.2. Students explain the breathing process. 2.1. Students interact with virtual reality to recognise the main parts of the respiratory system. 2.2. Students use the model from virtual reality to produce their own models. 3.1. Students compare their own models with the originals provided. 3.2. Students constructively criticise their classmates' models based on the rubric provided. 4.1. Students name/classify adjectives to describe the model. 4.2. Students accurately use sequence connectors to describe pulmonary ventilation.

CULTURE

Learning goal	**Learning standard**
A. To understand the different ways of living in people from Spain to those in higher altitudes: Sherpas. **B.** To suggest ways of protecting the respiratory system.	**A.1.** Students investigate about the location of the Sherpa ethnicity and its main characteristics. **A.2** Students describe how their natural habitat is different from the one in Spain. **A.3** Students explain how their natural habitat has led to an acclimatisation of their respiratory system to higher altitudes. **B.1** Students investigate how harmful smoking can be to the respiratory system. **B.2** Students propose ways of protecting the respiratory system.

COMMUNICATION

Language of learning:

-Key words and concepts: nose, mouth, trachea, bronchi, bronchioles, lungs, and diaphragm.
-Language related to the breathing process: inhale, exhale, oxygen, carbon dioxide, cells.
-Explanation concepts: This is…, it carries…, the circulatory system allows the entry of oxygen in the body and expels carbon dioxide.
-Language related to healthy lungs: exercise, medical check-ups, limited exposure to pollution
-Descriptive language: adjectives (small, big, large, elongated), verbs (contract, entry, relax).
-Sequence and consequence connectors: first, second, then, lastly, …; for this reason, as a result, …
-Virtual reality: to frame, change perspective, horizontal or vertical, simulation, 3D.

Language for learning:

-Cooperative language: what part of the system is represented? What material can we use

for the…? In my opinion…
-Constructive criticism language: I think you made a mistake here because …, I believe the strengths of your model were… however, it could be improved by …
-Instructive language: listen up, move around the class, sit down
-Relating parts of the system to their function: lungs to breathe, trachea to transport air, …
-STEM language: model language (parts, materials), scientific language (hypothesis, investigate, experiment, data analyse, reach a conclusion).
- Classroom language: Can you repeat it again? I didn´t understand

Language through learning:
Language through virtual reality use, language through making the model, language through interacting with peers, teacher, and language assistant.

ASSESSMENT

Evaluation criteria:	**STEM evaluation criteria:**
• To identify the parts of the respiratory system (mouth, nose, lungs, diaphragm, bronchi) • To use virtual reality as a tool for learning • To explain the relationship between the elements of the circulatory system using the model. • To assess models using constructive criticism. • To describe the pulmonary ventilation process using adequate vocabulary and connectors.	• To obtain relevant information from the models provided. • To use different sources of information (digital and on paper), applying the most appropriate one in each situation. • To communicate orally and in paper the results and conclusions obtained. • To cooperate with peers in experimental situations and understand the process as an enriching aspect of the learning process.

ASSESSMENT STRATEGIES AND RESOURCES

Formative assessment:	**Summative assessment:**
-Rubric given at the beginning of the unit. -Peer-evaluation checklist. -Peer and teacher feedback in activities. -Teacher modelling of words. -Thumbs up, thumbs down questions.	-End of unit quiz on the pulmonary ventilation process. -Students' naming or labelling the main parts of the respiratory system in a virtual reality model.

ATTENTION TO DIVERSITY

High Intellectual Abilities: the student will investigate about whether wearing a face mask daily can or not interfere with the breathing process. For that, she will take part in a short experiment about how the pulmonary capacity is or not reduced by the use of face masks. Afterwards, she will illustrate the reasons for it.

LOTS to HOTS:	**HOTS to LOTS:**
A. Students have access to multimodal input: virtual reality models together with pictures in worksheet, photographs, or flashcards. **B**. Students are helped by their peers in labelling and naming the parts of the system.	**A**. Students investigate about the differences between the human respiratory system and other animal's system. **B.** Students draw and name the main parts of the respiratory system in paper.

4.1.3. Didactic Unit 3: The basis of reproduction

Timing: 2.5 weeks of the first term; 5 sessions of 45 minutes.
Description: Students will understand the female and male reproductive systems, together with the basic aspects of human reproduction. Each group will record an episode to later combine them to create a podcast.
Final product: Podcast describing the main elements of the reproductive system (male and female), fertilization, embryo development, and childbirth.

CONTENT

<table>
<tr><td>Conceptual
• Male and female reproductive system.
• Fertilization, embryo development and childbirth.
Procedural
• Record of episodes describing the basic aspects of human reproduction to create a podcast.
• Explanation of process of reproduction using visual aids.
Attitudinal
• Appreciation of the importance of reproductive system health for overall health.
Language content
• Explanation of the process of reproduction through a podcast.</td><td>STEM related skills developed:
• Cooperative work.
• Use of technological devices to present information.
• Use of visual organisers to order information.
• Organise, select, and summarise information.
• Transfer and explain information in different ways.
• Evaluating the learning process.</td></tr>
<tr><td colspan="2">Contribution to key competences:
1. Linguistic competence: Developed by active communication, use of several platforms to seek information, organise and apply it and explain concepts in a written and oral form.
2. Mathematics, Science and Technology competence: Promoted by taking part in activities related to the reproductive systems and the process of reproduction.
3. Digital competence: Use of different digital platforms to organise and present information.
4. Learning to learn: Use of visual organisers and thinking strategies to plan individual learning strategies.
5. Social and civic competence: Promoted by working with peers and respecting others and putting into practice peaceful conflict resolution strategies.
6. Sense of initiative and entrepreneurship: Use of podcast as tool for depicting creativity and initiative in academic settings.
7. Cultural awareness and expression: Developed by creating a podcast as a cultural element of the 21st century.
8. Plurilingual competence: Promoted by comparing aspects of different cultures to foster coexistence and the use of language as a tool for learning.</td></tr>
<tr><td colspan="2">COGNITION</td></tr>
<tr><td><u>Learning goals</u>
Educational stage goals: a), b), e), f), i).
1. To identify the main parts of the female and male reproductive system.
2. To research on the main characteristics of human reproduction.
3. To describe the process of fertilization, embryo development and childbirth.
4. To cooperate with classmates to organise and divide work and create a podcast.
5. To describe the process of reproduction using a podcast (LLG).</td><td><u>Learning standards</u>
1.1 Students locate the parts of the reproductive system in a worksheet, differencing between male and female.
1.2 Students name/label the parts of the male and female reproductive system using pictures.
2.1 Students use websites and books to research on information about human reproduction.
2.2 Students order the information found in a visual organiser.
3.1 Students come up with new ways of organising information, classifying it.
4.1 Students take roles and divide the work by groups.
5.1 Students modify the speed and tone of voice when recording the podcast.
5.2 Students use synonyms to describe the process of reproduction in the episodes of the podcast.</td></tr>
<tr><td colspan="2">CULTURE</td></tr>
<tr><td><u>Learning goal</u>
A. To understand the different problems families</td><td><u>Learning standards</u>
A.1 Students investigate about the most common problems related to reproduction: infertility.</td></tr>
</table>

may have when choosing to have a baby. **B.** To understand the different types of families.	**A.2** Students present risk factors that may lead to infertility. **B.1** Students investigate about different types of families: adoption, foster care, … **B.2** Students compare their own families to their classmates.

COMMUNICATION

Language of learning:

-Key words and concepts: female reproductive system (vagina, uterus, ovary, fallopian tube) and male reproductive system (penis, testis, prostate, urethra, seminal vesicle).

-Descriptive language: adjectives, synonyms, simple figurative language (analogies, similes using "as"), descriptions (chronological, spatial, importance order).

-Language related to alternative ways of human reproduction: artificial insemination, assisted reproductive technology, such as in vitro fertilization.

-Language related to the process of reproduction: embryo, egg, sperm, childbirth, puberty, fertilization, zygote, embryo, cell division, labour, pregnancy, baby.

Language for learning:

-Cooperative language: I believe…, maybe we should…, we will do this part of the task.

-Reflecting about our own experiences: my group and I think that…, we have decided that…, we do/don´t agree on …

-Giving and understanding instructions: stand up, sit down, speak louder/clearer, …

-Relating parts of the reproductive system to their functions: egg and sperm as cells for reproduction, labour as the process where the baby is expelled from the body.

-STEM language: data, cause and effect, predictions, analyse, brainstorm.

-Classroom language: I don´t understand, what did you say? What do we have to do?

Language through learning:

Language through recording the podcast, language through searching for information, language through learning about the reproductive system, language through peer, teacher and language assistant interaction.

ASSESSMENT

Evaluation criteria:	**STEM evaluation criteria:**
• To identify the main parts of female and male reproductive system (Block 2, 1) • To use different tools (digital and on paper) to seek information about the reproductive system (Block 1, 1) • To describe the process of reproduction and its phases using appropriate vocabulary and images (Block 2, 2) • To consider other people´s ideas and strengths when recording the episodes for the podcast (Block 1, 3 and 4) • To describe and explain the process of reproduction using appropriate vocabulary, sections, and tone of voice.	• To obtain information from different sources, selecting the most relevant one. • To orally communicate the results founds and the conclusions reached. • To work cooperatively, reaching agreements and taking care of the materials used. • To carry out projects and present information about human reproduction using a podcast platform.

ASSESSMENT STRATEGIES AND RESOURCES

Formative assessment:	**Summative assessment:**
• Thumbs up, thumbs down questions about students' perception of their abilities. • Self-evaluation checklists. • Peer and teacher modelling of the words. • Learning intention walls. • Feedback of the activities on the spot.	• Rubrics to assess whether students have summarised the main ideas of human reproduction in the podcast.

ATTENTION TO DIVERSITY	
High Intellectual Abilities: the student will be in charge of organising the final product. For that, she will have to cooperate with her classmates to put together the episodes. Also, she will have to create an introduction and close for the podcast.	
LOTS to HOTS: **A**. Students investigate about the main differences between human and animal reproduction and create a short episode for the podcast.	**HOTS to LOTS:** **A.** Students watch a video about the topic they have been assigned, outline and copy the most important information and repeat it in the podcast.

4.1.4. Didactic Unit 4: Keeping ourselves healthy!	
Timing: 2.5 weeks of the first term; 5 sessions of 45 minutes. **Description:** Students will get divided into groups and each one will have to investigate about how to adopt healthy habits to keep oneself healthy. Also, some groups will investigate about the harmful effects of drugs and alcohol. All the findings will be presented in a fair. **Final product:** "The health fair" where students will create brochures to submit their findings, including QR codes in at least one section. Also, they will have to present the information to the public and use Google forms to assess other´s work.	
CONTENT	
Conceptual • Health and sickness. • Healthy habits. • Drugs and alcohol. **Procedural** • Analysing and presenting the information in a presentation • Experimentation with daily practices and reflect about their relation with health. **Attitudinal** • Assimilation of the importance of building healthy habits from an early age. **Language content** • Description and explanation of how healthy habits can lead to a healthy lifestyle and present sickness.	**STEM related skills developed:** • Cooperative work. • Experimentation in daily activities. • Sharing personal opinions and experiences about a topic. • Organising and revising as a group. • Stating cause and consequences of everyday actions. • Develop researching skills. • Organising and summarising information. • Use of digital resources as a pivotal element to present work.
Contribution to key competences: 1. Linguistic competence: Developed by an active communication among members of the group, organisation and summarising of ideas and oral and written presentation of the work. 2. Mathematics, Science and Technology competence: Activities related to health and sickness; technological knowledge related to the importance of a healthy lifestyle. 3. Digital competence: Promoted using technology to research, organise and present the information. 4. Learning to learn: Activities related to the need to organise the learning process according to task demands and time. 5. Social and civic competence: Developed by having to work with classmates, peacefully solving conflict and focusing on the importance of a healthy lifestyle. 6. Sense of initiative and entrepreneurship: Promoted by having to organise work according to specific demands. Also, referring to the planning capacity and decision-making of students.	
COGNITION	
Learning goals **Educational stage goals**: a), b), f), i), j)	**Learning standards** 1.1 Students define what health and sickness is.

1. To describe the difference between health and sickness. 2. To name daily practices that lead to a healthy lifestyle. 3. To describe the detrimental effects of some drugs and alcohol in health. 4. To assess other´s presentation using a rubric and justifying decisions 5. To present and explain different healthy habits (LLG).	1.2 Students give examples of daily/individual situations where they were healthy or sick. 2.1 Students group healthy practices according to the context they take part in. 2.2 Students investigate about healthy habits by making small changes in their daily routines. 3.1 Students investigate about the detrimental effects of alcohol and drugs in health. 3.2 Students evaluate the detrimental effects of certain substances based on the topics covered the visual organiser. 4.1 Students debate about the strengths and weak points of the other group´s presentation. 4.2 Students write a short paragraph offering constructive criticism to another group. 5.1 Students explain daily healthy habits.
CULTURE	
Learning goal	**Learning standard**
A. To value the importance of a healthy lifestyle. **B.** To acknowledge the importance of vaccines in stopping the spread of diseases.	**A.1** Students are aware of how small changes in their lifestyle can lead to health-related benefits. **B.1** Students investigate about the Spanish vaccination schedule for children. **B.2** Students discuss about real emergencies where the vaccination of the population stopped the spread of viruses: COVID-19 vaccine.
COMMUNICATION	
Language of learning: -Key words and concepts: health, sickness, virus, head/stomach-ache, drugs, doctor, hospital, drug, alcohol. -Language related to a healthy lifestyle: running, jumping, exercise, hydration, medical check-ups, take drugs. -Fair related language: take part in, capacity, exhibition stand, pavilion, graphic, information, QR code, Google form. -Descriptive and clarifying language: adjectives, examples, synonyms, sequence connectors. **Language for learning:** -Cooperative language: what health issue do we want to investigate about? What materials do we want to use? What about if we… -Description of activities to keep oneself healthy: to not have a cold I dress myself appropriately, I eat enough fruits and vegetables daily. -Instructive language: listen carefully, get divided into groups, open your computers -Relating parts of the body to health functions: the immune system helps battle diseases, white cells fight germs. -STEM language: experiment, hypothesis, prove ideas, reach a conclusion, scientific method. -Classroom language: what do we have to do? Can you repeat again? **Language through learning:** Language through using QR codes, language through presenting in the fair, language through searching for information, language through interacting with peers, teacher, and language assistant.	
ASSESSMENT	
Evaluation criteria: • To describe the difference between health and sickness (Block 2,3). • To provide examples of how to implement	**STEM evaluation criteria** • To establish hypothesis about specific events. • To create and take part in experiments

<table>
<tr><td>healthy habits in their daily lives (Block 2,3).
• To seek information about the effects of diseases and toxic substances in the human body (Block 2, 2).
• To provide constructive criticism to assess other people´s work (Block 1, 3).
• To present and explain healthy habits using appropriate vocabulary and intonation.</td><td>to test hypothesis.
• To analyse information and reach conclusions.
• To communicate orally the results obtained.
• To take turns in presenting findings, cooperating with peers.</td></tr>
<tr><td colspan="2">ASSESSMENT STRATEGIES AND RESOURCES</td></tr>
<tr><td>Formative assessment:
-Teacher checklist for observation of group work
-Peer and teacher modelling of the words.
-Teacher feedback on the spot.
-Students´ self-evaluation checklist about the elements that must be present in the brochure
-Rubric given to students at the beginning of the unit on what aspects they will be assessed on.</td><td>Summative assessment:
-Rubric for the oral presentation of student´s findings in the health fair.

-Checklist for group paragraphs on constructive criticism about other group´s work.</td></tr>
<tr><td colspan="2">ATTENTION TO DIVERSITY</td></tr>
<tr><td colspan="2">High Intellectual Abilities: the student will be the chairperson of the fair. Her work will be to present the theme of the fair, creating a small speech. Also, she will introduce each group and create a final activity as a summary of the main aspects covered in the fair. She will have total freedom to present the information as she likes.</td></tr>
<tr><td>LOTS to HOTS:
Students investigate about “superfoods” and their health benefits, presenting it to the class.</td><td>HOTS to LOTS:
Students use pictures and have notes they can read from in the fair.</td></tr>
</table>

4.2. Second Term Project: Exploring Nature!

In this second Project the CLIL approach will be combined with STEM education to work on different contents in the area of Natural Science for the 4th year of Primary Education. The Project is made up of four didactic units addressing the vertebrate and invertebrate animals, together with plant nutrition and reproduction, respectively. Throughout them, different ICT tools will be implemented to assist the process of learning.

<table>
<tr><td colspan="2">4.2.1. Didactic Unit 5: The vertebrate zoo!</td></tr>
<tr><td colspan="2">Timing: 2.5 weeks of the first term; 5 sessions of 45 minutes.
Description: Students will learn about the nutrition, breathing and reproduction of mammals, birds, reptiles, amphibians, and fish.
Final product: Interview. Students will get divided into groups and create questions and answers to later act out an interview, acting as the animal they have been assigned. The questions and answers will be written on a shared Google Document.</td></tr>
<tr><td colspan="2">CONTENT</td></tr>
<tr><td>Conceptual
• Vertebrate animals.
• Nutrition, breathing, and reproduction.
Procedural
• Description of the characteristics of nutrition, breathing and reproduction of vertebrate animals.
• Creation of a short text outlining the main characteristics of vertebrate animals.</td><td>STEM related skills developed:
• Emphasis on the importance of women in science: Jane Goodall.
• Search for information.
• Self-and peer-assessment.
• Finding out information about vertebrate animals.
• Providing shared experiences and</td></tr>
</table>

<table>
<tr><td>Attitudinal
• Become aware of the importance of respecting animals.
• Development of responsible attitudes towards animal ownership.
Language content
• Explanation of the nutrition, breathing and reproduction process of vertebrate animals.</td><td>examples.
• Reflection about the role of animals in current societies.
• Creation of collective work using a shared document.</td></tr>
<tr><td colspan="2">Contribution to key competences:
1. Linguistic competence: Developed by the planification and creation of a shared document among students and the brainstorming of ideas, fostering active communication and exchange of ideas.
2. Mathematics, Science and Technology competence: Activities related to the importance of animals and the respect to their habitats, by using scientific ways of thinking.
3. Digital competence: Promoted using different digital tools such as shared documents in a creative, critical, and safe way. Also, by using different sources of information.
4. Learning to learn: Developed by enabling further understanding of the processes of learning and adjusting them to the characteristics of the task.
5. Social and civic competence: Activities related to the need to cooperate with peers and find peaceful ways of solving conflicts.
6. Cultural awareness and expression: Value interviews as sources of knowledge and part of the cultural wealth of societies.</td></tr>
<tr><td colspan="2">COGNITION</td></tr>
<tr><td><u>Learning goals</u>
Educational stage goals: a), b), c), f), i), l)

1. To research information about the ways of living of vertebrate animals.
2. To analyse and summarise the nutrition, breathing and reproduction processes of vertebrate animals.
3. To explain nutrition, breathing and reproduction on vertebrate animals.
4. To discuss about the importance of respecting animals and their responsible care.
5. To illustrate the main characteristics of vertebrate animals using questions and answers (LLG).</td><td><u>Learning standards</u>
1.1 Students investigate about the characteristics of vertebrate animals using different sources.
1.2 Students cite the sources they got information from.
2.1 Students get divided into groups, summarising the main characteristics about the nutrition, breathing and reproduction processes of vertebrate animals.
3.1 Students illustrate their research sharing private experiences and ideas.
3.2 Students describe nutrition, breathing and reproduction
processes of vertebrate animals using their own words and appropriate vocabulary.
4.1 Students brainstorm reasons for respecting and caring for animals.
4.2 Students debate about ideas to better treat animals.
5.1 Students identify the core elements of questions.
5.2 Students formulate questions and answers to explain the characteristics of vertebrate animals.</td></tr>
<tr><td colspan="2">CULTURE</td></tr>
<tr><td><u>Learning goals</u>
To investigate about situations where animal rights are not
respected.</td><td><u>Learning standards</u>
1. Students explain different shows/companies that don´t respect animal rights.
2. Students suggest ways to promote animal rights in those situations.</td></tr>
<tr><td colspan="2">COMMUNICATION</td></tr>
<tr><td colspan="2">Language of learning:
-Key words and concepts: nutrition, breathing and reproduction, mammals (monotreme, marsupial, placental), birds, reptiles (snakes, crocodiles, alligators, turtles, lizards), amphibians, and fish (cartilaginous, bony), animal rights.</td></tr>
</table>

-Genre: interview
-Questions and short answers: structure and question marks (?); yes, they do, no, they don´t.
-Explaining concepts: Fishes breath through…, mammals differ from other vertebrate animals in that they are fed…, sharing personal ideas and experiences.
-Connectors: also, and, but, for example, because.
-Body language: upright posture, eye contact, nodding, …
-Animal-related language: snout, peak, wing, bark, swim, fly, scale, claw, gills, tail, …

Language for learning:

-Language for interacting in the groups: how would you say ….? Do you know how amphibians reproduce?
-Instructive language: look up, close your computers, listen up, get into groups
-Shared document language: font, title, sections, share a document, type, select, write, …
-Comparing animals and their nutrition, breathing and reproductive processes: This is a… he breathes through…/ most vertebrate animals breathe though…
-Discussing about the need to respect and equally treat animals: I think it is important to love and respect animals.
-Asking and answering questions: How are mammals fed? They are fed through… How long do fishes take to reproduce? It takes them …
-STEM language: brainstorm, plan, organise, observation.
-Classroom language: What is the next question? How many questions are left? What part are you doing? Can I help you? How do you say … in English?

Language through learning:

Language through ICT use, language through researching information and editing the document, language through learning and explaining the characteristics of vertebrate animals, language through debating about animal rights, language through interaction with peers, teacher, and language assistant.

ASSESSMENT

Evaluation criteria:

- To identify vertebrate animals in a group of animals (Block 3, 2).
- To equally distribute work among members of the group (Block 1, 4).
- To correctly describe the nutrition, breathing and reproductive processes of vertebrate animals (Block 3, 2).
- To explain the main characteristics of vertebrate animals using questions and answers (Block 3, 2).

STEM evaluation criteria:

- To cooperate with classmates in the creation of a shared document.
- To use different sources of information (digital and on paper) to carry out tasks.
- To share reviewed opinions and experiences related to vertebrate animals.
- To make predictions about specific events.

ASSESSMENT STRATEGIES AND RESOURCES

Formative assessment:

-Rubric given to students at the beginning of the unit outlining the main aspects of the interview.
-Student and teacher feedback on the activities.
-Self-assessment task for students.
-Teacher´s oral language modelling.

Summative assessment:

-Checklist for the shared *Google* document including all the questions and answers to be performed in the interview.
-Quiz on the reproductive, nutrition and breathing processes of vertebrate animals.

ATTENTION TO DIVERSITY

High Intellectual Abilities: the student will be in charge of conducting the interview. For that, she will have to create an introduction to the interview, summarising the main characteristics of invitees. Also, she will create specific questions to ask each animal, together with a final state that summarises the main ideas covered throughout the interview.

LOTS to HOTS:

A. Students will add questions related to other

HOTS to LOTS:

A. Students will be given simple question and

characteristics of vertebrate animals, such as the different ways of moving. **B.** Students reflect about the needs of vertebrate animals and the deterioration of their quality of life due to human impact.	sentence structures they will modify to organise the interview. **B.** Students will create mind maps using images and simple words to describe the main characteristics of vertebrate animals.

4.2.2. Didactic Unit 6: The invertebrate zoo!

Timing: 2.5 weeks of the first term; 5 sessions of 45 minutes.
Description: Students will identify and describe the main characteristics of invertebrate animals.
Final product: *Guess who?* Game. Students will film themselves describing the characteristics of some invertebrate animals and their classmates will have to guess who they are based on the description provided. The video will be accompanied by a short script, presenting what students will say in the video.

CONTENT

Conceptual
- Invertebrate animals

Procedural
- Recording of a short video outlining the main characteristics of invertebrate animals.
- Observation of invertebrate animals in their natural habitat.

Attitudinal
- Develop interest for knowing the main characteristics of invertebrate animals.
- Internalise the need to respect and protect invertebrate animals.

Language content
- Description of the main characteristics of invertebrate animals.

STEM related skills developed:
- Observing animals in their natural habitat.
- Engaging students in an activity.
- Seeking and summarising information.
- Transferring the information found to different platforms.
- Oral presentation of the information learnt.
- Use of daily activities and games as tools for learning.
- Assessing own and peer work, offering ways of improvement.

Contribution to key competences:
1. Linguistic competence: Developed through active communication among members of the group, researching information from different sources, writing a script for each video, and having to present conclusions orally by filming a video.
2. Mathematics, Science and Technology competence: Activities related to invertebrate animals, their habitats and characteristics and their relationships with humans.
3. Digital competence: The competence has an important role as students will have to use various ICT tools to research information, as well as creating a short video to present the research project.
4. Learning to learn: Students will have to use different sources of information, organising and summarising the information found. Also, they will need to reflect about it and adjust to the demands of the task.
5. Social and civic competence: Promoted by having to cooperate and collaborate with classmates, participating to respect our environment and developing interpersonal communication skills, as well as tolerance and respect to others.
6. Sense of initiative and entrepreneurship: Developed as students will have to design a plan of action for filming the video, making decisions or adapt to change and anticipate problems.
7. Cultural awareness and expression: Promoted as students will develop creativity and curiosity towards this new aspect of the media culture, recording videos with educational purposes.
8. Plurilingual competence: Developed using glossaries in English so that language can become

a tool for learning and communicating.

COGNITION	
Learning goals **Educational stage goals**: a), b), f), i), j), l) 1. To identify invertebrate animals among other animals. 2. To describe the main characteristics of the groups of vertebrate animals. 3. To create short videos explaining the characteristics of invertebrate animals. 4. To assess classmates´ videos, justifying corrections by using constructive criticism. 5. To create short statements to describe the main characteristics of invertebrate animals (LLG).	**Learning standards** 1.1 Students point at invertebrate animals from a set of animals. 1.2 Students name invertebrate animals from photos. 2.1 Students explain the main characteristics of invertebrate animals. 3.1 Students divide themselves in groups, organising which group will investigate about what animal. 3.2 Students investigate about the main groups of invertebrate animals and their characteristics. 3.3 Students film themselves describing the characteristics of invertebrate animals. 4.1 Students view their classmates' videos, taking note of the strengths and weaknesses of the video. 4.2 Students make recommendations about ways to improve the videos. 5.1 Students name/classify adjective to describe the animals. 5.2 Students accurately use addition connectors to describe the characteristics of invertebrate animals.
CULTURE	
Learning goals To investigate about the relationship between invertebrate animals and humans.	**Learning standards** 1. Students explain the importance of invertebrate animals. 2. Students investigate and justify why human intervention has led to a decrease in the number of bees worldwide, describing the effects it has had on the global food security. 3. Students propose actions humans can do to protect the habitat of invertebrate animals.

COMMUNICATION

Language of learning:

-Key words and concepts: habitat, classification of invertebrate animals (arthropods, molluscs, cnidaria, annelids, porifers and echinoderms), nutrition, movement, reproduction.

-Descriptive language: adjectives (big, small, oval shaped), verbs (live, move, breath)

-Explaining concepts: (statements) I am an invertebrate animal, I live in …, I move through…, my main characteristics are …

-Filming language: button, press, stop, record, framing, zoom in/out …

-Addiction connectors: and, also, in addition, too, as well as, then, …

-Language related to the relevance of protecting invertebrate animals: It is important to protect their habitats because …, humans can damage invertebrate animal´s habitat by …, some examples for protecting their habitat are …

Language for learning:

-Cooperative language: what group is describing which animals? What should we talk about? Have you ever seen a …? From my point of view,

-Language for creating the video: what animal are we describing? Who is filming me? Can you film me?

-Instructive language: listen up, start/stop filming, get into groups

-Relating invertebrate animals to their characteristics: annelids are segmented into parts, arachnids have eight legs, insects have an exoskeleton.

-STEM language: observation, explanation, make predictions, contrast information.

-Classroom language: Can we repeat the video? Pay attention, for today´s activity you´ll need

Language through learning:
Language through filming the video, language through ICT use, language through searching for information, language through interacting with peers, teacher, and language assistant.

ASSESSMENT

Evaluation criteria:

- To distinguish invertebrate animals from other animals (Block 3, 2).
- To categorise invertebrate animals into groups (Block 3, 2).
- To film a vide explaining the characteristics of invertebrate animals (Block 1,3).
- To write a script outlining the characteristics described in the video (Block 1, 3).
- To assess classmates' videos using constructive criticism (Block 1, 4).
- To describe the characteristics of invertebrate animals using short statements, adjectives, and connectors.

STEM evaluation criteria:

- To obtain relevant information about animals, categorising them into groups according to specific criteria.
- To orally communicate the results
- and conclusions obtained after carrying research about a topic, presenting them with graphic support.
- To work corporately with peers, caring about one´s and other safety.

ASSESSMENT STRATEGIES AND RESOURCES

Formative assessment:

- Self and peer assessment.
- Teacher modelling of words in the sport.
- Mini-white boards where students will have to guess which animal is the video referring to.
- Exit slips for reflection on the task.

Summative assessment:

- Bench marking on the written script outlining the text to be explained in the video.
- Written feedback on the text with the strengths and weaknesses of classmates' videos.
- Worksheet with the categorisation of invertebrate animals and the description of their main characteristics.

ATTENTION TO DIVERSITY

High Intellectual Abilities: the student will have to help classmates with their difficulties, aiding them with the researching process. Moreover, she will have to further investigate and provide examples about some curiosities about invertebrate animals students may not know about. For that, she will have total freedom to present her findings.

LOTS TO HOTS:
A. Students will choose their favourite invertebrate animal, research about their main characteristics, and present it to the class.

HOTS to LOTS:
A. Students will be provided with images of the different groups of invertebrate animals. They will have to sort them according to the pictures
B. Students identify invertebrate animals by circling/pointing at the right options exemplified by pictures.

4.2.3. Didactic Unit 7: Photosynthesing

Timing: 2.5 weeks of the first and second term; 5 sessions of 45 minutes.
Description: Students will understand the process of photosynthesis through an experiment, as well as describing its importance for the live on Earth.
Final product: Experiment about photosynthesis. There will be 3 plants in the classroom: a. Plant with not contact with water or sunlight, b. Plant with no contact with sunlight, and c. Plant with contact with water and sunlight. Students will have to hypothesise about whether each plant will be or not able to make photosynthesis. A whole research process will be done, following the steps of the scientific method. Finally, students will have to create an infographic using *Canva*, outlining the main findings from the research process and describing the process of photosynthesis.

CONTENT

<table>
<tr>
<td>Conceptual
• The process of photosynthesis.
• Scientific method.
Procedural
• Description of the process of reproduction using the scientific method.
• Creation of an infographic to explain the process of photosynthesis.
Attitudinal
• Become aware of the importance of plants for the environment.
Language content
• Explanation of the process of photosynthesis outlining its main characteristics and elements involved.</td>
<td><u>STEM related skills developed:</u>
• Find out what students already know about the process of photosynthesis.
• Research process about the process of photosynthesis.
• Research for information.
• Sharing personal experiences about a topic.
• Application of the scientific method to real situations.
• Creation of graphics to display conclusions
• Reflection about human interference with nature.
• Providing opportunities for further research and investigation.</td>
</tr>
<tr>
<td colspan="2">Contribution to key competences:
1. <u>Linguistic competence</u>: Developed by active communication among students throughout the activities, research for information from different sources, sharing of private experiences and oral and written presentation of results and conclusions.
2. <u>Mathematics, Science and Technology competence</u>: Activities related to the process of photosynthesis using scientific methods and exploration.
3. <u>Digital competence</u>: Promoted using ICT tools to investigate and present information. Also, several examples of digital media are used.
4. <u>Learning to learn</u>: Developed by adjusting time and resources to the needs of the task, selecting relevant information, adjusting, organising information, and managing one´s own process of learning. Also related to self and peer assessment.
5. <u>Social and civic competence</u>: Promoted by fostering knowledge about the context we live in, creating ways of participating in their social environment or developing interpersonal communication.
6. <u>Cultural awareness and expression</u>: Promoting creativity in the presentation of conclusions.
7. <u>Plurilingual competence</u>: Developed using glossaries in English so that language becomes a tool for communicating and learning.</td>
</tr>
<tr>
<td colspan="2">COGNITION</td>
</tr>
<tr>
<td><u>Learning goals</u>
Educational stage goals: a), b), f), i), j), l)

1. To know photosynthesis as the process of plant nutrition.
2. To research on the characteristics of the process of photosynthesis.
3. To know the elements that take part in the photosynthesis.
4. To carry out an experiment following the scientific method.
5. To discuss about the importance of photosynthesis for life on</td>
<td><u>Learning standards</u>
1.1 Students list the vital functions of plants.
1.2 Students associate photosynthesis with plant nutrition.
2.1 Students research about the process of photosynthesis, its importance, and the elements that intervene.
3.1 Students identify the elements needed for photosynthesis: light, water, carbon dioxide and oxygen.
3.2 Students relate the elements that take part in photosynthesis.
4.1 Students recognise the parts of the scientific method, labelling them.
4.2 Students summarise the characteristics of each part of the scientific method.
4.3. Students apply the scientific method to the experiment about photosynthesis.
5.1 Students compare a world with photosynthesis, with a world without it.
5.2 Students justify the importance of photosynthesis for live on Earth.</td>
</tr>
</table>

Earth. 6. To describe the process of photosynthesis (LLG).	6.1 Students name/label the main elements that take part in photosynthesis. 6.2 Students sequence photosynthesis stages to describe them.

CULTURE

Learning goals	**Learning standards**
To investigate about ways of protecting plants.	1. Students identify the importance of plants for the environment 2. Students explain different ways to protect plants.

COMMUNICATION

Language of learning: (Appendix A)
-Key words and concepts: plant, photosynthesis, carbon dioxide, oxygen, water, sun, cells, nutrition, soil, stem, leave, feed, sugar, mineral salts, roots, raw sap, elaborated sap, infographic (Figure 3)
-Explaining concepts: This is…, it carries…, the photosynthesis is the process of nutrition for plants. (Figure 4)
-Descriptive language: adjectives (small, endangered, long), adverbs (underground, above, in, out).
-Connectors: first, then, later, finally.
-Plant related language: root, stem, flower, petal, leaf, fruit. (Figure 5/ Figure 6)
-Language related to the importance of plants: Plants are important because they produce oxygen.
-Scientific method language: questions, hypothesis, experiment, data and results, conclusions.
Language for learning: (Appendix B)
-Debating about the importance of photosynthesis: From my point of view photosynthesis is important because it produces the oxygen we breath.
-Cooperative language: can you help me with…? What part are you doing? What should we write here?
-Language for making proposals: I suggest that we, I would recommend that we…
-Description of the experiment: Our hypothesis is…, the experiment has … parts, our conclusions are…
-Instructive and classroom language: get into groups, listen up, who wants to go first? (Figure 7)
-STEM language: scientific method, experiment, observation, design of an investigation process, reflection, draw conclusions.
-Classroom language: what part does this represent? I have a question; can you help me?
Language through learning:
Language through ICT use, language through creating the infographic, language through searching for information, language through reflecting about the importance of photosynthesis, language through interacting with peers, teacher, and language assistant.

MATERIALS

Human: Language Assistant (LA), teacher (T), and students (Ss).

Material: K-W-L chart, scientific journal, illustration of a plant and the deforestation of the Amazon, tools for the experiment (magnifying glass) and plants, infographic.

Digital: iPads or tablets. Video: https://www.youtube.com/watch?v=UPBMG5EYydo

PROCEDURE

Timing	**Activities (T/ Ss/LA role)**	**Grouping**
Session 1 (45 minutes)- Starting with photosynthesis		
15 min/ Activation task	**Act 1** Ss will be given the rubric used to assess the infographic. With the help of the LA, they will read the descriptors and solve doubts. Later, they will form groups. (Appendix C, Figure 8)	Whole class

15 min/ Presentation of the experiment 15 min/ Previous knowledge	**Act 2** The T will introduce the experiment. For that, she will bring out the 3 plants, describe the characteristics of each one and discuss with students about the best way to keep track of the changes in plants. **Act 3** Ss, in their groups, will brainstorm ideas about what they already know about photosynthesis. With the help of the LA, they will write short sentences to share their thoughts.	Whole class In groups
Session 2 (45 minutes)- Let the experimentation begin!		
20 min/ Organising information 25 min/ Scientific method	**Act 1** Ss will be asked to share their ideas. Simultaneously, each group will have to fill in a K-W-L chart. The same chart will be projected on the whiteboard and completed by the teacher. The last column (what I learnt) will be filled in at the end of the project. (Appendix D, Figure 9) **Act 2** Ss will revise about the steps of the scientific method. Later, they will be given a scientific journal which outlines each step, and they will have to fill it in throughout the sessions. They will initiate the research process by hypothesising about whether each plant will or not be able to make photosynthesis, filling in the scientific journal. (Appendix E, Figure 10)	In groups and whole class. In groups/ Individually
Session 3 (45 minutes)- Photosynthesis in depth!		
10 min/ Activation/ Observation 10 min/ Video/ Brainstorming/ Thinking skills 10 min/ Speaking 15 min/ Writing/ Problem-solving	**Act 1** Ss will be given time to observe the plants using magnifying glasses and other tools. Meanwhile, they will take notes on the changes on the plants that they see using their scientific journal. **Act 2** Ss will watch a video on photosynthesis. The video includes some questions about its characteristics and importance for life on Earth. These questions will be asked to Ss and answered out loud prior to watching the answers. **Act 3** T will show useful vocabulary that appeared in the video. Ss will repeat it, paying attention to its pronunciation and, with the help of the LA, use gestures, when needed, to say each word. (Appendix F, Figure 11) **Act 3** Students will be given a worksheet with a picture of photosynthesis. They will have to label/name each element portrayed and represent how photosynthesis takes place. Later, with the help of the LA they will create short sentences to describe the process of photosynthesis. (Appendix G, Figure 12)	In groups Whole class Whole class Individually
Session 4 (45 minutes)- Importance of photosynthesis for Earth		
20 min/ Activation/ Observation/ Reaching conclusions 15 min/ Thinking skills/ Problem-solving/	**Act 1** Ss will be given time to observe the plants. They will get into groups and share their conclusions, filling in their scientific journals. **Act 2** Ss will be given pictures showing the deforestation process in the Amazon in past years. Along with the pictures, there will be some short sentences that describe what is being shown. Ss will have to match the sentences with the pictures, justifying why they have related them. Finally, a short debate on the importance of	In groups/ Individually Whole class/ Individually

Speaking 10 min/ Speaking/ Brainstorming / Round up	photosynthesis for life on Earth will take place. (Appendix H, Figure 13) **Act 3** Ss will use the rest of the class to get into their groups, share their notes on the experimentation process through their scientific journals and brainstorm ideas on how they want to make their infographic outlining the main findings from the research process and describing the process of photosynthesis.	In groups
Session 5 (45 minutes)- Infographic		
20 min/ Creating the infographic 20 min/ Speaking/ Thinking skills 5 min/ Writing/ Round up	**Act 1** Ss will get into groups and create their infographic. T will give students a list with useful vocabulary to use when presenting. Each group will choose the expressions they need to use. The LA will assist students with the language for presenting their ideas. Throughout the creation process each Ss will fill in a self-assessment checklist. (Appendix I, Figure 14). **Act 2** Ss will present their infographics. Throughout the presentations each Ss will give a mark to their peers on the presentation and experimentation process (metacognition) using a checklist. (Appendix J, Figure 15/Figure 16). **Act 3** Ss will refer back to the K-W-L chart done at the beginning of the unit. They will complete the third column, what I learnt.	In groups In groups/ Individually Individually

ASSESSMENT

Evaluation criteria:	**STEM evaluation criteria:**
• To identify photosynthesis as the process of plant nutrition (Block 3, 2). • To describe the importance of photosynthesis for live on Earth (Block 3, 2) • To name the elements that take part in photosynthesis, explaining their function (Block 3, 2). • To correctly use ICT tools and infographics to present conclusions (Block 1, 3). • To describe the process of photosynthesis	• To seek information from different sources (on paper and digital). • To conduct experiments, taking care of the materials and caring about own and peer safety. • To organise investigations: pose problems, propose hypothesis, select material, draw conclusions, and communicate results. • To orally communicate the results obtained, using graphic support.

ASSESSMENT STRATEGIES AND RESOURCES

Formative assessment:	**Summative assessment:**
-Teacher observation of students using a checklist. -Mini white boards for short answers to questions formulated by the teacher to students about the observation process of plants.	-Worksheet with a description of each phase of the scientific method and the example from the experiment. -Rubric for the infographic, using *Canva*, describing the process of photosynthesis. -Checklist for peer and self-assessment.

ATTENTION TO DIVERSITY

High Intellectual Abilities: the student will investigate about the *Elysia chlorotica* and describe how this mollusc, despite being an animal, can make photosynthesis. She will have to investigate about the process that leads to it, whether the process differs to plant photosynthesis and present it to the class.

LOTS to HOTS:	**HOTS to LOTS:**
A. Students reflect about how life would be on Earth without photosynthesis.	**A**. Students circle the elements that take part in photosynthesis among others.

B. Students investigate what chloroplasts are and what their role in photosynthesis is, making a graph to explain it.	**B**. Students label a worksheet with a picture of the process of photosynthesis. **C**. Students classify descriptions about the importance of photosynthesis, stating whether they are or not relevant, using thumbs up/down sticks.

4.2.4. Didactic Unit 8: New plants on the way!

Timing: 2.5 weeks of the second term; 5 sessions of 45 minutes.
Description: Students will learn about the different types of plant reproduction.
Final product: Online mind map using the website mindomo outlining the main characteristics of plant reproduction. Later, the information on the mind map will be used to create a report on the different types of plant reproduction. Furthermore, the activity will be complemented with visits to the school´s garden to offer a first-hand observation.

CONTENT

Conceptual • Plant reproduction. **Procedural** • Analysing and presenting the information in a mind map. • Observing plants in their natural habitat. **Attitudinal** • Become aware of the importance of respecting plants. **Language content** • Report on the different types of plant reproduction.	**STEM related skills developed:** • Engaging students in activities. • Analysing, organising, and summarising information. • Research for information from different sources (digital or on paper). • Representing and transferring ideas to different platforms, using graphs and visual support. • Debate about specific topics. • Provide shared experiences.

Contribution to key competences:
1. Linguistic competence: Developed by active communication among classmates, research for information from different sources, organising and summarising information, as well as creating written texts and orally communicate results.
2. Mathematics, Science and Technology competence: Activities related to the process of plant reproduction and its characteristics.
3. Digital competence: This competence has an essential role as students will use ICT as tools for learning, by searching and organising information.
4. Learning to learn: Promoted by organising information, adjusting to the characteristics of a task, creating diagrams and mind maps to manage one´s learning process, as well as reflecting about the process of learning.
5. Social and civic competence: Activities related to pacific resolution of conflicts, knowledge about the environment and ways to improve it, or fostering interpersonal communication.
6. Cultural awareness and expression: This competence is supported by cultivating creativity in the representation of work, such as by using mind maps.
7. Plurilingual competence: Developed by comparing aspects of different cultures to foster coexistence and the use of language as a tool for learning.

COGNITION

Learning goals	**Learning standards**
Educational stage goals: b), f), i), j), l). 1. To understand reproduction as one of the vital functions of plants. 2. To research on the characteristics of plant reproduction.	1.1 Students name the three vital functions of a plant. 1.2 Students identify reproduction as a vital function. 2.1 Students investigate about plant reproduction. 2.2 Students analyse and organise the information. 3.1 Students group the information found into sections. 3.2 Students describe the process of plant reproduction.

3. To create a mind map outlining the process of plant reproduction. 4. To discuss about the importance of caring for and respecting plants. 5. To explain the process of plant reproduction using affirmative and negative short statements (LLG).	4.1 Students brainstorm ideas about the relevance of plants for the environment. 4.2 Students debate about ways of protecting plants. 5.1 Students identify the cause and effect of each step of the process of reproduction. 5.2 Students combine them using short statements and connectors.

CULTURE

Learning goals	**Learning standards**
To describe the different uses societies give to plants.	1. Students investigate about the most common medicinal plants in Spain: green tea, valerian, or mint. 2. Students describe the main reasons why people take these plants and the illnesses they aim to tackle. 3. Students compare the use of medicinal plants among cultures: Spain and the traditional Chinese medicine.

COMMUNICATION

Language of learning:

-Plant reproduction: sexual or asexual reproduction, gametes, angiosperms (flowering plants) and gymnosperms, flower, seed, fruit, germination, pollination, spore.
-Flower structure: sepals, petals, stamens, anthers, stigma, style, ovary, ovules.
-Pollination syndromes: wind, water, animals (bees, flies, butterflies, wasps, birds).
-Parts of a mind map: central theme, associations, keywords, descriptions, images, lines, levels
-Report structure: executive summary, introduction, body, conclusion, heading, research
-Body language in presentations: firm posture, eye content, make use of space, gestures
-Relating ideas and describing results: cause and effect connectors (because, therefore, for this reason), sequence connectors (first, next, finally).
-Language structures: angiosperms have flowers to attract pollinators, gymnosperms don´t have flowers and do have uncovered seeds, the most common pollinators are animals and wind

Language for learning:

-Discussing about the process of reproduction: In my opinion colourful petals attract animals, I agree/disagree, what do you think?
-Self and peer reflection: I believe…, we all agree on…, we have learnt that…
-Organising information in the mind map: in the middle of, on the top right/let corner, next to…
-Presenting the process of plant reproduction: Plant reproduction in angiosperms starts in flowers where …, flowers have male and female reproductive structures.
-Language for interaction: how would you link? What is your opinion on…? What ideas do you have?
-STEM language: brainstorm, discussion, plan, observation, conclusion.

Language through learning:

Language through ICT use, language through organising information and presenting the mind map, language through learning about plant reproduction, language through peer, teacher, and language assistant interaction.

ASSESSMENT

Evaluation criteria:	**STEM evaluation criteria:**
• To identify reproduction as one of the vital functions of plants. • To equally distribute the workload among members of the group. • To distinguish between angiosperm and gymnosperm´s reproduction processes. • To explain describe and explain plant reproduction	• To use appropriate materials for investigating about plants, magnifying glass. • To cooperate with classmates in the creation of a shared mind map. • To search for and obtain relevant information • To orally communicate, and in writing,

• To explain describe and explain plant reproduction using affirmative and negative statements.	the conclusions reached after carrying out research processes.

ASSESSMENT STRATEGIES AND RESOURCES	
Formative assessment:	**Summative assessment:**
-Mini white boards for short answers to questions. -On the spot teacher feedback. -Exit slips to collet students' responses. -Self and peer assessment tasks.	-Rubric with a description of the basics that must be represented in the group mind map, as well as on its oral presentation. -End of unit quiz on the key concepts on plant reproduction.

ATTENTION TO DIVERSITY	
High Intellectual Abilities: the student will have to conduct a complementary observation process. For it, she will choose its favourite flower, describe its main characteristics, and explain how it reproduces. Finally, she will present her findings to the class.	
LOTS to HOTS:	**HOTS to LOTS:**
A. Students reflect about the causes that may interfere in plant reproduction. **B**. Students create a list with examples of the name of angiosperms and gymnosperms around the world.	**A.** Students circle the correct answer, differentiating between angiosperms and gymnosperms. **B**. Students link images to the processes being described.

4.3. Third Term Project: Everything changes!

In this third Project the CLIL approach will be combined with STEM education to work on different contents in the area of Natural Science for the 4th year of Primary Education. The Project is made up of seven didactic units addressing general material properties, materials and their properties, buoyancy, the effects of forces in objects, together with simple and complex machines, the stages of aggregation or different inventions and discoveries, respectively. Throughout them, different ICT tools will be implemented to assist the process of learning.

4.3.1. Didactic Unit 9: Matter and its properties	
Timing: 2.5 weeks of the second term; 5 sessions of 45 minutes. **Description:** Students will learn about the general material properties of materials. **Final product:** Students will go to the school´s physics laboratory and do a research project on the properties of materials. Emphasis will be placed on engaging students by asking questions and doing hands-on activities where they can solve their own questions. Later, they will write a report on the materials covered.	
CONTENT	
Conceptual • General material properties **Procedural** • Description of the main properties in materials • Composition of an investigation report **Attitudinal** • Have interest on learning about the environment **Language content**	**STEM related skills developed:** • Engaging students in activities. • Finding out about the prior knowledge of students. • Using questions and students' interests as a guide for learning. • Measuring and calculating using various devices. • Organising and analysing information. • Creating investigation reports.

• Report on the general properties of materials.	• Offer further opportunities for research.

Contribution to key competences:

1. Linguistic competence: Developed by communication between members of the group, seeking for and selecting information from different sources, composition of written reports, and oral communication of findings.
2. Mathematics, Science and Technology competence: Activities related to the general material properties, and the use of devices to calculate the mass and volume of objects.
3. Digital competence: It has a central role as students need to seek for information and select the most relevant. Also, they will use it to present their reports.
4. Learning to learn: Promoted by selecting various sources of information, taking group decisions, adjusting the task to its demands, or promoting self and peer assessment.
5. Social and civic competence: Learning about the environment and coming up with ways to improve it, as well as pacific conflict resolution strategies.
6. Sense of initiative and entrepreneurship: Developed by promoting creativity in the presentation of the investigation report.

COGNITION

Learning goals	**Learning standards**
Educational stage goals: a), b), f), g), i) 1. To identify mass and volume as general material properties. 2. To use the scale and test tubes as ways of measurement. 3. To research on the main characteristics of mass and volume. 4. To conduct a scientific investigation process. 5. To describe the general material properties using an investigation report (LLG).	1.1 Students define the concept of matter. 1.2 Students allocate mass and volume as general material properties. 2.1 Students weight objects in the digital and analogical scale, presenting their measurements in grams. 2.2 Students weight water in different test tubes, presenting their findings in litres. 3.1 Students describe the characteristics of mass and volume. 3.2 Students research on specific aspects that make mass and volume different. 4.1 Students come up with questions to guide the investigation process. 4.2 Students collaborate with their peers and create a scientific investigation report. 5.1 Students use specific terminology when defining mass and volume. 5.2 Students apply theoretical knowledge to specific situations, creating personalised examples.

CULTURE

Learning goals	**Learning standards**
To understand the impact materials have in the environment.	1. Students investigate about the most common materials used worldwide, focusing on the use of plastic. 2. Students investigate about the “Pacific plastic island” and the reasons why it was created. 3. Students propose ways to reduce the use of plastic.

COMMUNICATION

Language of learning:

-Mass and volume: matter, object, digital/analogical scale, space, test tubes, liquid, container.
-Measure: mass, grams, kilograms, volume, litres, millilitres.
-Questions: question structure, question mark (?).
-Language for describing material properties: A rock has a volume of 1 litre; the mass of the pen is 6 grams.
-Language related to the investigation report: heading, subheadings, title of experiment, introduction (purpose), hypothesis, materials, method, conclusions.
-Scale and test tubes: graduated, mark, reach, plate, screen, measurement.

Language for learning:
-Comparing measures: This/that is…, while the first one measures…the second measures…, the object with the highest/lowest mass/volume is…
-Debate about the impact materials have in nature: the most common material is…, it is important to reduce the use of plastic because…
-Justifying decisions: object A has a higher mass than object B because…, In my opinion, I/we believe that
-Asking and answering questions: Do a rubber and a pen have the same mass? How do you calculate volume? We have to, we need a/an/ to…
-STEM language: report, hypothesis, experiment, measure, reach conclusions.
Language through learning:
Language through writing the investigation report, language through calculating the mass and volume of objects, language through using ICT, language through peer, teacher, and language assistant.

ASSESSMENT

Evaluation criteria:	**STEM evaluation criteria:**
• To identify and define mass and volume as general material properties (Block 4, 2). • To accurately use measurement devices, presenting findings using specific terminology (Block 4, 5). • To carry out an investigation, presenting findings through a scientific report (Block 1, 1 and 3). • To describe the general material properties using accurate measurement terms and proving examples (Block 4, 2).	• To carry out cooperative hands-on activities and experiments, respecting the opinions of others and exhibiting an attitude of care of the materials. • To obtain relevant information on the general properties of materials, making predictions about specific situations. • To formulate questions and hypothesis about the mass and volume of objects. • To communicate orally and in writings the results obtaining, including graphic support.

ASSESSMENT STRATEGIES AND RESOURCES

Formative assessment	**Summative assessment:**
-Mini whiteboards for short answers to questions. -Thumbs-up/down question. -Self-evaluation checklist. -Teacher feedback of activities on the spot.	-Rubric for evaluating the scientific investigation reports. -End of unit quiz on general material properties and its calculation.

ATTENTION TO DIVERSITY

High Intellectual Abilities: the student will be given different investigation questions she will have to answer. These include: What would you do to calculate the mass of the milk contained in a glass? Or is there any relation between the mass and the size of an object? Can an object have little mass and big size? She will have to answer these questions and include them in her investigation report.

LOTS to HOTS:	**HOTS to LOTS:**
A. Students calculate the volume of different objects varying the unit of measure. **B**. Students investigate about the multiples and submultiples of grams.	**A**. Students circle options to distinguish between mass or volume. **B.** Students identify what objects have more/less mass from pictures with measurements.

4.3.2. Didactic Unit 10: What are you like?

Timing: 2.5 weeks of the second term; 5 sessions of 45 minutes.
Description: Students will learn about materials and their main properties: hardness, impermeability, resistance, opacity, conductivity, elasticity, solubility, or flexibility.
Final product: Students will investigate about the properties of different materials by doing several experiments. These include creating a waterproof fabric using a candle, preventing an

egg from breaking using water with salt or turning on light bulbs using water, paperclips, and salt. Finally, students will create a *Padlet* where they will have to describe the properties of a material, asking their classmates to guess what the material described is. Emphasis will be placed on brainstorming ideas about the materials, by asking questions, prior to doing the experiments.

CONTENT

Conceptual
- Properties of materials.

Procedural
- Description of the properties of materials.
- Experimentation with daily materials and reflect about their properties.

Attitudinal
- Develop interest for knowing the main properties of daily materials.

Language content
- Description of the properties of materials.

STEM related skills developed:
- Cooperative work.
- Research for information from different sources.
- Emphasis on the importance of women in science: Stephanie Kwolek.
- Knowing students' prior knowledge on a topic using questions.
- Providing shared experiences through experimentation.
- Transferring the information learnt to the experiments and descriptions.
- Assessing their own descriptions and their peers´.

Contribution to key competences:
1. Linguistic competence: Developed by active communication among students, by researching information, reading, discussion of ideas and oral and written presentation of results.
2. Mathematics, Science and Technology competence: Activities related to the properties of materials, knowing about materials to learn about how it affects our daily life.
3. Digital competence: Use of ICT tools to seek information and present conclusions. Main role as it will be the main source of information.
4. Learning to learn: Developed by selecting information from various sources, analyse it and be critical with it. Also, related to self and peer assessment strategies.
5. Social and civic competence: Promoted by active cooperation among students, respect for different ideas, take part in the social context or take responsibility for our choices.
6. Cultural awareness and expression: Encouraging creativity by conducting experiments with different materials and tools.

COGNITION

Learning goals	**Learning standards**
Educational stage goals: a), b), f), i) 1. To identify the main properties of materials. 2. To research on materials with similar and opposite properties. 3. To investigate about material properties by conducting experiments. 4. To assess one´s and other´s descriptions by using rubrics and justifying decisions. 5. To describe the properties of materials (LLG)	1.1 Students recognise the main properties of materials. 1.2 Students label descriptions with the name of the property of the material. 2.1 Students investigate about properties that are specific to certain materials. 2.2 Students classify properties according to their nature. 3.1 Students create experimental activities where to play with the properties of materials. 3.2 Students discuss about how similar materials may have different properties. 4.1 Students assess their peers' description and give realistic ways of improvement using a rubric. 5.1 Students name/label/classify adjectives to describe the properties of the materials. 5.2 Students describe the properties of materials using appropriate terminology.

CULTURE

Learning goals	**Learning standards**
	1. Students investigate about the most common props used in films: glass.

To understand the different properties of materials used in movies.	2. Students present the main characteristics of glass and why it can be dangerous to use it. 3. Students describe how glass props are created in movies and what the properties of the materials used are. 4. Students explain how some materials that look similar may have different properties.

COMMUNICATION

Language of learning:

-Material properties: hardness, impermeability, resistance, opacity, conductivity, elasticity, flexibility, solubility.

-Descriptive language: adjectives (opaque, robust, shiny), addition connectors (also, in addition to, moreover).

-Explaining concepts: This material is…, The material can be found in…, Its function is…

-Everyday materials: egg, glove, candle, lighting bulb, paperclip, magnet.

-Actions (verbs): scratch, stain, break, squeeze, wet, conductive.

-Describing properties of materials: What is electric conductivity? You need insulating materials to stop the electric current.

Language for learning:

-Making hypothesis: This material is made of plastic, so it won´t conduct electricity. If we take hit an egg, it will break.

-Experiment instructions: First we take the fabric, then we spread the candle wax on it. Finally, we pour water.

-Asking and answering questions: Did the fabric get wet? No, it didn´t because the wax is waterproof.

-Discussing: I believe…, I disagree with you because…, I see your point, but maybe…

-STEM language: hypothesis, experimentation, brainstorming, conclusions, design.

Language through learning:

Language through ICT use (Padlet), language through conducting the experiments, language through interacting with peers, teacher, and language assistant.

ASSESSMENT

Evaluation criteria:	**STEM related criteria:**
• To identify the properties of materials (Block 4, 1). • To correctly use different ICT tools to seek information about a specific topic (Block 1,3). • To take part in experiments, applying the properties of materials to specific situations (Block 4, 3). • To classify materials according to their properties and explain how they justify the uses they are given (Block 4, 1). • To describe the properties of materials using appropriate terminology (Block 1, 1).	• To obtain relevant information on the properties of materials through experimental settings. • To communicate orally and in written the results obtained, presenting them with graphic support. • To carry out cooperative hands-on activities and experiments, respecting the opinions of others and exhibiting an attitude of care of the materials. • To formulate questions and hypothesis about materials and their properties.

ASSESSMENT STRATEGIES AND RESOURCES

Formative assessment:	**Summative assessment:**
-On the spot answers to short questions. -Learning intention walls. -Teacher and peer feedback on activities. -Metacognition activities by exit slips.	-Rubric for the Padlet publication with the minimum requirements needed. -Self-assessment tasks for students. -End of unit test on the properties of materials. -Worksheets related to the properties of materials.

ATTENTION TO DIVERSITY

High Intellectual Abilities: the student will have to investigate about how the properties of materials determine the uses they are given. For that, she will choose daily objects, describe the materials and its uses. As an example, she may explain why linen is a better material than cashmere in hot climates. Later, she will create a short presentation and explain her findings to her classmates. For it, she will have total freedom to do so.	
LOTS to HOTS: **A**. Students come up with other experiments where to apply the properties of a material.	**HOTS to LOTS:** **A**. Students circle the correct property of the material from a list.

4.3.3. Didactic Unit 11: Will it sink?	
Timing: 2.5 weeks of the third term; 5 sessions of 45 minutes. **Description:** Students will investigate about the buoyancy and density of objects and liquids. They will participate in different hands-on activities where they will experiment with daily objects and learn about how an object´s/liquid´s density determines whether objects float and whether their initial hypothesis were or not correct. **Final product:** Model of a ship and submarine using recycled materials. Throughout the activities they will write a blog recounting the process and outlining the conclusion reached.	
CONTENT	
Conceptual • Buoyancy and density of objects and liquids. **Procedural** • Construction of a model of a ship and submarine. • Explanation of the relation between density and buoyancy. **Attitudinal** • Becomes aware of the importance of the concept of buoyancy for daily tasks. **Language content** • Recount of the experiment process.	**STEM related skills developed:** • Researching for information about the buoyancy of objects and liquids. • Offering shared experiences. • Analysing, organising, and summarising information. • Creating models to understand and describe the relation between concepts. • Transferring knowledge to future activities. • Assessing own and peer work.
Contribution to key competences: 1. Linguistic competence: Developed by an active communication among students, organisation, and summarising of ideas and oral, seeking for information from different sources, written presentation of the work and oral presentation of conclusions. 2. Mathematics, Science and Technology competence: Activities related to buoyancy and density of objects and liquids. Knowing how it affects our daily lives. 3. Digital competence: Promoted using technology to research, organise and present the information, as well as developing digital skills using various forms of digital media. 4. Learning to learn: Developed by adjusting time and resources to the needs of the task, selecting relevant information, adjusting, organising information, and managing one´s own process of learning. Also, referring to assessing own and other´s work. 5. Social and civic competence: Promoted by fostering knowledge about the context we live in, creating ways of participating in their social environment or developing interpersonal communication. 6. Cultural awareness and expression: Developed through fostering creativity in the experiments using different tools and materials. 7. Plurilingual competence: Promoted by comparing aspects of different cultures to foster coexistence and the use of language as a tool for learning.	
COGNITION	

Learning goals	Learning standards
Educational stage goals: a), b), e), f), i) 1. To describe the concepts of density and buoyancy. 2. To research on the buoyancy of different liquids. 3. To conduct experiments to learn about buoyancy characteristics. 4. To create a model of a ship and a submarine. 5. To recount the steps followed in experiments, outlining conclusions (LLG)	1.1 Students explain density and buoyancy. 1.2 Students describe the relation between density and buoyancy. 2.1 Students identify the main characteristics of buoyancy. 2.2 Students explain the reason why different liquids may have unlike buoyancies. 3.1 Students recognise the parts of the scientific method, labelling them. 3.2 Students apply the scientific method to carry out the different experiments about buoyancy. 4.1 Students use visual organisers to compare the characteristics of ships and submarines. 4.2 Students apply the knowledge acquired about density and buoyancy in the creation of their models. 5.1 Students use specific terminology when describing density and buoyancy. 5.2 Students create separated blog entries to explain each part of the experiment, using synonyms and connectors to show the relation among them

CULTURE

Learning goals	Learning standards
To learn about boats around the world.	1. Students investigate about different ships and boats around the world. 2. Students compare metal boats (i.e., cruises or cargo ships) to wooden boats (i.e., African ancient wooden boats). 3. Students describe the similarities and differences among them.

COMMUNICATION

Language of learning:

-Buoyancy-related language: liquid, object, force, volume, density, sink, surface, push, rise.

-Archimedes' principle: physical law, submerge, immerse, upward/buoyant force, weight.

-Experiment materials: bottle, wood, plastic, modelling clay, weight, marble, water, oil, scale, dynamometer, test tube.

-Describing buoyancy and density: What is the relation between density and buoyancy? They are proportional. Buoyancy is important for vehicles: ships, balloons, boats.

-Describing materials: What objects sink? Objects with the exact same density as the liquid don´t sink or float. Boats float because they enclose air and have a lower density than water.

-Blog language: entry, title, share, tags, publication, link, preview.

Language for learning:

-Hypothesis: In my opinion the clay will sink because it is heavy. If the wood floats the plastic will too because they weight the same.

-Cooperative language: Would you give a hand? We can divide the work among us.

-Experiment description (recount): First we have to collect the objects, then fill a bucket with water, later place the objects on top, and finally observe the results.

-Discussing ideas: From my point of view, we believe that, I don´t see eye to eye with you

-STEM language: scientific method, observation, sharing of ideas, draw conclusions.

-Classroom language: What do you mean by…? I need your help.

Language through learning:

Language through writing the blog, language through seeking for information, language through learning about the relation between density and buoyancy, language through conducting the experiments, language through interacting with peers, teacher, and language assistant.

ASSESSMENT

Evaluation criteria:	STEM evaluation criteria:

• To describe the relation between buoyancy and density (Block 4, 2). • To explain why objects may float on specific liquids and not on others (Block 1, 2) • To know the basic laws that operate buoyancy, like the Archimedes' principle (Block 4, 2). • To explain how buoyancy is applied when creating objects or vehicles (Block 4, 2). • To describe buoyancy assisted by models.	• To obtain relevant information on buoyancy and density through experimental settings. • To communicate orally and in written the • results obtained, presenting them with graphic support. • To formulate questions and hypothesis about buoyancy. • To use appropriate materials for investigating, scale, test tube.
ASSESSMENT STRATEGIES AND RESOURCES	
Formative assessment: -Short sentences answering specific questions about a topic. -On the spot teacher feedback. -Learning intention wall and self- evaluation checklist.	**Summative assessment:** -Rubric with the basic ideas that must be present in the blog entries. -End of unit quiz on the key concepts of buoyancy and density.
ATTENTION TO DIVERSITY	
High Intellectual Abilities: the student will apply the concepts learnt to a real situation. She will investigate about the *Titanic* and why it sank. She will describe why the ship floated before the crash and why that changed after it. Finally, she will present it to the class.	
LOTS to HOTS: -Students investigate and discuss how the concept of buoyancy can be applied to balloons.	**HOTS to LOTS:** -Students will repeat descriptions about buoyancy and density after watching a video.

4.3.4. Didactic Unit 12: May the force be with you!	
Timing: 2.5 weeks of the third term; 5 sessions of 45 minutes. **Description:** Students will learn about forces and the effect they have in objects. **Final product:** Short clips. Students will film themselves doing daily activities, describing what force is acting in what they are doing, and how it affects the action. The clips will be put together to create a video about forces, titled: "May the force be with you!".	
CONTENT	
Conceptual • Forces • Effect of forces in objects. **Procedural** • Identification of forces in daily activities. • Explanation of effects of forces in objects. • Distinction between natural and human-provoked forces. **Attitudinal** • Become interested in learning about the effect of forces in daily activities. **Language content** • Description of the effect of forces in objects.	**STEM related skills developed:** • Researching for information from different sources. • Organising, analysing, and summarising information. • Fostering research skills. • Relate theoretical knowledge to daily practices. • Asking questions about daily activities. • Reflecting about shared experiences and how they affect daily practices. • Offering complemented opportunities for learning about the topic.
Contribution to key competences: 1. Linguistic competence: Developed through active communication among peers, researching information from different sources, writing different texts, and having to present conclusions orally by filming a video. 2. Mathematics, Science and Technology competence: Activities related to the effect of forces in objects. 3. Digital competence: It has a key role as ICT is used to research and select information. Also,	

various sources of digital media are used.
4. Learning to learn: Students will have to use different sources of information, organising and summarising the information found. Also, they will need to reflect about it, adjust to the demands of the task or provide ways of improvement.
5. Social and civic competence: Promoted by having to cooperate and collaborate with classmates, participating to respect our environment and developing interpersonal communication skills, as well as tolerance and respect to others.
6.Cultural awareness and expression: Promoted by developing creativity in the record of videos

COGNITION

Learning goals	**Learning standards**
Educational stage goals: a), b), f), i), j) 1. To describe the concept of a force 2. To research on the characteristics of forces. 3. To explain how forces affect objects. 4. To calculate simple net forces. 5. To describe the effect forces have in objects (LLG).	1.1 Students explain what a force is. 1.2 Students list the forces they apply to objects in their daily practices. 2.1 Students investigate about forces. 2.2 Students distinguish between natural and human-provoked forces, as well as contact and non-contact forces. 3.1 Students research on examples of forces. 3.2 Students analyse the effect of forces in objects. 4.1 Students explain what a net force is. 4.2 Students calculate net forces, expressing results in Newtons 5.1 Students create short sentences to describe an action and the force applied. 5.2 Students use adjectives to explain the effect forces have in objects.

CULTURE

Learning goal	**Learning standards**
To investigate about the gravity force.	1. Students brainstorm activities where forces take place. 2. Students investigate about Isaac Newton and the gravity force. 3. Students discuss about how different life on Earth may be if it wasn´t for gravity.

COMMUNICATION

Language of learning:
-Forces: stationary, accelerate, decelerate, push, pull, direction, magnitude, push, friction, vector, measurement, gravity, magnetism, balanced, repel, attract, Newtons (N), grams (g).
-Effects of forces: resultant force, change on the state of motion, change on the shape.
-Describing forces: This object is moving because I am pushing, so there is a change in the motion of the object.
-Connectors: Cause and effect (as a result of, therefore, because of, as a result).
-Measurement of forces: This force is 5N, the push force is higher than the other force.
Language for learning:
-Discussing about forces: What force do you think is being applied here? What is the name of this force?
-Interactive language: In my opinion, you may be right, but…, In other words…
-Presenting forces in the vide: When you kick a ball you apply a push force that changes the shape and direction of the ball.
-Creating the video: What clip should go first? Maybe we could change the order.
-STEM language: discussion, brainstorm, debating, observation, reflecting, reaching conclusions
Language through learning:
Language through putting clips together, language through searching for information, language through calculating forces, language through peer, teacher, and language assistant interaction.

ASSESSMENT

Evaluation criteria:	**STEM evaluation criteria:**
• To describe what a force is. • To distinguish between contact and non-contact forces. • To calculate net forces, presenting the result in Newtons. • To describe the effect of forces in object, using correct terminology.	• To obtain relevant information on forces through • experimental settings. • To search for and obtain relevant information. • To orally communicate, and in writing, the conclusions reached after carrying out research processes. • To present conclusions using videos and graphic support.

ASSESSMENT STRATEGIES AND RESOURCES	
Formative assessment:	**Summative assessment:**
-Checklist for active observation. -Teacher on the spot feedback. -Mini white boards for short answers. -Self-assessment tasks.	-Rubric with a description of the main concepts to be covered in the video. -Checklist for peer assessment on the videos, summarising the strengths of the performances.

ATTENTION TO DIVERSITY	
High Intellectual Abilities: the student will have a dual role. She will help her classmates with any difficulties they may have, as well as creating an introduction and ending to the class video. For that, she will have to investigate about Newton´s laws of motion.	
LOTS to HOTS:	**HOTS to LOTS:**
A. Students calculate net forces with more than two forces. **B**. Students investigate about air/water resistance	**A.** Students circle/tick the correct answer, differentiating between contact and non-contact forces.

4.3.5. Didactic Unit 13: Discovering machines	
Timing: 2.5 weeks of the third term; 5 sessions of 45 minutes. **Description**: Students will learn about simple machines, including pulleys, levers, and inclined planes. They will get divided in groups, create, and present their cardboard automatons. **Final product**: Cardboard Automaton. Students will create a mechanism for the automaton to later ponder about the sculpture that will go on top of it. For that, they will have to consider the mechanism they have created. Finally, students will have to persuade their classmates about why their automaton (and simple machine) is the most effective.	
CONTENT	
Conceptual • Simple machines **Procedural** • Planning and construction of automatons. **Attitudinal** • Become aware of the relevance of simple machines for daily activities. **Language content** • Persuading about the automaton and its mechanism.	**STEM related skills developed:** • Engaging students in activities. • Problem resolution. • Cooperative work strategies. • Representing and transferring ideas to different platforms, using graphs and visual support. • Debate about specific topics. • Provide shared experiences.
Contribution to key competences: 1. Linguistic competence: Developed by active communication among classmates, research for information from different sources, organising and summarising information, as well as creating written texts and orally communicate results. 2. Mathematics, Science and Technology competence: Activities related to mechanisms, transformation of movements, design, or spatial relations. 3. Digital competence: This competence has an essential role as students will use ICT as tools	

for learning, by searching and organising information.
4. Learning to learn: Promoted by adjusting to the needs of a task, creating diagrams and mind maps to manage one´s learning process, as well as reflecting about the process of learning.
5. Social and civic competence: Activities related to pacific resolution of conflicts, knowledge about the environment and ways to improve it, or fostering interpersonal communication.
6. Cultural awareness and expression: This competence is supported by cultivating creativity in the representation of work, such as by using mind maps.
7. Plurilingual competence: Developed by comparing aspects of different cultures to foster coexistence and the use of language as a tool for learning.

COGNITION

Learning goals	**Learning standards**
Educational stage goals: a), b), f), g), i), j) 1. To identify simple machines: pulley, lever, and inclined plane. 2. To research on the characteristics of simple machines. 3. To create cardboard automatons. 4. To include a sculpture on top of the automatons. 5. To persuade others about the best automaton and simple machine (LLG).	1.1 Students name simple machines. 1.2 Students identify the pulley, lever, and inclined plane as simple machines. 2.1 Students investigate about simple machines' mechanisms. 2.2 Students create sketches/designs of simple machines. 3.1 Students decide on the mechanism they want to create 3.2 Students create their mechanical sculptures. 4.1 Students reflect about what person/animal/object exhibits the same movement performed by the mechanism. 4.2 Students create sculptures to go on top of the automaton 5.1 Students debate about the movements of their automaton 5.2 Students create short sentences to describe movements, using appropriate terminology and relating sentences using connectors. 5.3. Students use persuasive language to highlight the properties of their automatons.

CULTURE

Learning goal	**Learning standards**
To understand the relevance of simple and complex machines in daily tasks.	1. Students investigate about aboriginal simple machines. 2. Students compare aboriginal simple machines to developed countries machines. 3. Students describe how daily tasks could be done using aboriginal simple machines.

COMMUNICATION

Language of learning:
-Mechanical movement: up, down, right, left, turn, side to side.
-Cardboard Automaton: mechanism, handle, frame, cam, cam follower, sculpture, movement.
-Automaton actions (verbs): cut, paste, place, draw, outline, thread, push, pierce, insert, adjust
-Relating ideas and describing results: cause and effect connectors (because, therefore, for this reason), sequence connectors (first, next, finally).
-Language structures: the automaton movement is up and down. The cam is connected to the cam follower, so that when one moves the other ones does too.
Language for learning:
-Discussing about the creation of the automaton: What movement do we want to create? Where should we put the cam? That cam doesn´t go there because…
-Self and peer reflection: In my opinion…, from my point of view…, maybe I´m wrong, but…
-Presenting the sculpture: we have chosen the windscreen wipers because they move like our automaton, from side to side.
-Language for persuading: research, personal opinions, rhetorical questions, examples, anecdotes
-Language for interaction: what sculpture should we put on top? Have you got any other ideas?
-STEM language: hypothesis, discussion, plan, observation, refection, reaching conclusions.

Language through learning:
Language through ICT use, language through investigation, analysing, and organising information, language through reflecting about the sculpture, language through learning about automatons, language through peer, teacher, and language assistant interaction.

ASSESSMENT

Evaluation criteria:	STEM evaluation criteria:
• To identify the pulley, lever, and inclined plane as simple machines. • To describe the type of movements that automatons can do. • To create automatons that can perform simple mechanical movements. • To relate mechanical movements with a person/animal/object´s movement. • To describe the type of movement performed by each automaton.	• To cooperate with classmates in the creation of an automaton. • To search for and obtain relevant information. • To orally communicate, and in writing, the conclusions reached after carrying out research processes. • To provide real life examples about theoretical data. • To hypothesise about natural phenomena or those created by humans.

ASSESSMENT STRATEGIES AND RESOURCES

Formative assessment:	Summative assessment:
-On the spot teacher feedback. -Active observation. -Thumps up/down questions. -Sketches/designs of simple machines.	-Checklist for the questions students have to create that will appear on the quiz. -Rubric for the evaluation of the automatons. -End of unit quiz

ATTENTION TO DIVERSITY

High Intellectual Abilities: the student will have to introduce other elements like springs, gears, or joints into her automaton. She will have to investigate about the type of movements that these elements allow, and how they are different to the ones done in class. Later, she will present her automaton to her classmates and describe and explain the mechanism she created.

LOTS to HOTS:	HOTS to LOTS:
A. Students investigate about Arthur Ganson, select one of his sculptures and describe the mechanism it has.	**A**. Students create automatons from a template

4.3.6. Didactic Unit 14: Solid, liquid or gas, what are you?

Timing: 2.5 weeks of the third term; 5 sessions of 45 minutes.
Description: Students will learn about the states of mater doing experiments. Throughout them, they will use the whiteboard to organise information, create tables, or present conclusions through pictures and graphs. Furthermore, along with the experiments, each student will fill in a record sheet with the steps of the experiments, the initial hypothesis, the states of matter, or the phase transitions that are being worked on. At the end they will have to present their findings.
Final product: Experiments about the states of matter and phase transitions. These include making and melting ice pops, creating sugar crystals on a string, or soda pop in a balloon.

CONTENT

Conceptual	STEM related skills developed:
• States of matter. **Procedural** • Use of the whiteboard to organise information, create tables, or present conclusions. • Explanation of the states of matter through experiments. **Attitudinal** • Become aware of the importance of the states of	• Cooperative work. • Research for information from different sources. • Knowing students' prior knowledge on a topic using questions. • Providing shared experiences through experimentation.

matter for daily practices. **Language content** • Record sheet with the steps of experiments and the conclusions reached.	• Researching for information. • Sharing personal experiences. • Organising, analysing, and summarising information.

Contribution to key competences:

1. Linguistic competence: Developed by an active communication among students, organisation, and summarising of ideas and oral, seeking for information from different sources, written presentation of the work and oral presentation of conclusions.
2. Mathematics, Science and Technology competence: Activities related to the states of matter and knowing how it affects our daily lives.
3. Digital competence: Promoted using technology to research, organise and present the information, as well as developing digital skills using various forms of digital media.
4. Learning to learn: Developed by adjusting time and resources to the task, selecting relevant information, adjusting, organising information, and managing one´s own process of learning. Also, referring to assessing own and other´s work.
5. Social and civic competence: Promoted by fostering knowledge about the context we live in, creating ways of participating in their social environment or developing interpersonal communication.
6. Cultural awareness and expression: Developed through fostering creativity in the experiments using different tools and materials.

COGNITION

Learning goals	**Learning standards**
Educational stage goals: a), b), f), i), j). 1. To identify and name the states of matter. 2. To describe the characteristics of each state of matter. 3. To experiment and observe the states of matter and phase transitions using various tools, respecting the rules, and caring for the safety of participants. 4. To use the whiteboard as a tool for learning and organising information. 5. To communicate the results of experimentation, filling in record sheets, with detailed information of the materials covered (LLG).	1.1 Students associate pictures to the states of matter. 1.2 Students name each state of matter. 2.1 Students classify the characteristics of the states of matter. 2.2 Students compare the states of matter, describing its characteristics. 3.1 Students hypothesise, observe, and collect information about the states of matter through experiments. 4.1 Students explore the potential and tools of whiteboards. 4.2 Students create their own tools for learning assisted by whiteboards. 5.1 Students use visual organisers and tables to organise the information on their record sheets. 5.2 Students combine the information recorded with individual experiences to communicate their findings.

CULTURE

Learning goal	**Learning standards**
To identify the states of matter in daily practices	1. Students brainstorm the main characteristics of solid, liquid, and gas objects. 2. Students identify solid, liquid, and gas objects in their daily life. 3. Students describe phase transitions that can be found in everyday practices.

COMMUNICATION

Language of learning:

-States of matter: solid, liquid, gas, melting, vaporisation, freezing, condensation, sublimation, deposition.
-Descriptive language: adjectives (hard, wet), addition connectors (also, in addition to).
-Compare and contrast: different from, however, similar to, alike, both, less than, on the contrary.
-Explaining concepts: The three states of matter are solid, liquid, and gas.

-Describing phase transitions: This experiment represents…, as we can see…, because of…
-Describing the experiment: First, we take…, then, we add…, finally, we… I believe…, I thought that…, Having finished the experiment are conclusions are…

Language for learning:

-Making hypothesis: If we heat the ice-cream it will melt; The drink has gas so, if we open it and put a balloon on top it will inflate.
-Using the whiteboard: Let´s add a table to organise information, should we draw the steps of the experiment?
-Sharing opinions: I believe…, I disagree with you because…, I see your point, but maybe…
-STEM language: hypothesis, experimentation, brainstorming, conclusions, design.
-Classroom language: Can you give me a hand with…? What shall we do next?

Language through learning:

Language through making the experiments, language through seeking for and organising information, language through learning about the states of matter and phase transitions, language through interacting with peers, teacher, and language assistant.

ASSESSMENT

Evaluation criteria:	**STEM evaluation criteria:**
• To name and describe the three states of matter using appropriate vocabulary (Block 4, 3). • To identify the states of matter in real life (Block 4, 3). • To identify and explain the phase transitions (Block 4, 3). • To analyse and organise the information using the white board (Block 1, 4). • To correctly fill in record sheets after doing experiments (Block 1, 5).	• To obtain relevant information on the states of matter through experimental settings. • To communicate orally and in written the results obtained, presenting them with graphic support. • To carry out cooperative hands-on activities and experiments, respecting the opinions of others and exhibiting an attitude of care of the materials. • To formulate questions and hypothesis about the states of matter.

ASSESSMENT STRATEGIES AND RESOURCES

Formative assessment:	**Summative assessment:**
-On the spot answers to questions. -Leaning intention walls. -Teacher and peer feedback on activities. -Metacognition activities by exit slips.	-End of unit quiz on the materials covered. -Checklist for students for the record sheet of experiments. -Rubric for the teacher on the final presentation.

ATTENTION TO DIVERSITY

High Intellectual Abilities: the student will be in charge of helping her classmates throughout the unit. Moreover, she will investigate about the fourth state of matter: plasma. For that, she will research about where it can be found or its main characteristics. Finally, she will include her findings on the record sheet and present her conclusions to her classmates.

LOTS to HOTS:	**HOTS to LOTS:**
A. Students will brainstorm ideas on how to create a short experiment that touches on one of the phase transitions. Provided they can be done with the tools at the school, students will carry it out and present it to their classmates.	**A**. Students will fill in blanks or circle the right answer in relation to the development of experiments.

4.3.7. Didactic Unit 15: Hatching discoveries!

Timing: 2.5 weeks of the third term; 5 sessions of 45 minutes.

Description: Students will learn about some of the most important human discoveries throughout history. They will investigate about Archimedes' discoveries: Archimedes' screw, Claw of Archimedes, architonnerre, …; as well as some other female and male inventors.

Final product: Collective *Instagram* account. The students will create an account where they will have to post about the most important discoveries. For each post they must include a photo, title, location, description of the invention or its importance on the time it was invented. Finally, a debate will take place about them, with questions such us: which discovery is more important? Which one has impacted human history the most? Do any still exist? Should any of them disappear? Why?

CONTENT

Conceptual
- Inventions and discoveries.

Procedural
- Composition of a written text to describe an invention.
- Sharing of ideas and opinion through a debate.

Attitudinal
- Become aware of the relevance of discoveries for human history.

Language content
- Debate about the relevance of human discoveries.

STEM related skills developed:
- Researching for information.
- Offering shared experiences.
- Emphasis on the importance of women in science: female inventors.
- Finding out information about inventions and discoveries.
- Analysing, organising, and summarising information.
- Transferring knowledge to future activities.
- Assessing own and peer work.

Contribution to key competences:

1. Linguistic competence: Developed by active communication among students throughout the activities, research for information from different sources, sharing of private experiences and oral and written presentation of results and conclusions, and debate of ideas.
2. Mathematics, Science and Technology competence: Activities related to the support of scientific research and attitudes and values related to valuation of scientific knowledge.
3. Digital competence: Promoted using ICT tools to investigate and present information. Also, several examples of digital media are used.
4. Learning to learn: Developed by adjusting time and resources to the needs of the task, selecting relevant information, adjusting, organising information, and managing one´s own process of learning. Also, related to self and peer assessment.
5. Social and civic competence: Promoted by fostering knowledge about the context we live in, creating ways of participating in their social environment or developing interpersonal communication.
6. Cultural awareness and expression: Promoting creativity in the presentation of conclusions.
7. Plurilingual competence: Developed using glossaries in English so that language becomes a tool for communicating and learning.

COGNITION

Learning goals

Educational stage goals: a), b), c), f), i), j)

1. To identify the most representative female and male inventors.
2. To research on the main characteristics of inventions.
3. To use different sources of digital media to present information.
4. To debate about the relevance of human inventions (LLG).

Learning standards

1.1 Students investigate about the most representative inventors.
1.2 Students link inventors with their discoveries.
2.1 Students investigate about the characteristics of inventions.
2.2 Students group inventions according to their characteristics.
3.1 Students research about the *Instagram* app.
3.2 Students create *Instagram* posts outlining the main characteristics of inventions and discoveries.
3.3. Students offer constructive criticism about the task through comments on the post.
4.1 Students rank, classify, and argue about the value and relevance of discoveries.
4.2. Students compose simple sentences to give opinions about

	the inventions in a debate.

CULTURE

Learning goals	**Learning standards**
A. To investigate about 21st century inventions that have shaped the world.	**A.1.** Students investigate about the most important inventions of the 21st century. **A.2.** Students describe the main characteristics of those inventions.
B. To research about inventions created in different countries.	**B.1.** Students study about the most popular inventions and discoveries in different countries. **B.2.** Students describe their inventions, outlining their importance.

COMMUNICATION

Language of learning:
-Inventions and discoveries: Archimedes, Newton, Martha Coston, Letitia Geer, Katherine Blodgett, telescope, Archimedes' screw, Claw of Archimedes, architonnerre, needle, emergency flares.
-Genre: debate.
-Debate language: agreement (that is a good point, I fully support that stance), disagreement (I´m afraid I don´t agree because…, I see your point but…), interrupting (excuse me, may I interrupt?), rephrasing (in other words, to put it another way, what I mean is…).
-*Instagram* language: social network, post, title, location, comment, like, share, story, profile.
Language for learning:
-Cooperative language: can you help me with this post? What invention dis you research on? What are your ideas on…?
-Constructive criticism language: I appreciated your post on…, but maybe next time think about… I think you thoroughly presented the characteristics of the invention, however…
-Deciding on what invention to post: We have chosen to…
-Instructive language: get into groups! Prepare for the debate! Open your computer, start posting
-STEM language: investigate, brainstorm, reach conclusions.
-Classroom language: what is the next step? What is the word in English for…?
Language through learning:
Language through sharing ideas in the debate, language through searching for information, language through using ICT tools (*Instagram*), language through peer, teacher, and language assistant.

ASSESSMENT

Evaluation criteria:	**STEM evaluation criteria:**
• To know about relevant female and male inventors (Block 5, 1 and 3). • To discuss about the past and present relevance of inventions and discoveries (Block 1,1). • To use different sources of digital media to organise and present information (Block 1,3 and 5); (Block 5, 4). • To present conclusions through a debate (Block 1, 3).	• To establish hypothesis about specific events and inventions and discoveries. • To analyse information and reach conclusions. • To communicate orally the results obtained. • To take turns in presenting findings, cooperating with peers, and proposing ways of improvement. • To debate and justify the importance of scientific discoveries.

ASSESSMENT STRATEGIES AND RESOURCES

Formative assessment:	**Summative assessment:**
-On the spot teacher feedback. -Active observation and exit slips. -Self and peer assessment tasks.	-Rubric for the *Instagram* post. -Teacher checklist on the sharing of ideas in the debate.

ATTENTION TO DIVERSITY

High Intellectual Abilities: the student will create a timeline where she will locate the inventions and discoveries. Moreover, she will investigate about the time those discoveries where invented, outlining their relevance in that time, and how they are still important currently.	
LOTS to HOTS: **A.** Students come up with alternative uses for the discoveries and inventions studied.	**HOTS to LOTS:** **A.** Students relate pictures of the inventions and discoveries to the name of the inventors.

5. CONCLUSIONS

Ending this Annual Syllabus Project and reflecting about the process, I can confirm that it has been a personal challenge. I started the design of the Syllabus with theoretical knowledge of what CLIL and STEM meant separately. However, the real obstacle laid in understanding how to combine them to create rich learning scenarios. This conjunction of methodological principles stems from the need to motivate young boys and girls to observe their context, to formulate questions, to seek answers, to use different sources of information, including ICT tools, to solve problems, or to become interested in science. That is the reality of the 21st century. Nowadays, more than ever, there is a need to have both theoretical and practical knowledge. Not only should we know how to describe or explain facts, but we also must learn to work with others, to integrate different kinds of ICT tools in our learning processes or to create meaningful learning scenarios where the theoretical knowledge acquired becomes practical understanding and can be applied to real life situations.

Implementing CLIL entails considering the nature of this dual-focused approach. For that, we must combine subject content with language, in this case English, in an integrated way and with the goal of reaching meaningful outcomes. From the beginning, I wanted to create scenarios that allowed students to take main roles and have active participation. Moreover, I decided to place value on the key competences, as displayed in the new educational framework (Organic Law 3/2020 and Royal Decree 157/2022). This came as a necessity to provide citizens with knowledge, skills, and attitudes to be able to actively participate in society, and as part of promoting lifelong learning processes. Conversely, the implementation of STEM education will allow students to develop specific skills and knowledge. It cannot be denied that we can´t predict what the future will hold, however it is a necessity to create learning scenarios that combine different methodological principles where meaningful learning takes place. That was the goal of this Annual Syllabus Project, to provide a response to the

need for future citizens to master content knowledge as well as language to become skilled workers in an increasingly digitalised context.

Another key component of this Syllabus was the digital competence and the use of ICT tools. It is a reality that students need to learn how to utilise and apply digital media into their daily lives. Such is its importance, that we opted for placing the digital competence in the centre of the learning process. To that end, this Project aimed to teach students how to use ICT tools, as well as developing the digital competence, a much wider content. Also, their implementation sought to ease the process of combining CLIL and STEM as to pillars for meaningful learning.

Ending this conclusion, I would like to thank everyone who helped me in the process. When I was first introduced to this new approach, I realised that learning does not only refer to facts or memorisation of information, but to the need to look at the bigger picture and consider all the other factors that influence it. Whether it is the personal characteristics of students, the context in which learning takes place, or the situations in which the knowledge can be applied, it should all be taken into account when organising learning scenarios. That has been one of the main learning outcomes I have taken from my time at Comillas Pontificial University, the need to combine theoretical and practical knowledge to ensure that students are placed in the centre of the learning process and that their needs and characteristics are met and respected. Moreover, this Project became a personal challenge as it forced me to reflect about the type of education I believe in and how to turn my ideas into action. Last, but not least, I would like to especially thank Magdalena Custodio for her support throughout the Project. I first started it with a somewhat chaotic knowledge and ideas of what I wanted my final product to become. In that way, had it not been for her support, guidance and feedback, this Annual Syllabus Project could not have been completed.

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7. ANNEXES

7.1 Annex 1. Table 3. Educational stage objectives.

Real Decreto 126/2014, de 28 de febrero, por el que se establece el currículo básico de la Educación Primaria.	a) Conocer y apreciar los valores y las normas de convivencia, aprender a obrar de acuerdo con ellas, prepararse para el ejercicio activo de la ciudadanía y respetar los derechos humanos, así como el pluralismo propio de una sociedad democrática. b) Desarrollar hábitos de trabajo individual y de equipo, de esfuerzo y de responsabilidad en el estudio, así como actitudes de confianza en sí mismo, sentido crítico, iniciativa personal, curiosidad, interés y creatividad en el aprendizaje, y espíritu emprendedor. c) Adquirir habilidades para la prevención y para la resolución pacífica de conflictos, que les permitan desenvolverse con autonomía en el ámbito familiar y doméstico, así como en los grupos sociales con los que se relacionan. d) Conocer, comprender y respetar las diferentes culturas y las diferencias entre las personas, la igualdad de derechos y oportunidades de hombres y mujeres y la no discriminación de personas con discapacidad. e) Conocer y utilizar de manera apropiada la lengua castellana y, si la hubiere, la lengua cooficial de la Comunidad Autónoma y desarrollar hábitos de lectura. f) Adquirir en, al menos, una lengua extranjera la competencia comunicativa básica que les permita expresar y comprender mensajes sencillos y desenvolverse en situaciones cotidianas. g) Desarrollar las competencias matemáticas básicas e iniciarse en la resolución de problemas que requieran la realización de operaciones elementales de cálculo, conocimientos geométricas y estimaciones, así como ser capaces de aplicarlos a las situaciones de su vida cotidiana. h) Conocer los aspectos fundamentales de las Ciencias de la Naturaleza, las Ciencias Sociales, la Geografía, la Historia y la Cultura. i) Iniciarse en la utilización, para el aprendizaje, de las Tecnologías de la Información y la Comunicación desarrollando un espíritu crítico ante los mensajes que reciben y elaboran. j) Utilizar diferentes representaciones y expresiones artísticas e iniciarse en la construcción de propuestas visuales y audiovisuales. k) Valorar la higiene y la salud, aceptar el propio cuerpo y el de los otros, respetar las diferencias y utilizar la educación física y el deporte como medios para favorecer el desarrollo personal y social. l) Conocer y valorar los animales más próximos al ser humano y adoptar modos de comportamiento que favorezcan su cuidado. m) Desarrollar sus capacidades afectivas en todos los ámbitos de la personalidad y en sus relaciones con los demás, así como una actitud contraria a la violencia, a los prejuicios de cualquier tipo y a los estereotipos sexistas. n) Fomentar la educación vial y actitudes de respeto que incidan en la prevención de los accidentes de tráfico.

7.2. Annex 2. Table 4. Natural Science objectives for the Fourth year.

Fourth Year Natural Science Objectives. Decreto 89/2014, de 24 de julio, del Consejo de Gobierno, por el que se establece para la Comunidad de Madrid el currículo de la Educación Primaria.	**El ser humano y la salud** **El aparato circulatorio.** 1. Identifica las principales características del aparato circulatorio. 2. Explica las funciones del corazón, las venas y las arterias. **El aparato respiratorio.** 3. Identifica las principales características del aparato respiratorio. 4. Explica las funciones de los pulmones, los bronquios y la tráquea. **El aparato reproductor.** 5. Identifica las principales características del aparato reproductor en el hombre y en la mujer. 6. Explica de forma general la fecundación, el desarrollo embrionario y el parto. **Salud y enfermedad.** 7. Conoce algunas enfermedades que afectan a los aparatos y sistemas del organismo humano estudiados. 8. Identifica y valora hábitos saludables para prevenir dichas enfermedades. 9. Reconoce los efectos nocivos del consumo de alcohol y drogas. **Los seres vivos** **Animales vertebrados.** 10. Explica la alimentación, respiración y reproducción en mamíferos, aves, reptiles, anfibios y peces. **Animales invertebrados. Clasificación.** 11. Identifica, observa y explica las características de los diferentes grupos de animales invertebrados. **Las plantas.** 12. Explica la nutrición y reproducción de las plantas. 13. Fotosíntesis. Explica su importancia para la vida en la Tierra. **Materia y energía. Tecnología, objetos y máquinas** **Estudio y clasificación de algunos materiales.** 14. Observa, identifica, describe y clasifica algunos materiales por sus propiedades (dureza, solubilidad, estado de agregación y conductividad térmica). **El peso de un cuerpo.** 15. Utiliza diferentes procedimientos para la medida del peso de un cuerpo. **Flotación de los cuerpos en un medio líquido.** 16. Identifica y explica las principales características de la flotabilidad en un medio líquido. **Cambios en el movimiento de los cuerpos por efecto de las fuerzas.** 17. Realiza experiencias sencillas que permitan predecir cambios en el movimiento, en la forma o en el estado de los cuerpos por efecto de las fuerzas. **Máquinas que facilitan la vida del hombre. Importantes inventos y descubrimientos.** 18. Observa y explora la utilidad de la palanca, polea y plano inclinado. 19. Identifica algunos inventos de Arquímedes. 20. Identifica a Isaac Newton como descubridor de la gravedad.

7.3. Annex 3. Table 6. Assessment Criteria.

Real Decreto 126/2014, de 28 de febrero, por el que se establece el currículo básico de la Educación Primaria.	
Block	**Assessment Criteria**
1. Initiation to scientific activity	1. Obtener información relevante sobre hechos o fenómenos previamente delimitados, haciendo predicciones sobre sucesos naturales, integrando datos de observación directa e indirecta a partir de la consulta de fuentes directa e indirectas y comunicando los resultados. 2. Establecer conjeturas tanto respecto de sucesos que ocurren de una forma natural como sobre los que ocurren cuando se provocan, a través de un experimento o una experiencia. 3. Comunicar de forma oral y escrita los resultados obtenidos tras la realización de diversas experiencias, presentándolos con apoyos gráficos. 4. Trabajar de forma cooperativa, apreciando el cuidado por la seguridad propia y de sus compañeros, cuidando las herramientas y haciendo uso adecuado de los materiales. 5. Realizar proyectos y presentar informes.
2. Human beings and health	1. Identificar y localizar los principales órganos implicados en la realización de las funciones vitales del cuerpo humano, estableciendo algunas relaciones fundamentales entre ellas y determinados hábitos de salud. 2. Conocer el funcionamiento del cuerpo humano: células, tejidos, órganos, aparatos, sistemas: su localización, forma, estructura, funciones, cuidados, etc. 3. Relacionar determinadas prácticas de vida con el adecuado funcionamiento del cuerpo, adoptando estilos de vida saludables, sabiendo las repercusiones para la salud de su modo de vida.
3. Living beings	1. Conocer la estructura de los seres vivos: células, tejidos, tipos, órganos, aparatos y sistemas: identificando las principales características y funciones. 2. Conocer diferentes niveles de clasificación de los seres vivos, atendiendo a sus características y tipos. 3. Conocer las características y componentes de un ecosistema. 4. Usar medios tecnológicos, respetando las normas de uso, de seguridad y de mantenimiento de los instrumentos de observación y de los materiales de trabajo, mostrando interés por la observación y el estudio riguroso de todos los seres vivos, y hábitos de respeto y cuidado hacia los seres vivos.
4. Matter and energy	1. Estudiar y clasificar materiales por sus propiedades. 2. Conocer los procedimientos para la medida de la masa, el volumen, la densidad de un cuerpo. 3. Conocer leyes básicas que rigen fenómenos, como la reflexión de la luz, la transmisión de la corriente eléctrica, o el cambio de estado, las reacciones químicas: la combustión, la oxidación y la fermentación. 4. Planificar y realizar sencillas investigaciones para estudiar el comportamiento de los cuerpos ante la luz, la electricidad, el magnetismo, el calor o el sonido. 5. Realizar experiencias sencillas y pequeñas investigaciones sobre diferentes fenómenos físicos y químicos de la materia.
5. Technology	1. Conocer los principios básicos que rigen máquinas y aparatos. 2. Planificar la construcción de objetos y aparatos con una finalidad previa, utilizando fuentes energéticas, operadores y materiales apropiados, realizando el trabajo individual y en equipo, y proporcionando información sobre que estrategias se han empleado. 3. Conocer las leyes básicas que rigen los fenómenos, como la reflexión de la luz, la transmisión de la corriente eléctrica. 4. Realizar experiencias sencillas y pequeñas investigaciones sobre diferentes fenómenos físicos de la materia: planteando problemas, enunciando hipótesis, seleccionando el material necesario, montando, realizando, extrayendo conclusiones, comunicando resultados, aplicando conocimientos básicos de las leyes básicas que rigen estos fenómenos, como la reflexión de la luz, la transmisión de la corriente eléctrica.

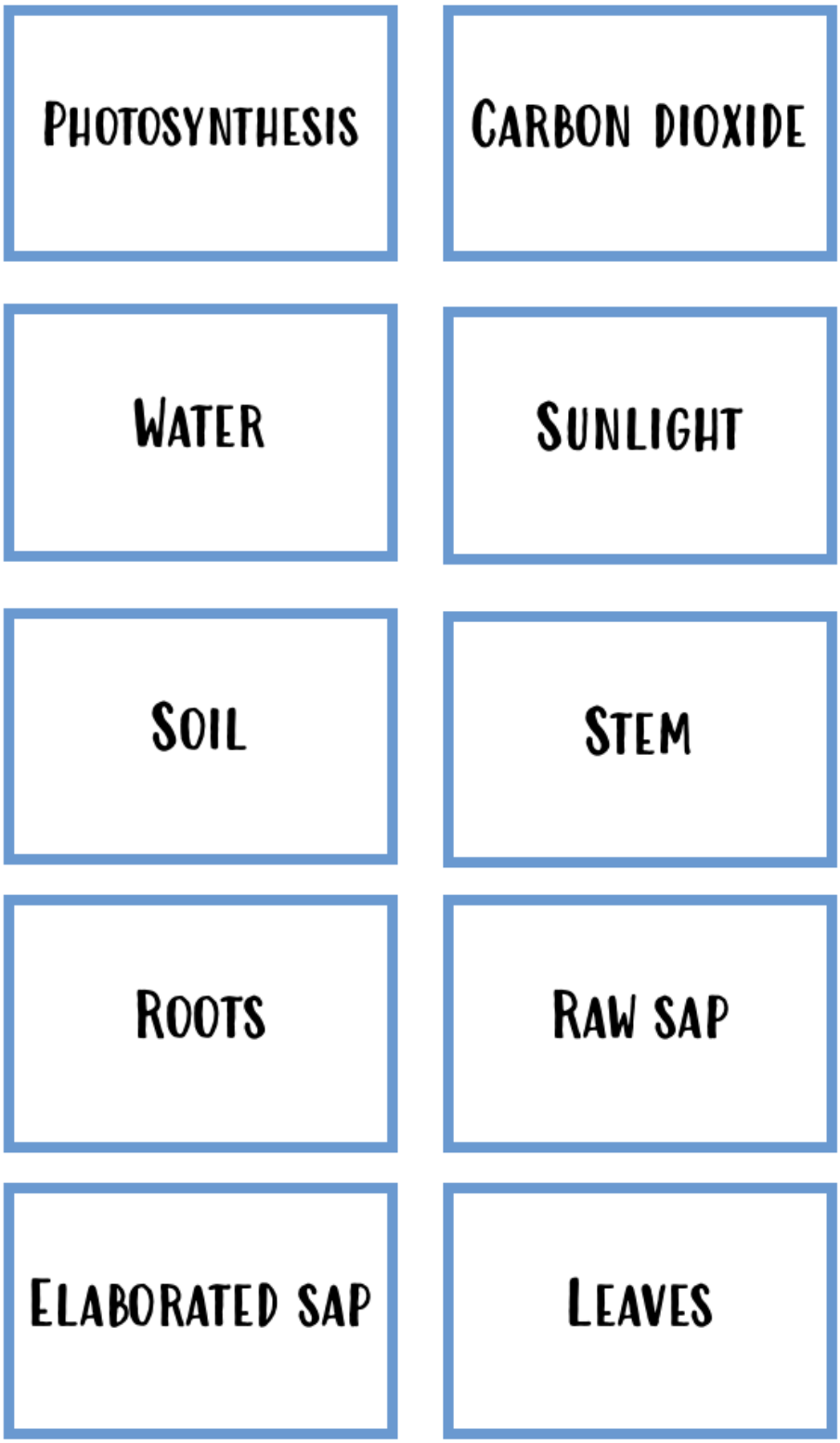
7.4. Annex 4. Table 7. Learning standards.

Real Decreto 126/2014, de 28 de febrero, por el que se establece el currículo básico de la Educación Primaria.	
Block	**Learning standards**
1. Initiation to scientific activity	2.1. Manifiesta autonomía en la planificación y ejecución de acciones y tareas y tiene iniciativa en la toma de decisiones. 3.1. Utiliza, de manera adecuada, el vocabulario correspondiente a cada uno de los bloques de contenidos. 4.2. Hace un uso adecuado de las tecnologías de la información y la comunicación como recurso de ocio. 4.3. Conoce y utiliza las medidas de protección y seguridad personal que debe utilizar en el uso de las tecnologías de la información y la comunicación. 4.4. Presenta los trabajos de manera ordenada, clara y limpia, en soporte papel y digital. 4.5. Utiliza estrategias para realizar trabajos de forma individual y en equipo, mostrando habilidades para la resolución pacífica de conflictos. 5.1. Realiza experiencias sencillas y pequeñas investigaciones: planteando problemas, enunciando hipótesis, seleccionando el material necesario, realizando, extrayendo conclusiones, y comunicando los resultados.
2. Human beings and health	2.2. Identifica las principales características de los aparatos (respiratorio, digestivo, locomotor, circulatorio y excretor) y explica las principales funciones. 3.1. Reconoce estilos de vida saludables y sus efectos sobre el cuidado y mantenimiento de los diferentes órganos y aparatos. 3.2. Identifica y valora hábitos saludables para prevenir enfermedades y mantiene una conducta responsable. 3.3. Identifica y adopta hábitos de higiene, cuidado y descanso. 3.4. Conoce y explica los principios de las dietas equilibradas, identificando las prácticas saludables para prevenir y detectar los riesgos para la salud. 3.6. Observa, identifica y describe algunos avances de la ciencia que mejoran la salud (medicina, producción y conservación de alimentos, potabilización del agua, etc.). 3.8. Identifica emociones y sentimientos propios, de sus compañeros y de los adultos manifestando conductas empáticas.
3. Living beings	2.1. Observa e identifica las características y clasifica los seres vivos: Reino animal. Reino de las plantas. Reino de los hongos. Otros reinos. 2.2. Observa directa e indirectamente, identifica características, reconoce y clasifica, animales invertebrados y vertebrados. 2.4. Observa directa e indirectamente, identifica características y clasifica plantas. 2.6. Explica la importancia de la fotosíntesis para la vida en la Tierra. 4.1. Muestra conductas de respeto y cuidado hacia los seres vivos. 4.2. Usa la lupa y otros medios tecnológicos en los diferentes trabajos que realiza. 4.3. Manifiesta una cierta precisión y rigor en la observación y en la elaboración de los trabajos.
4. Matter and energy	1.1. Observa, identifica, describe y clasifica algunos materiales por sus propiedades (dureza, solubilidad, estado de agregación, conductividad térmica). 2.1. Utiliza diferentes procedimientos para la medida de la masa y el volumen de un cuerpo. 2.2. Identifica y explica fenómenos físicos observables en términos de diferencias de densidad. 2.3. Identifica y explica las principales características de la flotabilidad en un medio líquido. 4.1. Planifica y realiza sencillas experiencias y predice cambios en el movimiento, en la forma o en el estado de los cuerpos por efecto de las fuerzas o de las aportaciones de energía, comunicando el proceso seguido y el resultado obtenido. 5.5. Investiga a través de la realización de experiencias sencillas sobre diferentes fenómenos físicos y químicos de la materia: planteando problemas, enunciando hipótesis, seleccionando el material necesario, extrayendo conclusiones, comunicando resultados, manifestando competencia en cada una de las fases, así como en el conocimiento de las leyes básicas que rigen los fenómenos estudiados.
5. Technology	1. Identifica diferentes tipos de máquinas, y las clasifica según el número de piezas, la manera de accionarlas, y la acción que realizan. 1.3. Observa e identifica alguna de las aplicaciones de las máquinas y aparatos, y su utilidad para facilitar las actividades humanas. 2.1. Construye alguna estructura sencilla que cumpla una función o condición para resolver un problema a partir de piezas moduladas, (escalera, puente, tobogán, etc.). 3.5. Conoce y explica algunos de los grandes descubrimientos e inventos de la humanidad. 4.4. Efectúa búsquedas guiadas de información en la red. 4.6. Utiliza algunos recursos a su alcance proporcionados por las tecnologías de la información para comunicarse y colaborar.

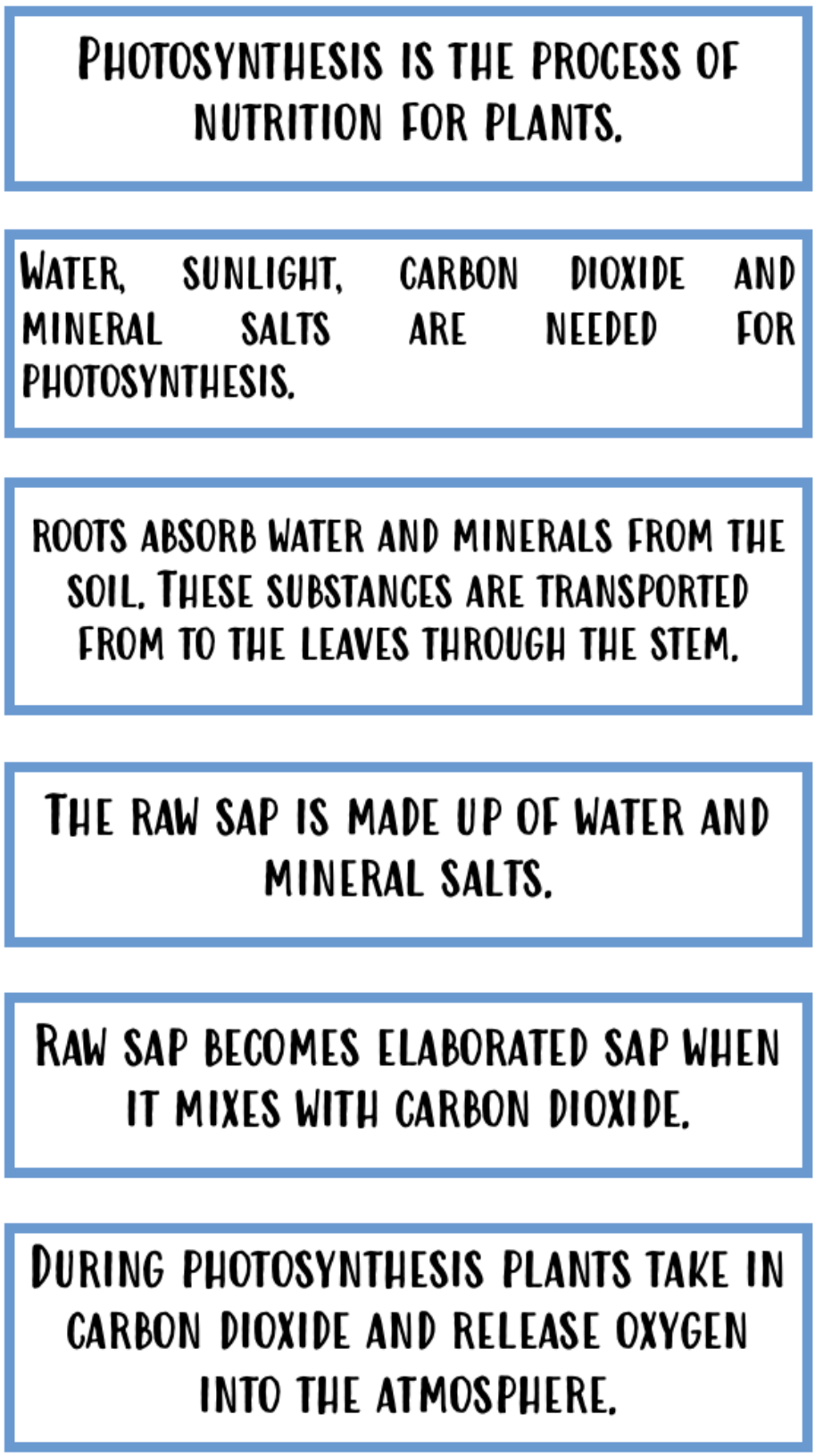
8. APPENDICES

8.1. Appendix A: Language of learning

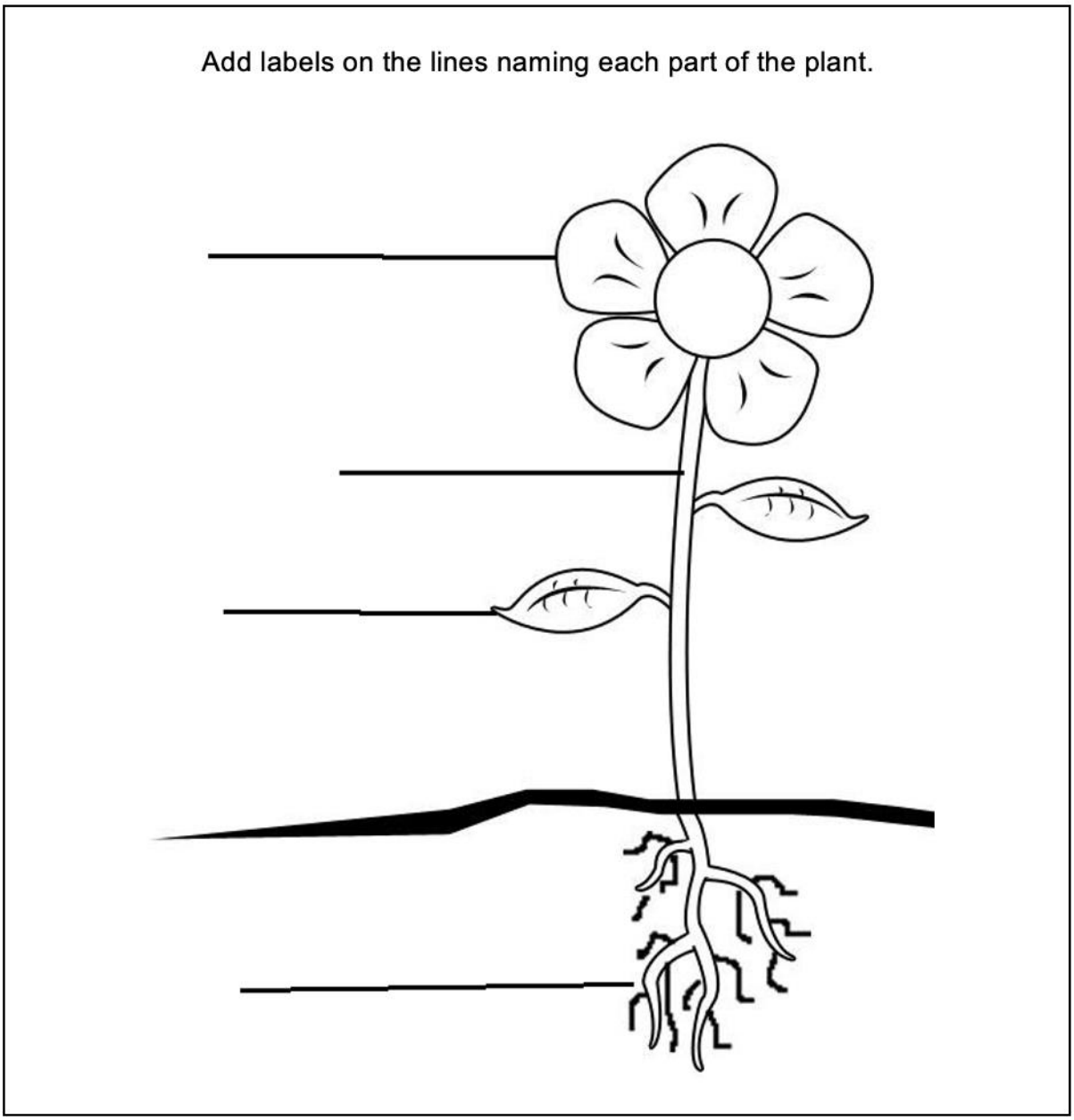
8.1.1. Figure 3. Photosynthesis vocabulary cards



8.1.2. Figure 4. Explaining concepts

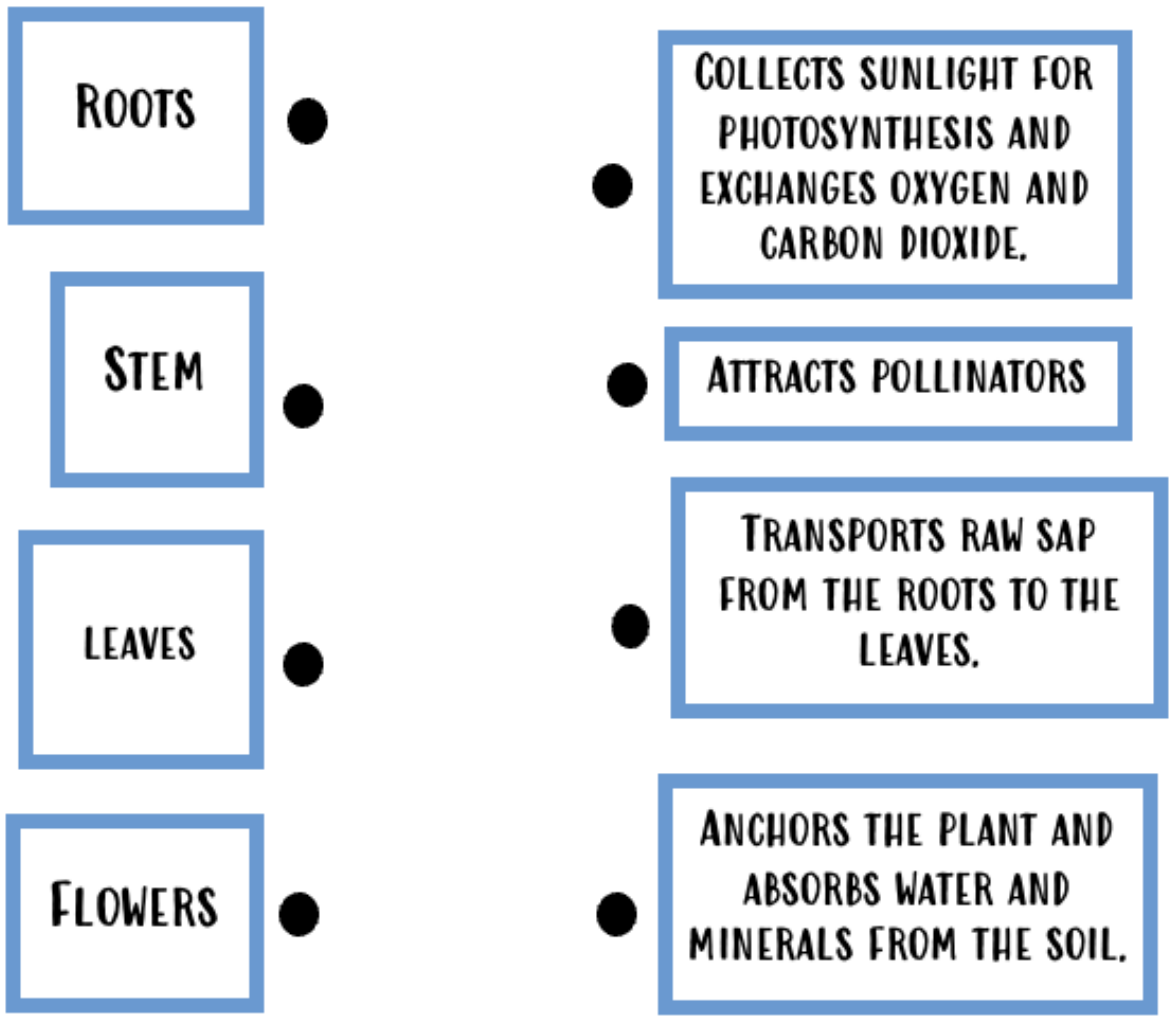


8.1.3. Figure 5. Plant related language



***Note*.** Taken from STEM learning

8.1.4. Figure 6. Role of the parts of the plant in photosynthesis



8.2. Appendix B: Language for learning

8.2.1 Figure 7. Instructive and Classroom language

8.3. Appendix C: Rubric for assessing the infographic

Oral Presentation Rubric : Photosynthesis´Infographic

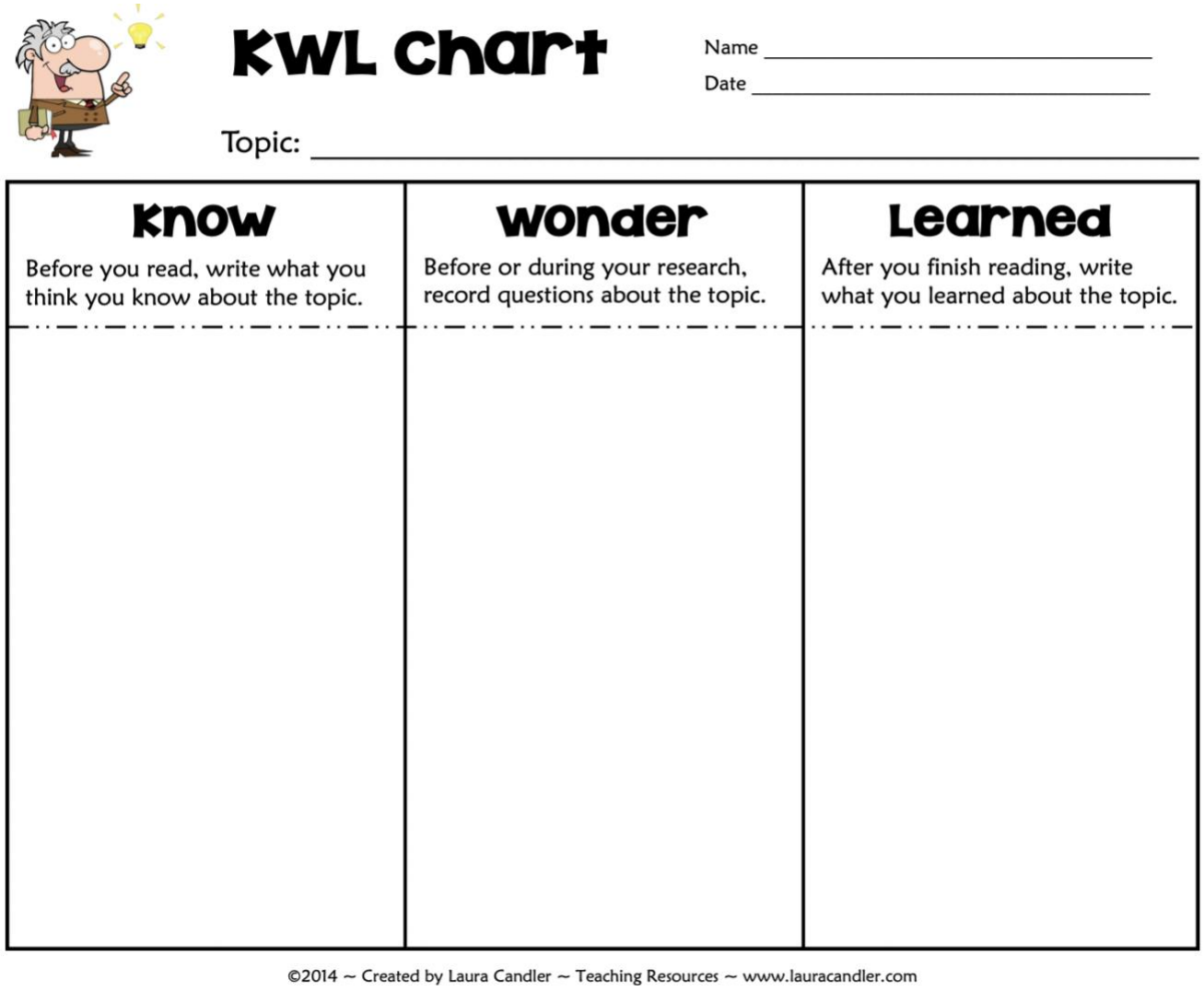
8.3.1. Figure 8. Rubric

Student Name: _____

CATEGORY	Excellent (9-10)	Good (7-8)	Fair (5-6)	Needs improvement (1-4)
Vocabulary	Uses vocabulary appropriate for the topic. Extends hers or his vocabulary by including 4 new sentences from the vocabulary list, using them correctly.	Uses vocabulary appropriate for the topic. Includes 2 or 3 new sentences from the vocabulary list.	Uses vocabulary appropriate for the topic. Only includes 1 new sentence from the vocabulary list, failing to use any other sentence appropriately.	Finds it hard to recall vocabulary related to the topic. Also, does not include any new expressions from the vocabulary list.
STEM	Creates a logical and coherent scientific investigation process. Incorporates information from various sources. Displays results and conclusions appropriately. Incorporates several tools in the learning process to aid their investigation.	For the most part creates a logical and coherent investigation process. Uses similar sources of information. Results and conclusions are shown cohesively, but with minor errors. Incorporates one to two tools for investigating.	Displays little logic and coherence in their investigation. Uses one source of information. Does not show conclusions cohesively. Only uses one tool for investigating.	Does not create a coherent investigation process. Only uses one source of information. Does not display conclusions or uses tools for investigating.
ICT use	Shows a clear understanding of how an infographic works. Exhibits initiative in using different kinds of digital media to presenting the information.	Shows some understanding of the characteristics of an infographic. Needs little assistance for using different kinds of digital media.	Has little understanding of how an infographic works. Relies on their peers´assistance for using most of the digital media.	Does not know to use and infographic and relies on their peers for assistance.
Public Speaking	Makes eye contact with the audience throughout the whole presentation. Various the tone of voice to emphasise important messages. Uses hands movements to engage the audience in the presentation.	Makes regular eye contact with the audience. Speaks clearly and at a reasonable volume. Uses several movements to engage the audience.	Makes some to little eye contact with the audience. Volume is soft and it is hard to understand. Little engagement with the audience.	Makes minimum to none eye contact with the audience. Volume cannot be heard and lacks the use of expression. Does not face the audience and is overly nervous.

8.4. Appendix D: Visual organiser

8.4.1. Figure 9. K-W-L chart



Note. Taken from Lauracandler.com

8.5. Appendix E: Scientific Journal

8.5.1. Figure 10. Scientific Journal

Do you know who **Jan Ingenhousz** is?

He was a British scientist who discovered the process of photosynthesis.

Let´s learn about what he discovered!

JAN INGENHOUSZ

Scientific method

1-Make an observation

In this step we observe our surroundings to percive important details and information.

What can you observe in the experiment?

2-Ask questions

In this step we ask ourselves questions about the details and information we saw before.

What questions do you have about the experiment?

3-Make hypothesis

In this step we formulate hypothesis about the experiment.

H1-

H2-

H3-

4-Conduct an experiment

In this step we design an experiment.

What are the characteristics of your experiment?

5-Draw conclusions

In this step we reach conclusions based on our initial hypothesis.

What conclusions have you drawn?

These next pages are for you to write any **changes** you can observe in **plants:**

Day 1:

Plant A

Plant B

Plant c

Day 2:

Plant A

Plant B

Plant c

Day 3:

Plant A

Plant B

Plant c

Day 4:

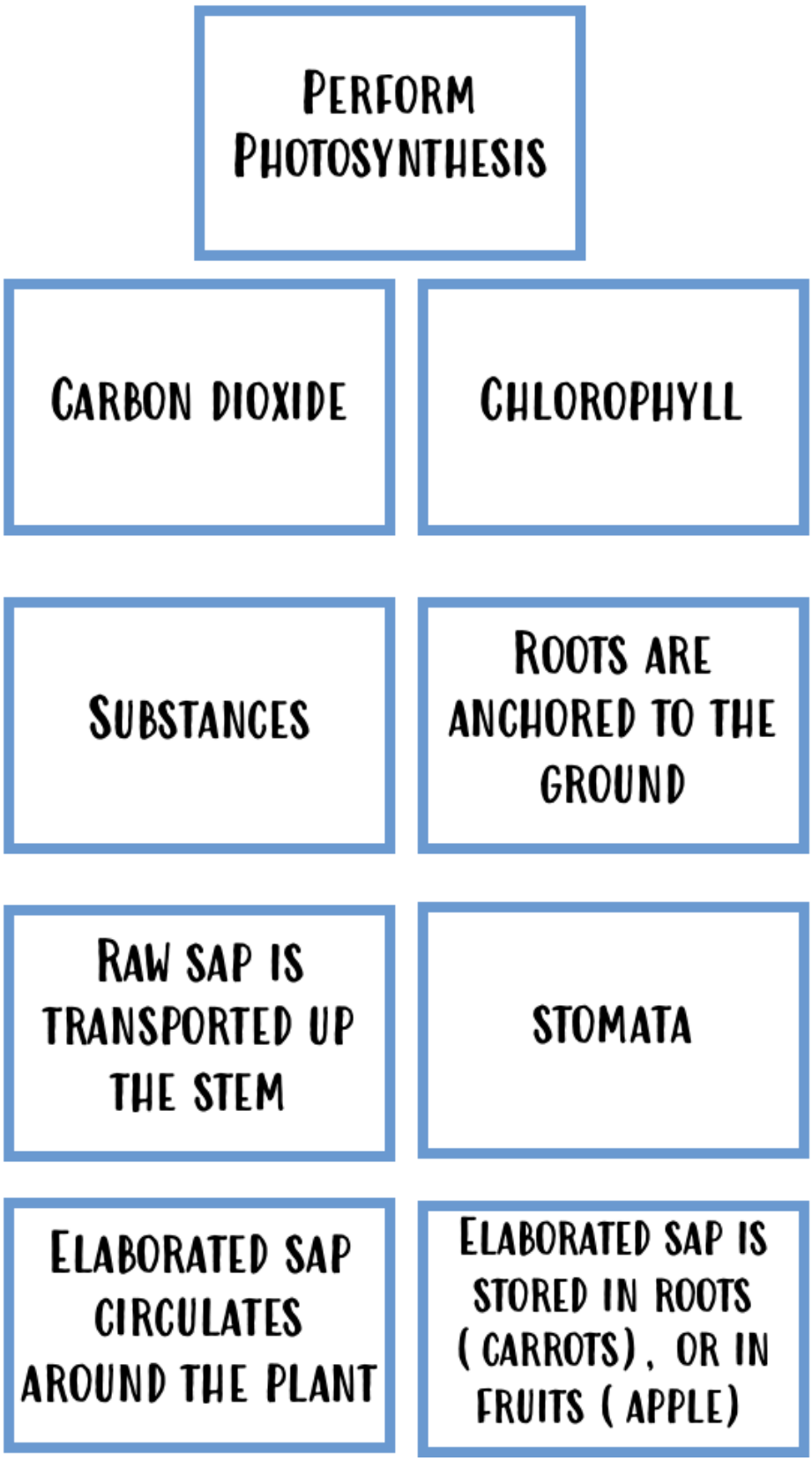
Plant A

Plant B

Plant c

8.6. Appendix F: Useful vocabulary

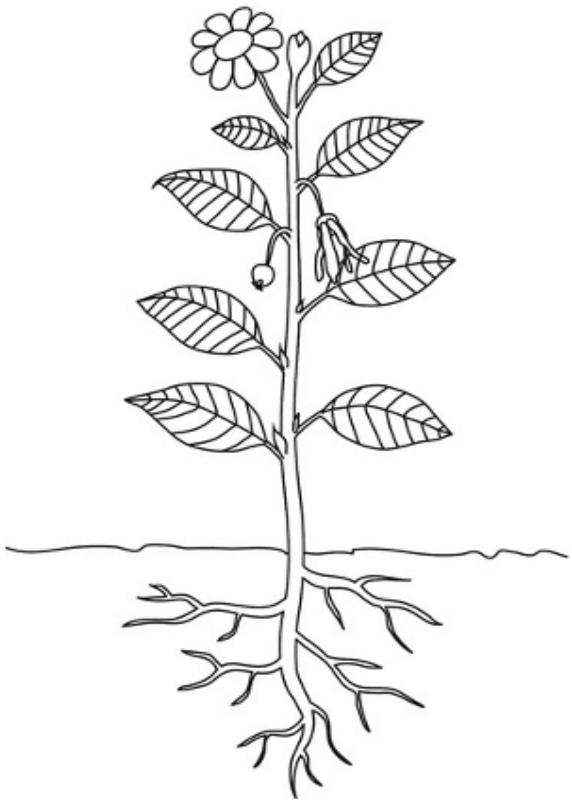
8.6.1. Figure 11. Key words and concepts



8.7. Appendix G: Photosynthesis process

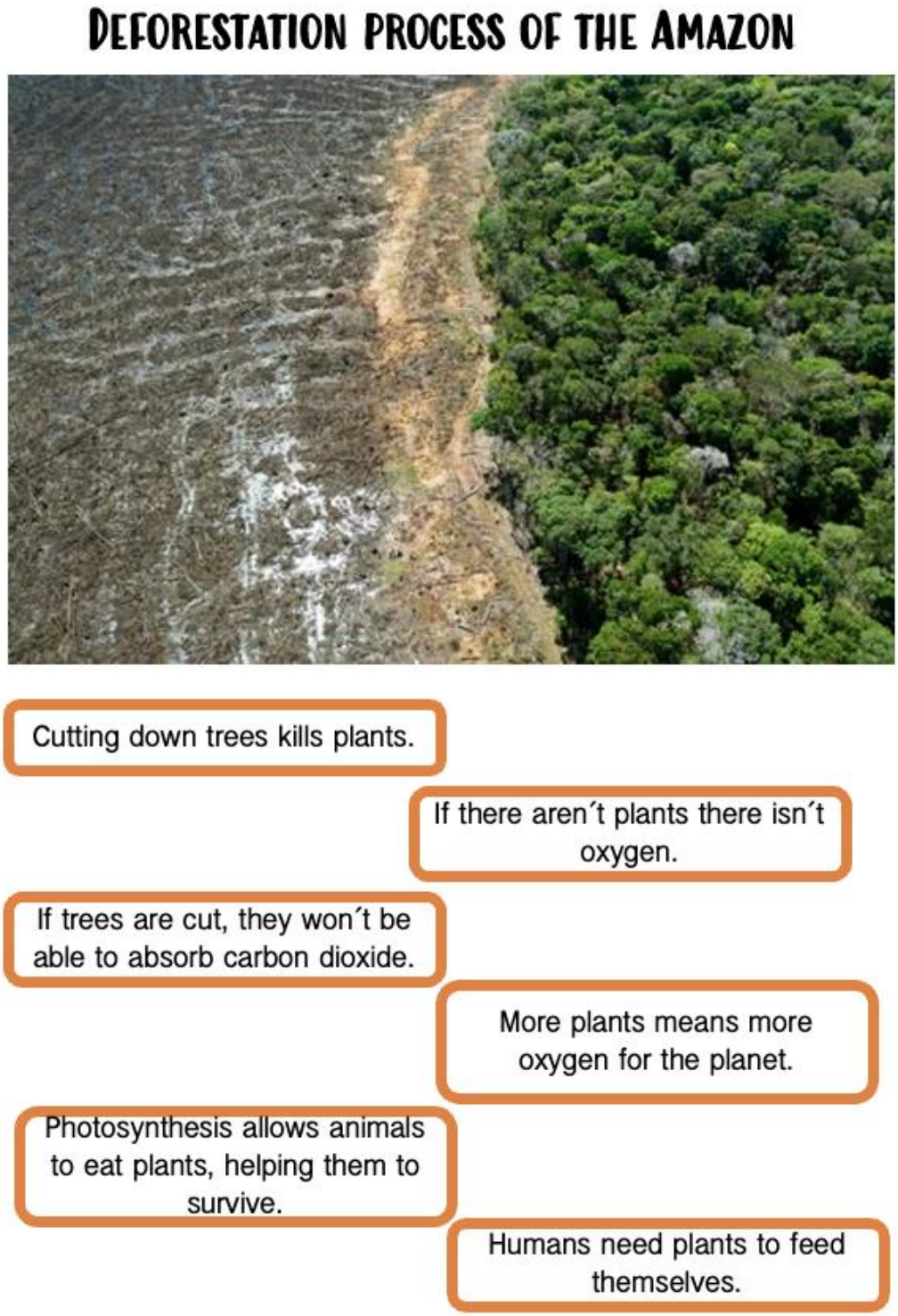
8.7.1. Figure 12. Description of the process of photosynthesis

Name the parts of the plant that take part in photosynthesis. Later, write sentences explaining what their role is.



8.8. Appendix H: Importance of photosynthesis

8.8.1. Figure 13. Deforestation process in the Amazon



***Note*.** Taken from "El País"

8.9. Appendix I: Infographic

8.9.1. Figure 14. “My vocabulary list”

MY VOCABULARY LIST

GRAPHS AND IMAGES

- ◯ This graph shows ...
- ◯ This picture represents ...
- ◯ In this table/ chart we can see ...
- ◯ This image is an example of ...

PARAPHRASE

- ◯ In other words ...
- ◯ To say it in a simpler way ...
- ◯ What I am trying to say ...
- ◯ To say it in a different way ...

CONCLUSION

- ◯ To finish the presentation we will talk about ...
- ◯ In brief, we believe that ...
- ◯ To summarise, I ...
- ◯ In conclusion, ...

QUESTIONS

- ◯ Do you have any questions?
- ◯ Are there any questions?
- ◯ Is there anything that isn´t clear?
- ◯ Did you understand everything?
- ◯ We invite you to ask your questions at the end of the presentation

8.10. Appendix J: Metacognition

8.10.1. Figure 15. Peer assessment checklist

PEER EVALUATION CHECKLIST

Name: _____

Who I am assessing: _____

INFOGRAPHIC PRESENTATION	YES	NO
My classmate described the characteristics of photosynthesis: substances involved, process and importance.		
I could hear my classmates when he was presenting and I found the infographic interesting and informative.		
The infographic had different parts and included pictures and graphs.		
My classmate used various words (synonyms, connectors, adjectives, ...) when presenting his/her infographic.		
The presentation had a conclusion that summarised the main points and explained the importance of photosynthesis on Earth.		

Time to give feedback!

A) What do you think was good about the infographic?

_____

_____

_____

B) What improvements would you suggest your classmate to make for the next time?

_____

_____

_____

8.10.2. Figure 16. Self-assessment checklist

SELF-ASSESSMENT CHECKLIST

Name: _____

INFOGRAPHIC PRESENTATION	YES	NO
I have described the whole process of photosynthesis: substances involved, process and importance.		
I have used different tools (magnifying glass, ...) and sources of information when putting together the information for crating the infographic.		
I have divided the infographic into different sections and have included pictures and graphs.		
I have used synonyms, connectors or adjectives to explain the process of photosynthesis.		
I have described why photosynthesis is so important for life on Earth.		
I have included expressions from the "Vocabulary list" to use on my presentation.		

Let´s reflect on our work!

A) What do you think are the strengths of your infographic?

_____

_____

_____

B) What do you think you could have done better?

_____

_____

_____