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PROGRAMACIÓN GENERAL ANUAL DE APRENDIZAJE INTEGRADO DE CONTENIDO Y LENGUA (AICLE)

ÁREA CIENCIAS DE LA NATURALEZA

4º EDUCACIÓN PRIMARIA

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PROGRAMACIÓN GENERAL ANUAL

ÁREA CIENCIAS DE LA NATURALEZA

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RESUMEN

En este Trabajo de Fin de Grado, se plantea una Programación General de Aula en el área de Ciencias de la Naturaleza. Esta programación está orientada al curso de 4º de Educación Primaria. La base de esta propuesta es el enfoque AICLE (Aprendizaje Integrado de Contenido y Lengua). Este trabajo está basado en el PEC (Proyecto Educativo de Centro) de un centro escolar real de la Comunidad de Madrid, siguiendo sus valores, normas y directrices para una educación de calidad.

El trabajo está formado por un marco teórico, en el cual se explican todas las teorías en las que están basadas las unidades didácticas. Para la redacción de este marco teórico se ha investigado y leído numerosos artículos sobre el tema. AICLE, apuesta por un aprendizaje del contenido y del lenguaje de una forma natural, experimental y manipulativa. En esta parte, también están explicados los contenidos, objetivos y criterios de evaluación utilizados, al igual que la tipología de actividades y la colaboración con las familias. En la segunda parte del trabajo, se desarrollan nueve unidades didácticas para el curso elegido. De esas nueva unidades, cuatro de ellas están desarrolladas con actividades y recursos para alcanzar los contenidos mínimos que los alumnos deben adquirir al final del curso escolar.

Palabras Clave

Ciencias de la Naturaleza, 4º de Primaria, AICLE, Programación General de Aula, Educación Bilingüe.

ABSTRACT

In this Final Degree Project, an Annual Syllabus is proposed in the area of Natural Sciences. This programme is oriented to year 4 of Primary Education. The basis of this proposal is based on Content and Language Integrated Learning approach (CLIL) This work is based on the PEC (Proyecto Educativo de Centro) of a real school in the Community of Madrid, following its values, norms and guidelines for quality education.

The work consists of a theoretical framework, in which all the theories on which the didactic units are based, are explained. For the writing of this theoretical framework, numerous articles on the subject have been researched and read. CLIL is committed to learning content and language in a natural, experimental and manipulative way. In this part, the contents, objectives and evaluation criteria used are also explained, as well as the typology of activities and collaboration with families. In the second part of the work, nine didactic units are developed for the chosen course. Of these new units, four of them are developed with activities and resources to reach the minimum contents that students must acquire at the end of the school year.

Key Words

Natural Sciences, 4 Primary, CLIL, General Classroom Programming, Bilingual Education, Content and Language.

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1. GENERAL PRESENTATION

This End-of-Degree Project proposal is an annual syllabus intended to teach Natural Sciences in Year 4 of Primary Education. This document consists of two different but united parts. The first part is the theoretical and legislative framework on which all the work is based on. It covers the procedures, methodologies, skills and projects where the didactic units are framed, on the basis of Royal Decree 126/2014, of 28 February, which establishes the basic curriculum of Primary Education: the contents, learning standards and assessment criteria. The second part, include nine didactic units, gathering all the contents and objectives established for the chosen stage.

These didactic units are formulated for the 2019-2020 school year from September to June. The methodology developed throughout the units is based on CLIL (Content and Language Integrating Learning), known in Spanish as AICLE (Aprendizaje Integrado de Contenido y Lenguaje). This approach promotes content learning and language acquisition at the same time. In this way, the student understands the curricular contents, making use of the language necessary to learn them.

In this teaching and learning context the role of the teacher will be to guide and support, leaving the role of leader to the student. In this way, it is the student who will discover and learn according to their own learning rhythm and interest. Moreover, as this is the area of Natural Sciences, experimentation and manipulative activities will prevail, incorporating an experimental activity carried out by the students in each unit.

When I was offered the opportunity to do an End-of-Degree Project on CLIL, at first, I thought it was a big challenge. It was not going to be easy at all, mostly because it is in another language. In spite of that, I decided to choose it because it seemed like a good way to finish this university stage. For me it has been completely a research work. I have had to look for a lot of information from psychologists, pedagogues, educators, etc. people who, like me, have chosen to go deeper into this subject. I have also had to learn a lot about other teaching techniques and bilingualism in Europe and Spain. Moreover, I have looked for information about the different evaluation techniques and how to attend

to all the students with special needs, because attention to diversity is one of the main challenges in CLIL.

2. ANNUAL SYLLABUS

2.1 Introduction

In this section, I have summarized the theories behind this learning approach. It also includes a detailed description of the school in which the project will be implemented. An analysis of the psychoevolutive characteristics of the students at this age is also included.

2.1.1 Theoretical Justification.

Content and Language Integrated Learning (CLIL) is a dual-focused educational approach in which an additional language is used for the learning and teaching of content and language with the objective of promoting both content and language mastery to pre-defined levels (Marsh, Mehisto, Wolff, and Frigols, 2010). This approach is meanly used to learn content and a second language at the same time. However, curricular content leads language learning. Since 1990 CLIL has emerged as an example of inter-disciplinary educational convergence (Wolff, 2012) that requires multi-faceted research approaches (Coyle, 2007; Dalton-Puffer and Smit, 2007; Lyster, 2007; Mehisto, 2011; Bonnet, 2012).

In the last decade, the dual focus on achieving simultaneous content and language learning outcomes has been influenced by multi-disciplinary educational research and dialogue (Mehisto, 2012). This has resulted in the triple focus concept, whereby content and language goals are pursued with understanding of student cognition, usually referred to as thinking skills (Coyle et al., 2010). This triple focus is within the remit of researchers in the fields of language awareness (Svalberg, 2007; Yassin et al., 2010; Llurda, 2010) and the educational neurosciences (Fischer et al., 2007; Adescope et al., 2010; Ansari et al., 2011; Campbell, 2011). One of the key issues relates to being able to differentiate learning within the curriculum through understanding of the thinking skills, content, and language required to achieve successful learning.

CLIL offers the opportunity to develop children intercultural knowledge and intercultural communication skills. Moreover, there is a support and promotion of more general and

comprehensive dimension of learning. With this approach, we give students a diversity of learning strategies and techniques on innovative teaching methods and learner motivation (Lofft Basse, 2016). Students cannot develop academic knowledge and skills without access to the language in which that knowledge is embedded, discussed, constructed, or evaluated. Nor can they acquire academic language skills in a context devoid of academic content. (Ioannou-Georgiou & Pavlou, 2011).

But the development of CLIL is part of a wider European policy developed in the first decade of the 21st century. The European Commission implemented an Action Plan called 'Promoting language learning and linguistic diversity' to provide a key to understand the different cultures we have in our country through the multilingualism. Thanks to multilingualism, citizens who speak more languages can reap the full benefits of free movement in the European Union and can integrate more easily in another country to study or work. This Action Plan puts forwards 47 concrete proposal with the same aim:

1. Lifelong language learning,

2. Better language learning,

3. Building a language-friendly environment.

Multilingualism at European level is the acknowledgement that languages matter to citizens and that there is a need to take action at the highest political level to bring together resources to promote multilingualism (Commission of the European Communities, 2003).

Although countries did not start from the same baseline, nor have they taken action at the same speed. Reforms have focused mainly on the same areas:

Review of the whole educational system in the light of a lifelong language learning approach.

- Introduction of early language learning in primary and sometimes in pre-primary education.
- Introduction of some CLIL (content and language integrated learning) in curricula.
- Increased offer of languages at secondary level.
- Increased investment in language teacher training.

- Review of curricula, examinations and certificates to align them to the Common European Framework of Reference for Languages.
- The use of European programmes and tools developed by the Commission and by the Council of Europe to review national education systems, develop suitable language materials and tests, and to promote language teacher training abroad and European cooperation in schools.

But it was at the Conference on CLIL in 2005, during Luxembourg's presidency, where for the first time CLIL was brought to the attention of European policy makers. As an effective way of strengthening communication skills and motivating students. It was recalled the need to ensure that pupils and students receive CLIL provision at different levels of school education. It was also emphasised that teachers should receive special training in CLIL. In 2006, the Eurydice network published a survey about CLIL in schools in Europe (Eurydice, 2006) setting out the main features of CLIL teaching in European Countries. The survey showed that if CLIL provision is to be generalised, it has to be supported in most countries by a significant effort in teacher training. Spain is one of many countries, including Belgium, Italy or Poland, that offered CLIL provision at primary, lower secondary and upper secondary education.

Figure 1: Levels of education at which CLIL is offered in mainstream provision (2004/2005), Source: Eurydice.
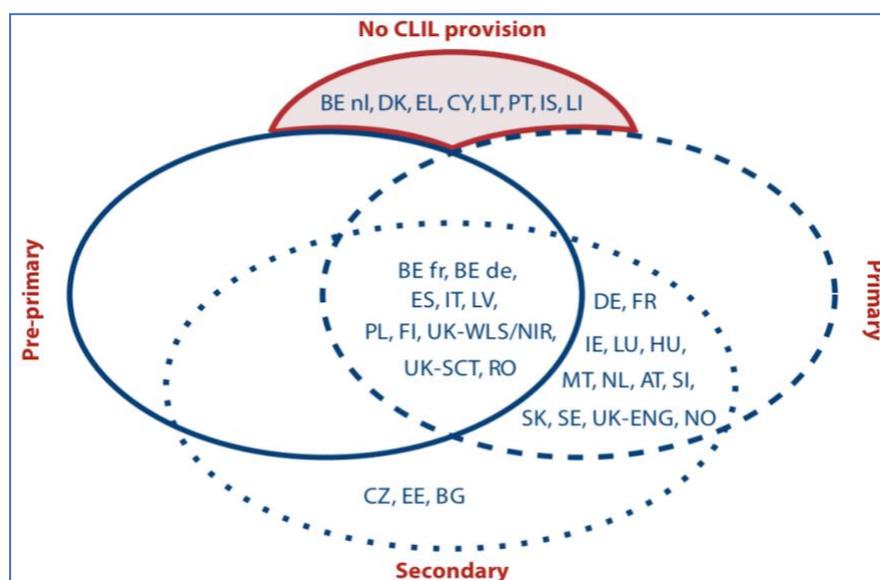
Madrid Bilingual Programme, based on CLIL, was launched during the 2004/2005 school year. The body responsible for funding this programme is the Ministry of Education and the Community of Madrid. In this project, all subjects except mathematics and Spanish language are taught in a foreign language, mainly English, providing one-third of the all weekly teaching in the target language (Eurydice, 2004).

2.1.2. Socio-cultural context

This end of degree project is based on Valdefuentes School, which has allowed to use their name in and data for the project. See appendix 3 to see the authorization.

The Valdefuentes School in Madrid is a private bilingual religious institution. The educational offer ranges from pre-primary to *bachillerato.* It is in Sanchinarro area. The school is located on a plot of 14,000 m2 and has 10,000 m2 constructed. It has the following facilities:

- Educational: Multifunction conference room, library, science laboratory, physics and chemistry laboratory, technology workshop, music room, drawing room, chapel.
- Sports: Sports centre, heated swimming pool, judo room, ballet and dance room, psychomotor rooms, three football and basketball fields.
- ICT equipment: Internet connection by optical fibre, educational and administrative management platform, digital blackboards.

The aim of the centre is to provide students who come to its classrooms with an integral education that will be inspired by the fundamental principles of Christian doctrine, which is especially present in the activities carried out in the centre. They also seek to form intellectually and culturally capable, dignified and responsible citizens for the benefit of their own perfection and of the society to which they are to be useful.

In Valdefuentes School they believe that living together is not only achieved through the application of disciplinary measures, but also by educating in the values and behaviours that promote it. The objectives are:

1. Provide an integral education inspired by the principles of Christian doctrine that achieves the intellectual, spiritual and human development of our students.

2. To form capable, intellectually and culturally dignified and responsible citizens for the benefit of their own development and society.

3. To develop a climate of coexistence based on participation, pluralism, tolerance, respect, dialogue, trust, understanding, individual attention, cooperation, critical thinking, responsibility and mutual acceptance.

The students studying in this school come from families in the area where they are located. They are characterized by a low level of immigration.

Valdelasfuenets School comes from an educational organization that includes different schools. The educational group was born as GECESA institution, founded in 1976, with the *Colegio Parque* which is located in the privileged environment of *Parquelagos,* in order to provide students who, come to their classrooms a comprehensive education inspired by the fundamental principles of the doctrine of the Catholic Church, this project has been developed in the last ten years in five other schools. At present GECESA has become EDUCARE, becoming one of the most important educational groups not only in the Community of Madrid, but also in Spain.

They promote a style of management, based on trust, with professionals who, far from hiding the problems, expose them to seek the best solutions. The schools that make up this educational group share the following educational bases:

1. Train intellectually and culturally capable, dignified and responsible people for the benefit of their own perfection and of the society to which they must be useful from now on. So that this benefit is not wasted, Educare considers it necessary and essential the contest of teachers, parents and students themselves.

2. Christian vision of life. That is why they always take as a point of reference, for the different branches of knowledge, the orientation of the Catholic Church.

3. Education is based on the uniqueness of each person, unique and unrepeatable; on their autonomy to decide and act responsibly; and on their openness, understood as a capacity for communication and relationship with others.

4. Students learn by seeking their integral development, contemplating intellectual, physical, moral and emotional aspects, in order to ensure their preparation to integrate adequately into society.

5. They want our students to be eager to improve, seeking excellence from their own personal perspective, with the desire to educate people who know how to put their skills at the service of others.

6. They form students who are generous with others, seeking to collaborate and participate in volunteer programs.

7. The involvement of parents is fundamental to achieving the objectives of Educare, of schools and, ultimately, of pupils.

8. Parents, as the ones primarily responsible for the education of their children, must participate and commit themselves to it, in addition, they must collaborate with Educare and the educators in whatever is required of them.

9. We understand that the responsibility for the education of the children corresponds to their parents, whom the school helps in their task of first educators. The educational activity of the schools is considered as a delegate and collaborator of the family action.

10. Attention to each family and each student, through individualized tutoring and family orientation, is an educational medium that characterizes EDUCARE schools, to which specific educational orientation talks are added.

2.1.3. Teaching staff context

The teachers are linked to the Educare project, live and believe in these values, and are committed to providing education following the philosophy that inspires them, as reflected in their RI. These professionals permanently improve their skills and actively participate in activities in accordance with the standards established by the ideology of EDUCARE and in specific training courses for the different needs that arise in the development of our educational work.

The general organization of the centres follows the same scheme:

Figure 2: General Organisation Scheme. Source: Author
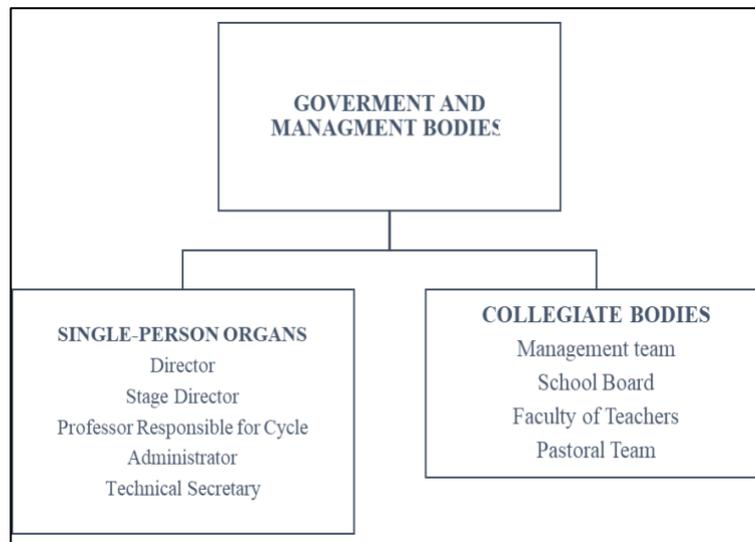
Figure 3: Educational Coordinating Scheme. Source: Author
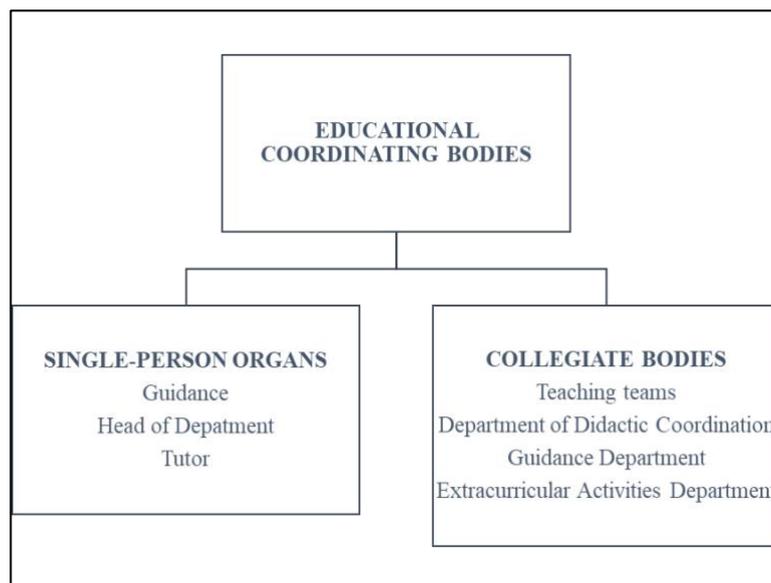
2.1.4. Psychoevolutive characteristics of the target students

Learners of any age differ from one another in significant ways. This syllabus is designed for Year 4 of Primary Education students, so the age of these children is between nine and ten years old.

Piaget (1963) identified four stages of cognitive and affective development in childhood and adolescence. Between age 7 and 11, where our students are, the child develops the

ability to apply logical thoughts to concrete problems. These concrete experiences help children to understand new concepts and ideas. They use the language to exchange information, so they become more social and less egocentric. Besides, they become more empathic and give more importance to friends. Piaget (1963) points out that children are not simply miniature adults and they do not think like them because their minds are not the same.

Kieran Egan (1979, 1986, 1992) gives insights about educational development. He describes development giving meaning to how learners make sense of the world. As individuals develop, they add new layers of sophistication without leaving behind the characteristic qualities of earlier layers. As he puts it, "Each stage contributes something vital and necessary to the mature adult's ability to make sense of the world and human experience" (1979, p. 86).

Our students would be on The Romantic Layer, which goes from ages 8 to 9 through 14 to 15. Upper elementary and middle school learners begin to separate the world around them from their internal world—they no longer assume that the world thinks and feels as they do. They are developing a sense of their own identity within this wider world. They often enjoy research on topics of their own choosing, and they are good at memorizing.

Intermediate-grade students are at a maximum of openness to people and situations different from their own experience. As developing the cognitive characteristics of the concrete operations level, they begin to understand cause and effect. They can begin a more systematic approach to language learning, but they continue to need concrete experiences as a starting point and to benefit from learning that is embedded in context. The phenomenon of "boy germs" and "girl germs" begins to develop during these years, and children may resist partner situations with children of the opposite sex. They continue to benefit from experiences with imagination and fantasy, emphasis on binary opposites, and strong emotional connection to what is learned, as well as story form with distinctive beginning, middle, and end. In addition, they will benefit from themes based on real-life heroes and heroines who display transcendent qualities in overcoming the challenges of life.

2.2. Objetives

2.2.1. Principal Objectives

The general principles at this stage, according to the Royal Decree 126/2014, of 28 February, by which the core curriculum of Primary Education is established, are as follows:

The aim of the Primary Education is to help students to learn the principles of oral expression and comprehension, reading, writing, calculation, the acquisition of basic notions of culture, and the habit of coexistence as well as study and work habits, the artistic sense, creativity and affectivity, in order to ensure an integral formation that contributes to the full development of the students' personality, and to prepare them effectively for Compulsory Secondary Education (RD/126/2014).

Primary Education is divided into six academic years, which will ordinarily be taught between six and twelve years old, and it is organized in areas, which will have a holistic and integrative approach.

According to the LOMCE:

a) **Curriculum**: regulation of the elements determining the teaching and learning process for each educational stage.

b) **Objectives**: references to the achievements that the student must attain at the end of the educational process, as a result of the teaching and learning experiences intentionally planned for this purpose.

c) **Competences**: abilities to apply the relevant contents of each educational stage in an integrated way, in order to achieve the correct realisation of the activities and the effective resolution of complex problems.

d) **Contents**: set of knowledge, abilities, skills, and attitudes which contribute to the achievement of the objectives for each educational stage and the acquisition of the relevant competences. The contents are organised into subjects, which are classified into areas, fields and modules, depending on the educational stage, or the programmes students take part in.

e) **Measurable Learning outcomes**: specifications of the evaluation criteria which allow to define the learning results, and specify what the student must know, understand and

know how to do, in each area; these standards must be observable, measurable, and assessable and must allow the graduation of the students' achievements. The standards must be designed in order to contribute and facilitate the use of standardized and comparable tests.

f) **Evaluation criteria**: specific references used to assess the students' learning process. They describe whatever it is that must be valued and that students must achieve, both in terms of knowledge and in competences; they respond to what is aimed to achieve in each area.

g) **Teaching methodology**: set of strategies, procedures and actions planned and organized by the teachers, consciously and reflexively, in order to promote the students' learning process and their achievements.

In the Community of Madrid, the Decree 89/2014 stablishes that primary education will contribute to the children's skills development that will enable them to:

1. Understand and appreciate the values and standards of living, learn to act in accordance with them, prepare for active citizenship and respect for human rights and pluralism inherent in a democratic society.
2. Develop individual and teamwork, effort and responsibility in the study as well as attitudes of self-confidence, critical sense, personal initiative, curiosity, creativity and interest in learning, and entrepreneurship.
3. Acquire skills for the prevention and peaceful resolution of conflict, enabling them to function independently in the family and household, as well as in social groups with which they are associated.
4. Know, understand and respect different cultures and differences among people, equal rights and opportunities for men and women and non-discrimination of people with disabilities.
5. Know and use appropriately the Spanish language and develop reading habits.
6. Acquire, in at least one foreign language, skills to enable them to express and understand simple messages and function in everyday situations.
7. Develop basic Maths skills and initiative in solving problems that require elementary operations of calculation, geometry and estimates, as well as being able to apply to situations in everyday life.

8. Know the main features of Natural Science, Social Science, Geography, History and Culture.

9. Start using, for learning, the information technology and communication to develop a critical mind to the messages they receive and produce.

10. Use representation and artistic expression and start to build visual and audio-visual proposal.

11. Rate hygiene and health, accept their body and that of others, respecting differences and using physical education and sport to encourage both personal and social development.

12. Know and appreciate those animals closest to us and adopt forms of behaviour that contribute to their preservation and care.

13. Develop emotional skills in all areas of personality and in their relationships with others and an attitude opposed to violence, prejudice of any kind and sexist stereotypes.

14. Promote road safety education and respectful attitudes that affect the prevention of accidents.

2.2.2. Competency-based Learning Approach

DeSeCo (Definition and Selection of Competencies) (2003) defines competence as the ability to respond to complex demands and carry out diverse tasks in an appropriate way. In line with the Recommendation 2006/962/EC of the European Parliament and Council of 18th December 2006, on Key Competences for Lifelong Learning, the Royal Decree 126/2014, of 28th February, by which the core curriculum of Primary Education is established, is based on the empowerment of learning through competences, integrated into curricular elements to promote a renewal in educational practice and teaching and learning process. The competence supposes a combination of practical skills, knowledge, motivation, ethical values, attitudes, emotions, and other social and behavioural components that are mobilized jointly to achieve an effective action.

Competences in the academic environment give students the capacity to know in different contexts how to resolve any conflict they may have, whether in the school or out of it. Also, competences make the lessons more inclusive and allow to work with different subjects in the same topic.

Key competences are those which every person requires to his or her self-realization and personal fulfilment, as well as to active citizenship, social inclusion and employment. According to the Royal Decree 126/2014, of 28th February, the key competences are:

1. Competence in linguistic communication.

2. Competence in mathematics, science and technology.

3. Digital competence.

4. Learning to learn.

5. Social and civic competences.

6. Sense of initiative and entrepreneurship.

7. Cultural awareness and expression.

2.2.3. Objetivos de área y objetivos en el curso

Los objetivos del área para este curso están formulados a partir de los criterios de evaluación, que se presentan en el *Real Decreto 126/2014* para el curso 4º de Primaria en la asignatura de Ciencias de la Naturaleza.

> Los criterios de evaluación son el referente específico para evaluar el aprendizaje del alumnado. Describen aquello que se quiere valorar y que el alumnado debe lograr, tanto en conocimientos como en competencias; responden a lo que se pretende conseguir en cada asignatura el referente específico para evaluar el aprendizaje del alumnado. (Art.2, RD 126/2014)

A partir de los contenidos del RD 126/2014, el Decreto 89/201 establece los siguientes objetivos y contenidos que se deben lograr al finalizar 4º de Educación Primaria en los alumnos como resultado de la intervención docente y pedagógica en esta área del currículo.

BLOQUE 1: OBJETIVOS COMUNES PARA TODA LA ETAPA

1. Buscar, seleccionar y organizar información concreta y relevante, analizar, obtener conclusiones, comunicar su experiencia, reflexionar acerca del proceso seguido y comunicarlo oralmente y por escrito.

2. Consultar y utilizar documentos escritos, imágenes y gráficos.

3. Desarrollar estrategias adecuadas para acceder a la información de textos de carácter científico.

4. Manifestar autonomía en la planificación y ejecución de acciones y tareas y tener iniciativa en la toma de decisiones.

5. Utilizar, de manera adecuada, el vocabulario correspondiente a cada uno de los bloques de contenidos.

6. Exponer oralmente de forma clara y ordenada contenidos relacionados con el área manifestando la compresión de textos orales y/o escritos

7. Usar de forma autónoma el tratamiento de textos (ajuste de página, inserción de ilustraciones o notas, etcétera).

8. Hacer un uso adecuado de las TIC como recurso de ocio.

9. Conocer y utilizar las medidas de protección y seguridad que debe utilizar en el uso de las TIC.

10. Realizar experiencias sencillas y pequeñas investigaciones: planteando problemas, enunciando hipótesis, seleccionando el material necesario, realizando, extrayendo conclusiones y comunicando los resultados.

11. Realizar un proyecto, trabajando de forma individual o en equipo, y presentar un informe, utilizando soporte papel y/o digital, recogiendo información de diferentes fuentes (directas, libros e Internet), con diferentes medios y comunicar de forma oral la experiencia realizada, apoyándose en imágenes y textos escritos.

12. Presentar trabajos de forma ordenada en soporte papel y digital de forma individual y en equipo.

BLOQUE 2: EL SER HUMANO Y LA SALUD

13. Identificar las principales características del aparato circulatorio.

14. Explicar las funciones del corazón, las venas y las arterias.

15. Identificar las principales características del aparato respiratorio.

16. Explicar las funciones de los pulmones, los bronquios y la tráquea.

17. Identificar las principales características del aparato reproductor en el hombre y en la mujer.

18. Explicar de forma general la fecundación, el desarrollo embrionario y el parto.

19. Conocer algunas enfermedades que afectan a los aparatos y sistemas del organismo humano estudiados.

20. Identificar y valorar hábitos saludables para prevenir dichas enfermedades.

21. Reconocer los efectos nocivos del consumo de alcohol y drogas.

BLOQUE 3: LOS SERES VIVOS

22. Explicar la alimentación, respiración y reproducción en mamíferos, aves, reptiles, anfibios y peces.

23. Identificar, observar y explicar las características de los diferentes grupos de animales invertebrados.

24. Explicar la nutrición y reproducción de las plantas.

25. Explicar la fotosíntesis y su importancia para la vida en la Tierra

BLOQUE 4: MATERIA Y ENERGÍA. LA TECNOLOGÍA, OBJETOS Y MÁQUINAS

26. Observar, identificar, describir y clasificar algunos materiales por sus propiedades (dureza, solubilidad, estado de agregación y conductividad térmica).

27. Utilizar diferentes procedimientos para la medida del peso de un cuerpo.

28. Identificar y explicar las principales características de la flotabilidad en un medio líquido.

29. Realizar experiencias sencillas que permitan predecir cambios en el movimiento, en la forma o en el estado de los cuerpos por efecto de las fuerzas.

30. Observar y explorar la utilidad de la palanca, polea y plano inclinado.

31. Identificar algunos inventos de Arquímedes.

32. Identificar a Isaac Newton como descubridor de la gravedad.

2.3. Contenidos

2.3.1. Secuenciación de contenidos del currículo oficial de la Comunidad de Madrid

Según el Real Decreto 126/2014, los contenidos propios del área de Ciencias de la Naturaleza de la etapa de cuarto de Educación Primaria se encuentran clasificados en conceptos, procedimientos y actitudes que ayudan a los alumnos a interpretar la realidad y saber abordar y proponer soluciones a los diferentes problemas de la misma. A su vez está dividida en cinco bloques principales: Iniciación a la actividad científica, Los seres vivos, El ser humano y la salud, La materia y la energía y La tecnología, los objetos y las máquinas. "Su tratamiento debe permitir que los alumnos y alumnas avancen en la adquisición de las ideas del conocimiento científico, en su organización y estructuración, como un todo articulado y coherente" (Anexo I, RD 126/2014).

Los contenidos son "un conjunto de conocimientos, habilidades, destrezas y actitudes que contribuyen al logro de los objetivos de cada enseñanza y etapa educativa" (Art.2, RD 126/2014). Pero son los contenidos curriculares establecidos por la Comunidad de Madrid en el Decreto 89/2014, los que son obligatorios para el diseño de las unidades didácticas que comprende esta programación anual. Estos contenidos se muestran en el Appendix 1 de la mencionada norma en sus diferentes bloques de conocimiento, divididos en conceptos, procedimientos y actitudes.

2.3.2. Secuenciación en Unidades Didácticas

Nine units will be organised in three different groups: Animal and Plant kingdom, Body systems and Energy and machines. Each group will have three units. See Appendix 2.

I. ANIMAL AND PLANT KINGDOM

UNIT 1: VERTEBRATES

Topics

- o *Characteristics of vertebrate animals.*
- o *Nutrition of vertebrate animals*
- o *Reproduction of vertebrate animals.*
- o *Mammals.*
- o *Birds.*
- o *Reptiles.*
- o *Amphibians.*
- o *Fish.*

UNIT 2: INVERTEBRATES

Topics

- o *Characteristics and classification invertebrate animals.*
- o *Sponges, cnidarians and worms.*
- o *Molluscs.*
- o *Echinoderms.*
- o *Insects, arachnids and crustaceans.*

UNIT 3: PLANTS

Topics

- o *Characteristics and parts of the plant.*
- o *Plants organs.*
- o *Plant nutrition: photosynthesis.*
- o *Sexual and asexual reproduction.*
- o *Pollination and Germination.*

II. BODY SYSTEMS AND HEALTHY LIFESTYLE

UNIT 4: CIRCULATORY AND RESPIRATORY SYSTEM

Topics

- o *Respiratory system: parts and organs.*
- o *Circulatory system: parts and organs.*
- o *Blood circulation.*
- o *The heart.*
- o *Physiology and functioning of the respiratory system.*

UNIT 5: REPRODUCTIVE SYSTEM

Topics

- o *Reproduction. Male and female reproductive organs.*
- o *Pregnancy and embryonic development.*
- o *Birth.*
- o *Types of families.*

UNIT 6: HEALTHY LIFESTYLE

Topics

- o *Illnesses that affect the respiratory and circulatory system.*
- o *Healthy habits.*
- o *Alcohol and drugs.*

III. ENERGY AND MACHINES

UNIT 7: MATTER

Topics

- o *The properties of the matters.*
- o *Mass, volume and density.*
- o *Properties of materials.*
- o *State of materials: solid, liquid and gas.*

UNIT 8: FORCES

Topics

- o *The effects and classification of forces.*
- o *Forces and movement.*

- *Gravity and speed.*
- *Newton inventions.*

UNIT 9: SIMPLE AND COMPLEX MACHINES

Topics

- *Pulley, inclined plane and levers.*
- *Archimedes simple machines.*

2.4. CLIL Approach

In order to understand this project, it is necessary to make an introduction to the different methodologies in which CLIL is based. Marsh (1994) defined CLIL as "…situations where subjects, or parts of subjects, are taught through a foreign language with dual-focussed aims, namely the learning of content, and the simultaneous learning of a foreign language" (p. 23). However, many different authors have created the basis for this approach. Coyle et al. (2010) formulated the 4Cs: content, culture, communication and cognition. Bruner, (1978) talks about scaffolding and its importance in student learning and how to achieve greater autonomy for students. Cummins (1979, 2001) contributed with the distinction between BICS (basic interpersonal communication skills) and CALP (cognitive academic language proficiency). Finally, the theories developed by Vygotsky (1978) point out the relation between cognitive and language development and the importance of the role of the teacher as a guide to the student, leaving him to be the leader of his learning.

2.4.1. Methodological Principles

Mehisto, Marsh and Frigols (2008) talk about the core features of CLIL methodology which must be a reference for an annual CLIL syllabus:

1. A multiple focus which supports language learning in content classes and content learning in language classes. This focus integrates several subjects at the same time that organise learning through cross-curricular themes and projects.

2. A context of rich and safe learning, based on routines of tasks and discourses that make language visible during learning, so that students feel secure and desire to interact and experiment with the language and content.

3. The authenticity of learning through the connection of the tasks with the interests of the students and their real and individual needs.

4. Active learning, understood as the learning in which the students have a sufficient time to talk and interact with the teacher, with other students, with himself or with learning resources; where you can help define the standards for learning content, language and learning process. A learning in which the role of the teacher is to facilitate all these processes described.

5. Scaffolding is necessary to address the diversity of students, their interests, learning styles and prior knowledge. A scaffolding that contemplates the reformulation of the language to make it affordable. In addition, it promotes creativity and critical thinking and allows students to learn through cognitive and language challenges that start from their own levels of competence.

6. Cooperation, between the CLIL teachers and those who teach the contents in LI, between parents and teachers and, in general, among all the members of the educational community, including the authorities and the employers of the future citizens who learn in this context.

Based on these characteristics, Custodio Espinar (2019) has elaborated a list of the methodological principles that are considered essential for a quality CLIL syllabus. These principles favour a series of strategies to encourage interaction in the classroom as a guarantee of linguistic development and content learning.

1. The syllabus model must include the four core elements defined by Coyle (1999): content, cognition, communication and culture. This will allow the teacher to generate the strategies, activities, resources, etc. necessary for an effective content learning and the balanced development of language, learning strategies and intercultural competence of students.

2. Language must be approached from two different areas: content and cognitive processes, on the one hand, and the interaction and communicative use of language (Cognitive Academic Language Profiency, CALP and Basic Interpersonal

Communication Skills, BICS) (Cummins, 1999), on the other hand. In CLIL the language is used to learn and communicate at the same time.

3. The content determines the linguistic demands that the teacher must analyse to support student's language development. The teaching of language in this context must respect the balanced development of the four basic skills of the language (listening, reading, speaking and writing). The CEFR is a fundamental tool for determining levels of proficiency and developing language assessment strategies adapted to them (Council of Europe, 2001).

4. The analysis of linguistic demands must guarantee the development of strategies to support interaction, adapted to student's language proficiency (Coyle, 1999, 2007, Coyle et al., 2010). This analysis allows the development of strategies, which are called scaffolding.

5. Attention to diversity is fundamental to guarantee the meaningful learning of the contents. Bloom's taxonomy (1956) is a very useful tool to facilitate the teacher's adaptation of the cognitive demand of the activities to the level of cognitive development of each student in particular. The tool allows to adapt an activity from a lower order cognitive skill (LOTS) to a higher order thinking skill (HOTS) depending on the needs of the student (Custodio Espinar, 2013)

6. The development of activities should follow these basic principles (Pérez Torres, 2015)

- The activities must connect with the curricular objectives.
- They must start from an approach to the content and meaning.
- The activities must be open and flexible, easily adaptable to higher or lower levels of difficulty as needed by the students.

7. ICT (Information and Communication Technologies) can greatly contribute to the development of activities and tasks that promote the integration of Coyle's 4Cs (1999), encouraging students to progress at their own pace, facilitating the development of learning strategies. These tecnolgies are highly motivating if they adjust to the interests and skills of the students (Custodio Espinar and Fernández 2011, Custodio Espinar y Caballero, 2016)

2.4.2. The 4 Cs

Students cannot develop academic knowledge and skills without access to the language in which that knowledge is embedded, discussed, constructed or evaluated. Nor can they acquire academic language skills in a context devoid of academic content (Crandall, 1994, p. 256)

The 4Cs Framework is another component of CLIL and it has to be considered to form a conceptual map of understanding CLIL. It integrates four contextualized building blocks: content (subject matter), communication (language learning and using), cognition (learning and thinking process) and culture (developing intercultural understanding) (Coyle et al., 2010)

Figure 4: The 4Cs Framework. Source: (Coyle et al., 2010)
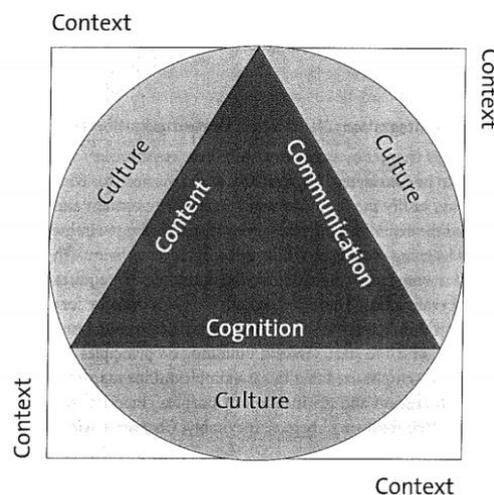
There is a symbiotic relationship between these elements that help develop CLIL in a better way. Coyle et al. (2010) suggest that effective CLIL takes place as a result of this symbiosis through:

1. Progression in knowledge, skills and understanding of the content.
2. Engagement in associated cognitive processing.
3. Interaction in the communicative context.
4. Development of appropriate language knowledge and skills.
5. The acquisition of a deepening intercultural awareness, which is in turn brought about by the positioning of self and 'otherness'

This perspective wants to analyse the importance of these 4 components to acquire a second language and new content in a significant way. Therefore, CLIL involves learning to use language appropriately whilst using language to learn effectively. Coyle et al. (2010) built this theory on the following principles:

1. Content matter is not only about acquiring knowledge and skills, it is about the learner creating their own knowledge and understanding and developing skills.
2. Content is related to learning and thinking. To enable the learner to create their own interpretation of content, it must be analysed for its linguistic demands.
3. Thinking processes need to be analysed for their linguistic demands.
4. Language needs to be learned which is related to the learning context, to learning through that language, to reconstructing the content, and to related cognitive processes. This language needs to be transparent and accessible.

According to (Coyle et al., 2010) the 4Cs framework consists of the following components:

1. **Content:** Progression in new knowledge, skills and understanding. It does not have to be part of a discrete curriculum discipline such as maths, it can be drawn from alternative approaches to a curriculum involving cross-curricular and integrated studies.
2. **Communication:** Interaction, progression in language using and learning. Learners are encouraged to produce subject language orally as well as in writing and to participate in meaningful interaction.
3. **Cognition:** High Order Thinking (HOT) activities and understanding, problem solving, and accepting challenges and reflecting on them. CLIL is about allowing individuals to construct their own understanding and be challenged –whatever their age or ability.
4. **Culture:** Awareness, identity, citizenship and progression towards multicultural understanding.

We can find other teaching and learning theories that support (Coyle et al., 2010) framework:

Subject matter is not only about acquiring knowledge and skills, it is about the learner constructing his/her own knowledge and developing skills (Lantolf, 2000; Vygotsky, 1978)

Acquiring subject knowledge, skills and understanding is related to learning and thinking (cognition). To enable the learner to construct an understanding of the subject matter, the linguistic demands of its content must be analysed and made accessible (Met, 1998)

Thinking processes (cognition) need to be analysed for their linguistic demands (Bloom, 1984; McGuiness, 1999)

2.4.3. Learner-centered autonomous learning

The main features of an autonomous classroom have been highlighted by Leni Dam (1995): authentic materials, group work, negotiation of learning tasks, self-evaluation of learning processes, and the teacher's role as a classroom manager were among the most important issues focused upon.

Although learner autonomy has been developed predominantly within a foreign language learning and teaching framework, the concepts characterizing this approach are valid for any other subject matter and learning context (von Aufschnaiter, Fischer and Schwedes, 1992). Authenticity, learning as social mediation, reflection on the learning process, self-evaluation, and a number of other related concepts are, from a pedagogical point of view, subject-independent, neutral categories which should be implemented in all institutionalized learning if learner autonomy is one of the goals (Wolff, 2003).

In a traditional learning environment, the learning context is dominated by decisions made outside the classroom, by the administration or by the school. In classrooms oriented towards learner autonomy, the learning context is created collaboratively by

students and teacher. Together they set up a kind of learning laboratory in which they experiment and do research, thus, they deal with their content and language learning in a motivating way.

CLIL teachers have to consider letting go of the reins in class, and to face losing our central role. We need to pass some control over to our learners. Some of the guidelines that this CLIL guide aims to achieve this challenge are (Attard Montalto, Walter, Theodorou, and Chrysanthou, 2014):

1. Try connecting with students' lives, and their needs and interests.
2. Practise encouraging (and enjoying) student-to-student communication.
3. Allow students to help decide on content and language assessment criteria.
4. Agree to adopt student-generated rules on acceptable classroom behaviour.
5. Decide to let students ask for new language when they need it, rather than teaching in advance the words you think they will need.
6. Stop expecting all students to work in the same way: advise them to recognise and develop their own learning styles and strategies.
7. Put yourself in their shoes, and imagine learning in different and exciting ways.
8. Vary your approach.
9. Respond to immediate needs.

In learner autonomy, the dominant social form of learning is group work. In an autonomous classroom, which is regarded as a research laboratory, occasions for group work are much more numerous than in a traditional classroom. It is clear that content subjects, with their rich potential for research and experimentation, add a new dimension to group work.

> Learning strategies have a very high potential with respect to the development of learner autonomy. Only learners who have learned to work with specific learning techniques and study skills will be able to become more independent in their learning. (Wolff, 2003)

2.4.4. Scaffolding

When teachers start planning, they have in mind what they are going to teach but they do not normally have into account how they are going to teach that content. CLIL is about building a potential synergism between what the students learn and how they learn it. CLIL demands an analysis of what is meant by effective pedagogies in different contexts.

There are some general learning theories on how individuals learn based on the work of theorist such as Bruner, Vygotsky and Wood. From many years the dominant model of knowledge transmission has been the traditional teacher giving a lecture and the learner memorising the content. It is called 'banking model' where the expert deposits information and skills into the memory bank of the learner and tends to be teacher-controlled, who is in charge of the class.

However, CLIL is a social-constructivist approach where the teacher guides the learning towards the information and their role is to activate student learning rather than promoting a passive reception of knowledge (Cummins, 2005). This approach focuses on interactive, mediated and student-led learning. In order to achieve this goal, the teacher needs to scaffold learning.

> Bruner, like Vygotsky, emphasized the social nature of learning, citing that other people should help a child develop skills through the process of **scaffolding**. The term scaffolding first appeared in the literature when Wood, Bruner, and Ross described how tutors interacted with a child to help them solve a block reconstruction problem (Wood et al., 1976).

The concept of scaffolding is very similar to Vygotsky notion of the zone of proximal development (ZPD) and it is not uncommon for the terms to be used interchangeably. Scaffolding involves helpful, structured interaction between an adult, or other students more expert, and a child with the aim of helping the child achieve a specific goal. This involves the teacher in maintaining a balance between cognitive challenge for learners and appropriate and decreasing support as learners progress.

[Scaffolding] refers to the steps taken to reduce the degrees of freedom in carrying out some task so that the child can concentrate on the difficult skill she is in the process of acquiring (Bruner, 1978, p. 19).

According to (Dale and Tanner, 2012) there are three types of scaffolding:

1. <u>Reception scaffolding:</u> help students to understand and process information from input.

2. <u>Transformation scaffolding:</u> help learners select, change and organize information into a different form.

3. <u>Production scaffolding:</u> help learners produce or create something new with the information they have in order to show their understanding. (p. 31)

2.4.5. Teacher's role and student's role

The implementation of CLIL encourages whole school development and innovation. It also means a change in teachers and students' role and benefits for both. With scaffolding and ZPD theories, teachers are a guide for learners and support their knowledge until they are prepared enough to learn by themselves.

CLIL teachers must reconsider how learners learn both language and content and, as a consequence, may often develop a completely new curriculum (Dale and Tanner, 2012) Non-native teachers improve their language skills through teaching their subjects in another language and using their language skills in practice. This new perspective leads teachers to broaden their understanding of both the subject and the teaching of the subject.

According to (Dale and Tanner, 2012) CLIL teachers have an important role in developing a wide range of children's skills:

1. Help students be aware of the language required to learn a particular content.

2. Build up on students' previous knowledge by developing activation strategies and activities at the beginning of every lesson.

3. Help students be aware of the content and the learning process they are learning by sharing the learning goals and outcomes from the beginning of the teaching/learning process.

4. Ensure that students understand the content by developing reception, transformation and production scaffolding and providing multimodal input.

Besides, this approach gives the same importance to receptive (listening and reading) and productive skills (speaking and writing). Teachers need to encourage learners to interact in their classroom, to use activities which encourage them to think, speak and write (Dale and Tanner, 2012). Assessment gives information about how the learners are acquiring the new content and language but also if teachers are planning their classes correctly in order to provide the best information in the best way. To know how to assess learner's progress is also a teacher role, in both content and language, and this role also involves providing feedback which will help develop both the content learning and the language proficiency.

The teacher competences required for successful CLIL teaching are extensive and clearly delineated by Bertaux, Coonan, Frigols and Mehisto (2009). Here it is offered a summary based on Mehisto, Marsh, and Frigols (2008).

1. Knowledge of methodology for integrating both language and content.
2. Ability to create rich and supportive target-language environments.
3. Ability to making input comprehensible.
4. Ability to use teacher-talk effectively.
5. Ability to promote student comprehensible output.
6. Ability to attend to diverse student needs.
7. Ability to continuously improve accuracy.

From the point of view of the students, their role throughout the teaching-learning process will be active with the help of the teacher by building their own knowledge, observing, discovering, thinking critically, and getting involved in the different proposed activities either individually, in pairs, in their cooperative groups or with the whole class.

This approach supposes a change on the role that the student plays in their learning. Crispin (2011) collects a series of skills that must be contemplated to obtain the best autonomous learning. First, learning autonomously requires establishing goals and activities that enable the fulfilment of the task, therefore, planning is essential. It should be encouraged to develop an awareness about the planning of the tasks that are done to learn. In addition, during the process of completing the tasks, the autonomous student must be able to understand what is done, how it is done and why it is done. Therefore, the author affirms, that learning monitoring requires a training of metacognitive skills, which makes it possible to make decisions about the best way to complete the task, as well as the steps and skills necessary for it.

But all this, not only requires teacher training, but students must also learn strategies to compensate for the difficulties involved in learning curricular content in a foreign language. According to Attard Montalto et al. (2014), one of the most important and most difficult challenges of CLIL teachers is to train students to be autonomous.

2.5. Activities and Resources

2.5.1. Activity-type

There is no specific sequence of activities considered to be CLIL. The eclectic nature of this approach makes it possible the combination of very different learning strategies and techniques (Dale and Tanner, 2012).

In general, a sequence of CLIL activities must begin with a diagnostic or activation activity, which connects the content with the interests of the students and activates previous knowledge about it. Then, depending on the methodology and the content, the activities can be reinforcement, application or extension. And, finally, it is essential that this sequence promotes higher order thinking and interaction. Therefore, it should include task of analysis, evaluation or creation, on the content that is being learned, preferably in group work. The integration of activities based on digital tools and resources promotes the development of all these principles (Custodio Espinar and Caballero, 2016)

These are the characteristics that Piaget (1975) attributes to the activities necessary for a constructivist learning of the type that CLIL involves:

a) Promote the learning by understanding and not by repetition.

b) Develop cognitive schemas of the learner.

c) Be related to the general objectives of the stage.

d) Demand from the student the practical application of the knowledge, skills, values, attitudes and learning strategies of the areas in which they are presented.

e) Facilitate its realization autonomously and demand an active role of the student.

f) To be able to be applied to reality.

g) Be motivating and adjusted to the interests and needs of students.

These are the different types of activities we can find in a CLIL syllabus:

- **Activation activities:** Warm-up activities, discussions on the new topic with learners. Questions and prompts using visuals. These activities are likely to help learners to be aware of what they are going to learn. Also, they help the teacher to know what leaners already know about the topic and what language they know about it. Some examples are: 'write down nouns related to….' Brainstorming using mind maps on the board, finish the sentence, guessing the lesson, Venn diagrams, KWL grid, word wall, etc.

- **Guiding understanding activities:** Expert groups, graphic organisers, jumbles, mind the gap, understating new words, etc. These activities should follow a cognitive progression according to a cognitive taxonomy, from LOTS to HOTS.

- **Activities to focus on language:** bingo, guess the word, noticing, ranking, taboo, vocabulary posters, word puzzle, etc. They will depend on the language demands analysis of the content and the language proficiency of the students.

- **Activities to focus on speaking:** Balloon debate, information gaps, role play, rubric jigsaw, speaking frames, vivid visuals, etc. These actvíties ensure the

interaction and, thus, the output that completes the learning process to check the understanding of the content.

- **Activities to focus on writing:** Brainstorming for writing, class magazine, instructions, recreate a text, storyboard, biographies, blogs, etc. These activities often apply to specific oral academic genres and writing products.
(López, Custodio and Buckingham, 2018)

2.5.2. Human, Material and ICT resources

- **Human resources:** These include those people who, in one way or another, support the students' learning:

  1. The subject teacher, in this case science teacher, who is the same teacher that teaches content subject and foreign language simultaneously.

  2. The Language assistants (LA), who are native speakers. They can support the CLIL teacher before, during and after the lessons and can develop many activities inside and outside the classroom. They can create a routine starting a lesson, work on phonics or lead oral activities. Outside the classroom the LA can we helpful teaching English to the teachers to improve their language proficiency. Although they are not trained teachers, they can help in the planning of lessons or specific parts of a lesson they will be involved in.

  3. It also includes those who participate in the students' educational process but are not part of the teaching staff: families, secretaries, the kitchen staff, the cleaning staff, the teachers of extracurricular activities, the maintenance team or the playground caretakers.

- **Material resources:** A series of materials are needed in order to allow students to learn meaningfully. Apart from ordinary materials such as paper, pencils or notebooks, we will prepare as many scaffolding resources as necessary such as flash cards, word cards, handouts, etc. We will also need technological resources such as iPads, a digital whiteboard and internet access to make use of certain resources obtained from internet web pages. At the same time, literary resources such as stories, narratives or riddles are necessary as well as the textbook which

will occasionally be used as a support material. The majority of activities and sessions will be held in the classroom, however, some activities will need other spaces such as the playground or the school library where we can find other types of materials.

- **ICT resources:** The new technologies will take on great value in the CLIL classroom, as it is intended to show the students tablets as a tool in learning. The use of them will be at all times regulated by the teacher, who will seek to ensure that students enjoy this resource. Thus, they will be used to carry out research, to review content on different websites, to play with the different topics covered, watch videos, complete the information they have, and so on. However, in addition to conducting searches, it is also intended that students learn to use the information found or provided.

  Dada la creciente importancia de las TIC en nuestra sociedad, es importante enseñar a los alumnos en el uso de las Tecnologías de la Información y la Comunicación, para aprender a buscar información y saber cómo tratarla y filtrarla (LOMCE, 2013).

  The students that we are going to accompany in the teaching-learning process are digital natives (Mark Prensky, 2001), which means that they will show a superior handling to the expected one without a previous training. In addition, their familiarity with technologies is very high, so we can use this resource as a tool to motivate them, bringing us closer to their daily lives and interests.

2.5.3. Space and time resources

The spaces that will be used for the development of the different didactic units are varied; they will be carried out in the classroom, as well as in the laboratory, the library, the computer room or the courtyard, among others.

It is important to create a space where kids can feel safe to be themselves, where they can participate without being judged and tell their opinion openly. Also, this space will bring

opportunities to use both language and content. To do this, the classroom with have spaces to show the final products of the different units.

The students will have two hours a week of the subject Nature Sciences which will be taught on Tuesdays and Thursdays. According to the schedule, the annual syllabus will be divided into 9 didactic units with 72 sessions, starting on September 2019 to June 2020. See Appendix 2 for the distribution of the units in the three trimesters.

2.5.4. Classroom organization and management

Both novice and experienced teachers consider classroom management to be a high priority and an area of concern (Sokal, Smith, and Mowat, 2003). Effective teachers expertly manage and organize the classroom and expect their students to contribute in a positive and productive manner (Stronge, Tucker, and Hindman, 2004). It seems prudent to pay careful attention to classroom climate, given that it can have as much impact on student learning as student aptitude (Wang, Haertel, and Walberg, 1993). Teachers take time in the beginning of the year and especially on the first day of school to establish classroom management, classroom organization, and expectations for student behaviour (Emmer, Evertson, and Anderson, 1980; Emmer, Evertson, and Worsham, 2003).

On the one hand, and according to Doyle (1987) classroom management is the actions and strategies teachers use to solve the problem of order in classrooms. But it can be also used rules, procedures and routines to ensure that students are actively involved in learning (Marzano and Pickering, 2003) In essence, they use management not to control student behaviour, but to influence and direct it in a constructive manner to set the stage for instruction (McLeod, Fisher, and Hoover, 2003).

Rules establish the boundaries for behaviour, and consistency in their implementation is essential to effective classroom management (Nakamura, 2000). Rules tend to focus on expectations of how to act toward one another, on how to maintain a safe environment, respect others and participate in learning. However, routines are more flexible tan rules and are a specific way for doing actions. Classrooms typically require many routines to operate efficiently and effectively (McLeod et al., 2003). Teachers invest the time at the

start of the school year to teach the routines. By establishing and practicing routines that require little monitoring, teachers ensure that the focus of the classroom is more squarely on instruction (Covino and Iwanicki, 1996; McLeod et al., 2003; Shellard and Protheroe, 2000). Additionally, routines empower students to be more responsible for their own behaviour and learning in the classroom (Covino and Iwanicki, 1996).

Some of the rules that would be used during the sessions are:
1. Respect each other.
2. Care for classroom materials.
3. Raise the hand for permission to talk.
4. Not drinking or eating in class.
5. Have fun every day.

On the other hand, classroom organization focuses on the physical environment. Teachers who organize a safe classroom environment strategically place furniture and materials in order to optimize student learning and reduce distractions (Educational Review Office, 1998). Furniture arrangements, location of materials, displays, and fixed elements are all part of organization (Stronge et al., 2004). Effective teachers decorate the room with student work, they arrange the furniture to promote interaction as appropriate, and they have comfortable areas for working (Kohn, 1996).

Classroom management and organization are intertwined. While rules and routines influence student behaviour, classroom organization affects the physical elements of the classroom, making it a more productive environment for its users. How the classroom environment is organized influences the behaviour in it (Stronge et al., 2004).

2.6. Assessment and Evaluation Strategies

Assessment is the process of gathering data. More specifically, assessment is the way instructors gather data about their teaching and their students' learning (Hanna and Dettmer, 2004).

The theme of assessment is a difficult and sometimes contentious area among CLIL teachers. In some respects, it lies at the heart of the question of how to define the level of content-language integration, because, ultimately, no matter what is taught and how it is taught, the mode of assessment determines how the learners perceive the teacher's intention and, of course, also shapes performance data. (Coyle et al., 2010)

The distinction between formative and summative assessment is important, as each serves a different purpose. Assessment processes can be broadly divided into **summative** and **formative** and this division forms a major distinction. Summative assessment makes a judgment on the capability of the learner at that point in time. It is therefore associated with testing and more formal setting or end-of-unit, even if this is not obtained through an examination. On the other hand, formative assessment is more complex, as its intention is to be directly diagnostic with a view to immediately impacting on the learner's next steps. It is also formative for the teacher, because it is planned from the beginning of the lesson and not only after all the work is complete. (Coyle et al., 2010)

For the design of lesson plans, which propose a leaners-centered constructivist learning, the following steps should be followed:

1. Determine what area, level and content of the official curriculum. In this syllabus the content area is Natural Sciences, fourth grade.
2. Design authentic tasks or close to reality, that imply the creation of a final product.
3. Identify, in the national official curriculum[1] the evaluation criteria and the learning standards.
4. Check that learning goals have been designed to assess the language that the content demands and that these are linked to the content objectives.
5. There must be criteria for evaluating the content, the language and the learning processes. Write the descriptors that reflect the level of competence for each criterion, from a perfect performance, to a deficient one.
6. Choose the assessment tools of the activity or task.

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[1] Real Decreto 126/2014, de 28 de febrero, por el que se establece el currículo básico de la Educación Primaria and Decreto 89/2014, de 24 de julio de 2014, del Consejo de Gobierno, por el que se establece para la Comunidad de Madrid el currículo de la Educación Primaria.

7. Use the descriptors to design formative assessment tools such as checklist, holistic rubrics, analytical rubrics.

2.6.1. Formative assessment

Formative assessment was advocated first by Scriven (1967) and Bloom (1968) In common with these writers, Ames and Ames (1984) suggest moving away from a norm-referencing approach. Also, Dweck (1986) argued that summative assessment demotivated learners. Formative assessment provides feedback and information during the instructional process, while learning is taking place. It allows to identify what students are learning and facilitate the integration of content and language (Coyle et al., 2010).

In CLIL, the formative evaluation tools fulfil a series of functions: they facilitate the exchange of information on the evaluation between teachers and students. With these tools, the objectives are shared, are made comprehensible and meaningful information is offered about what the student should improve in learning and how to do it (Custodio Espinar, 2018). Therefore, they offer a connexion and collaboration between the teacher and the learners about the evaluation process.

Formative assessment is oriented to achieve the following objectives (Custodio Espinar, 2018):

1. To adjust the teaching and the learning to a continuous form.
2. Increase the level of interaction and have feedback loops through the development of strategic questions
3. Improve the performance of students in relation to the objectives and assessment criteria raised both content and language.

These are some tools that can help increase the level of interaction and feedback by ensuring that all students take an active role during lessons:

1. Random selection tools: with sticks or cards that students can customize at the beginning of the school year. Used for open-ended questions, they ensure that all students take an active role and produce a similar amount of language.

2. Mini-white boards: useful for short content answers or to practice prepositions, vocabulary, comprehension, spelling, fill in gaps, grammar, etc. It allows to visualize the answer of all the students and, therefore, the real interaction and the feedback with all at the same time.

3. Thumbs up/down: physical response for the development of critical thinking and answers yes/no. Allows visualizing the amount of affirmative and negative responses.

4. Notes: to evaluate the lessons at the end of the day or session, to obtain feedback from the lesson, to offer the opportunity to give an opinion , suggest ideas, etc (Custodio Espinar, 2018)

The active observation of students, when they work independently, is also very important, because it allows to objectively evaluate language learning skills, content and capacity for social interaction and collaborative work.

For the long-term formative assessment, other types of tools can be used (Custodio Espinar, 2018):

1. Portfolios: Students have the responsibility to select a variety of works and organize them in a way that demonstrates the progress of their knowledge.

2. Learning notebooks: created by students from the beginning and they write their progress in a personalized way.

3. Rubrics: They allow to evaluate tasks based on processes or final products. They are scales that define the performance of a task. They are very suitable to assess the content, language and processes and learning skills that students develop during the task (Custodio Espinar, 2018)

To conclude with formative assessment, Zangl (2000) includes in the article three major conclusions about language assessment.

1. Assess the learner's proficiency within a multi-component framework, including not only domain- / structure-specific items, but also the use of language within the social context of the classroom

2. Capture both the learner's individual profile and the performance level of the class as a whole

3. Trace the learner along his or her developmental path where time and experience act as constructive factors (Zangl, 2000)

2.6.2. Summative assessment

It is necessary a summative assessment at the end of the process to measure if the students have reached or not the general and didactic outcomes and the competences established by the teacher. Unlike formative assessment, summative assessment measures what has been learnt and focuses more on the content rather than in both of them (López, Custodio, and Buckingham, 2018). The finding of this type of assessment is judgmental and gives the students a score or grade, whereas the formative assessment identifies areas for improvement. It is product-oriented and only focuses on what has been learned.

Table 1: Comparative between formative and summative assessment.

Formative Assessment	Summative Assessment
Provides feedback on knowledge, skills and attitudes. To improve learning.	Determines the quality level of a final product and allows decisions to be made based on the level of quality demonstrated.
Is process-oriented	Is product-oriented
Pursue the diagnosis of needs and improvements during learning.	It pursues the qualification of the final learning result.

Note. Adapted from Baehr (2010)

Some examples of this type of assessment are:

- End-of-term exams.
- Final project or creative portfolio.

- End-of-unit tests.
- Standardised tests that demonstrate school accountability used for pupil admissions; Autonomous Communities Exams.

2.7. Attention to Diversity Through CLIL

Two essential and complementary principles of a democratic school and society should be combined in a CLIL classroom: the principle of attending to **diversity** and the principle of **integration.** These principles make it clear that all people have the right to basic learning, through equal opportunities, the same curriculum and a formal school setting (Ainscow, 2001; UNESCO, 2004).

Diversity is an inherently human trait. It is based on respect for individual differences; diversity in prior ideas, experiences, knowledge and attitudes; different learning styles and multiple intelligences (Gardner, 1993); different learning methods; varying achievement levels, learning paces, and intellectual capacity; diverging interests, motivations, and expectations; and different socioeconomic and cultural backgrounds that affect the lives of students (Arnaiz, 2009; Julius and Madrid, 2017).

In a broad sense, attending to diversity encompasses all activity that responds to students' educational needs, especially those that need tailored responses due to sociocultural disadvantage, health restrictions, high intellectual capacities, special language requirements, disabilities, or serious personality disorders (León, Estévez, and Crisol, 2016; Monclús and Saban, 2012).

The second principle that helps promote equal opportunities among students is **inclusion** (Armstrong, Armstrong, & Spandagou, 2010). Inclusive education is an educational model that aims to respond to the learning needs of all students with a special focus on those who are at risk of marginalization and social exclusion.

Both inclusion and attending to diversity are associated with the phenomenon of **integration,** which is a consistent response to the diversity of student needs. As Madrid Manrique (2014) has acknowledged, inclusive education has become an influential

movement in the 21st century. It is currently treated as a priority among most governments worldwide. As a consequence, educational reforms in various countries are attempting to achieve this integration and social cohesion among their citizens.

Pérez Cañado (2018) propose a varied set of both general and specific lines of action to facilitate inclusion and attention to diversity based on the current legislation and official guidelines in Spain and the European Union. These actions include splitting the larger group into smaller, flexible groupings for activities, to avoid segregation and discrimination against the most vulnerable so that the highest level of collaboration is reached among students (Muntaner, 2014). Other proposals involve offering an inclusive curriculum that breaks down barriers, incorporating principles (valid for all) that facilitate accessibility for all students in all subjects, and making the methodology flexible to include learner autonomy in learning and the human support that students need to reach their goals (Ainscow, 2001; Arnaiz, 2009).Comprehension of students with learning difficulties can also be enhanced by employing abundant photos, summaries, images, diagrams, and similar techniques that provide obvious links to the topic and promote understanding by representing and clarifying information.

Finally, among the variables that exert a notable influence on the quality of CLIL programmes and satisfy the students' personal needs (Madrid & Julius, 2017), the students highlight the importance of nurturing an affective teacher-student relationship (rapport) and displaying understanding and patience in teaching and learning processes. Other significant aspects mentioned include employing the L1 in class to clarify concepts that are not clear in the L2, promoting extracurricular activities that support learning, encouraging trips and exchanges with native speakers, and organizing activities that interest them (e.g., games and sports).

2.7.1. Cognitive demand analysis: HOTS & LOTS

For content learning to be effective learning, students must be cognitively engaged. CLIL teachers will have to consider how to actively enable them to think through and articulate their own learning (Coyle et al., 2010). This, in turn, implies that learners need to be aware of their own learning through developing metacognitive skills such as 'learning to

learn'. Therefore, for CLIL teaching to support effective learning, it has to consider not only the knowledge and skills, but also the cognitive engagement by the students. Because, in addition to the development of communicative competence, CLIL justifies the usefulness of integrated learning from a neurological base, explaining, among other reasons, that cognitive flexibility is stimulated (Coyle et al., 2010). Students need to know how to think, need to be skilled in problem solving and higher order thinking skills (HOTS), creative thinking, in order to construct a framework through which to interpret meaning and understanding:

> If learning is to be retained and to be readily available for use, then learners must make their own construction of knowledge – make it their own – and must learn to take responsibility for the management of their own learning. (Nisbet, 1991)

Since the publication of Bloom's taxonomy outlining six different thinking processes in 1956, the categorization of different types of thinking has been the subject of great debate (McGuinness, 1999). In 2001, Anderson and Krathwohl published an updated version of Bloom's taxonomy (see Figure 5). The cognitive process dimension consists of lower-order thinking skills (LOTS) (remembering, understanding and applying) and HOTS (analysing, evaluating and creating), both of which are integral to effective learning. In this approach it is important to achieve the maximum development of cognitive skills analyse, evaluate and create, as opposed to lower order ones, remembering to understand and apply, following a sequence that progresses from LOTS to HOTS.

Figure 5: First Bloom's Taxonomy and Anderson and Krathwoh revised taxonomy.
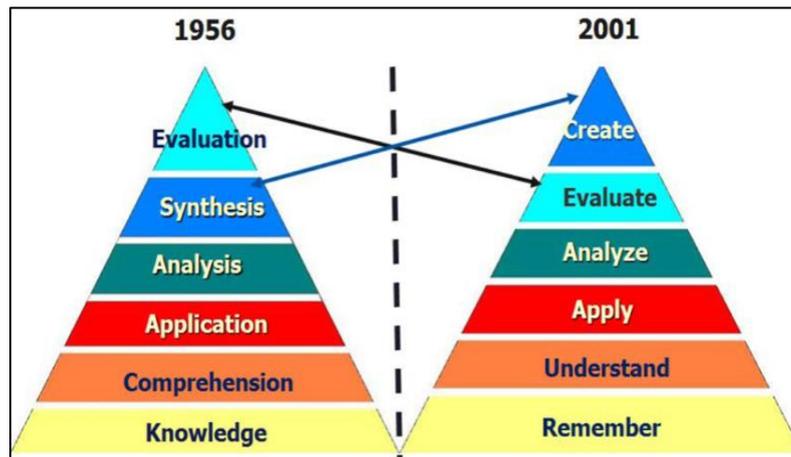
Apart from Bloom and Anderson and Krathwohl, other theorists have continued to develop the idea of different types of thinking. This is essential not only to ensure that all learners have access to learning but, at the same time, to ensure that they have the cognitive and language support they need.

To promote the development of cognitive skills of a higher order, it is necessary to offer students a work strategy that favours interaction, collaborative and cooperative work, and the resolution of problems or learning tasks (Custodio Espinar, 2018). Taking into account the six levels at which the cognitive skills of Bloom's taxonomy are organized, these should serve as a reference for the teacher to design learning objectives, depending on the content taught. For example, in this syllabus, if the final product is to create an anthill, students at higher order thinking skills will be able to research about how the ants live in their anthill during a week and observe the changes, whereas students with low order thinking skills will be able to illustrate the anthill.

2.7.2. Ordinary measures to attend diversity

The educational intervention must contemplate as a principle the diversity of the students. In this way its development is guaranteed at the same time as a personalized attention knowing the needs of each one. The ordinary measures are generated to give support to students who present some type of difficulty.

According to (LOMCE, 2013) these are some of the ordinary measures:

1. Different groupings that the school can establish are flexible groups, groups of deepening and enrichment, reinforcement groups in the areas and subjects.

2. The establishment of a flexible schedule and spaces adaptable to the needs of the students.

3. The organization of content in inclusive settings.

4. The use of methodological strategies that favour the participation of all students, such as cooperative learning or peer tutoring.

5. The adequacy of the activities to the different levels of curricular competence of the students.

6. The selection of different materials and resources for the realization of activities.

According to Comunidad de Madrid legislation there are different types of students who required special attention in the classroom:

1. **Students with Special Educational Needs:** Curricular and organisational measures and significant adaptations of the elements of the curriculum for pupils with special educational needs will be established, taking into account the different learning rhythms of the pupils, promoting autonomy and teamwork.

2. **Students with High Intellectual Abilities:** Appropriate measures will be taken to identify students with high intellectual capacities and to assess their needs at an early stage. Similarly, action plans and curricular enrichment programmes adapted to these needs will be developed to allow them to develop their abilities to the maximum.

3. **Late Incorporation Students:** The schooling of students who are incorporated late into the educational system will be carried out according to their circumstances, knowledge, age and academic background. The necessary reinforcement measures will be adopted to facilitate their school integration and to catch up with their group of reference. If this gap is overcome, they will be incorporated into the corresponding course to their age.

Among these students with special needs, some need ordinary measures and others need more specific and extraordinary adaptation of the learning context. In LOMCE, students with ADHD (Attention Deficit Hyperactivity Disorder) are included among the students

with specific educational needs, which were not considered in the LOE. This syllabus is designed for Year 4 where there is a student with ADHD.

The main features of these students are difficulty to maintain attention, the scarce ability to process information, motor restlessness, emotional instability and impulsive behaviours, which make students with ADHD susceptible to receive an educational response adapted to their possible learning difficulties, as a consequence of the deficit in the aforementioned executive functions (Miranda, Amado, and Jarque, 2001).

Some ordinary measures necessary to attend these students are:
- The student must be placed as close as possible to the teacher.
- Tasks, are going to be very organized, short, graduated in difficulty and with simplified formats. Bloom taxonomy will be used to ensure the cognitive progression from LOTS to HOTS and to adapt the cognitive demand of any activity that requires it.
- Regarding assessment, there are some strategies that can be used:
  1. Provide qualitative feedback. Avoid scoring numerically but by achievements, using rubrics and checklists.
  2. The assessment needs to be informed in advance. Avoid setting several exams in the same week.
  3. The tests will not be very extensive, they will be based on central knowledge, with short questions and not very numerous. The questions will be provided one by one on a separate paper or space.

Some other measures that we will take into account are:
- Understand and help the student to have a positive relationship between pupil-teacher.
- Involve and encourage the student to talk.
- Show interest when working at your table, approach the student's table regularly and ask him if he has any doubts or needs support.
- Encourage him regularly to keep working.

- Ask him regularly, to go out to the blackboard, improving his attention, and motivation and to better know his evolution.

2.7.3. Extraordinary measures

Extraordinary measures are those that are carried out individually, in the school, to respond to the specific educational needs of the student. They require the organization of personal resources and specific materials and curricular adaptation. The adaptation and modification of the objectives, contents and evaluation criteria to the particular characteristics of the student.

The measures will be implemented until sufficient evolution is observed in the student so that they can continue their ducational stage without adaptations of any kind. In order to make this decision, all the professionals who have worked with the student will meet and will have to reach an agreement.

Significant adaptations can be carried out on all elements of the curriculum, including basic access mechanisms and assessment, depending on the needs of the students. In the case of students with special educational needs, significant ACIs may be carried out after a psycho-pedagogical evaluation. These adaptations will serve as the basis for decisions on the modalities of support needed. In year 4, there are not students that need extraordinary measures.

2.8. Tutorial Action Plan and Collaboration with Families

Tutorial action is a collaborative process between teacher and students that addresses academic, personal, and professional aspects through planned actions to achieve optimal career development (Castro, 2004). Therefore, the Tutorial Action Plan (PAT) is the instrument for tutorial planning and development. It constitutes the framework in which the criteria of the organisation and the priority lines of operation of tutoring in the educational school (MEC,1996).

The teacher is the main responsible for carrying out the educational project. The teacher should be absolutely committed to this task and receive continuous training to perform it professionally.

According to Valdelasfuentes School Project these are the functions and tasks of the teacher to develop the PAT. The teacher will…

1. Be responsible for the follow-up of its students, both in academic and personal aspects.
2. Develop the Coexistence Plan in the group (order in class, values, coexistence...).
3. Meet, at least once a trimester, with the parents of its students to discuss the academic and personal evolution of each one.
4. Meet periodically with the other teachers who teach their students, who will inform him/her punctually of their progress.
5. Establish the organization of his classroom, establishing the positions that each student should occupy in class, with educational criteria and following the advice of the rest of the teachers.
6. Inform his/her students about the Rules of Coexistence of the School and is responsible for supervising their compliance.
7. Meet with their students individually at least once a term, and whenever the student needs it, dealing with various topics (academic and social evolution of the student, personal and family life of the student and its relationship with its development .... advising and accompanying the student from the principles and Christian values of the schools).
8. Nursing and the Food Services of the medical needs of their students (medication, diet) and monitoring the care provided.
9. Inform the families of the extracurricular and complementary activities carried out by the School, advising the families on their choice.
10. Guide the student and their family on the learning strategies and the habits that the student must work to improve his/her learning process (place, time dedicated and organization of the study, techniques and strategies).

2.9 Complementary and Extra-curricular Activities

2.9.1 Out-of-class activities

The out-of-class and complementary activities proposed to carry out are intended to complement the personal and academic development of students. On the one hand, out-of-class activities are those promoted by the school within the school timetable with the aim to relate what the students have learnt in class with the outside world and make it easier for students to extrapolate the contents they have worked on to other contexts.

On the other hand, complementary activities are part of the activation activities of the didactic units in such a way that they serve as preparation for the students to the next topic to be developed, linking it with a daily situation. They are shown in table 2.

Table 2. Distribution of the complementary activities along the school year.

Term	Complementary activity
First Term	Unit 2: Faunia
Second Term	Unit 4: Medical Centre
Third Term	Unit 8: MUNCYT (Museo Nacional de Ciencia y Tecnología)

This out-of-class activities will be beneficial for students to acquiere a more complete knowledge of the contents. All the activities are prepared by teachers, both on the school and the visited place.

2.9.2 Extensive reading programme

The reading plan is a set of strategies, resources and actions that are set in motion to obtain more satisfactory results between students and reading. In this way, reading comprehension is promoted. It should not be forgotten that reading is a source of information, learning and pleasure, so it has been essential to develop this reading plan to facilitate the learning process.

The role as a teacher is to be a mediator, to create a link between books and children, to stimulate them and, above all, to guide them in reading. For this reason, the reading plan proposed throughout this project serves to facilitate students' contact with books and to allow them, through the pleasure of reading, to consolidate a permanent reading habit that is necessary for their development, as well as, to consolidate the contents that are being learned in the different units.

In a more specific way, the objectives of this reading programme are the following:

1. To get students interested in reading so that they themselves want to read at any time and place, thus promoting a positive and autonomous reading habit.

2. To work transversally on reading comprehension from the different areas, subjects, fields and modules of the curriculum, not only in Language and Literature, thus allowing its reinforcement and enrichment.

3. To make reading an activity that generates motivation, a leisure activity with which they enjoy and not a punishment or obligation.

4. To get students to use their reasoning skills and reflect in such a way that they can respond to what they read.

5. Encourage the use of the centre's library in such a way that it is a source of information for students. motivation that awakens a taste for reading.

The above-mentioned reading programme will be worked on by comprehension cards, murals and mental maps. As well as making presentations with the fundamental details of the diverse readings in relation to the concepts learned in the didactic units.

These are some of the readings and books recommended to amplify the knowledge of each unit. Some of them will be used as part of the sessions and others can be read at home to consolidate what they have learnt in class.

- Skinner, N. (2019). *Bloom.* United Kingdom: HarperCollins

- Dahl, R. (1996) *James and the Giant Peach*. Knopf: Alfred A

- St. John, L. (2008) *The White Giraffe*. Paw Prints

- Butterworth, J. (2018) *When the mountains roared*. United Kingdom: Hachette

- Deak, J. (2015) *Your fantastic elastic brain: Stretch it, shape it.* March 4th Incorporated.

- Brown, C (2016) *The Human Body. Shine-A-Light*. Kane Miller.

- Ballen, K (2012) *A tour of your circulatory system. First Graphics.* Capstone.

- Limentani, A. (2016) *How much does a Ladybird weigh?.* Boxer books limited.

3. DIDACTIC UNITS

3.1.   First Term. Living Things and Plants

3.1.1.   UNIT 1. Vertebrate Animals

DIDACTIC UNIT 1: VERTEBRATE ANIMALS
CONTENT AREA: NATURAL SCIENCE / ANIMALS AND PLANT **Level:** Year 4 **Timing:** 8 sessions during the first semester over 4 weeks. **Description:** Recognize different types of invertebrate animals to choose one endangered animal to investigate. **Product:** Investigation and data research on endangered animals to generate an action plan to save them. **Rationale:** In this first didactic unit, students name and discover different groups of vertebrate animals and its characteristics. Also, they will identify the different kinds of reproduction and nutrition. Finally, students will analyze the living condition of engendered animals collecting information about them to prepare an action plan.
CONTENT

<u>Content</u>	<u>Contribution to key competences</u>
o Characteristics of vertebrate animals. o Nutrition and reproduction of vertebrate animals.	o Use of diverse sources of information. o Study and work techniques. o Development of work habits. o Effort and responsibility.

o Vertebrate animals (mammals, birds, reptiles, fish and amphibians) o Endangered animals. o Investigation and data research.	o Use of information and communication technologies to search for and select information, simulate processes and present conclusions. o Planning and implementation of projects and presentation of reports.

COGNITION

Teaching Objectives	**Learning Outcomes**
o To know the main characteristics of vertebrate animals and the 5 types of vertebrate animals. o To know the three types of nutrition: carnivores, herbivores, omnivores. To present in groups each type of vertebrate with its characteristic using photos and videos. o To analyse the living condition of endangered animals and create an action plan.	1. Pupils name the 5 types of vertebrate animals. 2. Pupils define and classify each type of nutrition: carnivore, herbivore and omnivore. 3. Pupils identify the different types of reproduction: viviparous and oviparous. 4. Pupils investigate and collect data from endangered animals. 5. Pupils explain the nutrition and reproduction of mammals, birds, reptiles, amphibians and fish. 6. Pupils record the results of the investigation 7. Pupils make a hypothesis on previous knowledge 8. Pupils defend an action plan to the rest of the class.

CULTURE	
Teaching Objectives	**Learning Outcomes**
o To understand the importance of invertebrate animals in the world. o To cooperate in group activities. o To respect the class group. o To raise awareness of personal behaviour to protect animals.	o Pupils respect the ideas from their peers. o Pupils work collaboratively. o Pupils identify human actions that contribute to protect animals and relate them to their personal experience.

COMMUNICATION

Language of learning:

- o <u>Academic vocabulary</u>: carnivore, consumer, herbivore, omnivore, oviparous, viviparous, lungs, producer.
- o <u>Connectors</u>: to describe and differentiate, compare and contrast.
- o <u>Parts of an investigation</u>: data research, hypothesis, result, conclusion.

Language for learning: Students need the language to

- o Explain and describe how the action plan was made *(First we look for information…, we planned this way…, we want to achieve…)*
- o Summarize why their animal is endangered and what we can do to help him *(This animal lives in…, since x years it was…, we can prevent…)*
- o *Classroom language*

Language through learning:

- o Language through activities, videos, ICT, teamwork, readings.
- o Language through peer interaction and project presentation.

ASSESMMENT

Evaluation criteria:

- o Identify the characteristics of vertebrate animals.
- o Classify the different groups of vertebrate animals.
- o Explain the different types of nutrition and reproduction.
- o Investigate about endangered animals to produce an action plan.

Minimum required:

- o Pupils explain the nutrition and reproduction of mammals, birds, reptiles, amphibians and fish.

Assessment:

1. **Formative Assessment:**
   - o Observation of the group work using a checklist for active observation.
   - o Verbal and written Feedback of each activity done in class using random selection tools, mini-whiteboards and exit slips.
   - o Peer assessment checklist to assess the presentations.
   - o The action plan and investigation will be assessed with a rubric.

2. **Summative Assessment:**
   - o Unit test.

ATTENTION TO DIVERSITY

Multimodal Input: The content of the unit will be presented in different ways throughout the sessions to ensure that all students engage and learn it.

- o A reading and a video to describe the characteristics.
- o A visual organizer to compare the groups.
- o Posters with the groups of vertebrate animals.

      o A presentation including a summary of the content studied to be used as a model.

LOTS: Choose a favourite vertebrate animal, investigate their characteristics and explain it to the class.

HOTS: Write a letter summarizing the action plan to save a specific endangered animal, point out the importance of the situation and send it to World Wildlife Fund – Endangered Species Conservation (WWF)

Attention deficit hyperactivity disorder (ADHD):

In this unit the self-instruction (what/how/when/ do I have to do?) is done through group work, role-playing, feedback, and especially the modelling of the teacher and also of the peers.

3.1.2. UNIT 2. Invertebrate animals

DIDACTIC UNIT 2:
INVERTEBRATE ANIMALS

CONTENT AREA: NATURAL SCIENCE / ANIMALS AND PLANTS

Level: Year 4

Timing: 8 sessions during the first semester over 4 weeks.

Description: Identify the different types of invertebrate animals and to design an anthill.

Product: Create an anthill using recycled materials and explain to the class how it works and how to take care of them.

Rationale: In this didactic unit, students will identify the invertebrate animals and their characteristics, recognizing the different types of invertebrates. With this unit, students will we aware of the wide variety of animals which live on Earth and the need to protect them.

CONTENT

Content	**Contribution to key competences**
o Invertebrate animals.	o Initiation to scientific activity.
o Groups of invertebrates.	o Use of diverse sources of information.
o Molluscs and their types.	o Study and work techniques.
o Arthropods: insects, arachnids, myriads and crustaceans.	o Development of work habits.
o The echinoderms and their characteristics.	o Effort and responsibility.
o The cnidarians and their properties.	o Use of information and communication technologies to search for and select information, simulate processes and present conclusions.
o Giving a presentation: structure and body language.	o Planning and implementation of projects and presentation of reports.

COGNITION	
Teaching Objectives	**Learning Outcomes**
o To know the characteristics of invertebrate animals, types and groups. o To differentiate types of invertebrate animals and classify them into groups. o To create an anthill in groups and present it in front of the class.	1. Pupils define and explain the characteristics of invertebrate animals. 2. Pupils list the six types of invertebrates. 3. Pupils recognize the main characteristics of each group of invertebrate animals. 4. Pupils classify the invertebrate animals in groups 5. Pupils differentiate the different types of invertebrate animals. 6. Pupils design an anthill based on an example and give a presentation.
CULTURE	
Teaching Objectives	**Learning Outcomes**
o To understand the importance of invertebrate animals in the world. o To raise awareness of personal behaviour to protect animals. o To collaborate in group activities.	o Pupils understand the importance of invertebrate animals in the world. o Pupils identify human actions that contribute to protect animals and relate them to their personal experience. o Pupils work together and respect others opinion.

COMMUNICATION

Language of learning:

- o Academic vocabulary: invertebrate animals, earthworm, exoskeleton, insects, predators, segments, shell, tentacles, molluscs, arthropods, echinoderms, cnidarians.
- o Connectors: to describe and differentiate, compare and contrast.
- o Parts of a presentation: table of contents, information, conclusion and the slides and headings.

Language for learning: Students need the language to

- o Explain and describe their anthill *(this my anthill…it has this parts…)*
- o Verify the utility of their creation and compare it to other models *(comparatives and superlatives, is… than, as well as…)*
- o Demonstrate their use and how the ants can live inside *(the ants can… they drink and eat…)*
- o Summarize the process of making it and list the materials they have used *(I have made it with… after that….finally…)*
- o *Classroom language*

Language through learning:

- o Language through activities, videos, ICT, teamwork, readings.
- o Language through peer interaction and project presentation.

ASSESMMENT

Evaluation criteria:

1. Explain the characteristics of invertebrate animals.
2. List the different types of invertebrate.
3. Differentiate the characteristics of each group of invertebrates.
4. Use an accurate language to present and explain the anthill
5. Respect and collaborate in group activities.

Minimum required:

1. Explain the properties of each group of invertebrates.
2. Differentiate each group.

Assessment:

1. **Formative Assessment:**
   o The anthill will be assessed with a rubric.
   o Observation of the group work using a checklist for active observation.
   o Verbal and written feedback of each activity done in class using random selection tools, mini-whiteboards and exit slips.
   o Peer-assessment checklist to assess the presentations.

2. **Summative Assessment:**
   o Unit test.

ATTENTION TO DIVERSITY

Multimodal Input: The content of the unit will be presented in different ways throughout the sessions to ensure that all students engage and learn it.

o An anthill with real ants inside to introduce the DU. Students will discover by themselves what is inside and will have the opportunity to question how they live inside there.
o A reading and a video to describe the characteristics.
o A visual organizer to compare the groups.
o Posters with the groups of invertebrate animals.
o A presentation including a summary of the content studied to be used as a model.

LOTS: Illustrate a design on how the student will imagine their anthill.

HOTS: Investigate and measure the right size and materials ants will need in order to make the best anthill for them.

Attention deficit hyperactivity disorder (ADHD):

In this unit the self-instruction (what/how/when/ do I have to do?) is done through group work, role-playing, feedback, and especially the modelling of the teacher and also of the peers.

3.1.3 UNIT 3. Plant Kingdom

DIDACTIC UNIT 3: PLANT KINGDOM

CONTENT AREA: NATURAL SCIENCE / ANIMALS AND PLANT

Level: Year 4

Timing: 8 sessions during the first semester over 4 weeks.

Description: Identify and understand the parts and stage of reproduction of a plant to observe and record the results.

Product: Observation of the growing of a plant.

Rationale: In this third unit, students will understand what a plant is and its main characteristics. Also, they will learn about their importance of plants to our planet and ecosystems.

CONTENT	
Content	**Contribution to key competences**
o Plants: characteristics and parts. o Organs of a plant. o Photosynthesis. o Classification of plants. o Taking notes of the changes in the growing process of the plant.	o Initiation to scientific activity. o Use of diverse sources of information. o Study and work techniques. o Development of work habits. o Effort and responsibility. o Use of information and communication technologies to search for and select information, simulate processes and present conclusions. o Planning and implementation of projects and presentation of reports.

COGNITION	
Teaching Objectives	**Learning Outcomes**
o To know the vital functions of plants. o To be aware of the differences between sexual and asexual reproduction. o To know the parts of a flower. o To understand the process of photosynthesis. o To observe the growing of a plant and take notes of the process to explain it.	1. Pupils identify vital functions of plants. 2. Pupils recognize the differences between sexual and asexual reproduction. 3. Pupils recognize the importance of plants in producing oxygen. 4. Pupils describe the process of photosynthesis. 5. Pupils discover how plants grow. 6. Pupils explain the characteristics of a plant and its parts using notes taken after an active observation of the growing process of a plant.
CULTURE	
Teaching Objectives	**Learning Outcomes**
o To understand the importance of plants in the world. o To cooperate in group activities. To respect the class group. o To raise awareness of personal behaviour to protect our ecosystems.	o Pupils identify human actions that contribute to protect ecosystems and relate them to their personal experience. o Pupils understand the importance of plants in the world. o Pupils cooperate in group activities. o Pupils respect the class group.

COMMUNICATION

Language of learning:

- o Academic vocabulary: conifers, corolla, ferns, flowers, leaves, non-flowering, ovules, petals, pistil, pollen, roots, spores, stamens, stem, bud, fertilisation, fruit, pollination, seed.
- o Connectors: reason and cause, succession, result, order, compare and contrast and difference and differentiate.
- o Parts of an observation: planning, hypothesis, result, conclusions and feedback.

Language for learning:

- o Students need the language to explain and expose their observation. *(As we can see here…At first we saw…After several days…)*
- o Summarize what happen during the observation, what changes were done and if they expected it. *(In a few days we could observe… We thought it…Our hypothesis was…The final result is…)*
- o *Demonstrate the changes by identifying the new parts of the plant. (When we started the plant was…After x days, the plant is…We can differentiate…)*
- o *Classroom language*

Language through learning:

- o Language through activities, videos, reading, teamwork.
- o Language through peer interaction and project observation of the plant.

ASSESMMENT

Evaluation criteria:

1. Explain what a plant is and identify its parts.
2. Recognize the differences of the two types of reproduction.
3. Describe the stages of photosynthesis.
4. Take notes and explain of the growing process
5. Understand the importance of plants in the world.

Minimum required:

1. Explain the characteristics of plants.
2. Describe the vital functions of plants.

Assessment:

1. **Formative Assessment:**
   o Observation of the group work using a checklist for active observation.
   o Verbal and written Feedback of each activity done in class using random selection tools, mini-whiteboards and exit slips.
   o Peer assessment checklist to assess the notes.
   o The observation of the plant will be assessed with a rubric.

2. **Summative Assessment:**
   o Unit test.

ATTENTION TO DIVERSITY

Multimodal Input: The content of the unit will be presented in different ways throughout the sessions to ensure that all students engage and learn it.

   o Different kind of plants with and without flowers for the students to explore them and observe how they are before starting to explain in detail each one of them.
   o A reading and a video to describe the characteristics.
   o A visual organizer to compare the groups.
   o Posters with the groups of plants.
   o A presentation including a summary of the content studied to be used as a model.

LOTS: Illustrate a mural from the observation of the plant once it has grown.

HOTS: Plant different kind of seeds and observe how they grow and what their differences are.

Attention deficit hyperactivity disorder (ADHD):

In this unit the self-instruction (what/how/when/ do I have to do?) is done through group work, role-playing, feedback, and especially the modelling of the teacher and also of the peers.

The student that present this disorder will help the teacher plant the seeds for the final product and make the necessary photos to record the changes.

3.2. Second Term. My Body

3.2.1. UNIT 4. Circulatory and Respiratory System

DIDACTIC UNIT 4: CIRCULATORY AND RESPIRATORY SYSTEM

CONTENT AREA: NATURAL SCIENCE / MY BODY

Level: Year 4

Timing: 8 sessions during the first semester over 4 weeks.

Description: Students understand the process of both systems to create an analogical model of one of them.

Product: Analogical model of circulatory or respiratory system with recycled materials.

Rationale: The aim of this fifth didactic unit is for students to learn the differences between the circulatory and respiratory systems, their functioning and their parts. Also, give awareness of the human body, the knowledge and care of it and learn to value it.

CONTENT

Content	Contribution to key competences
o Respiratory system. o Parts and organs of the respiratory system. o Circulatory system. o Parts and organs of the circulatory system. o Process of the circulatory system. o Illustration of a comic. o Creation of a model of circulatory or respiratory system.	o Initiation to scientific activity. o Use of diverse sources of information. o Study and work techniques. o Development of work habits. o Effort and responsibility. o Use of information and communication technologies to search for and select information, simulate processes and present conclusions. o Planning and implementation of projects and presentation of reports.

COGNITION	
Teaching Objectives o To know the vital functions of human body. o To know the principal characteristics of the respiratory system and its functions. o To understand the principals characteristics of the circulatory system. o To create a comic o To create and explain a model of the circulatory or respiratory system.	**Learning Outcomes** 1. Pupils identify the vital functions of human body. 2. Pupils name the principal characteristics of the respiratory system. 3. Pupils explain the functions of the respiratory system. 4. Pupils recognize and classify the principals characteristics of the circulatory system. 5. Pupils illustrate a comic of how the circulatory system works. 6. Pupils describe the meaning of the circulatory system. 7. Pupils create a model of the circulatory or respiratory system and prepare a presentation to explain them.
CULTURE	
Teaching Objectives o To respect for the opinions of all classmates. o To develop interest in the knowledge of our body and how it works.	**Learning Outcomes** o Pupils respect for the opinions of all colleagues. o Pupils search information on their own about particular functions and/or features of our body.

COMMUNICATION		
LANGUAGE OF LEARNING	**LANGUAGE FOR LEARNING**	**LANGUAGE THROUGH LEARNING**
o **Academic vocabulary:** arteries, capillaries, clot, plasma, platelets, red cells, veins, white cells, carbon dioxide, heart, lung, oxygen, alveoli, diaphragm. o **Connectors:** *comparison* (similarly, likewise, equally, as with) *contrast* (however, even so, though, instead) *cause and effect* (because, as a result of, therefore)	o **Language to make questions to a doctor:** (why do you became a doctor?… How does our body work? Why does my stomach hurt?) o **Language to explain their analogical model:** *(The circulatory/respiratory system has…we have done it with…)* o **Language to verify the utility of their creation and compare it to other models:** *(comparatives and superlatives, is… than, as well as…)* o **Language to summarize the process of making it and list the materials they have use:** *(I have made it with… after that….finally…)*	o Language through activities, videos, ICT. o Language through peer interaction. o Language through project preparation and presentation. o Language through making the analogical model.

	ACTIVITIES	

Session 1: *Out-of-school activity / 2 hours*

TIMING	ACTIVITIES	GROUPING/ SPACES
15 minutes /Activation activity.	**Preparing for the excursion.** Before the class goes to the medical centre to talk with a doctor about how our body works, the teacher reminds the students the rules they need to follow being out of the school. Also, the teacher asks the students to think about the questions they want to ask the doctor and write them down on their KWL chart. SCAFFOLDING: •Glossary: body parts, systems, verbs to describe functions, parts of the systems. •To make the questions the teacher writes on the bb: How does….work? What are the main parts of ….? Why is the…responsible for…? How many…are there in…? When…? Which…?	As a whole-class.
1-2 hours	**Talking to a doctor.** Once the class arrives to the medical centre, a doctor takes them to a conference room where he or she is going to talk to the class about our body, in particular how the respiratory and circulatory systems work. During the lecture, students need to take notes about words they do not understand and any questions they have. And when the doctor has finished ask some questions to fill in the L column of the KWL chart.	As a whole-class.

	The teacher will talk about them later in the next session. With this out-of-class activity the students get an external input about what they are going to learn in the next sessions. SCAFFOLDING: students use the KWL chart to make the questions to the doctor using the sentence cards with model questions.	
5 minutes	**Looking for more information at home.** Before leaving the medical centre and going back to the school, the teacher tell the students to look for more information about circulatory and respiratory system at home and take note of any more questions they have for the next class. During the unit, students are offered to read *"A tour of your: Circulatory System"*	Individually

Session 2: *"How our body works" /* **50 minutes**

TIMING	ACTIVITIES	GROUPING/ SPACES
10 minutes Activation	**Talking about the last session.** After going to the medical centre, the teacher asks the students what they liked the most about the lecture and if they have any questions. The teacher shows a picture of our body[2] and asks the students if they can name the three life processes of all living things. With this questions review the last 3 units about living things.	As a whole-class.

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[2] See Appendix 6.4.1

	SCAFFOLDING: three word-cards with the words nutrition, interaction and reproduction will be placed on the CALP poster on the wall.	
25 minutes	**Our body systems** Once they remember about nutrition, interaction and reproduction. The teacher ask: - *What do you understand by body systems? Do you know any?* The teacher accepts all answers on the mini-whiteboards. The students watch a video[3] about body systems. After that, they have to talk in groups, choose one system and discuss why it is important and what the video tells about it. SCAFFOLDING: While they are discussing in groups, the teacher shows a picture[4] on the digital board of all systems to help the students remember them and they can use the glossary.	As a whole-class. In groups.
15 minutes	**Presenting a body system** After a few minutes discussing about a body system and taking notes of 2 o 3 hits on why it is important and how it works, each group has to expose to the class the body system they have chosen. With this activity, the students will review those body systems they have learnt in previous years and know the new ones.	In pairs.

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[3] See Material and Resources
[4] See Appendix 6.4.1

Session 3: "*The circulatory system*" / 50 minutes

TIMING	ACTIVITIES	GROUPING/ SPACES
10 minutes	**Watching through a microscope** To start with the circulatory system, students and teacher will go to the science laboratory. There the teacher has a microscope with some blood on it. The teacher asks the students to see through the microscope and try to guess what they are seeing. SCAFFOLDING: The teacher shows a diagram of blood and its labels on the CALP poster on the wall.	As a whole-class. Science laboratory.
15 minutes	**Circulatory system** The teacher accepts all answer and write them on the board. After that the teacher will explain that they have seen blood and will ask: 1. *Why do we have blood?* 2. *Why do we need it?* 3. *What system does blood belong to?* The teacher gets feedback of every question using the mini-whiteboards and then, explains that blood is part of the circulatory system. Then the teacher asks: 3. *What else we can find on the circulatory system?* SCAFFOLDING: On the board the teacher writes: heart, veins, arteries, capillaries. The language assistant say each word and the students need to repeat	As a whole-class on the science lab.

	so they practise saying them. Highlight these words on the glossary.[5]	
25 minutes	**Who are you?** To check understating of the new words, the teacher divides the class into five groups and give S a word to each group: heart, arteries, veins capillaries and blood. The groups has to collect information with their laptops and prepare a small presentation for the rest of the class SCAFFOLDING: Students have to look for the location, function and importance of those words given. They can look for the information in the website[6]	In groups.

Session 4: *"How does the circulatory system work"* **/ 50 minutes**

TIMING	ACTIVITIES	GROUPING/ SPACES
10 minutes	**Watching a video of the CS** Before starting with the new lesson, the teacher reviews the last session asking the students the new words we learnt and which system they are learning. Students watch an introductory video[7] about it. They are going to watch it a second time taking notes about what it talks about.	As a whole-class.
10 minutes	The teacher will check understating of the new concepts by reading out some descriptions about how topics on the circulatory system[8] and the students have	Individually.

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[5] See Appendix 6.4.1
[6] See Materials and Resources
[7] See Materials and Resources
[8] See Appendix 6.4.1

	1 minute to write on their mini whiteboards the answer. Check the answer with the students once they have raised their whiteboards.	
20 minutes	**Checking the heartbeat** For this activity, teacher and students will go to the playground to check that our heartbeat changes after doing exercise. First, students need to know where to find the heartbeat so the teacher will do it and show how to put their finger on their neck. Once the students have found their heartbeat, they will count the beats during 1 minute. After that minute, each student writes how many they have had on a writing frame (done by the teacher) After this, the teacher tells the students to start running for 3 minutes. After that time, they have to stop, find their heartbeat and notice how much it has raised. They will take note of it and see the differences between being calm and after doing exercise. SCAFFOLDING: They have to complete a writing frame.	As a whole-class. On the playground.
10 minutes	**Discussion** After checking out heartbeats, in class, teacher and students discuss what happens before and after doing exercise. Students have to think other situations during the day and how they circulatory system works. For example, sleeping, doing the homework, dancing… SCAFFOLDING: students use as a model the notes they write in class.	As a whole-class.

TIMING	ACTIVITIES	GROUPING/ SPACES

Session 5: *"What happens to the blood when out heart beats?"* / 50 minutes

TIMING	ACTIVITIES	GROUPING/ SPACES
10 minutes	**Reviewing what we know about the circulatory system.** Teacher asks the students to tell what we have learned so far. They have to give some facts about the circulatory system. SCAFFOLDING: The students have to answer to these questions: 1. *What is the circulatory system?* 2. *What is the function of the heart ?*	As a whole-class.
40 minutes	**Making a comic** During the unit, students are offered to read *"A tour of your: Circulatory System"* In this session, teacher and students will talk about the book and make some comprehension questions to see if the students are understanding the book. The book is a comic about how blood cells go through our body form the heart to the rest of our body. The teacher asks the students to make their own comic where they have to write how a blood cells go from the heart to another organ and comes back to the heart. Extra idea: For those students that finish the comic they can fill a flowchart diagram[9] about the process the blood cells from the heart to the lungs to oxygenate the blood.	In pairs. As a whole-class.

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[9] See Appendix 6.4.1

| | SCAFFOLDING: Some students can do this activity on a worksheet including the steps they have to write and draw in order to make the comic. | |

Session 6: *"Respiratory system"* / **50 minutes**

TIMING	ACTIVITIES	GROUPING/ SPACES
10 minutes	**The respiratory system** To introduce this new concept, the teacher will ask the student about breathing and what the organs they think are involved in this system. Students will watch an introductory video[10] about respiratory system. SCAFFOLDING: before watching the video, Ss highlight the words connected to this system on the glossary. Then, while watching they have to tick them as many times as they appear. Who is the winner?	As a whole-class.
15 minutes	**Respiratory system.** After watching the video a second time, the teacher asks some questions to check comprehension: 1. *What are the different parts of the respiratory system?* 2. *What organs are involved?* 3. *What happens on the alveoli?*	As a whole-class and individually.

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[10] See Materials and Resources.

	The teacher accepts all answers and checks them writing them down on the board. Students take notes on their notebooks.	
15 minutes	**How long can I hold my breathe?** Students hold their breathe. The teacher guides them on when to inhale, hold the air and exhale. After this activity, in pairs, they discuss the next questions and write the answers. 1. *What takes longer, breathing in or out?* 2. *Do you prefer to breathe through your nose or mouth?* 3. *Do you do this activity to calm down when you are upset?* The teacher checks the answers all together using thumbs up/down. SCAFFOLDING: To help the students the teacher shows a picture with the three steps written: inhale, hold, exhale.	As a whole-class.
10 minutes	**Quiz! Check your learning** In the last 10 minutes of the session, the students can make a quiz[11] on their laptops to identify different parts of the respiratory system. After the quiz, the students check the answers with other pairs.	In pairs.

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[11] See Materials and Resources

Session 7: *"Making our own system* **/ 50 minutes**		

TIMING	ACTIVITIES	GROUPING/ SPACES
10 minutes	**Observing analogical models** In this sessions students have to make an analogical model of one of the systems studied. The teacher explains that they can choose the materials they want to use for this session, they go to the Arts and Craft class where they have bigger tables and more space. Before starting, the teacher shows a model[12] so they have some help to know how to start. SCAFFOLDING: to ensure the interaction in the L2 the teacher will display these word cards with images: arteries, capillaries, clot, plasma, platelets, red cells, veins, white cells, carbon dioxide, heart, lung, oxygen, alveoli, diaphragm.	As a whole-class.
40 minutes	**Making an analogical model** In groups of 4 students, they have to choose one system and build a model with materials. They can look on their notes to search where to put everything or look online[13].	In groups.

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[12] See Appendix 6.4.1
[13] See Materials and Resources

	Session 8: *"Our project"* / 50 minutes	

TIMING	ACTIVITIES	GROUPING/ SPACES
20 minutes	**Preparing the presentation** The students have 20 minutes to prepare what are they going to say in their presentations. They have to explain how they have done it and what materials they have used. Also, they have to talk about the system, how it works and why is important. SCAFFOLDING: Ss are given a ppt with the structure of the presentation and the headings on the slides: 1. Which system you have done 2. How it works 3. The parts of the system 4. What they have learnt doing it	In groups.
25 minutes	**Presentations.** In turns, each groups is going to present (PS) their models. The other groups are going to evaluate[14] them using a checklist and make questions at the end. Also, they have to give feedback to the group. SCAFFOLDING: students can give the feedback using the descriptors of the peer-assessment checklist.	In groups.
5 minutes	**Self-assessment** The teacher will give some time to the students for self-assessment[15] using a checklist with some questions. They have to read some statements and draw a happy face if they know it or sad face if they need to revise it again.	Individually.

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[14] See Appendix 6.4.1
[15] See Appendix 6.4.1

	Before starting the teacher has to make sure the students understand all the statement and what they have to do.	

MATERIAL AND RESOURCES

Human resources:

o Natural Science Teacher, students of year 4 and L2 teacher.

o Help of families to encourage students to learn every day.

o Doctor at the medical centre.

Material resources (All the material needed is in Appendix 6.4.1):

o Worksheet and writing frames.

o Scaffolding: picture of the body systems, glossary, flowchart diagram fill by the students, image on how to breathe, example of projects on both systems, final presentation.

o Materials for specific activities: word cards, glue, scissors, pencils, paper, markers

Digital resources

o Video about body systems: https://youtu.be/8fG5Pxr9ZQ0

o Video about circulatory system: https://youtu.be/tg_ObDJEaGo

o Video about respiratory system: https://youtu.be/mOKmjYwfDGU

o Quiz: https://online.seterra.com/en-an/vgp/3831

o ICT resources like laptops to look for information and digital board to see some picture of examples for activities: https://kidshealth.org/en/teens/heart.html

o Ppt presentations

ASSESMMENT

Evaluation criteria:

o Explain the respiratory and circulatory systems and how they work.

o Name the organs involved in the respiratory and circulatory systems.

Minimum required:

- o Name the organs implicated on both systems and their characteristics.

Assessment:

1. **Formative Assessment**

   - o Observation of the group work using a checklist[16] for active observation.
   - o Verbal and written Feedback of each activity done in class using mini-whiteboards and thumbs up/down.
   - o Peer assessment checklist[17] to assess the presentations.
   - o Self-assessment checklist.[18]

2. **Summative Assessment:**

   - o The analogical model will be assessed by the teacher and the language assistant with a rubric. [19]

ATTENTION TO DIVERSITY

Multimodal Input: The content of the unit will be presented in different ways throughout the sessions to ensure that all students engage and learn it.

- o Videos to describe the characteristics of the topic learnt (See Materials and Resources)
- o An image of our body (See Appendix 6.4.1)
- o Doctor in L1
- o Diagrams
- o Storytelling (using a book to present the content)
- o 3D analogical models

LOTS: Make an illustration of how one of the systems works.

HOTS: Investigate on the effects of smoking on the respiratory system and how our lungs suffer and change.

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[16] See Appendix 6.4.1

[17] See Appendix 6.4.1

[18] See Appendix 6.4.1

[19] See Appendix 6.4.1

Attention deficit hyperactivity disorder (ADHD):

In this unit the self-instruction (what/how/when/ do I have to do?) is done through group work, role-playing, feedback, and in particular, the modelling of the teacher and also of the peers.

For this particular student will:

1. Provide qualitative feedback. Avoid scoring numerically but by achievements, using rubrics and checklists.
2. The assessment needs to be informed in advance. Avoid setting several exams in the same week.

3.2.2. UNIT 5. Reproductive System

DIDACTIC UNIT 5: REPRODUCTIVE SYSTEM

CONTENT AREA: NATURAL SCIENCE / MY BODY

Level: Year 4

Timing: 7 sessions during the first semester over 4 weeks.

Description: Students recognize the process of fertilization and embryonic development to create a mural with the stages of pregnancy.

Product: Design and illustrate a mural about the stages of pregnancy.

Rationale: With this didactic unit the students will know and experiment about the female and male reproductive system. At the same time, they will become aware of the processes of fertilization, embryonic development and human birth.

CONTENT	
Content	**Contribution to key competences**
o Physical differences and similarities between woman and man.	o Initiation to scientific activity.
o Reproduction. The reproductive system.	o Study and work techniques.
o Male and female reproductive organs.	o Development of work habits.
o Fertilization and embryonic development.	o Effort and responsibility.
o Birth.	o Planning and implementation of projects and presentation of reports.
o A video explaining their family tree and showing their family.	

COGNITION	
Teaching Objectives o To understand the main physical differences and similarities between male and female and know the characteristics of their reproductive systems. o To create a mural of the stages of pregnancy. o To investigate at home about their family and illustrate a family tree.	**Learning Outcomes** 1. Pupils identify the main characteristics of the reproductive system in women and men. 2. Pupils explain fertilization, embryonic development and childbirth. 3. Pupils make a mural of the phases of pregnancy. 4. Pupils distinguish how each reproductive system works. 5. Pupils investigate with the help of the parents about their past and design a family tree. 6. Pupils prepare a presentation using Power Point to show their family tree.
CULTURE	
Teaching Objectives o To respect the opinions of all classmates. o To show respect for the differences between the two reproductive systems. o To develop interest in the knowledge of human reproduction problems.	**Learning Outcomes** o Pupils respect the opinions of all colleagues. o Pupils accept the differences between the two reproductive systems. o Pupils show interest in problems related to human reproduction such as adopted children.

COMMUNICATION

Language of learning:

o Academic vocabulary: embryo, fallopian tubes, ovaries, penis, testicles, umbilical cord, urethra, uterus, vagina, reproductive, male, female, fertilization, birth, family, fertilised egg, new-born.

o Connectors: reason and cause, succession, result, order, compare and contrast and difference and differentiate.

o Parts of a presentation: table of contents, information, conclusion and the slides and headings.

Language for learning:

o Language to explain their analogical model and family tree: *(The reproductive system has…we have done it with…We are x in my family…My grandfather…)*

o Language to verify the utility of their creation and compare it to other models: *(comparatives and superlatives, is… than, as well as…)*

o Language to summarize the process of making it and list the materials they have use: *(I have made it with… after that….finally…)*

o Classroom language

Language through learning:

o Language through activities.

o Language through peer interaction.

o Language through project preparation and presentation.

o Language through making the analogical model.

o Language thought investigating their family tree.

ASSESMMENT

Evaluation criteria:

1. Identify and locate the main organs involved in human reproduction.
2. Understand the functioning of the male and female reproductive system.

3. Distinguish both reproductive systems.

4. Create a mural of the different phases of pregnancy.

5. Identify the most important ideas of fertilization and childbirth.

6. Present the information found about their family tree.

Minimum required:

1. Identify and locate the main organs involved in carrying out the vital functions of the human body, establishing some key relations between them.

2. Understand the functioning of the male and female reproductive system.

Assessment:

1. **Formative Assessment:**
   - Observation of the group work using a checklist for active observation.
   - Verbal and written feedback of each activity done in class using random selection tool and mini-whiteboards.
   - Peer assessment checklist to assess the presentation.
   - The analogical model will be assessed by the teacher individually and with a rubric.

2. **Summative Assessment:**
   - Unit test.

ATTENTION TO DIVERSITY

Multimodal Input: The content of the unit will be presented in different ways throughout the sessions to ensure that all students engage and learn it.

   - A reading and a video to describe the characteristics of the topics of the unit.
   - A visual organizer to compare each reproductive system.
   - A presentation including a summary of the family tree.

LOTS: Label a model of a reproductive system.

HOTS: Investigate about a member of the family (grandparent) about their past and how the society has changed in every aspect: work, school, entertainment.

Attention deficit hyperactivity disorder (ADHD):

In this unit the self-instruction (what/how/when/ do I have to do?) is done through group work, role-playing, feedback, and especially the modelling of the teacher and also of the peers.

Some of the measures are:

- Understand and help the student to have a positive relationship between pupil-teacher.
- Involve and encourage the student to talk.
- Show interest when working at your table, approach the student's table regularly and ask him if he has any doubts or needs support.
- Encourage him regularly to keep working.
- Ask him regularly, to go out to the blackboard, improving his attention, and motivation and to better know his evolution.

3.2.3. UNIT 6. Healthy Lifestyle

DIDACTIC UNIT 6:
HEALTHY LIFESTYLE

CONTENT AREA: NATURAL SCIENCE / MY BODY

Level: Year 4

Timing: 7 sessions during the second semester over 4 weeks.

Description: Students understand the importance of a healthy style and actively inform about it to the school.

Product: Create a booklet on drugs and alcohol and present it at the school assembly.

Rationale: The aim of his unit is to learn the difference between health and disease, and the prevention of disease by having healthy habits.

CONTENT	
Content	**Contribution to key competences**
o Healthy habits o Medicine o Disseises that affect our body. o Prevention of illness o Alcohol and drugs. o Booklet on drugs and alcohol.	o Initiation to scientific activity. o Use of diverse sources of information. o Development of work habits. o Effort and responsibility. o Planning and implementation of projects and presentation of reports.
COGNITION	
Teaching Objectives	**Learning Outcomes**
o To know healthy lifestyles and their effects on the body systems. o To be aware of healthy habits to prevent disease such as hygiene, care and rest habits.	1. Pupils recognise healthy lifestyles and their effects on the body systems. 2. Pupils identify healthy habits to prevent disease. 3. Pupils identify and adopt hygiene, care and rest habits.

o To understand some treatments to illnesses. o To recognise the effects of alcohol and drugs. o To write a booklet on drugs and alcohol consumption and print it to be distributed at school.	4. Pupils identify and describe some treatments to illnesses. 5. Pupils analyse and describe the effects of alcohol and drugs. 6. Pupils create a booklet and prepare a presentation to raise awareness to the school.

CULTURE

Teaching Objectives	**Learning Outcomes**
o To be aware of the physical and mental care of the human body. o To accept the diversity of opinions on the same subject.	o Pupils distinguish the difference between physical and mental care of the human body. o Pupils are tolerant towards other's opinions on the same subject.

COMMUNICATION

LANGUAGE OF LEARNING	**LANGUAGE FOR LEARNING**	**LANGUAGE THROUGH LEARNING**
o **Academic vocabulary:** aching, cold, cough, flu, pain, sneeze, virus, bacteria, carbohydrates, fats, minerals, vitamins, protein, nutrients, first aid, antibiotics, penicillin, vaccination, drugs, illegal, lungs, smoking, alcohol.	o **Language to present the content learn on healthy habits** (this graph shows you…, as you can see…, from this we can understand…) o **Language to explain the result of an observation.** (We have observed… At	o Language through activities o Language through peer interaction. o Language through project preparation and booklet presentation.

o **Connectors:** *comparison* (similarly, likewise, equally, as with) *contrast* (however, even so, though, instead) *cause and effect* (because, as a result of, therefore)	first, we thought it would…. Finally, it was…)	

ACTIVITIES

Session 1: *Introduction* / 50 minutes

TIMING	ACTIVITIES	GROUPING/ SPACES
15 minutes	**Brainstorm of ideas on healthy life** To start the unit, we ask the students to put into 4 groups and we give them 10 minutes to think about all the illnesses they can name in English. After giving them time to think, the teacher goes through their suggestions and writes a list on the board. With this activity the teacher knows the previous knowledge of the students about the topic SCAFFOLDING: word cards with the name of illnesses in English and Google translator to check the meaning in Spanish.	4 groups. Inside the class.

20 minutes	**Looking for illnesses**	In pairs and
	Students see the picture[20] of illnesses and the teacher asks them: *What is wrong with these children?* To answer, the students will be looking at the picture and trying to identify what is worn with each children. Each one of them is sick with a different virus. In the end, both of them will have discover all the illnesses on the picture. Whole group checking answers.	as a whole-class.
	Extra time: If they finish earlier, give the students a couple more minutes to look again to the picture. Then close the book and have a quiz: *Is the person with the broken arm a girl or a boy? What colour hair has the mum with the boy with lice?* SCAFFOLDING: as poster with bubbles to model the interaction including the following language.	
	- Look at this kid. What is wrong with him? - It looks like he has fever. And this girl? - This girl has her arm broken. Why does this kid have red dot in his face?	
10 minutes	**Checking understanding of new words**	Individually.
	The teacher writes some symptoms on the board and some illnesses[21]. The language assistant reads through all the symptoms to check understanding of all the new words. For this they will use the digital board with a game. They have to guess which word is an illness and which one is not. After that, the LA will say the illnesses and ask them to act them out to reinforce the learning.	

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[20] See Appendix 6.4.2
[21] See Appendix 6.4.2

	Once the students understand the new vocabulary, they can create a glossary with the new words. They work individually matching the symptoms to their illnesses in their mini white- boards. Once all the class has finished, the teacher check the answers as a class rising the boards.	
5 minutes	**Making a mind map.** The teacher gives the last 5 minutes to the students to copy a mind map[22] of things students can do every day to prevent illnesses on the notebooks and encourage them to keep adding illnesses as they progress through the unit.	Individually.

Session 2: *"Healthy eating" / 50 minutes*

TIMING	ACTIVITIES	GROUPING/ SPACES
15 minutes	**Classifying healthy and unhealthy food** The teacher shows the flashcards of food and ask the students to classify them into healthy and unhealthy and also ask them why they made that choice[23] The T also can know the previous knowledge of the student.	As a whole-class.
20 minutes	**Learning about nutrients** In their notebooks, after reading about each group of nutrients, students answer the following questions: 1. *What kind of food contains each one of them?* 2. *Why are they good for us?*	In pairs. As a whole-class.

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[22] See Appendix 6.4.2
[23] See Appendix 6.4.2

	3. *How often should we eat them? Daily? Weekly?* Whole-group checking answers . The LA reads the name of some food aloud and using the random selection sticks asks students to come to the bb and write the name of that food under the correct heading. SCAFFOLDING: students write the name of the food on the bb and the classmates check the spelling looking at the LA's cards. If there is any mistake, they can spell it to the student until the writing is correct.	
15 minutes	**Making a healthy menu** The teacher encourage the students to discuss different types of healthy food they know. The LA says the name of different food and asks them if they think it is healthy or not. Students will work in pairs to design a healthy menu for a day, including breakfast, mid-morning snack, lunch, snack and dinner[24]. SCAFFOLDING: Students have a model with the headings to know how to write their own one.	In pairs.

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[24] See Appendix 6.4.2

Session 3: "*Healthy lifestyle*" / 50 minutes		
TIMING	**ACTIVITIES**	**GROUPING/ SPACES**
5 minutes	**Do I have a healthy lifestyle?** To start this session the teacher will ask some questions to the students about their lifestyle and if they have a healthy lifestyle. *What is important about doing exercise?* *How many hours do you sleep? Do you think you should sleep more?* Whole-class checking answers.	As a whole-class.
15 minutes	**Exercise, Technology and Sleep time.** In groups of 3, the students read the boxes about exercise[25] about exercise, screen time and sleep. Each group reads one box. Then they take turns to explain what they have read to the rest of the group. Once each group has read the 3 boxes, the teacher will write on the board 3 headings: Exercise, Technology and Sleep. Under each one of them, using the sticks and picking one student to write the main important things they have read about them. Adding any extra information, they think is relevant. SCAFFOLDING: the LA helps students to highlight the important information on each box before the go to the bb to write it under each heading.	In groups, as a whole-class.

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[25] See Appendix 6.4.2

30 minutes	**How much do I sleep during one day?**	Individually.
	The students will read about sleeping and dreaming[26]. After reading, they have to answer some questions about it and investigate about how much do their favourite animal sleep.	
	SCAFFOLDING: Ss search for the answers on the reading highlight the evidence to the answer. For the investigation they have to write down the hypothesis, after that the result of how many hours they sleep every day and finally the conclusion comparing both result and hypothesis.	

Session 4: *"Medicine"* / 50 minutes

TIMING	**ACTIVITIES**	**GROUPING/ SPACES**
10 minutes	**Asking questions about medicine**	Small groups
	The teacher arrange the students in groups and ask them to discuss about what medical treatments they have had. If they have be hospitalized, had an X-Ray… The teacher ask some questions:	
	o *Where did you go when you were feeling sick?*	
	o *How did the doctor know what happened to you?*	
	o *Did you remember having a vaccination? Why did we need it for? Who discovered them?*	
	o *When did you think the X-Ray machine was invented?*	
	The teacher wrote all their suggestions on the board and checks the answer with the whole class.	

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[26] See Appendix 6.4.2

20 minutes	**What should we eat each day?** In their notebooks, after reading about each group of nutrients, students answer the following questions: 1. *What kind of food contains each one of them?* 2. *Why are they good for us?* 3. *How much should we eat them? Daily? Weekly?* The teacher check with the class. After that, the teacher writes on the board the food groups as heading and call out a food. The teacher with the sticks picks up some students to come to the board.	In pairs. As a whole-class.
15 minutes	Students look for information[27] about inventions that helped medicine. For this students in pairs will search for it and write down the one they like the most.	In pairs.

Session 5: *"Drugs and alcohol"* / 50 minutes

TIMING	ACTIVITIES	GROUPING/ SPACES
10 minutes	**Brainstorm about drugs and alcohol** The teacher asked some questions about the topic: 3. *What are dugs? And alcohol?* 4. *Do you know if drugs are good or bad for out body?* After asking some questions we can play "Hands Up" The teacher asked some more questions and the	As a whole-class.

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[27] See Materials and Resources

	students have to raise their hands if it is true. For example:
	
	    1. Have you seen someone drinking alcohol?
	    2. Have you seen someone smoking cigarettes?
	    3. Do you think are there legal and illegal drugs?
	
	With this activity the teacher knows the previous knowledge of the students and adapt the lesson according to it.	

20 minutes	**Are there any good or bad drugs?**
	The students, in pairs, read some information about the topics[28]. In their notebooks, after reading about each group (drugs, cigarettes and alcohol) answer the questions:
	
	    1. It is good to take some kind of drugs? When is good? When is bad?
	    2. Why is smoking dangerous? What system gets involve in it?
	    3. Why is alcohol dangerous? Where we can find it?
	
	<u>Extra activity:</u> for those who finish earlier, they can research on internet about the damage of cigarettes on the body.
		In pairs. As a class.

20 minutes	**Making a booklet about drugs and alcohol.** In small groups, students make a booklet about drugs and alcohol. Preventing their use and warning about their damage. They will use information from the internet.	Small groups.

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[28] See Appendix 6.4.2

| | SCAFFOLDING: The teacher give them an example[29] to look at it. For the language, the teacher will show some flashcards with the words they need to use. | |

Session 6: *"Eat me or don't eat me"* **/ 50 minutes**

TIMING	ACTIVITIES	GROUPING/ SPACES
10 minutes	**Processed food** Before starting, the teacher will talk with student about processed food and fresh food, so they know the differences. They have to talk about how the food in packed in factories and how sometimes sugar, salt or fat is added. We can know what ingredients are in each food reading the food label. SCAFFOLDING: Before starting, students will see some models of food labels.	As a whole-class.
20 minutes	**Making a poster about food labels** In groups and they have the correspondent materials (card, food label, glue and scissors). Each group will make a poster explaining using food labels which ones are good and we should eat them and which not. They will have time to look at the labels and choose where to put the labels. SCAFFOLDING: Students look for information and follow the instructions given[30].	Groups.

TIMING	ACTIVITIES	GROUPING/ SPACES
20 minutes	**Look at my poster** In the last 10 minutes, the teacher will give some time to the students to practice presenting their posters. After 5 minutes preparing who is going to say each part of the poster, they present it taking turns. Teacher will assess the presentation with a checklist assessing language and content, body language and expression.	Groups.

Session 7: *"What we have learnt"* / **50 minutes**

TIMING	ACTIVITIES	GROUPING/ SPACES
10 minutes	**Reviewing what we have seen.** The teacher gives some minutes to students to review the concepts from the previous classes.	As a whole-class.
30 minutes	**Complete the mind map** The teacher will hand out final activities[31] that summarise what they have learnt. Before that, students will finish the mind map they started at the beginning of the didactic unit. The teacher will use this time to observe those students that need more help and those who have really understood the exercises.	Individually.
10 minutes	**Self-assessment** In the last 10 minutes, the teacher will give some time to the students for self-assessment[32]. They have to	Individually.

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[31] See Appendix 6.4.2
[32] See Appendix 6.4.2

	read some statements and draw a happy face if they know it or sad face if they need to revise it again. Before starting the teacher has to make sure the students understand all the statements and what they have to do. Every answer is valid and individual.	

Session 8: *"Final test / 50 minutes*

TIMING	ACTIVITIES	GROUPING/ SPACES
5 minutes	**Looking at the unit test** Before starting the final test, the teacher makes sure the students understand all the questions of the test.	As a whole-class.
45 minutes	**Unit Test** Students have 45 minutes to do the final test[33] of the didactic unit. For those who finish earlier they have a reinforcement activity.[34]	Individually

MATERIALS AND RESOURCES

Human resources:

o Natural Science Teacher, students of year 4 and language assistant.

Material resources:

o Activities given by the teacher taken from various syllabus. (See Appendix 6.4.2)

o Scaffolding: Glossary, mind map, model of both posters and final production.

o Materials for specific activities: card, food labels, glue, scissors, pencils, paper, markers.

o Reinforcement and extension activities for those students that want to continue working at home.

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[33] See Appendix 6.4.2
[34] See Appendix 6.4.2

Digital resources

- o Laptops to look for information.
- o Digital board to see some picture of examples for activities and do some activities.
- o Inventions on medicine: https://interestingengineering.com/10-medical-inventions-of-all-time-that-changed-the-world
- o Drugs: https://kidshealth.org/en/kids/know-drugs.html

ASSESMMENT

Evaluation criteria:

1. Relate certain lifestyles to the proper functioning of the body, recognise the need to adopt healthy lifestyles.
2. Presentation on food labels and menus.
3. Understand the damage of alcohol and drugs on our body.

Minimum required:

1. Name the illnesses related to the respiratory system and circulatory.
2. Identify the effects of drugs and alcohol.

Assessment (See Appendix 6.4.2):

1. **Formative Assessment:**
   - o Observation of the group work using a checklist for active observation.
   - o Verbal and written Feedback of each activity done in class using random selection tools, mini-whiteboards and exit slips.
   - o Peer assessment checklist to assess the presentations (See Appendix 6.4.2)
   - o Self-assessment checklist (See Appendix 6.4.2)

2. **Summative Assessment:**
   - o Unit test.

ATTENTION TO DIVERSITY

Multimodal Input: The content of the unit will be presented in different ways throughout the sessions to ensure that all students engage and learn it (See Appendix 6.4.2)

- o A picture of some of the common illnesses.
- o A visual organizer to compare the groups.
- o Posters with the groups of healthy lifestyles.

LOTS: Choose a food label and explain what nutrients we can see in it and if we should eat it.

HOTS: Make a sleep study and discover how many hours does the student sleep[35].

Attention deficit hyperactivity disorder (ADHD):

In this unit the self-instruction (what/how/when/ do I have to do?) is done through group work, role-playing, feedback, and especially the modelling of the teacher and also of the peers.

Some ordinary measures necessary to attend these students are:

- The student must be placed as close as possible to the teacher.
- Tasks, are going to be very organized, short, graduated in difficulty and with simplified formats. Bloom taxonomy will be used to ensure the cognitive progression from LOTS to HOTS and to adapt the cognitive demand of any activity that requires it.

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[35] See Appendix 6.4.2

3.3. Third Term. Matter, Energy and Machines

3.3.1. UNIT 7. Matter

DIDACTIC UNIT 7: MATTER
CONTENT AREA: NATURAL SCIENCE / MATTER, ENERGY AND MACHINES **Level:** Year 4 **Timing:** 8 sessions during the third semester over 4 weeks. **Description:** Students understand the concept of matter to make a trivia with true/false cards about facts learnt in the sessions. **Product:** Research on the topics learnt in the sessions to create a trivia with true and false facts. **Rationale:** In this seventh didactic unit, students will learn about matter, its characteristics and properties. Also, they will review about recycling and why is highly necessary these days.

CONTENT	

Content
 	
   o Classification of materials
   o Mixtures and solutions
   o Changes in matter: solid, liquid and gas.
   o Thermal conductivity.
   o Research and advertisement.
	Contribution to key competences
	
	   o Initiation to scientific activity.
	   o Development of work habits.
	   o Effort and responsibility.
	   o Use of information and communication technologies to search for and select information, simulate processes and present conclusions.

COGNITION	
Teaching Objectives ○ To understand the concept of matter. ○ To know materials by their properties. ○ To be aware of the different states of matter. ○ To analyse recycling materials. ○ To create a Trivia about matter to assess the knowledge acquired throughout the DU.	**Learning Outcomes** 1. Pupils understand the concept of matter. 2. Pupils observe, identify and classify some materials by their properties. 3. Pupils recognize the different states of matter. 4. Pupils analyse recycling materials to use them every day. 5. Pupils create a Trivia and decide to write the questions and answers about the content studied to assess their learning about matter.
CULTURE	
Teaching Objectives ○ To appreciate the importance of chemistry in our daily life. ○ To accept the diversity of opinions on the same subject. ○ To show respect for speaking and active listening.	**Learning Outcomes** ○ Pupils realize the importance of chemistry in our daily life and give examples of it. ○ Pupils give and listen to opinions on the same subject in a tolerant manner. ○ Pupils use conventional rules for speaking and active listening.
COMMUNICATION	

LANGUAGE OF LEARNING	LANGUAGE FOR LEARNING	LANGUAGE THROUGH LEARNING
○ **Academic vocabulary:** Gas, liquid, mass, matter, solid, volume,	○ **Language to present the content learnt on matter** (this graph	○ Language through activities

| recycle, plastic, metal, wood, wool, atom, compound, hard, fragile, soft, tough, thermal conductor, thermal insulators, solution, mixture, chemical change,

o **Connectors:** *comparison* (similarly, likewise, equally, as with)

contrast (however, even so, though, instead)

cause and effect (because, as a result of, therefore) | shows you…, as you can see…, from this we can understand…)

o **Language to explain the result of a research** (The result of this research is… we wanted to look for… the aims is… I have learnt with this…)

o **Language to compare:** (long/short adjectives) (as… as) | o Language through peer interaction.
o Language through research and investigation. |

ACTIVITIES

Session 1: *Introduction* / 50 minutes

TIMING	ACTIVITIES	GROUPING/ SPACES
10 minutes	**What is matter?** The teacher shows some flashcards[36] of some objects. These objects are simple things they see every day. The teacher asks if they know what they are and if they know what they are made of. The teacher explains that	As a whole-class.

[36] See Appendix 6.4.3

	everything is made of matter. The teacher shows an introductory video[37] about matter.	
	To check understanding, the teachers asks some direct questions about the video and students have to answers with thumbs up and down.	
	SCAFFOLDING: The flashcards to present the new words. If necessary, the teacher will slow down the speed and include the subtitles in the video.	
15 minutes	**States of matter**	Individually and as a whole-class.
	Once the students know a little bit about matter and the three states, they will fill in a chart[38] writing some words that correspond to solid, liquid and gas under the correct heading. The students can add other words to the headings. Once they finish it, they correct the answer as a class.	
	SCAFFOLDING: Ss fill in a chart to help them know the process from one sate to the other.	
20 minutes	**Which one is heavier?**	Individually
	To differentiate between mass and volume, the teacher gives the students two different containers with some objects inside. They have to feel their weight without knowing what is inside. After that, the teacher asks what is similar and different about them making a Venn diagram[39] on the board to write the ideas of the students. The teacher explains that they have the same volume because it is same container but a different mass as each one of them has something different inside (feather, stones).	

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[37] See Materials and Resources

[38] See Appendix 6.4.3

[39] See Appendix 6.4.3

	In their notebooks they have to put them in order from the one with the biggest mass to the smallest. SCAFFOLDING: Ss use the Venn diagram to compare both objects using the word cards with the comparative and superlative forms of the adjectives they have to use in the comparisons.	

Session 2: *"What is matter?" /* **50 minutes**

TIMING	ACTIVITIES	GROUPING/ SPACES
10 minutes	**Brainstorm on atoms and molecules** The teacher writes the word atom and molecules on the board and asks the students if they know what it means. The teacher writes on the board any answer given. SCAFFOLDING: The teacher gives some time for the students to look for information about what atoms and molecules are on their laptops.	As a whole-class.
25 minutes	**Atoms made of students** Once they know what atoms and molecules are, the teacher will check understanding by making some questions. Ss have to answer using their mini-whiteboards. Then, after each question the T will write the correct answer on the bb. These are the questions: 1. *Difference between atoms and molecules?* 2. *How are atoms represented?* 3. *What is an element?* After that, the teacher asks the students to make groups of 3-4 students. They have to make molecules	As a whole-class, In groups.

	made of atoms and the students will be the atoms. Student in each group picks a letter of the periodic table of elements and together they have to make a molecule. The teacher gives some time to prepare. Once they have the molecule made, the entire group have to represent it to the class and the rest of the students have to guess which molecule is. SCAFFOLDING: the correct answers the T has written on the bb will serve as a model to describe the molecules.	
15 minutes	**Matter and properties** The teacher makes a word wall[40] with some words related to the unit. First, the students read them and check their understanding. Second, the language assistant reads them out loud to listen to a proper pronunciation of the word and the students repeat it. Finally, when the language assistant reads one of them, the students need to stand up if it's a property of matter or stay sitting down if it is a type of matter. With this activity the teacher can check is the students have understood the basic concepts of the unit. SCAFFOLDING: Word wall with the new words.	As a whole-class.

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[40] See Appendix 6.4.3

Session 3: "*Thermal insulators and conductors*" / 50 minutes		

TIMING	ACTIVITIES	GROUPING/ SPACES
15 minutes	**Reading about the topic** The teacher gives some time for the students to read[41] about thermal insulators and conductors before asking them about it. Once they have read it, the teacher explains the meaning of both. In pairs they answer the questions about the text. SCAFFOLDING: before answering the questions, the LA help students to highlight on the text the relevant information, which includes the answer to the questions.	Individually and in pairs.
20 minutes	**Which one is an insulator or a conductor?** For this activity the teacher has a cup of boiling water and a spoon. The teacher asks the students what they think is going to happen if we put the spoon inside. *Is it going to melt? Is it going to be hot after that?* We make the experiment and find out that the spoon was hot, but why? After that, we try with a wooden spoon. *Is it going to happen the same?* Before watching it, the students write on their notebooks the hypothesis about what is going to happen and what happened with the metal spoon. They will find out that the wooden spoon was not hot and that is because one is a conductor and the other an insulator.	In groups, as a whole-class.

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[41] See Appendix 6.4.3

	SCAFFOLDING: The students write down on their notebooks the results as the language assistant writes them on the bb.	
15 minutes	**Are there more insulators and conductors?** Students make a poster in groups with two separate parts: thermal insulator and thermal conductors. For it, they have to look on the internet about more insulators and conductors and write a short description of both. SCAFFOLDING: For them to know how to do it, the teacher shows an example[42] of one. For those who finish earlier they can draw how the molecules are in both of them.	Individually.

Session 4: *"Mixtures"* / 50 minutes

TIMING	ACTIVITIES	GROUPING/ SPACES
15 minutes	**What happens if you mix anything with water?** The teacher asks the students if they know what happens if they mix salt with water or beans with water. After their answers, the students demonstrates what happens. The students take some plastic cups, water, salt, beans and teaspoons. Then, they start mixing. For the first one, salt and water, the students watch how he salt dissolves on the water and the molecules mix but for the beans, they don't dissolve so the molecules don't mix.	As a whole-class. Science laboratory.

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[42] See Appendix 6.4.3

	SCAFFOLDING: Ss complete the worksheet[43] with the different mixtures and describe what happens.	
25 minutes	**Homogeneous and heterogeneous mixtures.** The students watch a video[44] about homogeneous and heterogeneous mixtures. After watching it, the teacher asks if the salt and water and beans and water are homogeneous or heterogeneous mixtures and write it on the worksheet[45]. What else can be homogeneous and heterogeneous mixture? For this, teacher draws a Venn diagram[46] on the board and students go to the board to write more mixtures. Students watch the video again and find out answer some questions about the mixtures. They write the information on the worksheet. For those who finish earlier, they search for more mixtures and put some examples underneath. SCAFFOLDING: The language assistant will stop the video and explain every point of the worksheet before they write their answers.	As a whole-class. Individually.
10 minutes	**Check Understanding.** Before moving forward, the teacher and language assistant will check understanding of the new words: *homogenous, solution, solvent, heterogeneous, dissolve, solute, mixture*. For it, students read the words and try to pronounce them correctly. After that, together they review the meaning of them. The language assistant says the meaning of the words and	As a whole-class.

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[43] See Appendix 6.4.3
[44] See Materials and Resources
[45] See Appendix 6.4.3
[46] See Appendix 6.4.3

| | the students have to write which word is being described on their mini-whiteboards. SCAFFOLDING: students can read the definitions on the IWB. | |

Session 5: *"Let's mix it up!"* / **50 minutes**

TIMING	ACTIVITIES	GROUPING/ SPACES
15 minutes	**Identify the solute and the solvent of these mixtures** The teacher reminds the students about last sessions using the random selection tool to ensure that all students provide feedback and continues with the mixtures. The teacher writes on the board some mixtures[47] and the students need to identify the solute and solvent of each solution on their notebooks. For those students that have difficulties, they can borrow from the teacher a visual organiser[48] about the topic. SCAFFOLDING: Ss have a visual organiser as a model to help them do the activity.	Individually
25 minutes	**Do you like chocolate powder?** For this activity, teacher, language assistant and students will move to the science laboratory. Students will be in small groups to make the experiment of mixing chocolate powder. They will need: plastic cups, milk, teaspoon and chocolate powder. Before starting the language assistant reads the instructions[49] to sure that students understand the	Groups.

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[47] See Appendix 6.4.3
[48] See Appendix 6.4.3
[49] See Appendix 6.4.3

	experiment. Students make some hypothesis about what is going to happen. Students make the experiment and write down the results. After the experiment, the teacher asks these questions to the students: 1. *What will happen if you add more chocolate powder than milk? And more milk that powder?* The language assistant checks the written answers.	
10 minutes	In the last 10 minutes, students will use their laptops to make a quiz[50] about mixtures and solutions. In case they finish earlier, they can do some more about the other topics they have learnt like states of matter, insulators and conductors. These quizzes will be used at the beginning of the next session to review.	Small groups.

Session 6: *"Changes in matter"* / 50 minutes

TIMING	ACTIVITIES	GROUPING/ SPACES
10 minutes	**Burning paper** To start learning about changes in matter, the teacher is going to show some pieces of paper and hand them out to the students. They have to make a paper airplane. After that, the teacher asks: 1. *Is it still paper? What has changed? Do you think the molecules have changed?*	As a whole-class.

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[50] See Materials and Resources

	Then the teacher takes another paper and burns it in a metal cup. And the teacher asks the students the same question above. Students use thumbs up/down to answer yes/no to both questions. With this experiment the teacher wants students to identify *physical change*, where the molecules stay the same and *chemical change,* where new molecules are made. SCAFFOLDING: before the experiment, the LA writes on the bb the expressions physical change and chemical change on the left and draws an origami airplane and a burning paper on the right. At the end of the activity, Ss do the matching orally.	
15 minutes	**Reading about changes in matter** Students read a text[51] about changes in matter and think about some physical and chemical changes they have seen at home or on the street. The teacher gives some more examples and writes them on the bb: *Physical Change: folded paper, freeze food…* *Chemical change: burn paper ,rotten food…* Extra time: Once they have read it and note some examples, they look for some videos of chemical and physical changes on internet. SCAFFOLDING: If Ss cannot find examples, at a lower cognitive level, this activity can be adapted by doing a matching activity. The teacher writes the examples on the bb and the students identify the type of change.	Individually

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[51] See Appendix 6.4.3

20 minutes	**Messing around with matter**	As a whole-class and individually.
	The teacher posts in opposite walls two posters: Physical change and chemical change. Students have to stand up and move to one or other when the teacher names a change out loud. They have to decide to what poster go.	
	After each one, they have to write them down on the notebooks filling a chart[52] under both headings.	
5 minutes	**Planes competition.**	As a whole-class.
	During the last 5 minutes, the teacher gives a break and the students can make a plane competition with the planes they made at the begging of the lesson. The teacher encourages them to make any changes to see if they can fly further and stay for a longer time.	

Session 7: "Review of the unit" / 50 minutes

TIMING	ACTIVITIES	GROUPING/ SPACES
35 minutes	**Mind map**	In small groups.
	To start reviewing all the new concepts of the unit, students will create a mind map using the digital tool Popplet[53]. They have to include all the new concepts and main characteristics of all of them.	
	SCAFFOLDING: The teacher will show an example[54] of other unit to help those that have more difficulties.	
15 minutes	**Self-assessment**	Individually
	In the last 10 minutes, the teacher will give some time to the students for self-assessment[55]. They have to	

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[52] See Appendix 6.4.3
[53] See Material and Resources
[54] See Appendix 6.4.3
[55] See Appendix 6.4.3

read some statements and draw a happy face if they know it or sad face if they need to revise it again.

Before starting the teacher has to make sure the students understand all the statement and what they have to do. Every answer is valid and individual.

This activity is beneficial for the students to really think if they have learnt something and what content needs more learning.

Session 8: *"Matter Trivia"*/ 50 minutes

TIMING	ACTIVITIES	GROUPING/ SPACES
5 minutes	**Instructions and materials** Students will be in groups of four or five students to make the trivia. The teacher hands out the instructions[56] and reads out loud them so the teacher makes sure all of them understand them. The teacher gives each group the materials they need to make it: template of trivia, dice and small cards to each student. Each student has to write a true or false fact on the card, writing the correct answer underneath. This cards will be read if any student land on the question mark. The teacher will encourage the students to search through the unit for facts and let~~ting~~ them choose the information they want.	As a whole-class.

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[56] See Appendix 6.4.3

10 minutes	**Preparing the game**	Individually
	Once they are in their groups, students have little time to write on the cards and to fill in the template[57]. On those empty spots they can write instructions like: *go back 3 places, start again, go forward 2 places…* Once all groups have finish writing their cards, they exchange cards with the group on their left and start playing. Each student has a counter to differentiate them from the rest.	
35 minutes	**Let's Play!**	Individually.
	During the rest of the session the students will be playing the trivia. Once they have read all the cards, they keep exchanging with other group. The teacher will be observing how they play and assessing the students with their answers.	

.MATERIALS AND RESOURCES

Human resources:

   o Natural Science Teacher, students of year 4 and language assistant.

Material resources (All the material needed is in Appendix 6.4.3)

   o Activities given by the teacher taken from various syllabuses.

   o <u>Scaffolding</u>: flashcards, charts, Venn diagram, role play atoms and molecules, word wall, poster about thermal conductor and insulators.

   o Materials for specific activities: card, food labels, glue, scissors, pencils, paper, markers, flashcards.

   o Reinforcement and extension activities for those students that want to continue working at home.

Digital resources

   o Video about states of matter: https://www.youtube.com/watch?v=DE3LCPfP8N8

   o Video about mixtures: https://youtu.be/4mLst4JqyhU

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[57] See Appendix 6.4.3

o Video about physical and chemical changes: https://youtu.be/BgM3e8YZxuc

o Website about atoms and molecules:

https://www.ducksters.com/science/the_atom.php

o Quizzes: https://www.proprofs.com/quiz-school/story.php?title=1dq-mixtures-and-solutions_8yu // https://www.qldscienceteachers.com/junior-science/chemistry/quizzes/mixtures

o Kahoot states of matter: https://create.kahoot.it/details/matter/ec098478-6ee1-433a-a405-d4ebaeed90e8

o Popplet: http://popplet.com/app/#/159352

o ICT resources like laptops to look for information and digital board to see some picture of examples for activities.

ASSESSMMENT

Evaluation criteria:

1. Define the meaning of matter and identify its properties.

2. Differentiate the three states of matter.

3. Identify the different types of mixtures and their reactions.

4. Write questions and answers about matter, states of matter and its properties to create a Trivia.

Minimum required:

1. Define the meaning of matter and identify its properties.

2. Identify the 3 states of matter

Assessment:

1. **Formative Assessment:**
   o Observation of the group work using a checklist for active observation.
   o Verbal and written Feedback of each activity done in class using…..
   o Self-assessment checklist (see appendix 6.4.3)

2. **Summative Assessment:**
   o Matter Trivia.

o Multiple choice test using the questions and answers of the Trivia (See Appendix 6.4.3)

ATTENTION TO DIVERSITY

Multimodal Input: The content of the unit will be presented in different ways throughout the sessions to ensure that all students engage and learn it. (See in Appendix 6.4.3)

o A video to describe the characteristics about the topics seen on the unit (See Materials and Resources)

o Flashcards about some objects.

o A visual organizer to learn new words

o Posters to compare insulators and conductors.

o A reading about thermal insulators and conductors.

LOTS: Create cards with true or false facts about states of matter.

HOTS: Read and investigate about new material used to produce object to make them better[58]

Attention deficit hyperactivity disorder (ADHD):

In this unit the self-instruction (what/how/when/ do I have to do?) is done through group work, role-playing, feedback, and especially the modelling of the teacher and also of the peers.

Some of the measures are:

- Understand and help the student to have a positive relationship between pupil-teacher.

- Involve and encourage the student to talk.

- Show interest when working at your table, approach the student's table regularly and ask him if he has any doubts or needs support.

- Encourage him regularly to keep working.

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[58] See Appendix 6.4.3

- Ask him regularly, to go out to the blackboard, improving his attention, and motivation and to better know his evolution.

3.3.2. UNIT 8. Forces

DIDACTIC UNIT 8: FORCES

CONTENT AREA: NATURAL SCIENCE / MATTER, ENERGY AND MACHINES

Level: Year 4

Timing: 8 sessions during the third semester over 4 weeks.

Description: Write an interview between Newton and a reporter.

Product: Students will learn about forces, magnetism and gravity to invent an interview about Newton and his contribution to our history.

Rationale: In this unit, students will learn about forces, magnetism and gravity and its main characteristics. Also they will learn about Newton and his inventions and discoveries.

CONTENT

Content	**Contribution to key competences**
o Push and pull forces.	o Initiation to scientific activity.
o Magnetism, gravity and weight.	o Use of diverse sources of information.
o Floatability.	o Study and work techniques.
o Newton and his discoveries.	o Development of work habits.
o Making an interview.	o Effort and responsibility.
	o Use of information and communication technologies to search for and select information, simulate processes and present conclusions.

COGNITION	
Teaching Objectives o To know the characteristics of floatability. o To know forces, effects they produce, and the types of forces. o To use different procedures to measure mass and volume. o To understand the main characteristic of upthrust in water. o To plan and create experiments to prove the theories. o To invent an interview.	**Learning Outcomes** 1. Pupils explain the characteristics of floatability. 2. Pupils identify forces and the effects they produce. 3. Pupils recognize the types of forces. 4. Pupils choose different procedures to measure mass and volume. 5. Pupils identify and explain the main characteristic of upthrust in water. 6. Pupils plan and create experiment to prove the theories. 7. Pupils write and perform an interview between Newton and a journalist.
CULTURE	
Teaching Objectives o To work collaboratively as part of a team, with skills for conflict resolution. o To be aware of the contribution of scientists to help people understand the world better.	**Learning Outcomes** o Pupils work collaboratively as part of a team, with skills for conflict resolution. o Pupils reflect about the contribution of Newton to the scientific knowledge in their interviews.

COMMUNICATION

Language of learning:

o <u>Academic vocabulary:</u> float, force, gravity, magnetic, sink, balanced, contact force, pull force, push force, unbalanced, magnetic field, magnetism, repel, attract, gravity, mass, weight, volume, upthrust.

o <u>Connectors:</u> reason and cause, succession, result, order, compare and contrast and difference and differentiate.

o <u>Parts of a biography:</u> Birth date, studies, discoveries, inventions, why he/she is important.

Language for learning:

o Language of an interview: *(Tell us about yourself… What was your biggest discovery?… what are you more proud of?… how was the society before?… did you go to the school?...)*

o Language to measure mass and volume (gram, kilogram, cubic metre, tone)

o Language to describe the characteristics of gravity (zero gravity, centre of gravity, laws of gravity)

o Classroom language

Language through learning:

o Language through activities.

o Language through peer interaction.

o Language through project preparation and presentation.

o Language through writing the biography and the interview.

ASSESMMENT

Evaluation criteria:

1. Understand forces and its main characteristics.
2. Know how to measure mass and volume.
3. Identify the main characteristics of magnetism, gravity and weight.

4. Write with an accurate vocabulary and register a biography and an interview about Newton.

Minimum required:

1. Explain forces and types of forces.
2. To measure mass and volume.
3. Describe the concept of floatability.

Assessment:

1. **Formative Assessment:**
   o Observation of the group work using a checklist for active observation.
   o Verbal and written Feedback of each activity done in class using random selection tool and mini-whiteboards.
   o Peer assessment checklist to assess the biographies and interviews.
2. **Summative Assessment:**
   o Unit test.

ATTENTION TO DIVERSITY

Multimodal Input: The content of the unit will be presented in different ways throughout the sessions to ensure that all students engage and learn it.

   o A reading and a video to describe the characteristics of mass and volume.
   o A visual organizer to compare the types of forces and law of gravity.
   o Posters with the laws of Newton.
   o An interview and a biography to discuss and describe the content of the unit in a real context for a real purpose.

LOTS: Write down the discoveries of Newton and choose one as a favourite.

HOTS: Prove as an experiment the principle of Newton and write down the hypothesis and results.

> **Attention deficit hyperactivity disorder (ADHD):**
>
> In this unit the self-instruction (what/how/when/ do I have to do?) is done through group work, role-playing, feedback, and especially the modelling of the teacher and also of the peers. For this particular student will:
>
> 1. Provide qualitative feedback. Avoid scoring numerically but by achievements, using rubrics and checklists.
> 2. The assessment needs to be informed in advance. Avoid setting several exams in the same week.

3.3.2. UNIT 9. Simple and Complex Machines

DIDACTIC UNIT 9:
SIMPLE AND COMPLEX MACHINES

CONTENT AREA: NATURAL SCIENCE/ MATTER, ENERGY AND MACHINES

Level: Year 4

Timing: 8 sessions during the third semester over 4 weeks.

Description: Students understand and recognize the simple and complex machines to choose a favourite and create a timeline of the evolution of the invention using pictures and dates to explain the changes. biography about its invertor.

Product: Timeline of an invention.

Rationale: In this last didactic unit, students will identify and contrast the differences between wheels, planes and pulleys. Also, they will create a pulley and learn about Archimedes discoveries. Students will get noticed on how important those inventions are to our daily life.

CONTENT

Content	**Contribution to key competences**
o Simple and complex machines. o Levers. o Wheels, axle and pulleys. o Incline plane. o Archimedes and his discoveries. o Timelines.	o Initiation to scientific activity. o Use of diverse sources of information. o Study and work techniques. o Development of work habits. o Effort and responsibility. o Use of information and communication technologies to search for and select information, simulate processes and present conclusions.

COGNITION	
Teaching Objectives	**Learning Outcomes**
o To know simple and complex machines. o To be aware of some uses of machines and tools and how they helps us. o To know the uses of the pulley, axle and inclined plane. o To design a simple structure to solve a problem. o To know and explain some of the great discoveries and inventions from history. o To do a timeline about a discovery and its changes throughout history.	1. Pupils observe, identify and describe some machines 2. Pupils identify between simple and complex machines 3. Pupils observe and identify some uses of machines and tools and how they helps us. 4. Pupils recognize the uses of the pulley, axle and inclined plane. 5. Pupils design a simple structure to solve a problem. 6. Pupils know and explain some of the great discoveries and inventions from history. 7. Pupils create a timeline about a discovery using accurate dates, descriptions and images that illustrate its changes throughout time.
CULTURE	
Teaching Objectives	**Learning Outcomes**
o To be aware of the repercussions of some discoveries for daily life. o To know the different impact of some machines in different cultures.	o Pupils analyse the advantages of having a fridge, a washing machine, a TV, computers… for their lives. o Pupils compare the electrical appliances children use in Spain and other country.

COMMUNICATION		
LANGUAGE OF LEARNING	**LANGUAGE FOR LEARNING**	**LANGUAGE THROUGH LEARNING**
o **Academic vocabulary:** mixer, crowbar, energy, hammer, lorry, ramp, saw, shovel, wheel, winch, load, rigid bar, axle, groove, rope, inclined plane, screw, slide, steep, catapult, claw. o **Names of machines:** wheel, axles, inclined plane o **Connectors:** comparison (*similarly, likewise, equally, as with*) contrast (*however, even so, though, instead*) cause and effect (*because, as a result of, therefore*)	o **Language to explain the result of a research** (*The result of this research is… we wanted to look for… the aims is… I have learnt with this…*) o **Language to describe the pass of time:** (dates and how to read them 19-35) o **Language to describe differences between two machines** (*comparative forms of adjectives: -er/-est, -r/-st, -ier/-iest, more/the most*)	o Language through activities. o Language through peer interaction. o Language through project preparation and presentation. o Language through creating a timeline.

ACTIVITIES		

Session 1: *Introduction* / 50 minutes

TIMING	ACTIVITIES	GROUPING/ SPACES
10 minutes	**Brainstorm about machines** The teacher writes the word machines on the board and tells the students to brainstorm machines in groups as they are seated. After a few minutes, the teacher goes through their suggestions and one member of each group writes their answer on the bb.writing them on the board. SCAFFOLDING: L1 is welcome to elicit previous knowledge about machines. The teacher translates and the LA writes the machines in English on the bb.	As a whole-class and in groups.
20 minutes	**See the picture** The teacher show flashcards[59] where students can recognize some machines and tools. The teacher asks the students: 1. *What can you see in these flashcards?* While the students start saying some suggestions the teacher writes down the tools and machines they are saying. After that if any new word is missing the teacher adds it to the new glossary. SCAFFOLDING: Students make a new glossary with some of these words: hammer, saw, crowbar, winch shovel, cement mixer.	As a whole-class.

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[59] See Appendix 6.4.4

	The language assistant goes through those words and the students have to mime each one to check understanding. The students will be doing TPR. At first the language assistant will make the mime with them and at the second round they will do it alone just listening to the word.	
10 minutes	**A quick look at simple and complex machines** Students will watch a video[60] two times. The first one they just have to watch it and the second one they have to write down on the worksheet those machines they recognize and the ones they know how to use. After the video, the teacher explains that they are going to learn about those machines. SCAFFOLDING: Ss can check the spelling of the machines on the bb and in their glossaries.	Individually.
10 minutes	**Draw simple machines** In the last 10 minutes, to check that students have understood what simple machines are, they will have to draw some. For this, they can have access to internet or just think about some. The teacher will hand out a template[61] with three headings: in the street, at home and at the school. They have to draw simple machines that can be found in these places	Individually.

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[60] See Materials and Resources
[61] See Appendix 6.4.4

TIMING	ACTIVITIES	GROUPING/ SPACES
	Session 2: *Simple Machines: levers / 50 minutes*	
10 minutes	**What is this?** The teacher shows a picture of a see-saw[62] and asks the students what kind of machine it is. The teacher will elicit that it is a lever. The teacher explains the two parts of the see-saw: the rigid bar and the pivot point.	As a whole-class.
15 minutes	**How levers works?** The teacher shows a video[63] about how levers work. After watching it, students have to take note of the most important details. Students raise their hands to say them. After watching a video, answer some questions in pairs in their notebooks. 1. *What is a lever?* 2. *Parts of a lever* 3. *How does a lever works?* 4. *Examples of levers.* SCAFFOLDING: the language assistant will write the beginning of the answers on the bb e.g. A lever is a …. It consists of …..	As a whole-class and in pairs.
10 minutes	**New vocabulary** Students will add to the glossary new words: lever, rigid bar, pivot pint, load, effort, see-saw. SCAFFOLDING: For this activity, the language assistant will read through the words and check the understanding of each one.	As a whole-class.

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[62] See Appendix 6.4.4
[63] See Materials and Resources

TIMING	ACTIVITIES	GROUPING/ SPACES
15 minutes	**Making a see-saw with a book** With the instructions[64] given, students have to make a see-saw using basic materials such as ruler, rubber and a book. The teacher goes through the instructions making sure students understand them. Once they have made the see-saw, they have to draw the result on their notebooks. The teacher asks a volunteer to come in front on the class and demonstrate the result. SCAFFOLDING: the Ss can use the set of instructions as a support to describe the process.	In pairs.

Session 3: *Simple machines: pulleys and wheels* / 50 minutes		

TIMING	ACTIVITIES	GROUPING/ SPACES
15 minutes	**Finding out about pulleys** To start this session, students will start reading[65] about pulleys before the teacher explain it. While reading, students will take note of those words they don't understand so the teacher can explain them later. Before reading, the teacher asks some questions: 1. *What are the parts of a pulley.* 2. *What a pulley does?* 3. *How does a pulley work?* 4. *Examples of pulleys.* After that and without answering, students have to read and highlight the main information about pulleys	Individually and as a whole-class.

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[64] See Appendix 6.4.4
[65] See Appendix 6.4.4

	and try to answer the questions using the highlighted information. Check the answers as a class. Finally, Ss watch a video[66] about how a pulley works.	
10 minutes	**Is this a pulley?** The teacher shows some pictures[67] and students have to say if they are pulleys or not. For this, they will use their mini whiteboard and raise them with a yes or a no. If the answer is yes, they have to guess what type of work they are used for.	Individually.
5 minutes	**Update the glossary** Students will update their glossary with the new words: wheel, axle, pulley, rope and lift. The language assistant will read out loud them and the students have to repeat them. Then, to practise the LA will draw them on the bb and Ss have to guess the word.	Individually and as a whole-class.
20 minutes	**Making a Pulley** With the instructions[68] given, students have to make a pulley using basic materials such as small plastic container, scissor, string, magnets and paper clips. The teacher goes through the instructions making sure students understand them. Once they have made the pulley, they have to draw the result on their notebooks. The teacher asks for a volunteer to come in front on the class and demonstrate the result. If they finish earlier, they can find more things to put inside the container and lift.	In small groups.

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[66] See Materials and Resources
[67] See Appendix 6.4.4
[68] See Appendix 6.4.4

| | SCAFFOLDING: the Ss can use the set of instructions as a support to describe the process. | |

Session 4: *Simple machines: inclined plane* / **50 minutes**

TIMING	ACTIVITIES	GROUPING/ SPACES
10 minutes	**Inclined planes** The teacher shows two pictures of ramps[69], shorter than the other and asks the students to look for the name of these ramps and explain what they can be used for. The teacher explains that these ramps are called inclined planes and why they are important. SCAFFOLDING: Students visit this website[70] to look for the name of the ramps.	As a whole-class.
20 minutes	**What are inclined planes?** Students watch a video[71] about inclined planes. Before watching it the teacher hands out a worksheet with incomplete sentences about inclined planes. The students read them. After watching the video, in pairs, complete the worksheet. Check answers as a class. After brainstorming where we can find inclined planes, the teacher shows some examples[72] of them and with their mini whiteboards they have to write down what they are used for.	In pairs. As a whole-class.

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[69] See Appendix 6.4.4
[70] See Appendix 6.4.4
[71] See Materials and Resources
[72] See Appendix 6.4.4

| 20 minutes | In the last 20 minutes, students are going to create a cootie catcher with simple machines inside. The teacher is going to show an example[73]and give them a template[74]. Once they have created it, they can play in pairs and exchange them.

The teacher uses this activity to see those students that are struggling more and assess by verbal feedback the information they used to create the game.

SCAFFOLDING: the model and the template. | In pairs. |

Session 5: *Complex machines*/ **50 minutes**

TIMING	ACTIVITIES	GROUPING/ SPACES
5 minutes	**Review simple machines** Before explaining a new concept, the teacher reviews with the students wheels, axle, pulleys and levers. Ss explain the difference between simple and complex. SCAFFOLDING: connectors to contrast will be displayed on the CALP wall. Simple means… whereas complex ….	As a whole-group.
20 minutes	**Brainstorm about complex machines** In pairs, students brainstorm about complex machines that use mainly electricity. In 5 minutes, the teacher asks how many they have thought and checks which pair has more machines. After doing the brainstorm, the teacher shows a bicycle and asks how many of them have a bicycle and if they think a bicycle is a complex machine.	In pairs. As a whole-group.

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[73] See Appendix 6.4.4
[74] See Appendix 6.4.4

	The teacher asks them if they know the parts of a bicycle: 1. *Does a bicycle have any levers? Wheels? And pulleys?* For this activity, the teacher brings a bicycle to the class and prepare word cards for students to place on as they answer. Then, the teacher gives the students a picture[75] of a bicycle and they have to try to name the parts. They can look back on the information about simple machines if they are struggling. Check the answers as a class with the solutions picture[76]. SCAFFOLDING: word cards with the parts of the bicycle and the picture to name them.	
15 minutes	**Other complex machines** The teacher asks the students to think about electric machines they can have at home. Give them 5 minutes and then, the teacher asks them to raise their hands if they have: 1. *A dishwasher* 2. *A washing machine* 3. *A computer* 4. *A oven* 5. *A hairdryer* 6. *A fridge*	Small groups.

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[75] See Appendix 6.4.4
[76] See Appendix 6.4.4

	They are given time to think about other electrical objects they can have at home. For this, they complete a chart in their notebooks. After that, the teacher compare the answers with the students, and they can add anything else they have forgotten to write. To develop intercultural competence the teacher asks the Ss if they think that all the children in the world have the same machines at home. To compare, the language assistant explains how children live in an African town. To finish, Ss have to decide which of the machines they will give as a present to these children and why. SCAFFOLDING: The LA writes on the bb: I'd give them a _____ because with it they can _____.	
10 minutes	**Compare and contrast** To finish with simple and complex machines, students with fill a compare and contrast chart[77] with the main characteristics of both of them. SCAFFOLDING: the chart will help SS to better understand the differences between the two types of machines.	In pairs.

Session 6: *Archimedes simple machines and discoveries* / **50 minutes**

TIMING	ACTIVITIES	GROUPING/ SPACES
25 minutes	**Reading a comic about Archimedes** The teacher gives the students a comic[78] about one of Archimedes discoveries. They will read the comic all	As a whole-class.

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[77] See Appendix 6.4.4
[78] See Appendix 6.4.4

	together doing a play role, so the teacher ask for two volunteers: one to read Archimedes and the other the King.
	
	Before the role play, the teacher asks some questions:
	
	  1. *How could the king have been cheated if the scale with the cube and the crown have the same weight?*
	  2. *What is Archimedes plan about?*
	  3. *Why did the water rise when Archimedes get into it?*
	  4. *Why did the cube of water with the crown in it displace more water than the other?*
	  5. *What did Archimedes discover? What we can used it for?*
	
	The teacher will be pausing the role play to check understanding.
	
	SCAFFOLDING: before starting the role play, the LA checks the understanding of all the questions written on the bb, e.g. cheated, rise, weight, scale, etc.		

25 minutes	**More inventions about Archimedes** Once the students know a little bit more about who Archimedes was, in groups they have to find out more about him. *What else did he invented and what was his life like?* In a A3, students make a poster in the most important invention, discoveries and facts about his life. The teacher shows an example[79] to the students. Then, they	Groups.	

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[79] See Appendix 6.4.4

| | choose one of them and describe how it has changed throughout time using a timeline with images and dates to describe these changes. To make the timeline, students will be using the digital tool Visme.[80] | |

Session 7: *Writing a biography* / 50 minutes

TIMING	ACTIVITIES	GROUPING/ SPACES
10 minutes	**Presenting the timelines** Students present in front of the class their timelines. SCAFFOLDING: a word card about reading years and dates will be displayed on the CALP poster.	In groups.
30 minutes	**Writing a biography.** Students are going to learn how to write a biography. For this, in small groups, they have to choose a historical inventor and look for information about it. The teacher gives the students some instruction about what information they have to look up. 1. *Date and place of birth* 2. *Childhood* 3. *Main inventions and discoveries* 4. *Why you have choose this character.* SCAFFOLDING: a writing frame including headings of these elements of the biography will be provided.	In groups.
10 minutes	**Presenting my biography.** Once the students have written their biography, in groups they have to present it to the rest of the class.	Individually.

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[80] See Materials and Resources

| | The students have to assess their peers with a checklist. Also, the teacher will be assessing with a rubric the language used with the help of the language assistant. | |

Session 8: *Reviewing*/ 50 minutes

TIMING	ACTIVITIES	GROUPING/ SPACES
5 minutes	**Looking at the topics studied** Before playing Kahoot! Students have 5 minutes to look and read about all the concepts and vocabulary of the unit. After the 5 minutes, they have to close every book and open their tablets to play.	Individually.
35 minutes	**Final Test** Students will play Kahoot![81] as a final test. Before answering each question, the teacher will read them aloud and answer any question they may have. If they finish earlier they can do a reinforcement activity.[82] Students have the opportunity to use all the new knowledge of these weeks doing the final test	Individually
10 minutes	**Self-assessment** In the last 10 minutes, the teacher will give some time to the students for self-assessment[83]. Before starting the teacher has to make sure the students understand all the statements and what they have to do. Every answer is valid and individual.	Individually

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[81] See Materials and Resources
[82] See Appendix 6.4.4
[83] See Appendix 6.4.4

This activity is beneficial for the students because they can think if they have learnt or not the content studied. And if they need more time to learn it.	

MATERIALS AND RESOURCES

Human resources:

o Natural Science Teacher, students of year 4 and language assistant.

Material resources (All the material needed is in [Appendix 6.4.4](#)):

o Activities given by the teacher taken from various syllabus.

o Scaffolding: biography, glossary, visual organiser, flashcards, compare and contrast.

o Materials for specific activities: card, food labels, glue, scissors, pencils, paper, markers.

Digital resources

- o Video about simple and complex machines:
  https://www.youtube.com/watch?v=8GHRZabpsQE
- o Video about pulleys: https://youtu.be/LiarGb_LK10
- o Video about how pulleys work: https://youtu.be/LiBcur1aqcg
- o Video about inclined planes: https://youtu.be/sTOWiDDgTIk
- o Timeline tool app: https://www.visme.co/education/
- o Kahoot!: https://create.kahoot.it/details/simple-machines-machines/81a9b9f2-380a-48c5-9c0d-5fd965b3d6dc

o ICT resources like laptops to look for information and digital board to see some picture of examples for activities.

ASSESSMENT

Evaluation criteria:

1. Know the basic principles of machines and tools.
2. Plan how to build a specific machine.
3. Identify Archimedes and his discoveries.

4. Identify simple and complex machines.

5. Recognize a pulley, lever and inclined plane.

6. Write a biography with most important facts.

Minimum required:

1. Recognize the most important discoveries of Archimedes

2. Differentiate between simple and complex machine

3. Name three types of machine: pulley, lever and inclined plane.

Assessment:

1. **Formative Assessment (See Appendix 6.4.4):**

   o Observation of the group work using a checklist for active observation.

   o Verbal and written Feedback of each activity done in class using random selection tool and mini-whiteboards.

   o Peer assessment checklist to assess the presentations of the timelines or the biographies.

   o Self-assessment checklist.

2. **Summative Assessment:**

   o Kahoot!, using an Excel spread sheet from the digital tool with all the individual scores.

ATTENTION TO DIVERSITY

Multimodal Input: The content of the unit will be presented in different ways throughout the sessions to ensure that all students engage and learn it. (See Appendix 6.4.4)

   o A video about the characteristics on the topics (See Materials and Resources)

   o A visual organizer to compare simples and complex machines.

   o Image with some examples of simple and complex machines.

LOTS: Illustrate a comic about a discovery or invention of a historical character.

HOTS: Design a plan to create and prove a historical invention. Make the hypothesis and record the results.

Attention deficit hyperactivity disorder (ADHD):

In this unit the self-instruction (what/how/when/ do I have to do?) is done through group work, role-playing, feedback, and especially the modelling of the teacher and also of the peers.

Some ordinary measures necessary to attend these students are:

- The student must be placed as close as possible to the teacher.
- Tasks, are going to be very organized, short, graduated in difficulty and with simplified formats. Bloom taxonomy will be used to ensure the cognitive progression from LOTS to HOTS and to adapt the cognitive demand of any activity that requires it.

4. CONCLUSIONS

After completing my end of degree work I can affirm the magnificent challenge that it has been for me. Six months ago, I decided to make this project based on CLIL, which was almost unknown a few years ago, and, although there have been hard times, I can say that I am very proud of the work done.

With this project I have researched all kinds of methodologies, ways of teaching, planning and evaluating. I have been able to improve not only the language but also my knowledge on the subject, in particular, on CLIL. Now I feel much more prepared to be able to talk about CLIL and above all, and more importantly, to be able to carry out an academic course based on this learning approach.

All my experiences both in internships and at University have helped me to transfer all that knowledge into the project. In particular, during last year of internship I have been able to learn completely new and very complicated techniques at Valdelasfuentes School. That is why I would like to thank Teresa, my internship tutor, who has taught me to love this profession. With Teresa I have learned to make use of the environment that surrounds us, to use all the resources and above all to get out of class and learn by experimenting and discovering.

This way of working has helped me to plan this annual syllabus since this learning approach makes a lot of use of experimentation, manipulative activities, digital resources and resources outside the classroom. That's why I wanted to create activities where students can build their own creations, search for information and explain the contents on their own. I have created digital activities where the students make use of different apps or websites of interest that amplify their knowledge.

It is also important to highlight the assessment, a very important factor in CLIL, where much more importance is given to formative assessment and where students are able to self-evaluate and evaluate their peers. In this way they are aware of their mistakes and know the content they have to review and making an effort for it. For this purpose, grids, rubrics, and checklist have been created for the assessment of other members of the group, for self-assessment and students' assessment.

Increasingly, society is becoming aware of the importance of bilingualism in education, as it allows us to connect with people from other countries and share our knowledge with the world. It makes us more competent at work and opens borders with society.

Finally, to close this stage, I would like to thank all the teachers I've had throughout my school years because thanks to all of them I have discovered my vocation. I would like to thank my colleagues and professors at the Universidad Pontificia Comillas who have allowed me to discover many ways of teaching and above all, the opportunity to connect with so many professionals through conferences, workshops and internships. And I would like to thank my tutor, Magdalena Custodio Espinar, who has guided me towards the end of this project, always encouraging me to improve and not to give up.

I believe that this project is the result of a lot of hard work, a lot of time researching and planning, a lot of passion for education and, above all, for creating a better future for children.

"The goal of education is not to increase the amount of knowledge but to create the possibilities for a child to invent and discover, to create men who are capable of doing new things"

Jean Piaget

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6. APPENDICES

6.1. Appendix 1: Contenidos Curriculares

Table 3. Contenidos Curriculares de Ciencias de la Natulareza para 4º de Educación Primaria. Source: the author.

BLOQUE 1: EL SER HUMANO Y LA SALUD		
CONCEPTOS	PROCEDIMIENTOS	ACTITUDES
El aparato circulatorio.	Identificación de las principales características del aparato circulatorio.	Valora hábitos saludables para prevenir dichas enfermedades.
El aparato respiratorio.		
El aparato reproductor.	Explicación de las funciones del corazón, venas y arterias.	Reconocimiento de los efectos nocivos del alcohol y drogas.
La salud y enfermedad.		
	Identificación de las principales características del aparato respiratorio.	
	Explicación de las funciones de los pulmones, bronquios y tráquea.	
	Identificación de las principales características del aparato en el hombre y en la mujer.	
	Explicación de forma general la fecundación,	

	desarrollo embrionario y el parto.	
	Conocimiento de las enfermedades que afectan a los aparatos y sistemas estudiados.	

BLOQUE 2: LOS SERES VIVOS		
CONCEPTOS	PROCEDIMIENTOS	ACTITUDES
Animales vertebrados. Animales invertebrados. Las plantas.	Explicación de la alimentación, respiración y reproducción en mamíferos, aves, reptiles, anfibios y peces. Identificación, observación y explicación de las características de los diferentes grupos de animales invertebrados. Explicación de la nutrición y reproducción de las plantas. Explicación de la fotosíntesis y su importancia en La Tierra.	Interés por la observación y el estudio riguroso de todos los seres vivos. Hábitos de respeto y cuidado hacia los seres vivos.

BLOQUE 3: MATERIA Y ENERGÍA. LA TECNOLOGÍA, OBJETOS Y MÁQUINAS.		
CONCEPTOS	PROCEDIMIENTOS	ACTITUDES
Estudio y clasificación de algunos materiales. El peso de un cuerpo Flotabilidad de los cuerpos en un medio líquido. Cambios en el movimiento de los cuerpos por efecto de las fuerzas. Maquinas que facilitan la vida del hombre. Importantes inventos y descubrimientos.	Observación, identificación, descripción y clasificación de algunos materiales por sus propiedades. Utilización de diferentes procedimientos para la medida del peso de un cuerpo. Identificación y explicación las principales características de la flotabilidad en un medio líquido. Realización de experiencias sencillas que permitan predecir cambios en el movimiento, en la forma o en el estado de los cuerpos por efecto de las fuerzas. Observación y exploración de la utilidad de la	

	palanca, polea y plano inclinado. Identificación algunos inventos de Arquímedes. Identificación de Isaac Newton como descubridor de la gravedad.	

CONTENIDOS COMUNES		
CONCEPTOS	PROCEDIMIENTOS	ACTITUDES
Hábitos de prevención de enfermedades y accidentes, en el aula y en el centro. Técnicas de estudio y trabajo. Desarrollo de hábitos de trabajo. Esfuerzo y responsabilidad.	Iniciación a la actividad científica. Aproximación experimental a algunas cuestiones. Utilización de diferentes fuentes de información (directas, libros). Lectura de textos propios del área. Utilización de las tecnologías de la información y comunicación para buscar y seleccionar información,	Trabajo individual y en grupo

| simular procesos y presentar conclusiones.

Utilización de diversos materiales, teniendo en cuenta las normas de seguridad.

Planificación de proyectos y presentación de informes. Realización de proyectos.	

6.2. Appendix 2: Secuenciación de las Unidades Didácticas

Según la ORDEN 2227/2018, de 20 de junio, de la Consejería de Educación e Investigación por la que se establece el Calendario Escolar[84] para el curso 2018-2019 en los centros educativos no universitarios sostenidos con fondos públicos de la Comunidad de Madrid, se crea una secuenciación de las unidades didácicas divididas en cada trismestre del calendario.

Table 4. Secuenciación de las UD por trimestres. Source: the author

BEGINNING OF THE SCHOOL YEAER	10TH OF SEPTEMBER
1ST TERM **Unit 1-3**	11TH OF SEPTEMBER – 4TH OF DECEMBER (24 sessions) Excluding: 11/01/2018

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[84] Calendario escolar oficial de la Comunidad de Madrid:
https://www.educa2.madrid.org/web/calendario-escolar-de-la-comunidad-de-madrid

2ND TERM **Unit 4-6**	4TH OF DECEMBER – 14TH OF MARCH (24 sessions) Excluding: 12/06/2018 12/24/2018 – 01/07/2019
3RD TERM **Unit 7-9**	19TH OF MARCH – 20TH OF JUNE (25 sessions) Excluding: 04/15/2019 – 04/22/2019 05/02/2019
END OF THE SCHOOL YEAR	21ST OF JUNE

6.3. Appendix 3: Autorización del Colegio Valdefuentes

Figure 6: Carta de autorización del Centro Educativo Valdefuentes.

6.4. Appendix 4: Didactic Unit Resources

6.4.1. Resources Didactic Unit 4

SESSION 2

Figure 7: Body image. Source: https://online.seterra.com/en-an/vgp/3801
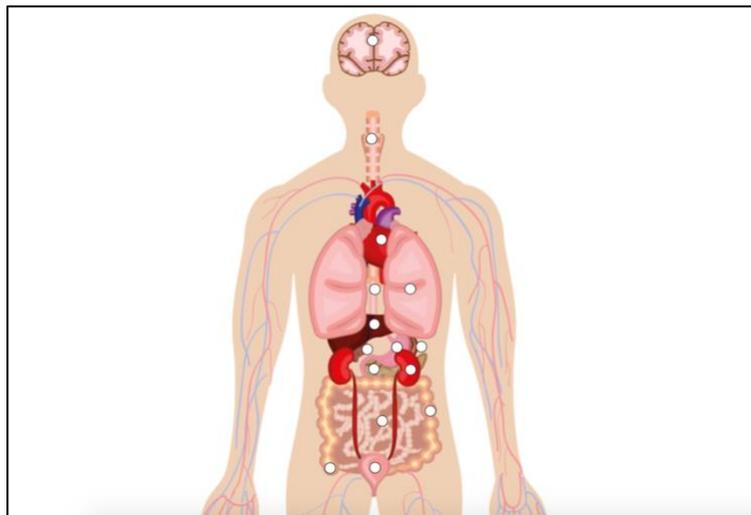
Figure 8. Body Systems. Source: https://www.vectorstock.com/royalty-free-vector/human-body-organ-systems-poster-vector-19844616
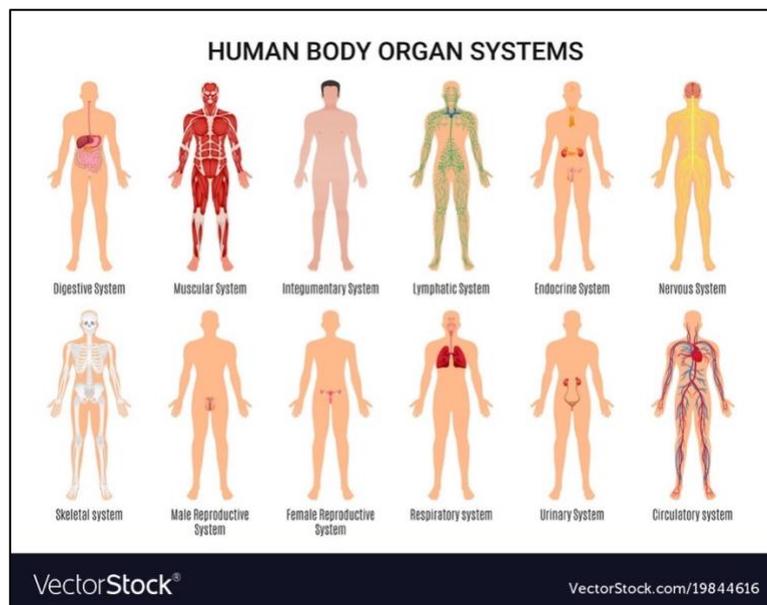
SESSION 3

Figure 9. Glossary about circulatory system. Source: The Author.

HEART	VEINS	ARTERIES
	CAPILLARIES	BLOOD
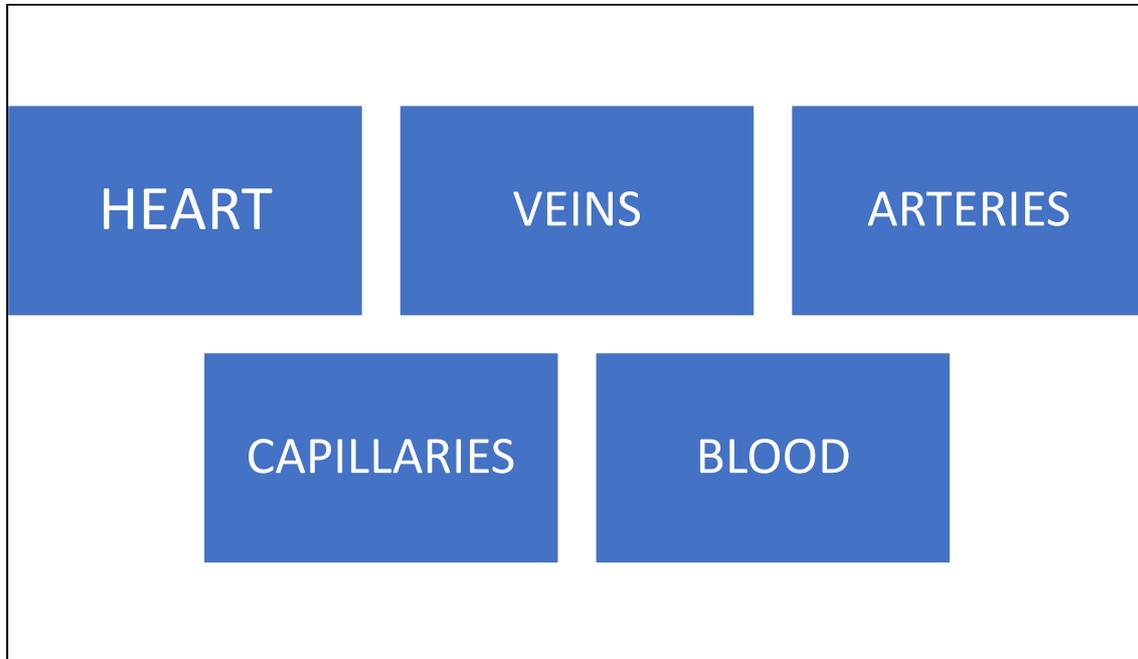
SESSION 4

Figure 10. Descriptions of the circulatory system. Source: the author.

DECRIPTIONS

1. Carry blood from the heart to all parts of the body.
2. Are where oxygen and nutrients are exchanged to carbon dioxide and waste materials.
3. Carry blood from all parts of the body back to the heart.
4. Is a muscular pump that pumps blood around the body.
5. Is made up of plasma, red and white blood cells and platelets.

Table 5. Writing frame for hearbeats. Source: the author.

STUDENT NAME	HB BEFORE EXERCISE	HB AFTER EXERCISE

SESSION 5

Figure 11. Writing frame for comics. Source: www.printablepaper.net
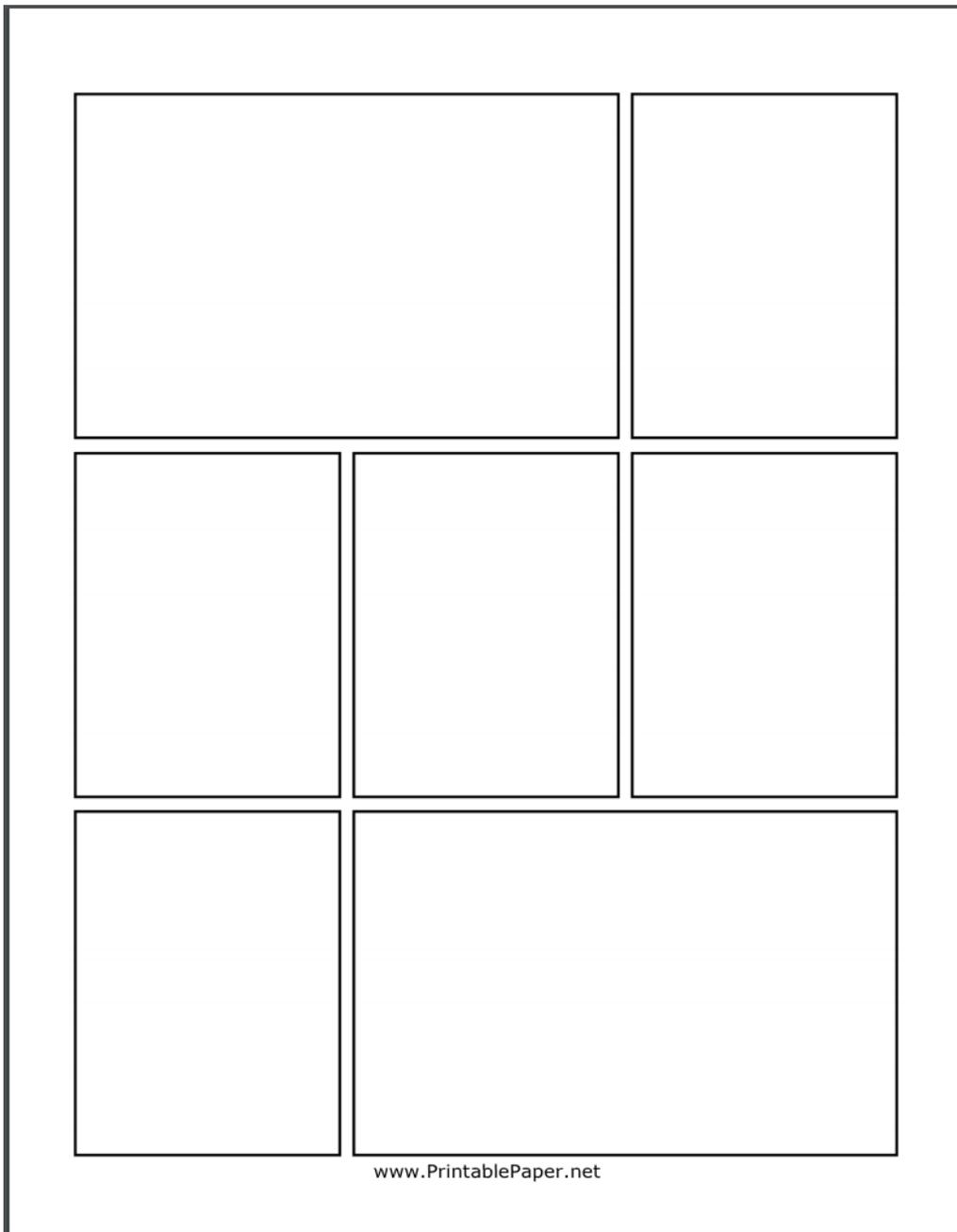
Figure 12. Flow Chart for the process of the Respiratory System. Source:
https://pdf.wondershare.com/templates/flow-chart-template-download.html

SESSION 6

Figure 13. Respiratory System. Source: https://www.britannica.com/science/human-respiratory-system/The-mechanics-of-breathing
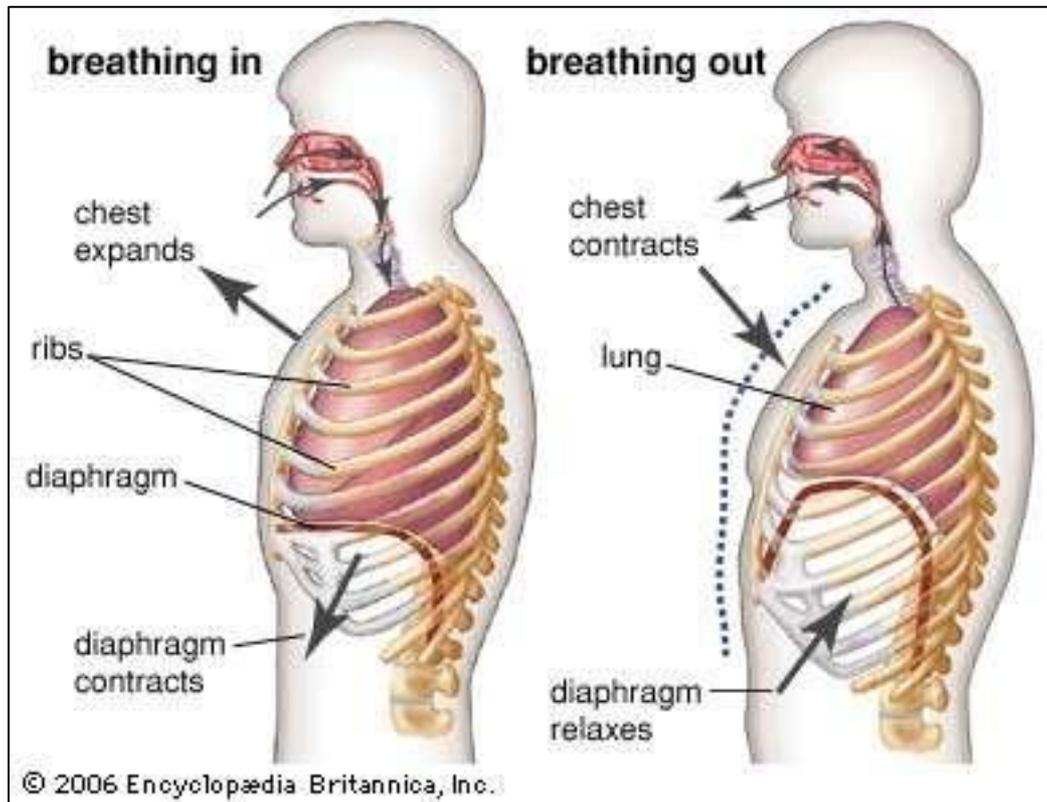
SESSION 7

Figure 14. 3D model of respiratory system. Source:
https://cardsandschoolprojects.blogspot.com/2017/08/making-respiratory-system-
model.html?showComment=1503992914153#c5015295529268136278
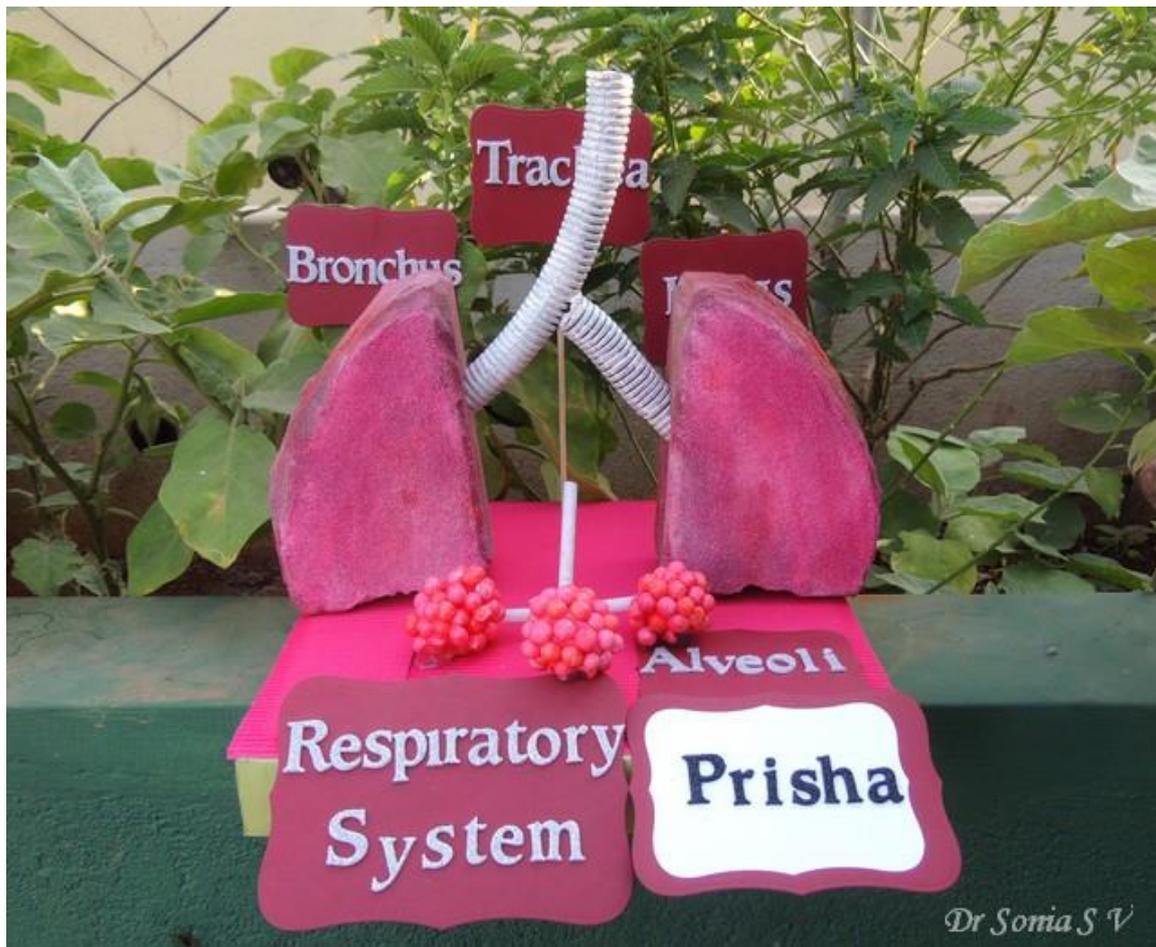
Figure 15. 3D model of circulatory system. Source: https://paksc.org/pk/science-experiments-urdu/working-model-of-heart/
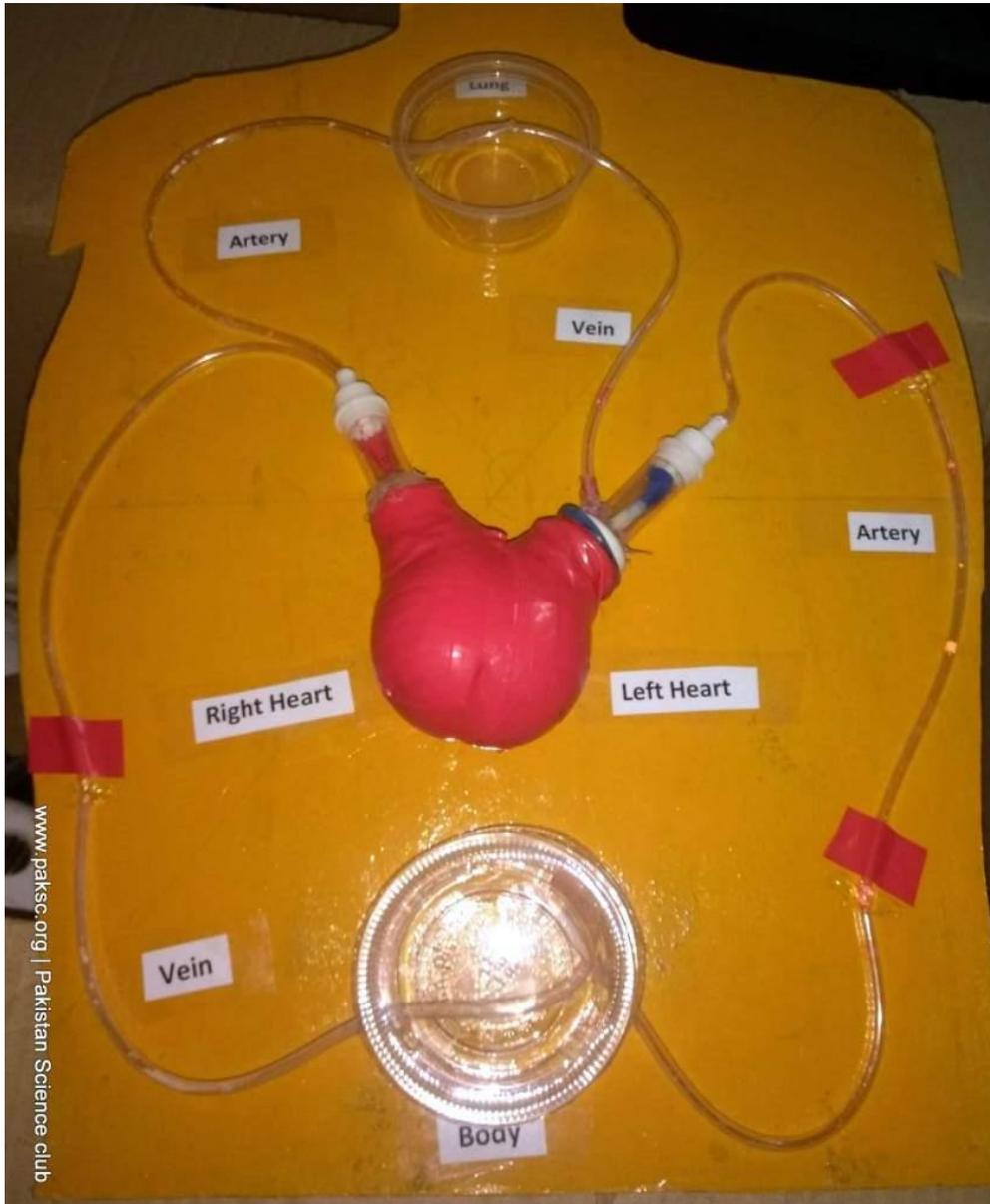
SESSION 8 – ASSESSMENT CHECKLIST

Table 6. Peer Assessment. Source: the author.

PEER ASSESSMENT.

GROUP MEMBERS:

	🙁	😐	🙂
Students pronounce the language correctly with rhythm and intonation.			
Students show great understanding of the topic and use the correct vocabulary.			
Students are able to communicate ideas clearly.			
Students have prepared the presentation.			
The project has been worked and shows the most important parts that was required.			
The project is original and has used the material in a good way.			

Figure 16. Self-assessment checklist. Source: the author

SELF-ASSESSMENT

1. I know the two systems of nutrition and how they work.
2. I understand how the circulatory system works.
3. I understand how the circulatory and respiratory systems work together.

6.4.2. Resources Didactic Unit 6

SESSION 1

Figure 17. Illnesses image. Source:
http://hermanospinzon4th.blogspot.com/2016/01/natural-science-commin-illnesses-unit-3.html
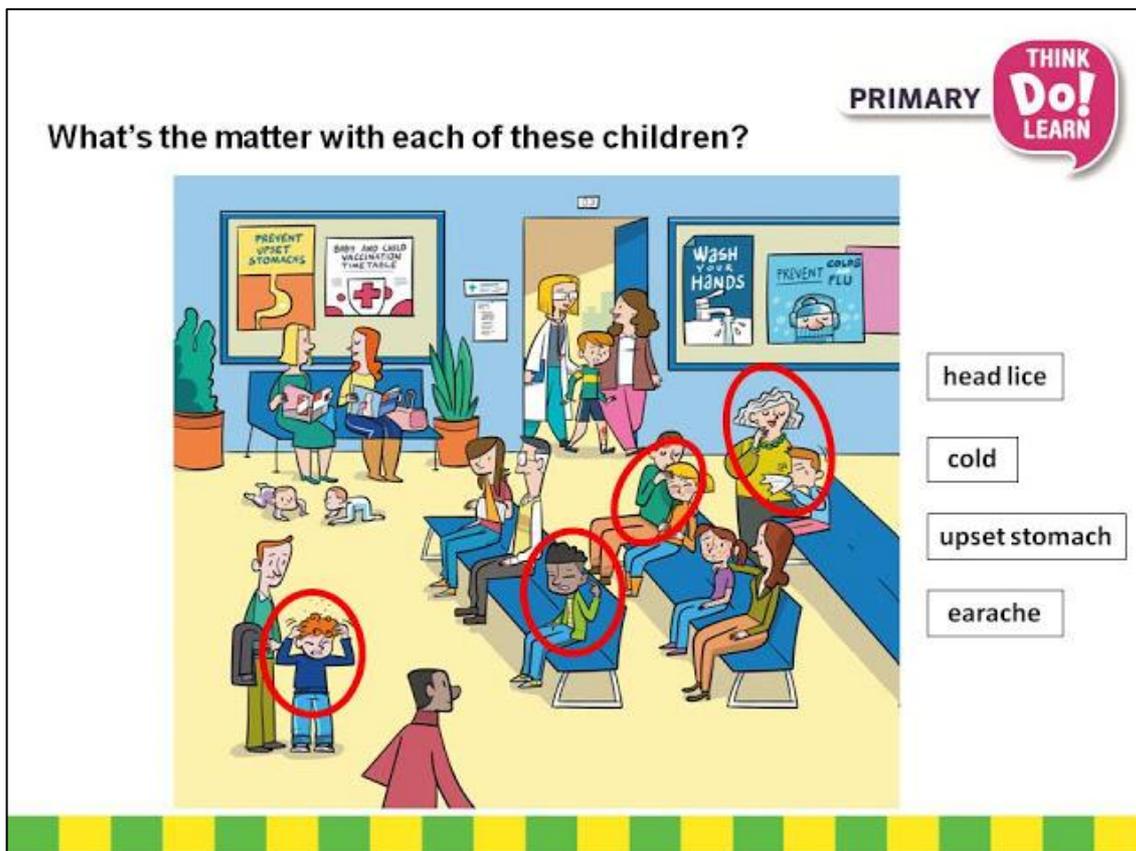
Table 7. Symptoms and Illnesses. Source: the author.

1. Runny nose, sneezing, coughing.	a) An earache
2. Pain in your stomach.	b) Head lice
3. An Itchy head.	c) Upset stomach
4. Pain in the ear.	d) Flu
5. High temperature, aching body.	e) A cold

Figure 18. Mind map template. Source: https://www.template.net/design-templates/print/mind-map-template/
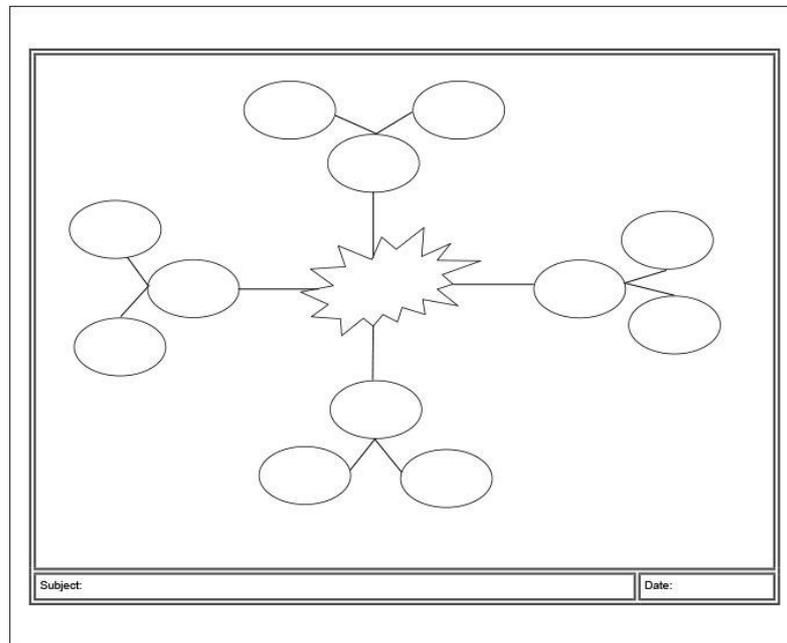
SESSION 2

Figure 19 Readings about nutrients. .Source: http://hermanospinzon4th.blogspot.com/2016/01/natural-science-commin-illnesses-unit-3.html

Figure 20. Menu Template. Source: https://www.pinterest.es/pin/347621664970753246

SESSION 3

Figure 21. Reading about healthy lifestyle .Source:
http://hermanospinzon4th.blogspot.com/2016/01/natural-science-commin-illnesses-unit-3.html

Figure 22. Sleeping activity. Source: Photocopiable material © 2015 Santillana Educación, S.L.

SESSION 5

Figure 23. Drugs and Alcohol poster. Source: www.pinterest.com
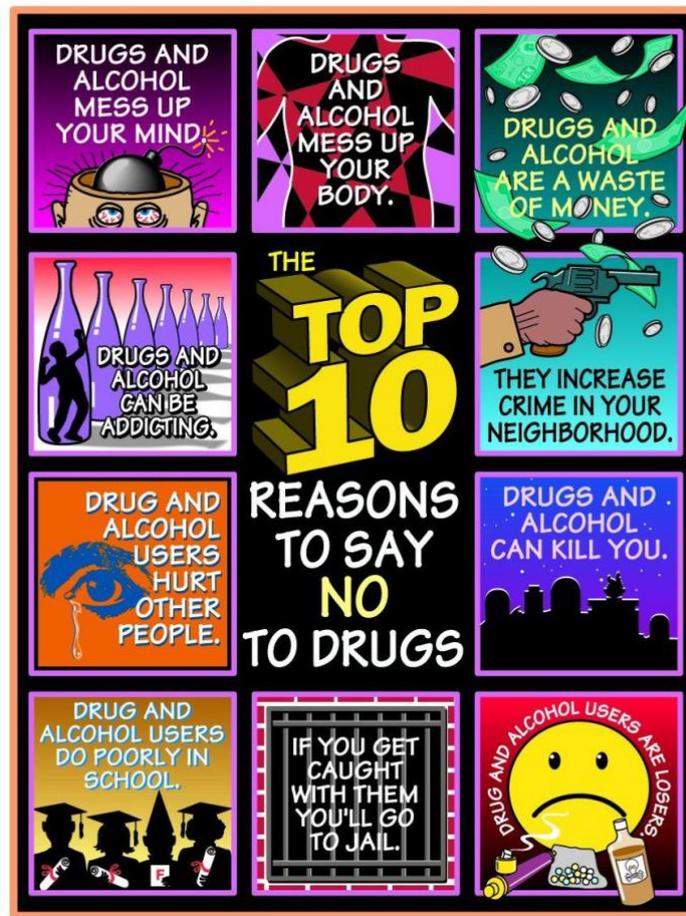
SESSION 6

Figure 24. Instructions for the poster. Source: the author

INSTRUCTIONS FOR THE POSTER

1. Write the title for the poster.
2. Put all the food labels in the table and classify them into fresh food and process food.
3. Stick each label on the poster.
4. Present your poster to the rest of the class.

SESSION 7

Figure 25. Review acitivities. Source: Photocopiable material © 2015 Santillana Educación, S.L.

Name _____ Date _____

1 Read and classify the words.

people – body – processes – emotions – relationships – pain – ourselves

physical health ⟩ _____

mental health ⟩ _____

social health ⟩ _____

2 Tick (✓) the correct boxes.

	prevention	health care
Getting vaccinations		
Taking medicine prescribed by the doctor		
Going to the doctor when you are ill		
Having healthy habits		
Going to the doctor for a check-up		
Visiting medical specialists		

3 Read and match.

a. Keeping your back straight when you are sitting.   hygiene

b. Brushing your teeth after every meal.   sleep

c. Practising sports.   posture

d. Visiting an amusement park.   physical exercise

e. Sleeping ten hours a day.   leisure activities

Figure 26. Review acitivties. Source: Photocopiable material © 2015 Santillana Educación, S.L.

4 Write *T* (true) or *F* (false). Then, correct the false sentences.

a. Visiting a museum is a leisure activity.

b. Good posture helps you to prevent hand pain.

c. You should wash your hands once a day.

d. Physical exercise makes you stronger and more flexible.

e. Children need to sleep eight hours a day.

5 Match the two halves and write complete sentences.

a. Eat a variety of foods to get   fruit, vegetables and pulses.

b. Reduce fats of animal origin,   cakes, sweets and fizzy drinks.

c. Eat plenty of fibre found in   all the nutrients your body needs.

d. Reduce sugar found in   such as bacon and butter.

6 Look at the pictures and write an accident prevention recommendation for each.

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Figure 27. Self-assessment checklist. Source: the author

SELF-ASSESSMENT

4. I know what nutrients do in our body.
5. I identify different ways to keep healthy.
6. I can name some nutrients.
7. I know some of the most important medical inventions.
8. I understand how drugs and alcohol work in our body.

SESSION 8

Figure 28. Unit Test. Source: Photocopiable material © 2015 Santillana Educación, S.L.

Figure 29. Extension Activity. Source: Photocopiable material © 2015 Santillana Educación, S.L.

Living for over a hundred years

The Japanese island of Okinawa has one of the largest populations of people over a hundred years old. The Italian island of Sardinia in the Mediterranean Sea also has a high number of centenarians. Doctors are trying to explain why Okinawa and Sardinia are so special.

What helps people live to be over a hundred? There are several reasons for this. In Okinawa the climate is mild, people have a healthy diet and they do a lot of exercise in the fresh air. And they are always in a good mood!

Apparently, the reasons in Sardinia are similar: mild weather, healthy lifestyle and strong social relationships.

1 Read the text and answer the questions.

a. Who are centenarians? _____

b. Which two places in the world have a large centenarian population? Where are they?

_____

_____

c. Why do people live such long lives in Okinawa? _____

_____

d. What about in Sardinia? _____

_____

2 Search the Internet to find out about the five oldest people in the world. Write their names, age and country of origin.

_____

_____

_____

_____

_____

_____

Photocopiable material © 2015 Santillana Educación, S.L.

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HOTS ACTIVITY

Figure 30. Reinforcement Activity. Source: Photocopiable material © 2015 Santillana Educación, S.L.

Name _____   Date _____

1 **How many hours do you sleep a day?**

Getting enough sleep is essential to stay healthy.

Instructions

1. You are going to record how many hours you sleep per day for a week.

2. Write the time you go to bed and the time you wake up every day. Calculate the hours you sleep and record your results in the table.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
hours of sleep							

3. At the end of the week, look at the table and answer the questions.

a. Did you sleep the same number of hours every day?

_____

b. Do you sleep the same number of hours on weekdays as at weekends?

_____

c. Which day did you sleep the most hours?

_____

d. Which day did you sleep the least hours?

_____

e. How many hours do you sleep on average?

_____

f. Do you think you are a good or a bad sleeper?

_____

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ASSESSMENT CHECKLISTS

Figure 31. Presentation Assessment Rubric. Source:
http://en.copian.ca/library/learning/btg/ed/evaluation/evaluation.pdf

Presentation Rubric

	Apprentice	**B**asic	**L**earned	**E**xemplary
Organization	Audience cannot understand presentation because there is no sequence of information.	Audience has difficulty following presentation because student jumps around.	Student presents information in logical sequence which audience can follow.	Student presents information in logical, interesting sequence which audience can follow.
Subject Knowledge	Student does not have grasp of information; student cannot answer questions about subject.	Student is uncomfortable with information and is able to answer only rudimentary questions.	Student is at ease with expected answers to all questions, but fails to elaborate.	Student demonstrates full knowledge (more than required) by answering all class questions with explanations and elaboration.
Graphics	Student uses superfluous graphics or no graphics	Student occasionally uses graphics that rarely support text and presentation.	Student's graphics relate to text and presentation.	Student's graphics explain and reinforce screen text and presentation.
Mechanics	Student's presentation has four or more spelling errors and/or grammatical errors.	Presentation has three misspellings and/or grammatical errors.	Presentation has no more than two misspellings and/or grammatical errors.	Presentation has no misspellings or grammatical errors.
Eye Contact	Student reads all of report with no eye contact.	Student occasionally uses eye contact, but still reads most of report.	Student maintains eye contact most of the time but frequently returns to notes.	Student maintains eye contact with audience, seldom returning to notes.
Elocution	Student mumbles, incorrectly pronounces terms, and speaks too quietly for students in the back of class to hear.	Student's voice is low. Student incorrectly pronounces terms. Audience members have difficulty hearing presentation.	Student's voice is clear. Student pronounces most words correctly. Most audience members can hear presentation.	Student uses a clear voice and correct, precise pronunciation of terms so that all audience members can hear presentation.

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Table 8. Peer Assessment Checlist. Source: The author

PEER ASSESSMENT. **GROUP MEMBERS:**			
Students pronounce the language correctly with rhythm and intonation.			
Students show great understanding of the topic and use the correct vocabulary.			
Students are able to communicate ideas clearly.			
Students have prepared the presentation.			
The project has been worked and shows the most important parts that was required.			
The project is original and has used the material in a good way.			

6.4.3. Resources Didactic Unit 7

SESSION 1

Figure 32. Venn Diagram. Edited in www.teach-nology.com

Figure 33. Flashcards about simple objects. Source: https://www.kids-pages.com/folders/flashcards/School_Objects/page1.htm

Figure 34. States of matter. Source: the author
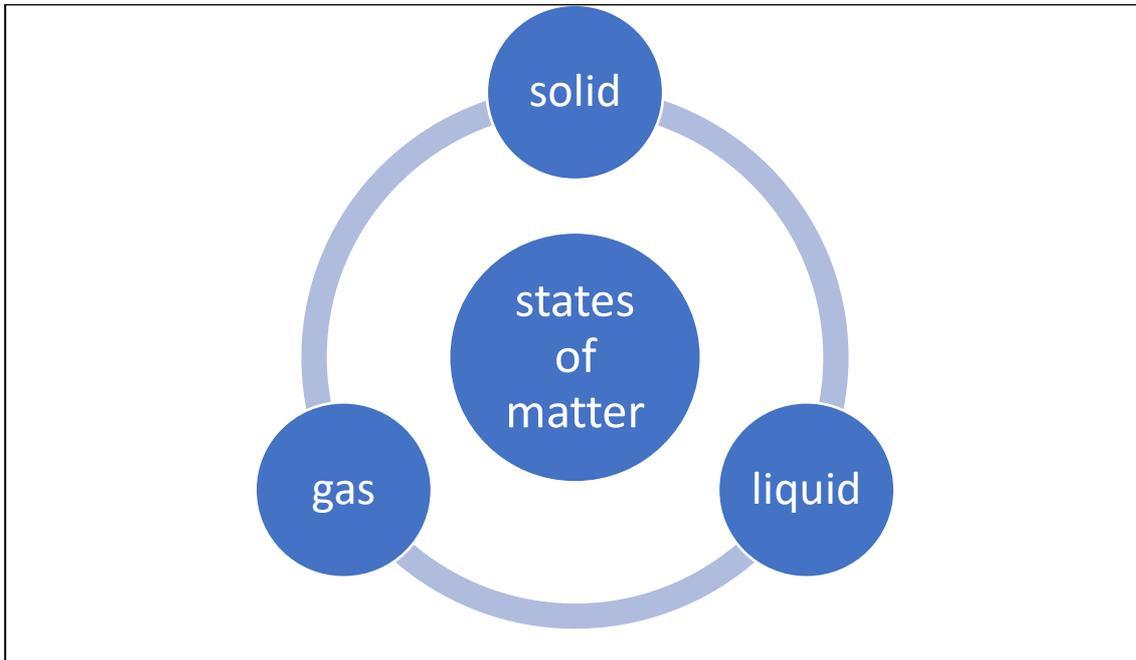
SESSION 2

Figure 35. Glossary. Source: the author.

SESSION 3

Figure 36. Thermal insulators and conductors. Source:
https://wardsci.com/www.wardsci.com/images/Gr_4_temp_probe.pdf

Different materials transfer heat and keep things warm (or cool) in various ways. Some materials are good thermal **insulators**, which do not let heat pass through easily. Thermal insulators are good at keeping heat out and keeping heat in. A good example of a thermal insulator is your winter scarf because it stops the heat from your body escaping into the cold air. Plastic is another good example of a thermal insulator. It can be used as a handle on a saucepan - the plastic stops the heat from traveling to your hand.

Other materials are good thermal **conductors** which do the opposite of insulators; they let heat pass through them with ease. Metals are a good example of thermal conductors; we use metals to make objects that need to conduct heat well. For example, metal pans conduct heat well so the food inside heats up quickly.

Figure 37. Model of conductor and insulators. Source:
https://i.pinimg.com/originals/fe/21/fa/fe21fa174b84a30fb3dbd71b5661f9a3.jpg
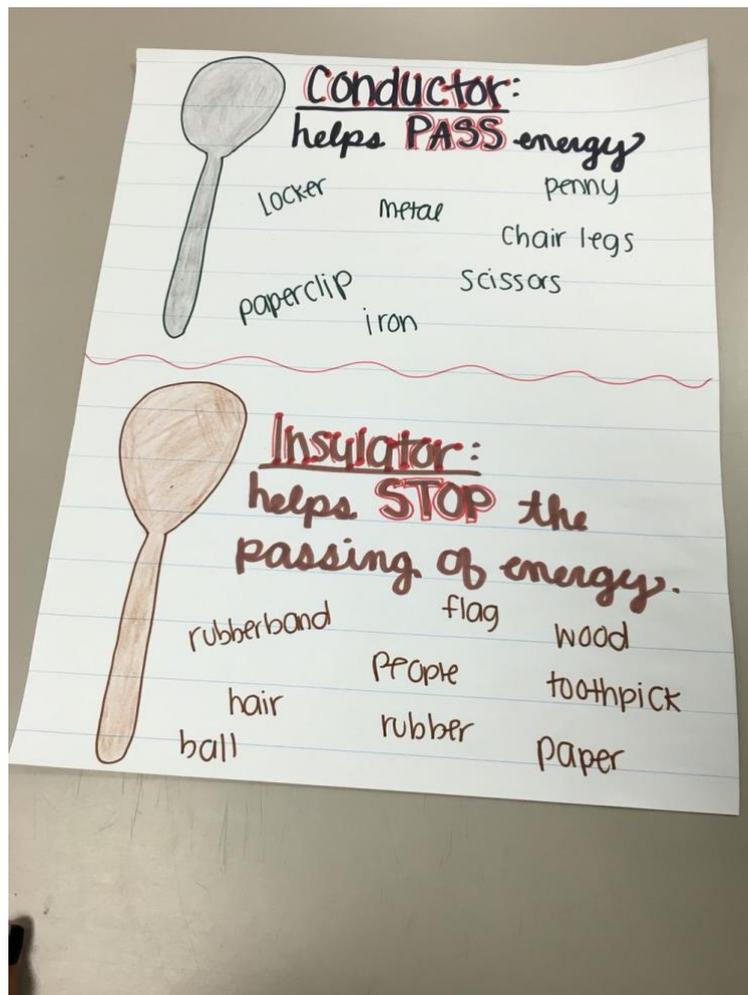
SESSION 4

Figure 38. Wrting frame for mixtures. Source:

Mixture 1 Water + salt
The water dissolves /does not dissolve
Type of mixture_____
Mixture 2 Water + beans
The water dissolves /does not dissolve
Type of mixture _____

Mixtures and solutions
1.Differences…
2. Names…

Figure 39. Venn Diagram. Edited in www.teach-nology.com

Name _____   Subject: Science

Teacher: Patricia Gomez   Date: _____

MIXTURES

HETEROGENOUS

HOMOGENEOUS

Powered by TeAch-nology.com- www.teach-nology.com

SESSION 5

Figure 40. Solutions. Source: the author

1. HOT CHOCOLATE
2. TOMATO SUP
3. MINT TEA
4. LEMON YOGURT
5. WATER WITH SHAMPOO

Figure 41. Solutions Theory. Source: the author

SOLVENT
- THE LIQUID IN WHICH THE SOLUTE IS DISSOLVE

SOLUTE
- THE COMPONENT THTA DISSOLVE IN THE SOLVENT

SOLUTION
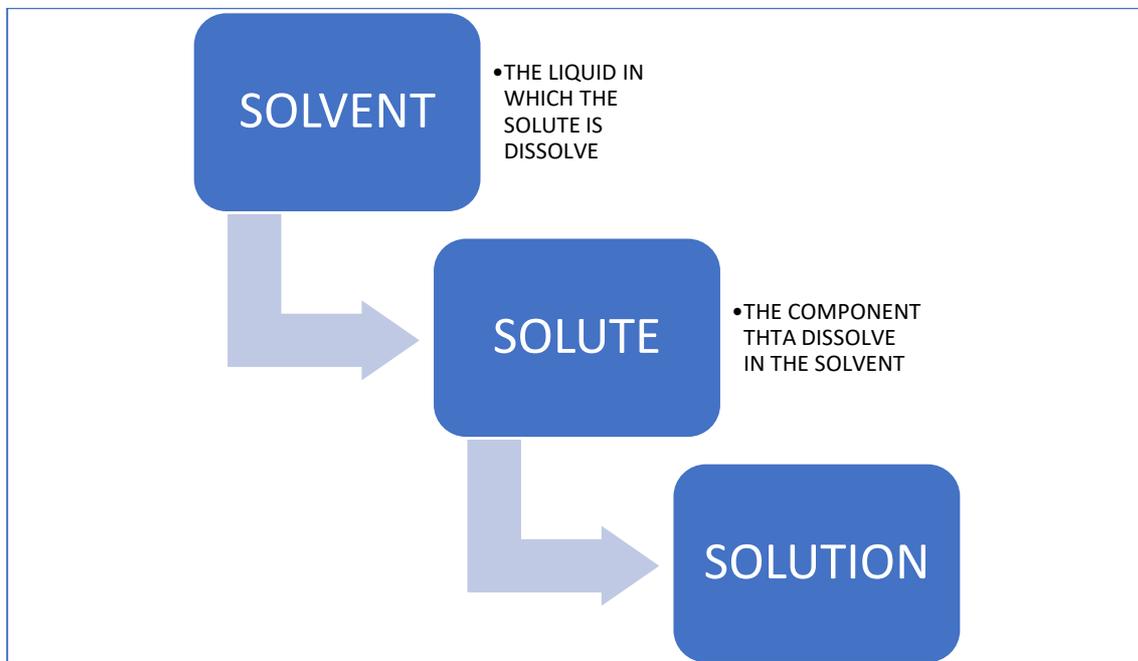
Figure 42. Instructions for experiment. Source: the author

INSTRUCTIONS MIXING CHOCOLATE POWDER

1. PUT THE SAME AMOUNT OF MILK AND CHOCOLATE POWDER IN THE CUP
2. MIX AND OBSERVE WHAT HAPPEN.

SESSION 6

Figure 43. Chemical and Physical Changes.
Source:https://www.generationgenius.com/learn-physical-and-chemical-changes

Chemical changes make new substances

Anytime a new substance is made, a chemical change takes place. Usually two or more materials are combined and a new substance is formed. A chemical change can produce amazing explosions, like fireworks. Some chemical changes are a little more difficult to spot, like when a nail rusts.

If you notice bubbles being formed, or a change in color or temperature, there is a good chance a chemical change has taken place, but not always. Scientists can determine if a chemical change has occurred by asking this question: Was the substance formed present before? If the answer is no, then it is a chemical change.

Since chemical changes make new substances, most of them cannot easily be undone. For example, when you burn wood, you can't really turn the gases back into a log very easily.

Physical changes do not make a new substance.

Physical changes come in many forms. It can be a change in the shape or appearance of an object, like crumpling a piece of paper, or cutting, bending, or dissolving something.

Since objects do not become a different substance during a physical change, it is usually easy to reverse the change. For example, if you dissolve sugar in water you can easily reverse the change by evaporating the water from the solution. When all the water evaporates, sugar crystals will be left behind.

Figure 44. Chemical and Physical changes worksheet. Source: the author.

PHYSICAL CHANGES

- –

CHEMICAL CHANGES

- –

SESSION 7

Figure 45. Model of mindmap. Source: http://blog.popplet.com/dr-popplet-health-happiness-and-well-being/
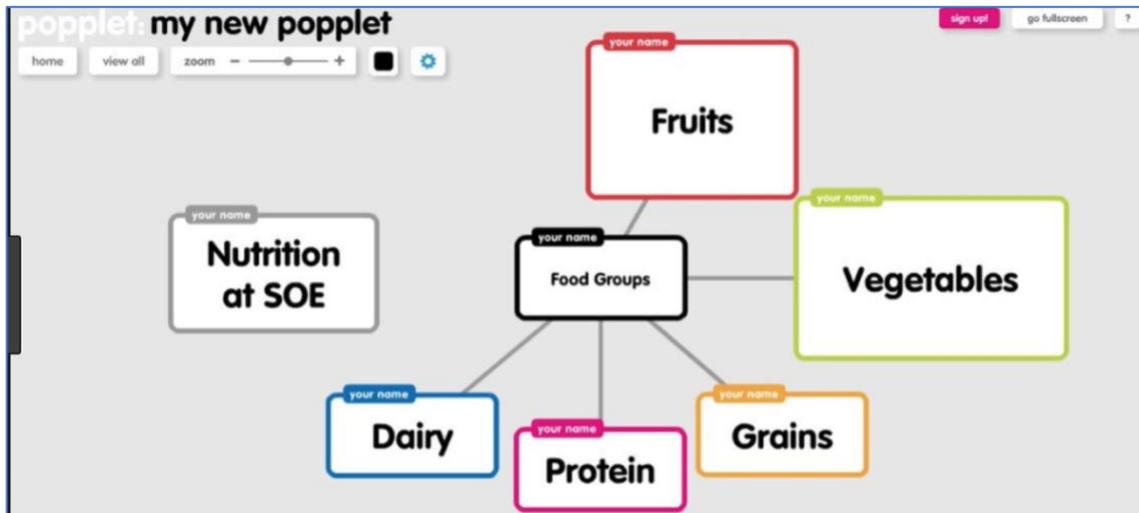
Figure 46. Self-assessment checklist. Source: the author

SELF-ASSESSMENT

1. I know what matter is
2. I know that matter is made of atom and molecules
3. I understand the differences between substances and mixtures.
4. I identify thermal insulators and conductors.
5. I understand how a solution is formed.
6. I know the difference between physical and chemical changes.

SESSION 8

Figure 47. Trivia template. Source: https://www.timvandevall.com/printables/board-game-template-02-bw/

Figure 48. Multiple choices unit test. Source:Photocopiable material © 2015 Santillana Educación, S.L.

Name _____ Date _____

1 Matter is everything around us that takes up…

    a. space.   b. volume.   c. mass.

2 Mass and volume are…

    a. common to all matter.   b. different for each substance.   c. always the same.

3 Mass is measured using…

    a. a thermometer.   b. scales.   c. a measuring cylinder.

4 There are 1,000 ml or 1,000 cm^3 in a…

    a. litre.   b. cubic metre.   c. kilogram.

5 The concentration of matter in an object is the…

    a. volume.   b. mass.   c. density.

6 To calculate the density of an object, we need to…

    a. divide its volume by its mass.
    b. divide its mass by its volume.
    c. multiply its mass by its volume.

7 Objects float because their density…

    a. is equal to the density of water.
    b. is lower than the density of water.
    c. is higher than the density of water.

8 Wood, glass and pottery are not…

    a. good conductors of heat.
    b. good conductors of electricity.
    c. good conductors of heat and electricity.

9 Most plastics are made from…

    a. petroleum.   b. minerals.   c. sand.

10 Smart clothing for outdoor activities include…

    a. solar shade clothing and fire-resistant clothing.
    b. solar shade clothing and waterproof breathable clothing.
    c. waterproof breathable clothing and fire-resistant clothing.

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HOTS ACTIVITY

Figure 49. Extension Activity. Source:Photocopiable material © 2015 Santillana Educación, S.L.

Name _____ Date _____

Amazing materials

Nowadays, there are many new materials with amazing properties. Fibreglass is one of them. It is made of very thin threads, or fibres, of glass. When these glass fibres are woven together, they make a light, but strong and versatile material. Fibreglass is used to make many different objects, such as boats, surfboards and poles for pole vaulting.

Fibreglass is also used to make optical fibre. This material is made of very fine fibres of pure glass. Light travels easily through them. Cables made of optical fibre can send information in the form of light from one side of our planet to the other.

1 Read the text and complete the index card.

Fibreglass

Composition: _____

Properties: _____

Uses: _____

_____

2 Search the Internet for information about two new materials. Then, complete.

name	composition	properties	uses

Photocopiable material © 2015 Santillana Educación, S.L.

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6.4.4. Resources Didactic Unit 9

SESSION 1

Figure 50. Simple machines flashcards. Source:
https://www.teacherspayteachers.com/Store/One-Room-Schoolhouse

Figure 51. Simple Machines Worksheet. Source: the author.

HOME

SCHOOL

STREET

Figure 52. Writing frame about simple and complex machines. Source: the author

DID RECOGNIZE	DID NOT RECOGNIZE

SESSION 2

Figure 53. See-saw image. Source: https://www.liberaldictionary.com/see-saw/

Figure 54. Instructions for experiment. Source: the author.

INSTRUCTIONS

1. MAKE A SEE-SAW WITH THE MATERIALS AND TRY TO LIFT THE BOOK.
2. CHANGE DE POSITION OF TEH RUBBER
3. DRAW A PICTURE OF THE RESULT ON YOUR NOTEBOOK.

SESSION 3

Figure 55. Well image. Source: https://es.123rf.com/photo_36432745_de-dibujos-animados-retro-del-estilo-del-c%C3%B3mic-pozo-de-los-deseos.html

Figure 56. Wheel. Source: https://galeria.dibujos.net/vehiculos/otros/bicicleta-para-ninos-pintado-por--11466854.html
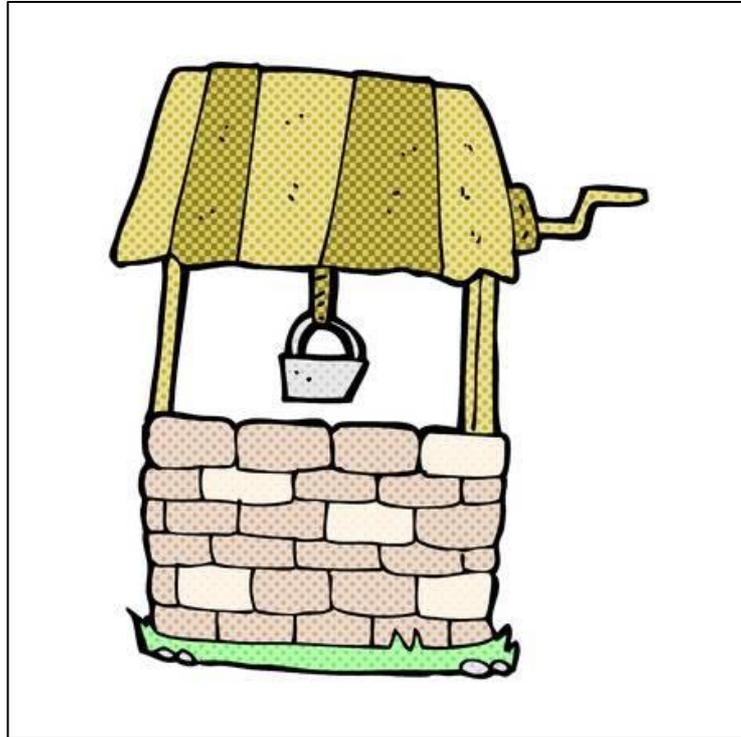
Figure 57. Crane image. Source: *https://www.guiainfantil.com/dibujo-de-una-grua-para-colorear/*

Figure 58. Zip line image. Source: *https://www.pictotraductor.com/frase/541617/centro-comercial-tirolina-rocodromo-montar*

SESSION 4

Figure 60. Types of inclined planes. Source: eschooltoday.com
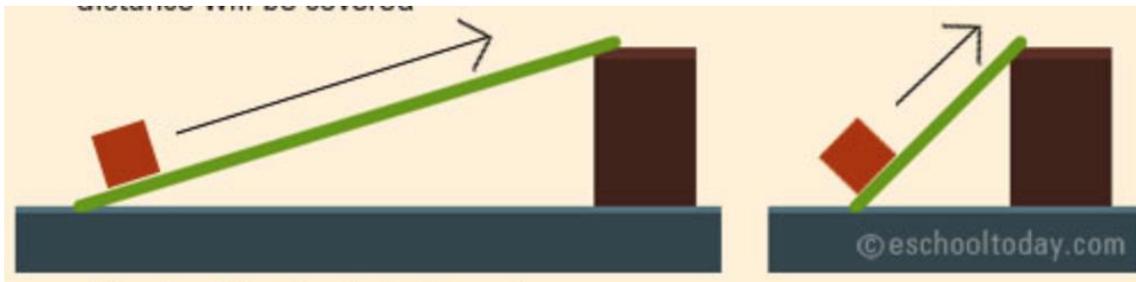
Figure 61. Cootie Catcher template. Source:
https://www.pinterest.es/pin/215821007118815448/?lp=true
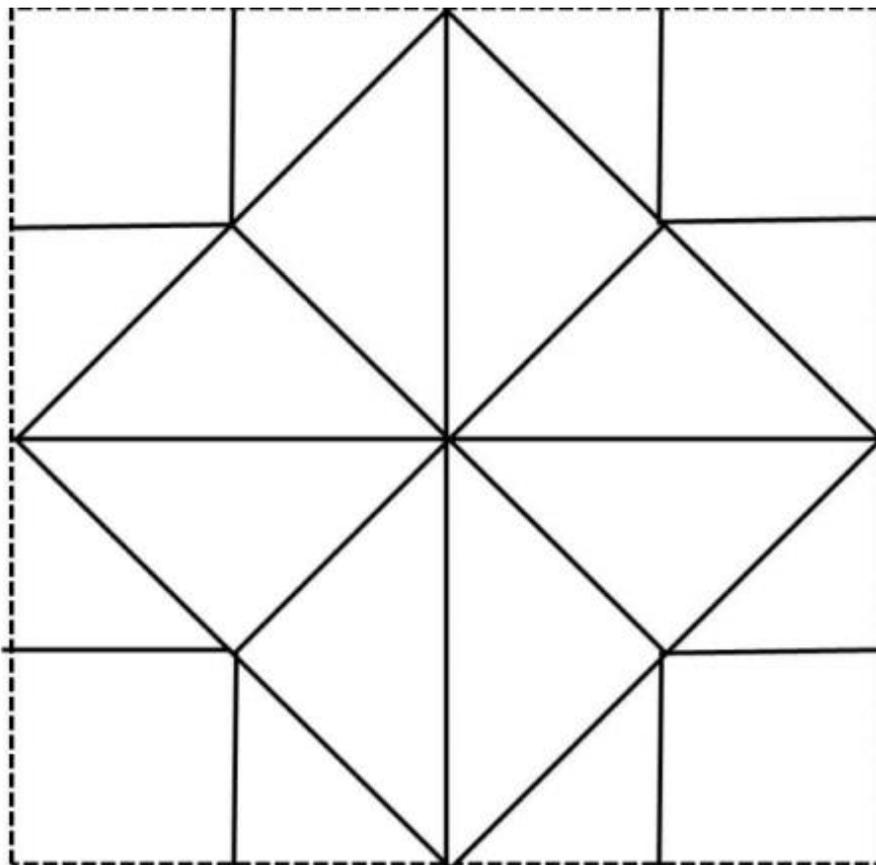
Figure 62. Simple machines cootie catcher model. Source:
https://i.pinimg.com/originals/7a/75/fd/7a75fdd80d6cbe847fcff174289b5ffe.gif
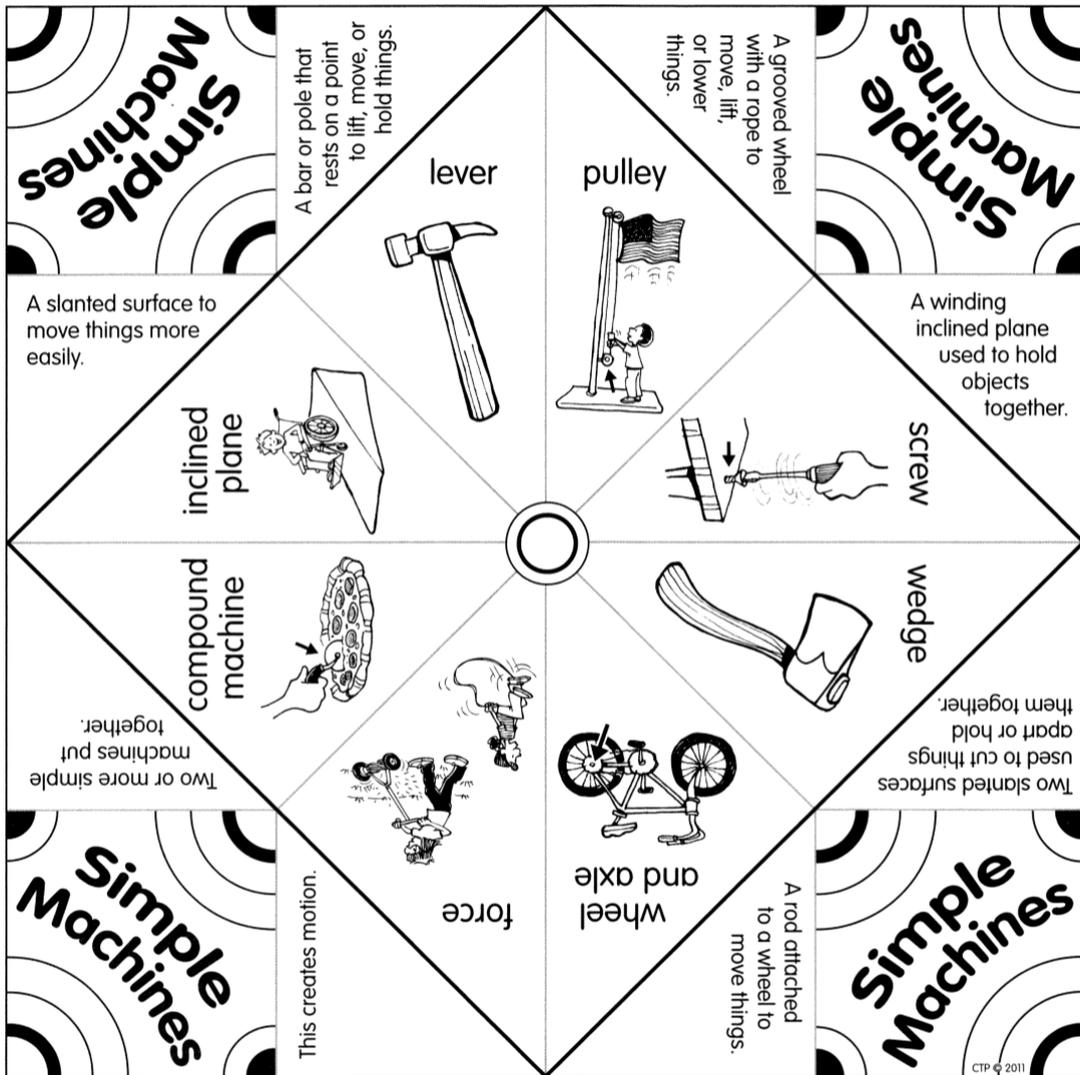
SESSION 5

Figure 63. Label de Bicycle worksheet. Source:
http://www.schoolofdragons.com/lang/es/resources/label-the-bicycle-view

LABEL THE BICYCLE

The Word Box below contains names of the different parts of a bicycle. Write the names in the spaces provided.

Word Box

Handlebar   Spoke   Frame   Seat   Tire   Pedal
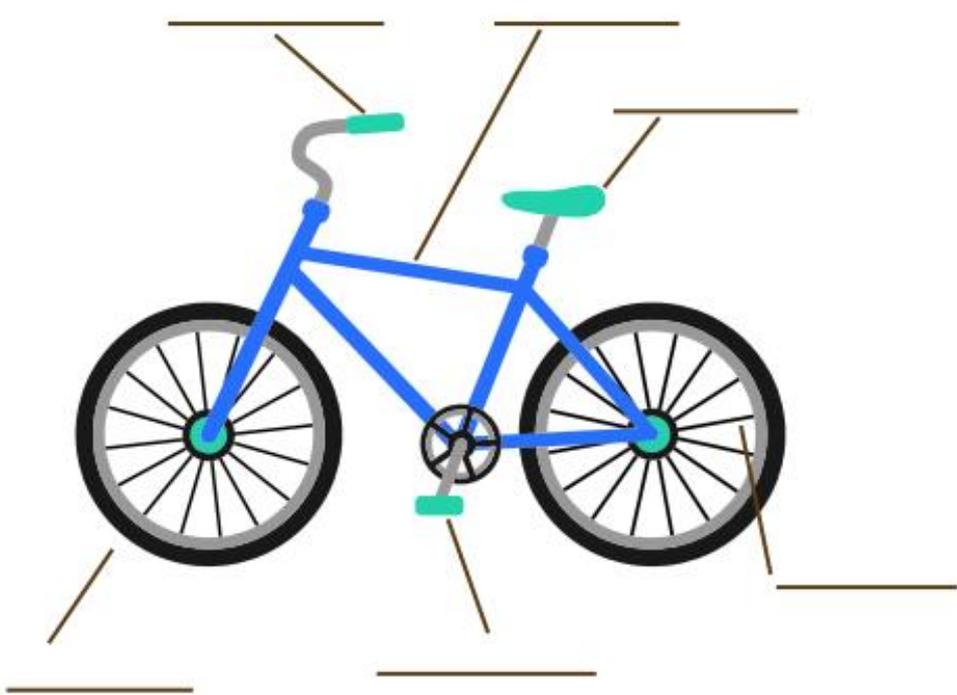
Figure 64. Label the Bicycle answer sheet. Source:
http://www.schoolofdragons.com/lang/es/resources/label-the-bicycle-view
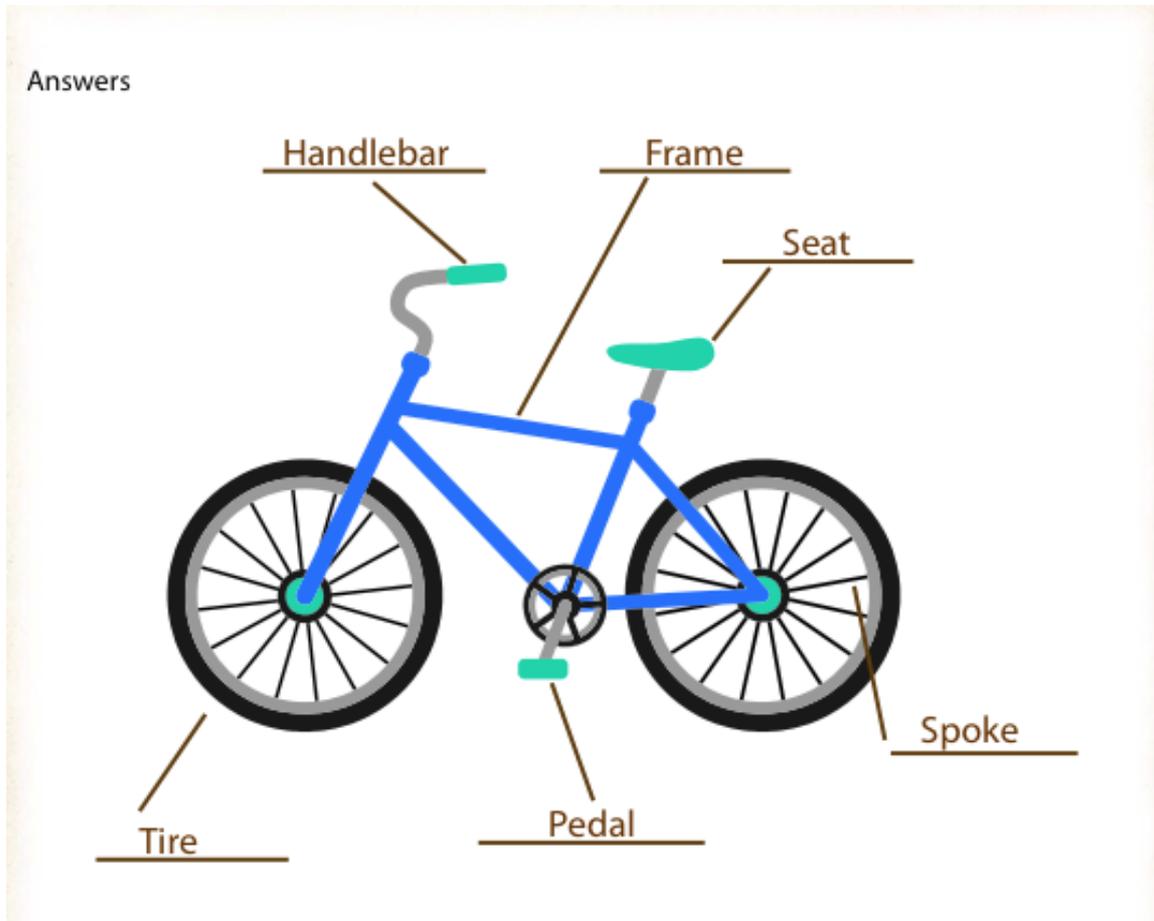
Figure 65. Words cards. Source: the author

HANDLE BAR	FRAME	TIRE
PEDAL	SPOKE	SEAT

Figure 66. Compare and Contrast frame. Source:
https://www.biologycorner.com/worksheets/graphic_compare.html
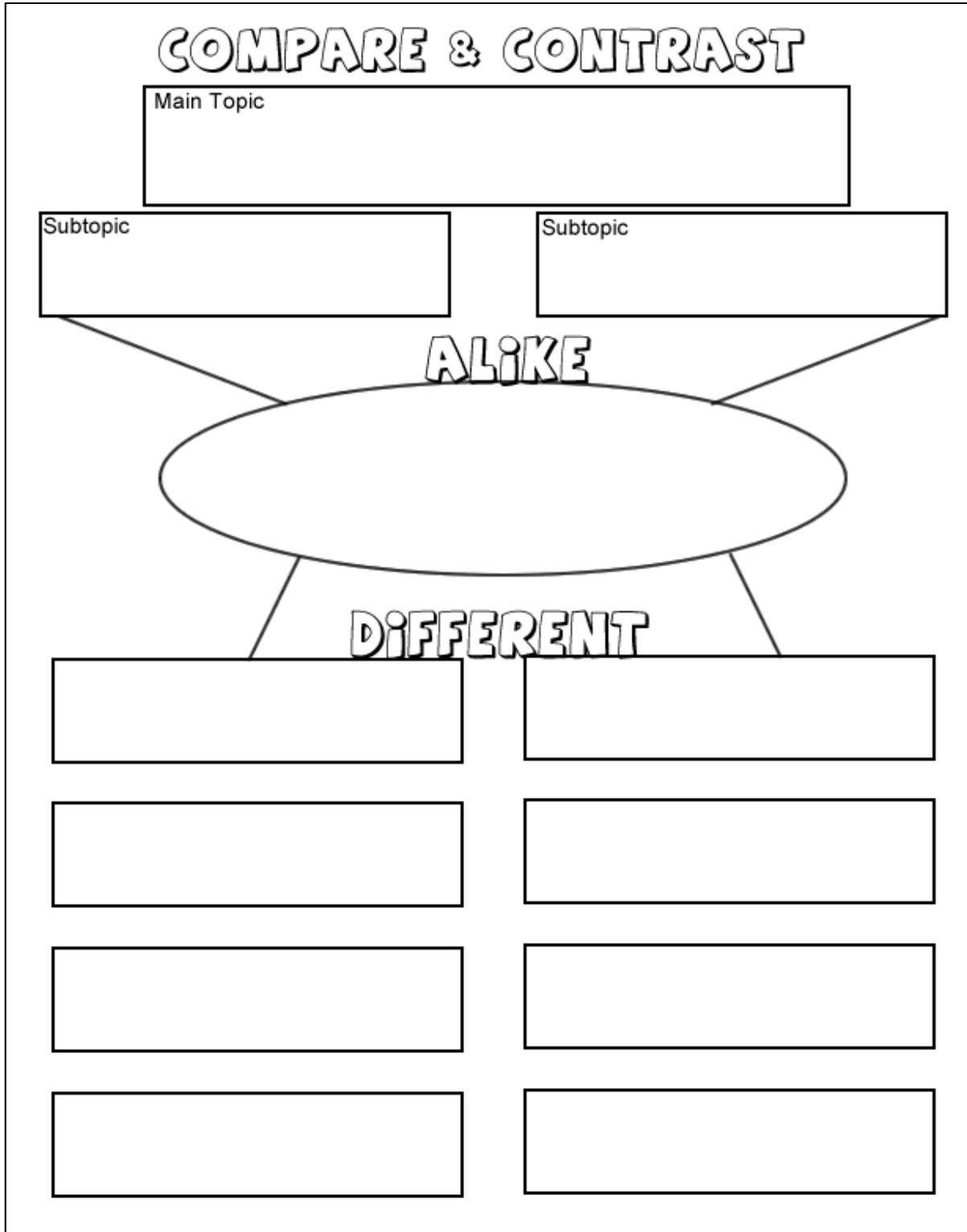
SESSION 6

Figure 67. Archimedes Comic Story. Source:
https://serpmedia.org/scigen/assets/archimedes_p1-4.pdf

© 2017 SERP   Page 2 of 4   serpmedia.org/scigen/M2.1

Patricia Gómez Herreros

© 2017 SERP   Page 3 of 4   serpmedia.org/scigen/M2.1
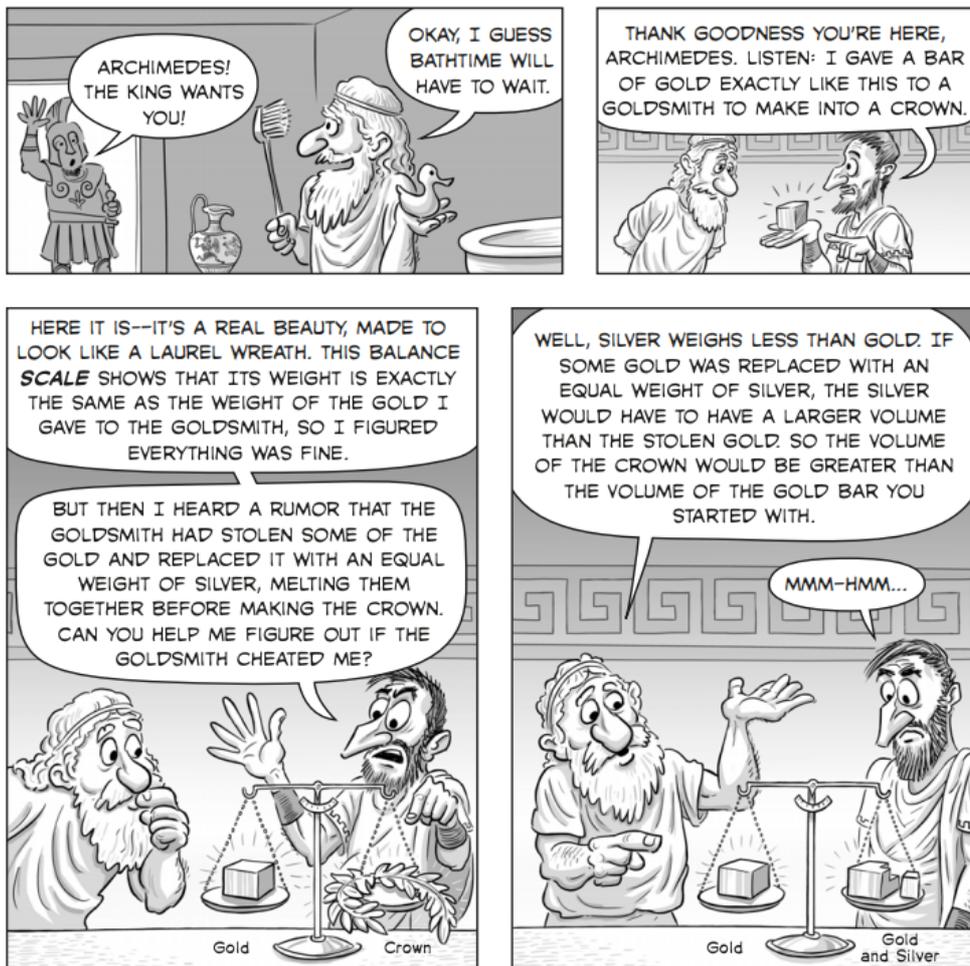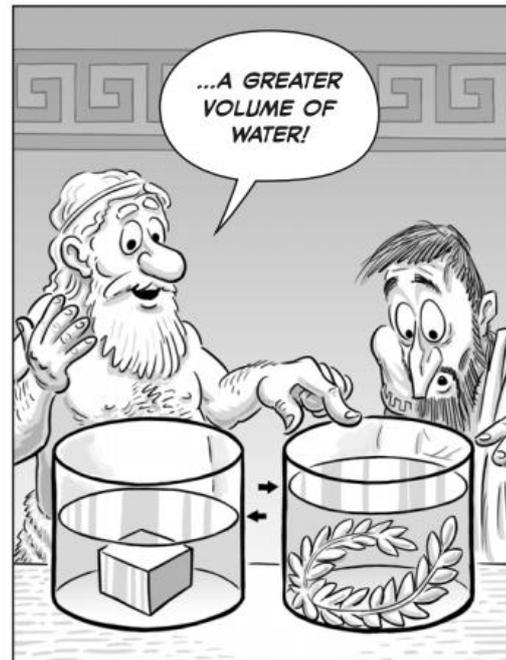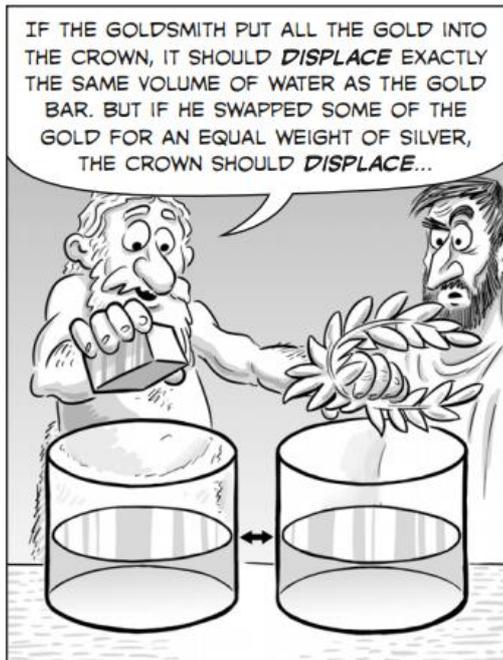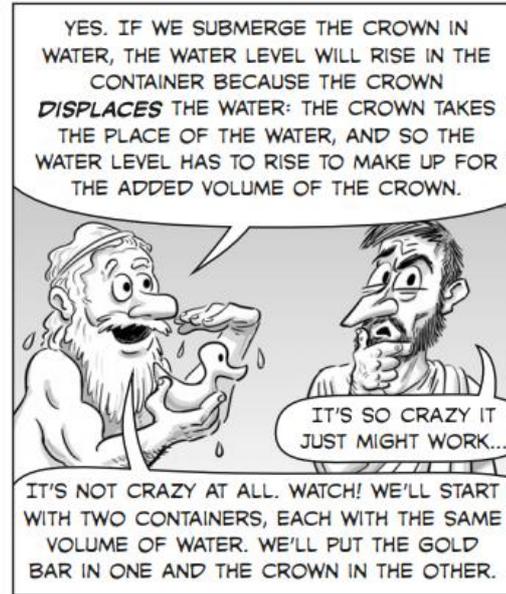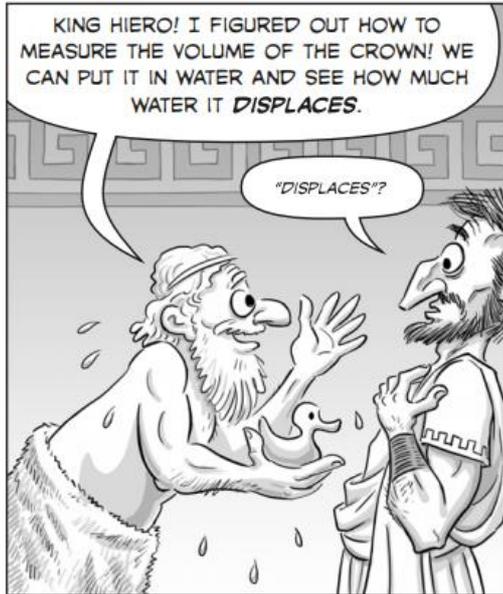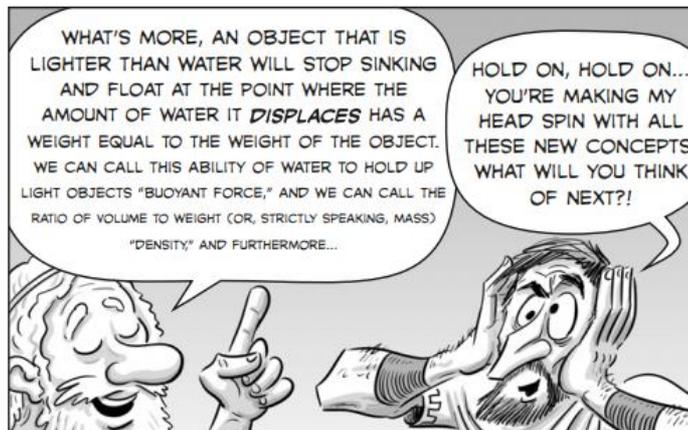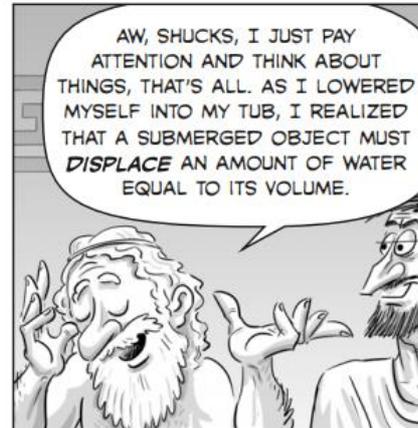
Figure 68. Archimedes biography model poster. Source:
https://www.pinterest.es/pin/117164027778463539/?lp=true

Figure 69. Biography Report Form. Source: www.educationpossible.com

Biography Report Form/Organizer

Person's Name: _____

Birthdate: _____

Hometown: _____

Parents/Siblings: _____

Date of death: _____

Photo or drawing

What is this person famous for:

_____

_____

_____

Interesting facts about this person:

_____

_____

_____

Four adjectives you would use to describe this person:

_____ _____ _____ _____

Quote from this person:

_____

What did you learn from researching this person?

_____

If you could ask this person one question, what would it be?

_____

www.educationpossible.com ©2013 Education Possible

SESSION 8

Figure 70. Extension Activity. Source: Photocopiable material © 2015 Santillana Educación, S.L.

Name _____ Date _____

Levers over time

Did you know that our arms are levers? Yes, these simple machines are as old as human beings. However, animals were the first to make use of levers. Sea otters use rocks to open seashells, and orangutans use sticks to open fruit. Human beings also used objects as levers for these simple tasks. Later, they started to use trees as levers to move heavy rocks.

Ancient Egyptians used levers to build pyramids and to draw water from rivers. Later in Ancient Greece, Archimedes wrote the Law of the Lever, which explains how levers work. Ancient Rome found new uses for levers: Romans used scissors to make clothing, and catapults to fight enemy armies.

Nowadays, we use objects as levers in many different ways, for example, a hammer to bang in a nail, a bottle-opener to open a bottle, or a screwdriver to take the lid off a tin of paint.

1 Complete the timeline to show the history of levers.

| Ancient Egypt | Ancient Greece | Ancient Rome |

2 Search the Internet for examples of how we use levers nowadays.

at school	at home	in the playground

Figure 71. Reinforcement activity. Source: Photocopiable material © 2015 Santillana Educación, S.L.

Name _____ Date _____

A dizzy race

A Formula 1 car is a very complex machine. It is made up of thousands of pieces. A fuel engine moves the gears, belts and chains. These parts transmit the movement from the engine to the wheels. The wheels then move the car. In addition, electric and electronic circuits allow the driver to check the car's functions, for example, how much fuel is left.

Driving a Formula 1 car is not easy. The driver of the car has to face intense forces that push him against the seat, or shake him about when he drives very fast round corners. Most Formula 1 drivers wear a neck protector to soften the effect of these forces.

1 Read the text and answer the questions.

    a. What type of machine is a Formula 1 car? _____

    b. Which operating parts transmit the movement from the engine to the wheels?

    _____

    c. What types of components allow the driver to know how much fuel is left?

    _____

    d. What protection do most drivers use? Why?

    _____

    _____

2 Search the Internet for information about three Formula 1 Grands Prix. Complete the table.

Formula 1 Grand Prix	country	dates held	number of races

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ASSESSMENT CHECKLISTS

Figure 72. Self-assessment checklist. Source: the author

SELF-ASSESSMENT

1. I understand simple and complex machines.
2. I understand how lever, pulleys and inclined planes works.
3. I recognize lever, pulleys and inclined planes if I see them.
4. I can name Archimedes' main discoveries.

Table 9. Peer assessment checklist. Source: the author

PEER ASSESSMENT. GROUP MEMBERS:			
	☹	😐	🙂
Students pronounce the language correctly with rhythm and intonation.			
Students show great understanding of the topic and use the correct vocabulary.			
Students are able to communicate ideas clearly.			
Students have prepared the presentation.			
The project has been worked and shows the most			

important parts that was required.			
The project is original and has used the material in a good way.			

Figure 73. Grading Rubric for Written Assignments. Source:
http://home.snu.edu/~hculbert/criteria.pdf

Grading Rubric for Written Assignments

Levels of Assessment

Criteria	Inadequate=D (Below Standard)	Adequate=C (Meets Standard)	Above Average=B (Exceeds Standard)	Exemplary=A (Far Exceeds Standard)
Organization	Writing lacks logical organization. It shows some coherence but ideas lack unity. Serious errors.	Writing is coherent and logically organized. Some points remain misplaced and stray from the topic. Transitions evident but not used throughout essay.	Writing is coherent and logically organized with transitions used between ideas and paragraphs to create coherence. Overall unity of ideas is present.	Writing shows high degree of attention to logic and reasoning of points. Unity clearly leads the reader to the conclusion and stirs thought regarding the topic.
Level of Content	Shows some thinking and reasoning but most ideas are underdeveloped and unoriginal.	Content indicates thinking and reasoning applied with original thought on a few ideas.	Content indicates original thinking and develops ideas with sufficient and firm evidence.	Content indicates synthesis of ideas, in-depth analysis and evidences original thought and support for the topic.
Development	Main points lack detailed development. Ideas are vague with little evidence of critical thinking.	Main points are present with limited detail and development. Some critical thinking is present.	Main points well developed with quality supporting details and quantity. Critical thinking is weaved into points	Main points well developed with high quality and quantity support. Reveals high degree of critical thinking.
Grammar & Mechanics	Spelling, punctuation, and grammatical errors create distraction, making reading difficult; fragments, comma splices, run-ons evident. Errors are frequent.	Most spelling, punctuation, and grammar correct allowing reader to progress though essay. Some errors remain.	Essay has few spelling, punctuation, and grammatical errors allowing reader to follow ideas clearly. Very few fragments or run-ons.	Essay is free of distracting spelling, punctuation, and grammatical errors; absent of fragments, comma splices, and run-ons.
Style	Mostly in elementary form with little or no variety in sentence structure, diction, rhetorical devices or emphasis.	Approaches college level usage of some variety in sentence patterns, diction, and rhetorical devices.	Attains college level style; tone is appropriate and rhetorical devices used to enhance content; sentence variety used effectively.	Shows outstanding style going beyond usual college level; rhetorical devices and tone used effectively; creative use of sentence structure and coordination
Format	Fails to follow format and assignment requirements; incorrect margins, spacing and indentation; neatness of essay needs attention.	Meets format and assignment requirements; generally correct margins, spacing, and indentations; essay is neat but may have some assembly errors.	Meets format and assignment requirements; margins, spacing, and indentations are correct; essay is neat and correctly assembled.	Meets all formal and assignment requirements and evidences attention to detail; all margins, spacing and indentations are correct; essay is neat and correctly assembled with professional look.

Figure 74. Presentation Assessment Rubric. Source:
http://en.copian.ca/library/learning/btg/ed/evaluation/evaluation.pdf

Presentation Rubric

	Apprentice	**B**asic	**L**earned	**E**xemplary
Organization	Audience cannot understand presentation because there is no sequence of information.	Audience has difficulty following presentation because student jumps around.	Student presents information in logical sequence which audience can follow.	Student presents information in logical, interesting sequence which audience can follow.
Subject Knowledge	Student does not have grasp of information; student cannot answer questions about subject.	Student is uncomfortable with information and is able to answer only rudimentary questions.	Student is at ease with expected answers to all questions, but fails to elaborate.	Student demonstrates full knowledge (more than required) by answering all class questions with explanations and elaboration.
Graphics	Student uses superfluous graphics or no graphics	Student occasionally uses graphics that rarely support text and presentation.	Student's graphics relate to text and presentation.	Student's graphics explain and reinforce screen text and presentation.
Mechanics	Student's presentation has four or more spelling errors and/or grammatical errors.	Presentation has three misspellings and/or grammatical errors.	Presentation has no more than two misspellings and/or grammatical errors.	Presentation has no misspellings or grammatical errors.
Eye Contact	Student reads all of report with no eye contact.	Student occasionally uses eye contact, but still reads most of report.	Student maintains eye contact most of the time but frequently returns to notes.	Student maintains eye contact with audience, seldom returning to notes.
Elocution	Student mumbles, incorrectly pronounces terms, and speaks too quietly for students in the back of class to hear.	Student's voice is low. Student incorrectly pronounces terms. Audience members have difficulty hearing presentation.	Student's voice is clear. Student pronounces most words correctly. Most audience members can hear presentation.	Student uses a clear voice and correct, precise pronunciation of terms so that all audience members can hear presentation.

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