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STEAM CLIL

A new digital era for bilingual education.

Annual Syllabus for Technology and Robotics in 5th Grade Primary Education.

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PROGRAMACIÓN GENERAL ANUAL - CLIL
ÁREA DE TECNOLOGÍA Y ROBÓTICA

5º EDUCACIÓN PRIMARIA

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ABSTRACT

This Final Degree Project presents an Annual Syllabus designed for the fifth year of Primary Education (10-11 years old). The syllabus combines the CLIL (Content and Language Integrated Learning) and STEAM (Science, Technology, Engineering, Art, and Math) approaches, implemented in the curricular area of Technology and Robotics. The syllabus is structured in two parts. The first presents the theoretical framework and justifies the CLIL and STEAM approaches and its symbiotic relationship. In the second, three learning situations ("Chaos on wheels", "Time to recharge" and "Fix the glinch") are explained, each including five challenges, distributed throughout the three terms of the academic year. In this design, both the theoretical framework and the competencies to be developed have been taken into account. In addition, each learning situation is linked to a final product that integrates different genres and text types, allowing the content and language to be worked on simultaneously in an integrated manner. Throughout this process, students will be accompanied by the Artificial Intelligence (AI) generated characters Zira-11, Neon-X and Oria-22, who guide them in the challenges, developing both technological and linguistic skills.

***Keywords**:* CLIL, digital competence, Artificial Intelligence (AI), technology, primary education.

RESUMEN

Este Trabajo de Fin de Grado presenta una Programación Anual diseñada para el quinto curso de Educación Primaria (10-11 años). La programación anual combina los enfoques AICLE (Aprendizaje Integrado de Contenidos y Lenguas Extranjeras) y STEAM (ciencias, tecnología, ingeniería, artes y matemáticas) en el área curricular de Tecnología y Robótica. El plan de estudios se estructura en dos partes. La primera, presenta el marco teórico y justifica los enfoques CLIL y STEAM y su relación simbiótica. En el segundo, se explican tres situaciones de aprendizaje ("Chaos on wheels", "Time to recharge" and "Fix the glinch"), cada una de las cuales incluye cinco retos, distribuidos a lo largo de los tres trimestres del curso académico. En este diseño, se ha tenido en cuenta tanto el marco teórico como las competencias que se pretenden desarrollar. Además, cada situación de aprendizaje lleva ligado un producto final que integra diferentes géneros y textos literarios, permitiendo trabajar simultáneamente el contenido de manera integrada con la lengua. A lo largo de este proceso, los estudiantes irán acompañados de los personajes generados con inteligencia artificial (IA) Zira-11, Neón-X y Oria-22, quienes los guiarán en los desafíos que les permitirán desarrollar tanto competencias tecnológicas como lingüísticas.

Palabras clave: CLIL, competencia digital, Inteligencia Artificial (IA), tecnología, educación primaria.

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1. INTRODUCTION

In today's digital world, education needs to build students with 21st century skills and knowledge. This annual syllabus for the third cycle of primary education, focus on the digital domain through the CLIL (Content and Language Integrated Learning) approach. By combining this two, students will improve both their technology and language abilities at the same time.

The syllabus is organized around three learning situations, one for each term. They are design based on an interconnected story that ensure coherence and progression of the goals that we want to achieve. Each learning situation includes five challenges that focuses on real-life use, helping students think critically, work together, and solve problems while using the foreign language.

The first section of the project examines the theoretical framework, analysing methodologies, authors, and how CLIL integrates with digital skills. The second section puts this theorical framework into practice, providing the different learning situations.

1.1 Justification

This project connects the European Union's framework on key competences, especially digital competence, with the interdependent relationship between Science, Technology, Engineering, Arts and Mathematics (STEAM) education and the CLIL approach. Integrating these STEAM-CLIL approach also helps an interdisciplinary model that prepares students for a globalized and digital environment. According to Martín-Carrasquilla and Custodio-Espinar (2024), the hands on, problem-solving of STEAM fits with CLIL's goal of combining useful content and language learning. This helps students to think critically, be creative and work together.

This STEAM-CLIL approach also cultivates important skills such as digital literacy, multilingual communication, and scientific understanding, ensuring coherence and relevance across different disciplines. Rooted in the Digital Competence Framework (*DigComp*) and supporting the Digital Education Action Plan 2021–2027, introduced by the European Commision, the project provides students and educators with the tools needed to succeed in interconnected fields.

Without a doubt, my teaching practice this year has been a big motivation for me. It made me realise how important it is to make language learning engaging, as some students see it as a duty rather than something natural. That is why I have chosen this STEAM-CLIL focus, because it is supported by scientific evidence in its potential for promoting foreign language learning, and its alignment with STEAM education. Besides, CLIL is an innovative approach widely implemented in the schools of the Community of Madrid, where this syllabus is contextualised.

I have always been drawn to teaching in English since it is the global language of the future. Moreover, I believe that combining it with digitalization can yield great results, as both are finding their place in the new world of 21st-century education.

Finally, following the goals of the university's educational plan, I have gained theoretical knowledge, applied it in practical ways, and developed my identity as a teacher. As a result, this annual syllabus represents the culmination of my studies in this degree, demonstrating the educational values I strongly support.

1.2 Objectives

Objectives of the theoretical framework

- Explore how the CLIL approach helps by teaching robotics and technology in a bilingual school.
- Learn how teaching robotics and technology in primary education, help young students in STEAM learning.
- Support the syllabus´ design with references that demonstrate the importance of technology in today´s society.

Objectives of curriculum design

- Create an annual syllabus for Year 5 that combines English, robotics and technology in a practical way.
- Make sure the content follows educational standards and supports interdisciplinary learning with a STEAM focus.
- Design flexible activities and materials that fit the classroom´s needs and their interests.

Personal goals

- Apply the knowledge acquired during the degree to design an innovative annual syllabus.
- Develop interactive activities that helps critical thinking, creativity, and problem-solving in English.
- Analyse if the CLIL approach truly helps students to learn both English and robotics and technology.

2. THEORETICAL FRAMEWORK

2.1 Bilingual education

Bilingual education has become an important element of Madrid's education offer, with the region leading the implementation of the CLIL approach since the 2004-2005 academic year.

This initiative is part of a wider European Union policy that encourages early language learning to improve communication, inclusion, and cultural understanding among European Union (EU) member states (Commission of the European Communities, 2003). Initially started in Primary Education, Madrid's Bilingual Program has now expanded to encompass Secondary and Pre-Primary levels, demonstrating the regional government's dedication to making bilingualism a key part of its educational system.

A remarkable aspect of the program is that about a third of the curriculum is taught in English, with subjects like science, arts, and physical education being the most frequently offered in the foreign language (Llinares & Dafouz, 2010). Schools such as Padre Manyanet, which are part of both the Bilingual Program and the Bilingual English Development and Assessment (BEDA) program for Catholic institutions. These initiatives help to improve English language skills, encourage cultural exchange, and prepare students for the globalized world.

2.1.1 Regulations for bilingual education

To address bilingual education in Spain, it is essential to review its guidelines. The right to education is a fundamental right recognized in Article 27.1 of the Spanish Constitution of 1978 (CE), the highest law in the legal system. Article 27.2 CE emphasizes that education must promote the full development of human personality and respect for rights and freedoms.

Additionally, Article 27.4 CE establishes that education is compulsory and free, obliging public authorities to guarantee access for all citizens. Article 27.6 CE allows the creation of private educational centers, ensuring a plural and diverse educational offer that respects parents' freedom of choice. Finally, Article 27.5 CE mandates public authorities to regulate education to guarantee quality, inclusive access for everyone.

This right is further developed through laws such as the Organic Law on the Right to Education (LODE 8/1985). Its preamble highlights education as a fundamental pillar for social progress and individual freedoms.

These regulations have enabled the development of accessible, quality education in Spain, including bilingual education models that respect the country's linguistic and cultural diversity. Over time, various reforms have shaped an educational system designed to guarantee this fundamental right.

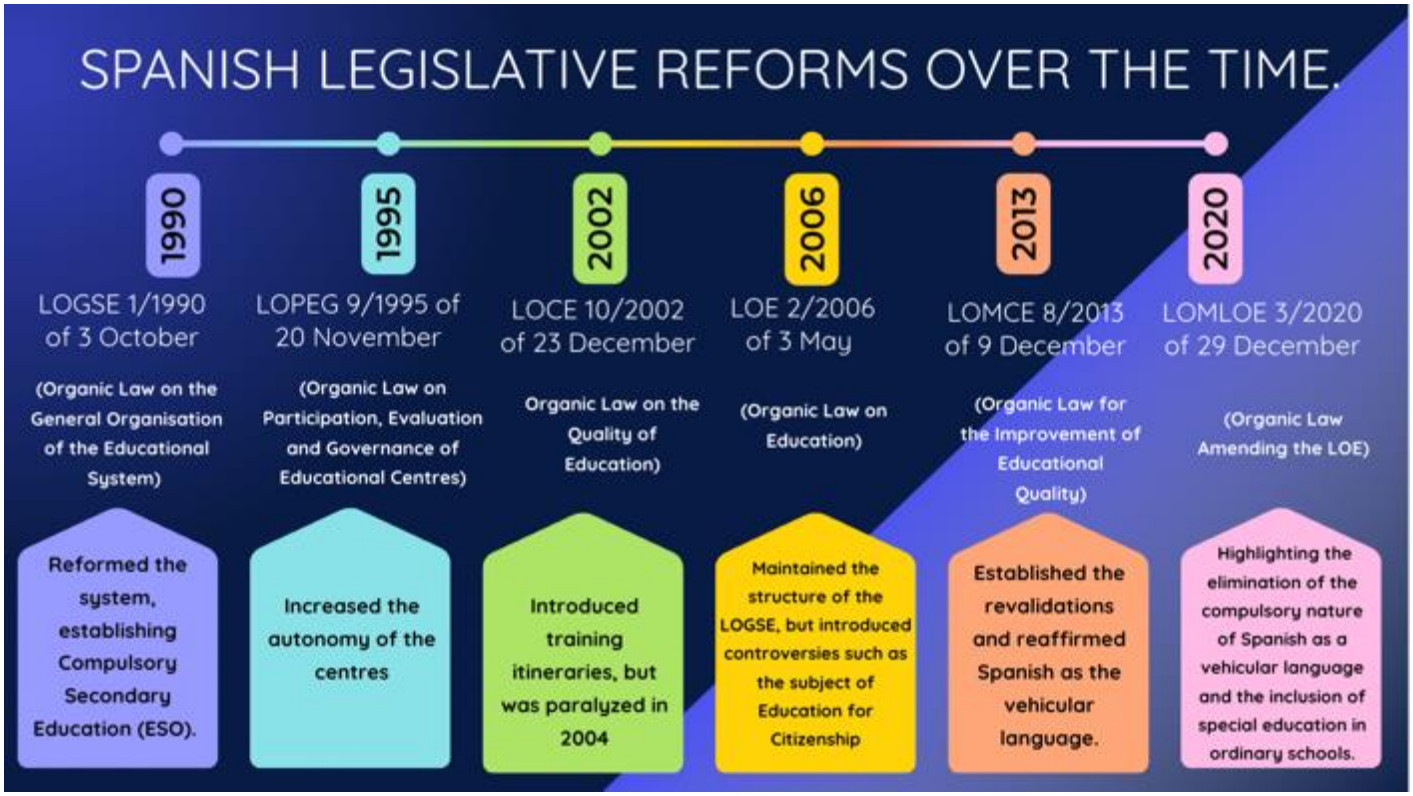

Figure 1. Visual graphic informing about the different legislative reforms in Spain in recent years. Source: Own elaboration.

The LOMLOE (Law 3/2020) and Royal Decree 157/2022 support bilingual education by ensuring equal access to quality learning and setting national

standards for core competencies. The regulations encourage inclusive and flexible bilingual programs, adapting to students' needs while working with this innovative teaching methods like CLIL. By reinforcing bilingual education within a structured and fair framework, these laws helps that all students can develop linguistic skills while receiving a proper education. Likewise, at the end of the stage students must achieve some key competences, which are essential to face global challenges.

One of the most important achievements has been Order 5958/2010, of 7 December, which regulates bilingual public schools in the Community of Madrid. The goal is to make it easy to learn in English, so many public and semi-private pre-primary, primary and secondary schools now use bilingual teaching. In these schools, English is more than just a class, it's used as the main language in many different subjects.

Since 2004, the Regional Ministry of Education of the Community of Madrid has promoted the Bilingual Public Schools Program, gradually implementing bilingual education in public schools. The program started in 2004 for primary schools and expanded to secondary schools in 2010, following *Orden 5958/2010*. By 2017, it was fully established in pre-primary education. In primary education, the program requires at least 30% of subjects to be taught in English, with a minimum of two subjects in the bilingual format. Madrid's bilingual education system follows a structured progression, including external evaluation tests in *6th grade of Primary and 1st year of Secondary.*

Other initiatives that provide bilingual education are the Bilingual Education Programme (BEP), which integrates the British and Spanish curricula to develop bilingual and bicultural students in pre- primary, Primary, and Secondary education, and the BEDA Programme, run by *Escuelas Católicas de Madrid* in collaboration with *Cambridge English Language Assessment*,

2.1.2 The 4 C´s

The 4Cs framework, presented by Coyle et al. (2010), is one of the three pillars of the CLIL approach. This framework connects four key components (Content, Cognition, Communication, and Culture), vital for developing ~~clear and~~ meaningful bilingual learning experiences.

- **Content** includes curricular subjects that focus not only on the acquisition of knowledge, but also helping students to construct their understanding and creating individual experiences through diverse thinking methods.
- **Cognition** involves supporting critical thinking and cognitive skills, focusing on both Lower Order Thinking Skills (LOTS) and Higher Order Thinking Skills (HOTS), and requires understanding language needs to help students explain complex ideas.
- **Communication** acts like a channel through which language helps people interact and learn within a structured system It includes three types of learnings: language of learning (key language terms and grammar), language for learning (useful language to take part), and language through learning (emerging language gained during the process).
- **Culture** highlights the importance of looking at different viewpoints and promoting intercultural understanding, encouraging global citizenship and tolerance by helping learners appreciate their own culture.

In CLIL, language learning is linked with subject content, moving from Basic Interpersonal Communication Skills (BICS) for everyday conversations to Cognitive Academic Language Proficiency (CALP) for academic discussions (Cummins, 2000). The framework aligns with Bloom's taxonomy, promoting a shift from LOTS to (HOTS) as students take part in more complex activities.

Educators play a key role in supporting learning, participation, and creating environments where communication is active to ensure students gain both content expertise and language skills. Additionally, culture helps develop intercultural competence, improving students' ability to adapt to various situations and respect the values of different people.

2.1.3 CLIL methodological principles

This section provides a simple summary of the main CLIL teaching principles, organized in a table based on the CLIL lesson plan template in Custodio Espinar (2019):

Table 1. CLIL main methodological principles. Adapted from Custodio-Espinar (2019)

CLIL component	CLIL principle	In practice CLIL…
Content	Learning should integrate conceptual, linguistic, and procedural content.	Aligns with curriculum goals and develops subject-specific language skills.
Cognition	Tasks should progress in complexity, following Bloom's Taxonomy.	Moves from simple to complex tasks, fostering critical thinking.
Communication	Language should be used meaningfully, covering receptive and productive skills and literacy development.	Uses listening, speaking, reading, and writing strategies to enhance learning based on genres and text types.
Culture	Intercultural competence fosters global awareness.	Integrates cultural elements to enhance relevance and understanding of the context.
Methodology	Learning strategies should be hands-on, autonomous, and interactive.	Encourages active participation, teamwork, and independent learning.
Activities	Lessons should link theory to practice and be engaging.	Aligns with curricular goals, interests, and includes assessments.
Resources	Materials should support independent and interactive learning.	Uses ICT and varied tools to cater to different learning needs.

Assessment	Evaluates both subject knowledge and language proficiency.	Includes group work, self-assessment, and a mix of continuous and final assessments.
Classroom organization	A structured environment supports effective learning.	Uses routines, visual aids, and interactive strategies to create a positive space.
Diversity	Instruction should be adaptable to different learning needs.	Adjusts tasks using Bloom's Taxonomy and provides content and language scaffolding to ensure inclusivity.

2.2. Science, Technology, Engineering and Mathematics (STEAM) education

Science, Technology, Engineering, art and Mathematics (STEAM) education get students ready for a world driven by science and technology. It's about teaching them not just content but also skills for the world like problem-solving, creativity, teamwork, and critical thinking, which are necessary for real-life problems.

In a STEAM classroom, students learn how science, technology, engineering, and math are connected, and how these subjects come together to help us understand the world that surrounds us (National Science Foundation, 2017). STEAM gives students the tools to make a real impact on their lives. Introducing these ideas to early students can help them discover careers they might not have considered, especially in areas where women and other underrepresented groups are still catching up. That´s why, in my syllabus, I focus on the importance of digitalization and STEAM education from an early age, as it is the future of education and society.

2.2.1. ICT in STEAM education

In this CLIL framework, the incorporation of ICT tools in STEAM education is important for improving students' learning experiences. Based on laws like Royal Decree 157/2022, which focus on developing students' digital skills, technology plays a key role in creating and interactive learning environment. With this type of hands-on STEAM syllabus, ICT tools help to reinforce content while they advance with their digital education.

Through inquiry-based learning, developing scientific models, and analysing data, these tools make difficult ideas easier to understand. Moreover, in a CLIL setting, ICT helps interaction and communication as it provides different resources such as films, audios, and texts that support both language acquisition and content understanding. Effective use of ICT, as emphasized by different authors including Bates (2015) can help to optimize teaching effectiveness, offer personalized instruction, and facilitate the generation of customized learning materials for a successful educational experience.

2.2.2. Digital scaffolding

Digital scaffolding improves traditional scaffolding by using digital tools and technologies to support learning, as discussed by Pea (2004). These tools provide guidance, interactive feedback, and personalized learning experiences that help students comprehend. This includes multimedia, online platforms and apps that assist students in support both content and language, especially in CLIL. With these resources, students can access to different materials that make it easier to understand new content and learn a foreign language.

One of the key features of digital scaffolding is its temporary support, which is similar to traditional scaffolding. Digital tools adjust the level of difficulty based on students' progress and level, providing support that gradually helps students become more independent. In CLIL, this support is really important since students need both content and language scaffolding to succeed on their learning process.

Digital scaffolding operates at both “macro” and “micro” levels. On one side, macro level digital scaffolding helps teachers design lessons that align with curriculum goals. On the other side, micro level digital scaffolding offers real-time feedback, giving personalized help to students when needed (Reiser & Tabak,

2014). Additionally, the context is important in digital scaffolding. Online platforms, such as Google Classroom or Meet, create a safe environment for learners. They make sure that these digital tools adapt to what students are doing, keeping tasks at the right level of difficulty.

Lastly, another important aspect of digital scaffolding is the continuity and the flow. This helps students to build on what the already know. Learning management systems create a clear path for students to follow, making their learning experience structured and continuous (Van de Pol et al., 2010).

2.2.3. The role of teacher and students in the digital CLIL classroom

In the digital CLIL classroom, the roles of both teachers and students change. Teachers act as facilitators who guide students through content while helping them learn and use the target language. They use digital tools like videos, websites and collaborative platforms to create interactive learning environments (Dale & Tanner, 2012). Teachers must make sure that materials are accessible and engaging for all the students offering scaffolding.

On the other hand, students take a more active role in the digital CLIL classroom. They learn in an independent way, with collaborative online activities, developing their language skills through many interactions with other students. The digital tools allow students to work on their own, participate and access resources that help their understanding. This technology-based approach increases their autonomy, motivation, and intercultural awareness.

2.2.4. Assessment and evaluation in digital contexts

The way we assess and evaluate students has totally changed nowadays. Teachers can check progress in real-time, give quick feedback, and collect useful data to improve students´ learning. These new tools help both formative (ongoing) and summative (final) assessments, making it easier to measure results of the learning process. (Black & Wiliam, 2009).

Some of the most popular digital assessment tools include e-portfolios, interactive activities, online quizzes, and gamified tasks. These tools make learning more engaging for student by supporting different learning styles. In addition, Artificial Intelligence (AI) can personalize lessons by detecting weak areas and adapt the content to the students´ needs.

Self- and peer-assessment is crucial in our digital education (Nicol & Macfarlane-Dick, 2006). Using online tools, students can check their own progress and give feedback to others. This not only builds autonomy on the students, but also improves communication with each other, which is an important pillar of the CLIL approach.

However, digital assessment also involves some challenges, like preventing students from cheating and making sure that everyone can access to it. To make it work effectively, educators need to be aware and choose wisely the tools and strategies that match their learning goals.

3. ANNUAL CLIL SYLLABUS

3.1 Socio cultural contextualization

3.1.1. School analysis

The school, where this project takes place, is a well-equipped private school located in center of Madrid. Being in the city center involves many benefits, such as easy access to services, cultural places, and public transport. This makes the school the perfect option for families from the same area.

This school follows a bilingual education system, integrating Spanish and English into their daily life. This center covers all educational stages from pre-Primary to High school, with four lines per grade and a strong team of teachers and professionals in this area. The school count with modern resources offering students access to the highest quality equipment possible and extracurricular activities.

Most families that attend the school belong to an upper-class background. Many parents are university graduates who work in fields like finance, law, medicine, and technology. Education is a very important for them, and they actively involved in school events, workshops, and activities.

3.1.2. Classroom context

This syllabus take place in a year 5 of Primary Education class, in Group A. The class has 25 students, with 12 boys (48%) and 13 girls (52%). The group is homogeneous, with no big differences in academic abilities between the students. However, there are some specific needs: one girl with dyslexia, which

may require support with reading and writing activities, and one boy with a low level of English, so he might need extra help with language comprehension.

The classroom is prepared to work in an individual and group way, with 5 cooperative groups of 5 students each. Additionally, there are some areas for different activities, including a reading corner, an iPad station, and a space for debates. Other areas that the class include are the students' hangers, a locker area, magnetic corks to stick the work, and the teacher's desk, all helping to keep the classroom tidy and clean.

3.1.3. Psychoevolutive characteristics of students

According to Jean Piaget, children aged 10 to 11 are in the concrete operations stage, which happens between the ages of 7 to 12. At this stage, kids start to think logically and clearly, but they still linked to the real experiences. They can do mental tasks such as classification, seriation, conservation, and reversibility, which help them to solve problems in a more structured way. In addition, they begin to understand other people´s point of view, which helps them work better in teams and cooperate. These characteristics suggest that the learning environment at this age should combines individual and cooperative work, with practical activities that develop their logical reasoning and autonomy (Piaget, 1972).

3.2 **Objectives**

3.2.1. Stage objectives

The stage objectives are defined in Decree 61/2022 included in **ANNEX 1**, which is based on the Royal Decree 157/2022, ensuring alignment with the national framework. However, Decree 61/2022 makes specific changes to take into account the particularities of each region. For example, the Community of Madrid includes subjects like Technology and Robotics, to promote digital competence among students in Madrid. These regulations focus on the development of the students at the mental, emotional, and physical levels, and aim to ensure their success by the end of the primary education stage, helping them develop their personality and knowledge for the secondary education stage.

3.2.2. *Sequence in the annual syllabus*

To achieve the stage objectives, the proposal uses a STEAM-CLIL approach, encouraging active learning through digital tools, programming, and prototype creation. Learning objectives are clearly set to help students gain important digital skills such as: solving problems, creativity, and teamwork. Objectives, outcomes, and activities are based on Bloom's Taxonomy, moving from remembering and understanding concepts to applying, analyzing, evaluating, and creating solutions to challenge them. The sequence encourages students to become confident while using technology and capable of designing innovative systems.

3.3. Contents

This syllabus examines the subject Technology and Robotics in the Decree of the Community of Madrid, 61/2022.These contents, previously described, are included in the **ANNEX 2**

3.4. Competences

Key competences were first incorporated into Spanish legislation through the Organic Law on Education (2006). Their purpose is to define the essential knowledge, skills, and attitudes that all students should develop to promote successfully.

In the current Spanish framework, these competences are included in Organic Law 3/2020 (LOMLOE) and Royal Decree 95/2022, presented in **ANNEX 3**.

These competences establish that all components of the curriculum objectives, contents, methodologies, and evaluation criteria must be aligned with these competences. To help students learn effectively, it is important to create activities that help students build those key competences. This includes using tools to track progress and projects (STEAM-CLIL based) that connects the knowledge with practical skills.

3.5. **Methodology**

My didactic unit will use various active methodologies designed to keep student´s interest while learning. One main methodology that I will use is cooperative learning, where students work together in teams to achieve common objectives. By working in this groups with different roles, students will develop

social skills while reinforcing their learning through peer support. This methodology is based on positive interdependence, helping each other, and taking responsibility for both their individual and group task (Johnson et al., 1994).

Another key methodology is thinking-based learning (TBL), which helps students improve their critical thinking and autonomy. As suggested by Perkins (2008), this methodology encourages individual reflection, problem solving, and metacognition. The teacher will include activities that challenge students to analyse the problems and create a way of thinking that will be useful in real life.

Learning stations will also be used to make the classroom more dynamic. The space will be divide into zones where students can complete activities based on their interest (Ibáñez, 2010). Some corners will require teacher guidance, while others will allow independent work.

Finally, project-based learning (PBL) will play an important role. Students will work with real challenges that promotes active participation and problem solving (Chillón, 2013). Through this methodology, students will improve their research skills, and teamwork, while also connecting their own knowledge with real world experiences.

3.5.1. Learning situations

Under the framework of the new educational approach proposed by decree of the Community of Madrid, 61/2022, learning situations are incorporated as a key element in the teaching-learning process. These learning situations are didactic contexts that allow students to apply their knowledge and attitudes in a practical way in the world around them. They are designed to connect their knowledge with real life experiences, encouraging a competency-based education that responds to the challenges of the 21st century. The learning situations are based on a challenge close to the interests of the students, making them reflect and investigate in a more motivated way.

In my syllabus, according to the decree of the Community of Madrid, 61/2022, the main driver will be a three learning situations story that will guide the whole process. Each of them will guide the discovery of concepts related with technology and robotics curriculum. In this way, we will be able to help children

develop minds capable of solving problems, creating collaborative projects, improving creativity, and metacognitive reflection on the learning process itself.

3.6. **Evaluation**

Assessment is a key element of CLIL, where both content knowledge and language skills are developed. As Coyle et al. (2010) point out, evaluation isn't just about checking what students know at the end, it's more about understanding how they're learning along the way. That is why both, formative and summative assessments, are essential to provide a complete evaluation. According to Jabbarifar (2009), assessment should reflect what has been taught; testing students on unfamiliar content or language is unfair. That is why evaluation must be a part of lesson planning from the start so teachers can make changes when needed.

This syllabus approaches evaluation as a continuous process, using both formative and summative strategies. Content is assessed using goals and criteria outlined in Decree 61/2022, while language assessment follows the Common European Framework of Reference for Languages (CEFR, 2018), which make sure the language level fits correctly.

As Otto (2018) suggests, tools like rubrics, peer, and self-assessment help evaluate content and language throughout learning. This syllabus includes these tools to support both formative and summative assessment across the three learning situations and 15 challenges.

- **Assessment for interaction**: Different tools will be used to encourage student participation, including random selection sticks, mini whiteboards, thumbs up/down, exit slips, and oral language demonstrations by the teacher (T) and language assistant (LA).
- **Assessment for active observation**: Teacher observation will be a key method for evaluating tasks during the learning situations and challenges. Rubrics will also be used to assess the final products of the projects.
- **Assessment for peer/evaluation**: Will allow students to assess their own and each other's work. Using checklists and rubrics, students will provide feedback, helping each other improve.

- **Assessment for long term assessment**: Will be developed by using checklists and rubrics from a formative perspective, and from a summative perspective to measure the quality of the learning.

3.7. **Attention to diversity**

Recognizing heterogeneity in our classroom is a crucial principle in today's learning environment. In academic spaces, it is essential to ensure a fair and comprehensive education for every student. According to Decree 23/2023 on Government Council decree regulating educational support for individual differences among students in the Community of Madrid, instructional strategies should incorporate student variability as a fundamental axiom, customizing educational methods for individual differentiations, unique demands, inclinations, and modes of learning per student. This tactic recognizes that each child matures and progresses at a unique pace and that the school must adapt to this variety to achieve authentic and comprehensive inclusion of all students.

When implementing the CLIL approach, it is paramount to value the cultural variety of our students since we must take into account the learning stages of each one, taking into account that not only academic content is covered, but also the mastery of the second language is worked on. This double objective that we present can pose an extra challenge for certain students, such as those with specific educational support needs (ACNEAE), in which the LOMLOE includes children with special educational needs (ACNEE), specific learning difficulties, students with high intellectual abilities, or students who join late.

At school level, the focus is to make room for everyone and valuing the different types of people within our teaching. This will be carried out through daily actions, where it will be intended that each student participates and advances within the educational method, without differences in their abilities. Some of these actions consist of employing flexible groupings, non-significant methodological adaptations, and the integration of visual aids to improve comprehension (Ainscow, 2003). In addition, we need to create a supportive environment that helps students to be more motivated and improve the way they feel about themselves.

In CLIL classrooms, students with autism spectrum syndromes (ASD), attention deficit disorder (ADHD), high abilities and other functional profiles receive specialized care. Students with ASD require specific academic modifications and support within a standardized environment and, where possible, inclusion in personalized group assignments corresponding to their abilities and requirements. For ADHD students, methodological and structural alterations facilitate better attention and behavior, emphasizing teamwork and practical efforts that help them generate interest. Educational inclusion not only means physical attendance, but also active participation and the meaningful acquisition of knowledge. In doing so, Universal Design for Learning (UDL) is applied, which offers various forms of information dissemination, execution, interaction, and engagement.

3.7.1. Cognitive demand analysis: HOTS & LOTS

In CLIL, it is crucial to consider the stage of cognitive growth of students to ensure that education is truly effective. The purpose is not only to learn content in another language, but to create educational scenarios that allow students to reflect and build their own ideas. Consequently, it is crucial to develop tasks that consider this intellectual growth, starting from lower order thinking skills (LOTS) such us remembering, understanding, and applying, then moving on to more advanced skills such as analysis, evaluating and creating, that are higher-order thinking skills (HOTS) (Bloom, 1956). This evolution is significant, as it allows the attention to diversity within the classroom, accommodating the learning patterns, curiosities and needs of the students. As a result, while some students need to consolidate basic information, others may face more advanced obstacles that drive them to foster a critical mindset.

In fact, it is crucial in the CLIL approach, not to overlook the importance of leading critical reflection, or in other words, helping students to understand their methods of acquiring knowledge and governing their educational progress. This can be achieved through simple but powerful tactics. For example, the KWL chart (what do I know, what do I want to learn, what have I learned) directs them before, during, and after the activity. Or visual self-assessment cues, such as traffic lights, which aid in instant progress assessments. The instruments not only

promote self-governance, but also encourage motivation, as students perceive themselves as participants and protagonists within the educational environment.

On the other hand, it is essential to underline that the growth of HOTS in CLIL is driven by tasks that encourage interaction, teamwork and real problem solving. The process not only encourages contemplation and critical analysis, but also increases language skills, as language becomes an instrument for articulating concepts. Finally, the main objective is to provide educational possibilities that are stimulating but achievable, confirming that everyone, regardless of whether they start from their starting position or not, can progress in improving their mental and language skills in an integrated manner.

3.7.2. Measures to address diversity

Attention to diversity is a fundamental principle in the Spanish educational framework, declared in the Education Law (LOE, 2006) and later reinforced and expanded by subsequent laws, such as the current Decree 23/2023, of 22 March. In this framework, the comprehensive training and education of each person is guaranteed, regardless of age or ability. In this project, the presence of students with specific educational support needs (ACNEAE) is recognized. With the latest legislative changes, we have improved the inclusion of students in schools.

The educational response to diversity can be adjusted through a set of organizational and curricular measures that can be divided into ordinary measures and extraordinary measures, depending on the degree of needs that are needed.

- **Ordinary measures.** The ordinary measures for students (ACNEAE) within the educational framework seek to provide adaptations to needs, without altering the fundamental elements of the curriculum. Some of the strategies that will be used in my project will be the structured organization of space and time, ensuring that the student is in a place close to the teacher to facilitate supervision; simplification of tasks, dividing them into clear and defined steps, and the difficulty of the activities is organized according to Bloom's Taxonomy; formative assessment, prioritizing qualitative feedback and using brief tests to reduce cognitive overload. In

addition, you should try to promote positive reinforcement and generate an emotional bond.

- **Extraordinary measures.** Extraordinary measures are those that are used when ordinary strategies are not sufficient to respond to educational needs. These measures are used especially with children with specific educational support needs (NEAE). These measures require significant curricular adaptation and usually involve the intervention of the educational guidance team, as well as an individualized psych-pedagogical evaluation. According to the LOMLOE, students with SEN may require adjustments in different areas of the curriculum, such as objectives, contents, evaluation criteria, teaching method**s**, etc.

These modifications, called Individualized Curriculum Adaptation (ACI), are created to adapt to the needs and abilities of the student.

3.8. **Other projects and school plans**

This syllabus, focused on robotics and technology, is not only about teaching technical skills but also fostering essential values and competencies used in daily life. It connects with different school initiatives to make sure that students develop both practical abilities and life skills. Rather than being a separated subject, this syllabus acts like a tool for interdisciplinary learning, connecting different areas inside and outside the classroom.

- **Contribution to the school's coexistence plan**

The activities in this syllabus are based on projects that encourage teamwork, problem solving, and respect with each other. These are key elements of the school's coexistence plan. By working together, students learn to share ideas, make decisions, and solve conflicts in a way that reflects the school's values. These activities help create a friendly and safe school environment.

- **Connection to the school's reading plan**

The school's reading plan plays an important role, and this syllabus helps support it in many ways. Even though robotics and technology usually involved hands-on activities, adding reading, and writing tasks can improve learning. For example, writing journals at the end of the projects, following instructions while

building, and using guidelines can help students organize their thoughts and making it easier to understand.

- **Promotion of safety and responsible technology use**

This syllabus also helps students learn how to use technology safely, one of the main objectives of all the schools nowadays. These topics are essential to work with because it helps students not only acquire technical knowledge but also develop a responsible use of this digital tools. As children use technology at younger ages, it is crucial to guide them in using it wisely. That is why, this syllabus includes challenges about programming, networking, and digital safety, especially about using the cloud.

- **Promotion of inclusion and gender equality**

This syllabus is also designed to be inclusive and to give equal opportunities, no matter whether their genders or abilities. Robotics has often been seen as a male dominated field, but this syllabus helps break that idea.

The integration of robotics and technology into broader educational initiatives supports a well-rounded learning experience that extends beyond technical knowledge, shaping students into responsible, collaborative, and informed individuals.

4. LEARNING SITUATIONS

The following syllabus, organized into three learning situations with five challenges each, integrates the curricular components described above. In addition, one of these challenges will be developed in detail through specific sessions. Each learning situation is structured based on different blocks of content that we find in the Decree of the Community of Madrid 61/202, always following the perspective of the CLIL approach and in direct relation to the tastes and immediate environment of the students.

Figure 2. Computers that represent each of the learning situations and that have their 5 challenges placed as apps.
Source: Own production made with Canva and Logo maker
https://goo.su/9jOoA.

To give cohesion to the journey of this syllabus, children who come from the future called Zira-11, Neón-X and Oria-22 present and guide us throughout the learning experiences. They represent, in an authentic way, the true meaning of this educational project: learning done by and for the children themselves. As for the appearance of the children, they are inspired by my three little cousins, who always showed me that I wanted to be a teacher, and that is why I would love for them to be here accompanying my students. These three children will have the function of helping the children during the course in the different challenges, so that they can have guides during learning as presented in ANNEX 4.

Figure 3. Zira-11, Neón-X and Oria-22- future kids
Source: Own creation made with artificial intelligence through the program "Bing" https://www.bing.com/images/create.

Each challenge will have the objective of delivering a final product. When students complete their work, they will receive the logo of the app they have accomplished. In addition, each learning situation will end with different formats, allowing students work together, share ideas, and express themselves.

The main objective is to offer a realistic, attractive, and motivating proposal for children. The journey through the three learning situations is linear, fluidly covering all areas of technology and robotics in the curriculum for primary school in the Community of Madrid.

4.1 Learning situation I: Chaos on wheels

This first learning situation, titled "*Chaos on wheels*", responds to the structure and organization offered in **Table 4.** To start the learning situation, one of the children, Zira-11, will guide them through the 5 challenges to accomplish them.

Table 4. LEARNING SITUATION I. CHAOS ON WHEELS.

LEARNING SITUATION I. CHAOS ON WHEELS
Contextualization of the learning situation by Zira-11
In this learning situation, students will have to restore order to their future city Zeta 9, that has been manipulated by Chaoticus, a monster that has generated a disaster there. Through a series of challenges, students will design algorithms, program smart traffic lights, build robotic vehicles and more to save the city.

Figure 4. Chaoticus
Source: Own creation made with artificial intelligence through the program “bing”. https://www.bing.com/images/create.

Timing	September-December.	**Genres**	Instruction Explanation Report (magazine article) Interview
Where?	This will take place in the main classroom, computer lab and the technology workshop.	**Context**	The students will receive a video from Zira-11 explaining the situation in the city and showing images of the chaos. https://youtu.be/8vJFSQp6SzI.
Final product	The final product will be a **book with step-by-step instructions** for fixing the city's cars, traffic lights, and delivery robots, so future children can repair them if Chaoticus returns.		
Challenges			
- **Challenge 1:** Decode the route - **Challenge 2:** Smart traffic lights - **Challenge 3**: Robot race - **Challenge 4**: Debigging day - **Challenge 5:** Traffic city model			

4.1.1. Challenge 1: Decode the route!

CHALLENGE 1: Decode the route!	
Description: Students design and test simple algorithms using block-based coding (Scratch) solving challenges with robots. They build programming and language skills and create a final ebook. **Final product:** Step-by-step algorithm in their ebook to guide the vehicle. **Timing**: First term. (2nd of September - 17th of September) Monday (50 minutes) and Tuesday (50 minutes).	
CONTENT	
CURRICULAR CONTENT - Interpretation and execution of simple algorithms (routines, instructions with ordered steps,	**Contribution to specific competences** 1. Use computational thinking to solve problems, generating a

game rules, instructions, sequences, repetitive patterns, block programming). - Phases of computational thinking: Decomposing a task into simpler parts, recognizing patterns, and creating simple algorithms for solving the problem. **LANGUAGE CONTENT:** Commands for algorithms Genre type: Instructions.	creative and original product that responds to each of the challenges posed or generated through the observation of the environment.
COGNITION	
Learning goals **1. To remember** the basic concepts of algorithms in programming and to **understand** how algorithms can guide an object avoiding obstacles. 2. **To analyze** the map´s obstacles and plan a safe route. To **evaluate** the algorithm, identifying mistakes, and find how to improve. 3. **Metacognition**: To use the KWL chart. 4. **Language:** To write some instructions of the steps they followed to design the algorithm.	**Learning outcomes (standards)** 1.1 SS. **name** basic concepts related to algorithms, sequences, and instructions. 1.2 SS. **describe** how algorithms and sequences work to guide an object. 2.1 SS. **compare** different routes and identify risks. 2.2 SS. **judge** the effectiveness of their algorithm. 3.1 SS. **identify** what they don't understand and create clear questions to guide their learning. 3.2 SS. **demonstrate** the ability to think critically about their learning process. 4.1 SS. **prepare** the formal aspects of the genre (instructions) to be published in their ebook.

	4.2 SS. **identify** the necessary commands for this set of instructions and write them on the ebook.
CULTURE	
Learning goals (idem)	**Learning outcomes (standards)**
To **remember** how different societies have developed systems to navigate and to **understand** how clear instructions should be to ensure safety in transportation.	SS. **list** examples of how we use routes, maps, and instructions for travelling. SS. **compare** how different countries use instructions to ensure safety.
COMMUNICATION Coyle, Hood and Marsh (2010)	
LANGUAGE OF: **Key language:** Algorithm, Instructions, Sequence, Pattern, Decomposition, Rules, Execution, Block-based programming, Problem-solving. **Language content (genre):** Instructions, commands for algorithms. - **Structure**: title, steps, commands, numbers or bullets, clear order, start to finish. - **Language input**: Imperatives → move forward, repeat, turn left. **Academic language:** Introduces the first step – **First.** Shows the following step – **Next.** Indicates the next action – **Then.** **LANGUAGE FOR:** **Language for describing** algorithms, sequences, routes, errors, instructions: **"**The algorithm helps the robot navigate around obstacles". **Language for comparing** different routes and risks: **"**Route A is faster but riskier". **Language for explaining** how sequences work, why an algorithm is effective or not: **"**The sequence directs the robot step-by-step but fails with sharp turns". **Classroom language**	

- **Group Work:** Let's work together, can you help me? share your ideas.
- **Activities:** Follow the steps, test your algorithm, try this.
- **Classroom Interaction:** What worked well?

LANGUAGE THROUGH:

Learning through interests.

Learning through peer interaction.

Learning through interaction with technology while programming the algorithm.

Learning through watching the video of Zira-11.

CONTENT EVALUATION CRITERIA (decree 61/2022)

1.1. Know the basic fundamentals of block programming.

1.2. Perform a set of systematic operations or algorithms that comply with a previously set pattern for the correct operation of the program.

1.3. To collect information from the environment that allows us to obtain the necessary data to generate a product that provides a technological solution for a specific situation.

LANGUAGE EVALUATION CRITERIA (CEFR, 2018)

ADAPTED PLURILINGUAL COMPRHENSION→ A2: Can use simple warnings, instructions and product information given to find relevant information.

ASSESSMENT TOOLS

For interaction	Name stick, language assistant.
For active observation	Active observation checklist.
For peer/self-evaluation	Two stars and a wish: giving two positive comments and one area for improvement.
For summative assessment	Analytic rubric for ebook.

ATTENTION TO DIVERSITY

General measures:

Use different resources: Use videos, images, or diagrams to explain the algorithms. This will help visual or auditory learners. Also, put subtitles to facilitate understanding.

Assess flexibly: Use assessments such as self-assessments or small quizzes to track each student's progress. Adjust expectations based on their abilities.	
LOST → HOTS: Ask students to write a set of basic instructions to review so that the robot can move from point A to point B, following a sequence created. For example, "forward 3 steps," "turn left,".	**HOTS → LOTS:** Ask students to analyze an algorithm for moving a robot and propose improvements, such as reducing steps or finding faster routes.

4.1.2. Challenge 2: Smart traffic lights

CHALLENGE 2: Smart traffic lights	
Description: Students will design and program a smart traffic light using Scratch, test and improve their ideas, and present their work through a poster. They'll also learn about the history of traffic lights and the role of smart systems in safety and traffic flow. **Final product:** Smart traffic light presented in a poster with the code and functions. **Timing**: First term. (23rd of September - 8th of October) Monday (50 minutes) and Tuesday (50 minutes).	
CONTENT	
CURRICULAR CONTENT - Programming fundamentals: loops, conditionals, operators, messages, variables, functions, events, debugging. - Extensions of block programming and application to educational robotics (music, drawing, video sensor, text-to-speech, translator...). **LANGUAGE CONTENT:** Create a poster	**Contribution to specific competences** 1. Use computational thinking to solve problems, generating a creative and original product that responds to each of the challenges posed or generated through the observation of the environment.

Genre type: explanation.	
COGNITION	
Learning goals	**Learning outcomes (standards)**
1. To **remember** the basic concepts of programming and to **understand** how smart systems, like traffic lights, use conditions to make decisions and manage traffic flow. 2. To **apply** conditional programming that responds to the presence of cars and to **evaluate** the functionality of the smart traffic light by testing different scenarios. To **create** a pedestrian traffic light system that synchronizes with the vehicle traffic light. 3. **Metacognition:** To reflect with the "see, think, wonder" thinking routine. 4. **Language:** To create a poster explaining the code behind the smart traffic light.	1.1 SS. **list** basic programming concepts used in Scratch. 1.2 SS. **describe** how conditional logic controls the behaviour of a smart traffic light. 2.1 SS. **demonstrate** how conditional programming can detect the presence vehicles. 2.2 SS. **test** how effective their smart traffic light is in different conditions. 2.3 SS. **design** a new traffic light that synchronizes with the traffic light one. 3.1 SS. **name** the things that they have done before, during and after the learning process. 3.2 SS. **explain** the choices they made while programming. 4.1 SS. **use** the formal aspects of the genre (explanation) to be create a poster. 4.2 SS. **illustrate** the key commands and functions of the smart traffic light code in the poster.
CULTURE	
Learning goals (idem)	**Learning outcomes (standards)**
To **remember** the evolution of traffic light systems, from manual to modern smart ones and to **understand** the	**SS. describe** the evolution of traffic light from manual operations to modern smart solutions.

impact of smart traffic solutions on reducing congestion, pollution, and accidents in cities.	SS. **explain** how smart traffic lights help reduce traffic jams, pollution, and accidents.

COMMUNICATION

Coyle, Hood and Marsh (2010)

LANGUAGE OF:

Key language: Loops, Conditionals, Operators, Messages, Variables, Functions, Events, Debugging, Robotics, Sensors.

Language content (genre): Explanation, create a poster.

- **Structure:** Title, general statement, sequenced explanation. closing statement.
- **Language input:** Passive voice: is heated, are mixed, is formed and present tense: flows, changes, produces.

Academic language:

To start the report – **First.**

To explain why something happened – **Because.**

To end the report – **Finally.**

LANGUAGE FOR:

Language for testing effectiveness of their smart traffic light under different conditions: **"**I tested the light under heavy traffic to check if it adjusts".

Language for designing a traffic light system that works with another one: "I designed the lights to sync by sharing green phases".

Language for reflecting things done before, during, and after learning: "Before, I researched; during, I programmed; after, I tested".

Classroom language

- **Group Work:** Share your ideas, present your solution, discuss with your partner, work together, listen to others.
- **Activities:** Test it, try it, explain your code, Fix the error, improve your solution, Follow the steps.
- **Classroom Interaction**: How does it work? Look for examples, ask questions, compare answers, Think about different solutions.

LANGUAGE THROUGH:

Language through interests.

Learning through peer interaction.
Learning through interaction with technology while programming the traffic light.
Learning through watching the video of Zira-11.

CONTENT EVALUATION CRITERIA (decree 61/2022)

1.1. Know the basic fundamentals of block programming.
1.2. Perform a set of systematic operations or algorithms that comply with a previously set pattern for the correct operation of the program.

LANGUAGE EVALUATION CRITERIA (CEFR, 2018)

STRATEGIES TO EXPLAIN A NEW CONCEPT → A2: Can repeat the main point of a simple message, using different words to help someone else understand it.

ASSESSMENT TOOLS

For interaction	Random pick-up tools, mini whiteboards, language assistant.
For active observation	Teacher diary checklist.
For peer/self-evaluation	Self-evaluation checklist for assessing the poster.
For summative assessment	Kahoot.

ATTENTION TO DIVERSITY

General measures:

Multiple ways of representation: Provides both written and visual instructions, such as videos with captions. In addition, it uses a visual glossary with definitions and examples of key terms to facilitate understanding.

Formative assessment: Conducts informal assessments during classes and provides ongoing feedback to make quick adjustments.

LOST → HOTS:	**HOST → LOTS:**
Instead of programming the entire traffic light, start with smaller tasks, such as	They need to integrate their traffic light into a larger scenario, such

making a character change color from red to green when you click or press a key.	as a traffic system with vehicles moving across the screen.

4.1.3. Challenge 3: Robot race

<table>
<tr><th colspan="2">CHALLENGE 3: Robot race.</th></tr>
<tr><td colspan="2">Description: Students design and build a motor-powered sustainable vehicle using gears, pulleys, and 3D-printed parts. They test, and document their process, ultimately showcasing their final design in the school’s technology magazine.
Final product: Motor-powered sustainable design vehicle presented in the school’s technology magazine.
Timing: First term. (14th of October - 5th of November)
Monday (50 minutes) and Tuesday (50 minutes).</td></tr>
<tr><th colspan="2">CONTENT</th></tr>
<tr><td>CURRICULAR CONTENT
- Design and construction of simple robots.
- Tools and tools necessary for the manufacture and assembly of appliances. Operation of gears and pulleys.
- Manual and mechanical design and manufacturing techniques.
LANGUAGE CONTENT:
Article on school´s magazine
Genre type: Report.</td><td><u>Contribution to specific competences</u>
2. Solve problems posed by applying knowledge of mechanics, electricity, design and programming, developing automated solutions, designing or building programmable and/or robotic control systems appropriate to their level.</td></tr>
<tr><th colspan="2">COGNITION</th></tr>
<tr><td><u>Learning goals</u>
1.To remember types of machines and functions and to understand the operation of this type of machine in vehicles.</td><td><u>Learning outcomes (standards)</u>
1.1 SS. name different machines and functions that perform.
1.2 SS. describe how the machine works.
2.1 SS. sketch a prototype.</td></tr>
</table>

2. To **apply** machine functions to build a prototype and sketch in their diary. Then to **evaluate** if the prototype works correctly and discuss what the error may be and, finally, to **create** a solution to the problems that may arise when creating the prototype. 3. **Metacognition**: To create a learning journal. 4. **Language:** To write a detailed report explaining the design, construction, and functionality of their motor-powered sustainable vehicle.	2.2 SS **argue** the problem that may exist. 2.3 SS. **develop** solutions to problems. 3.1 SS. **summarize** all the activities and steps that they have done to achieve the result. 3.2 SS. **demonstrate** the ability to plan their work in the journal. 4.1 SS. **use** the formal aspects of the genre (report) to create an article. 4.2. SS. **implement** specific technical terms when describing the components and their vehicle.
CULTURE	
Learning goals (idem)	**Learning outcomes (standards)**
To **remember** reasons why we create sustainable vehicles and to **understand** how pollution impacts in different countries.	SS**. state** why it is necessary to build sustainable vehicles. SS. **compare** pollution in different countries.
COMMUNICATION Coyle, Hood and Marsh (2010)	
LANGUAGE OF: **Key language:** Tool, Gear, Pulley, Blueprint, Prototype, Assembly, Digital Design, 3D Printing, Collaboration, Strategy. **Language content (genre):** Report, school magazine article. - **Structure**: Title, introduction, body, conclusion. - **Language input**: Past tense: We built a traffic light. **Academic language:** Contrasting ideas: **However.** Justifies a reason – **Because.** Link's ideas or actions – **And.**	

Indicates the next action – **Then**.

LANGUAGE FOR:

Language for testing identifying potential problems in the mock-up: “The wheels might not hold the weight”.

Language for building constructing and refining their prototype: “I strengthened the structure for stability”.

Language for sketching creating visual representations of the prototype: “I sketched the design to spot issues”.

Classroom language

- **Group Work**: Sketch your design, test the prototype, create a report.
- **Activities**: Explain the mechanism, describe the steps, present your results.
- **Classroom Interaction:** How does it work? What’s the problem? Show your work.

LANGUAGE THROUGH:

Language through interests.

Learning through peer interaction.

Learning through interaction with technology while building the vehicle.

Learning through interaction with materials and instruments while building.

Learning through watching the video of Zira-11.

CONTENT EVALUATION CRITERIA (decree 61/2022)

2.1 To apply elementary knowledge of electricity and mechanics to the assembly of appliances.

2.2 Make, in a guided way, a simple final product that provides a solution to a design problem, testing different prototypes as a team and safely using mechanical, electrical or programming materials.

2.3. Show orally or graphically the final product of the design projects, explaining the steps followed and the purpose of the project.

LANGUAGE EVALUATION CRITERIA (CEFR, 2018)

WRITEN REPORTS AND ESSAYS→ A2: Can write simple texts on familiar subjects of interest, linking sentences with connectors like ‘and,’ ‘because,’ or ‘then.’

ASSESSMENT TOOLS

For interaction	Exit slips, language assistant.
For active observation	Rating scales checklist.
For peer/self-evaluation	Self-evaluation checklist for assessing the article.
For summative assessment	Rubric to evaluate the article.

ATTENTION TO DIVERSITY	
General measures: **Videos and animations:** Provide videos or animated tutorials showing how gears and pulleys work. **Provide real-world connections:** Make the lesson more engaging by showing real-world examples of sustainable transportation or robotic designs. **Frequent check-ins and feedback:** Provide ongoing formative assessments through individual progress meetings to guide student understanding and give immediate feedback.	
LOST → HOTS: Instead of expecting a fully vehicle design, focus on basic functionality. The final product could simply be a working vehicle that moves a little.	**HOST → LOTS:** After testing the vehicle, have students collect and analyse data on how well their design performs, such as speed, stability, or energy efficiency.

4.1.4. Challenge 4: Degging day

CHALLENGE 4: Degging day
Description: Students collaborate to fix a broken program affecting city delivery robots, searching for errors, testing solutions, and record an interview video explaining their process. **Final product:** Interview video with solutions for the debug of a sabotaged program. **Timing**: First term. (11th of November - 26th of November) Monday (50 minutes) and Tuesday (50 minutes).
CONTENT

<table>
<tr><td>CURRICULAR CONTENT
- Programming fundamentals: loops, conditionals, operators, messages, variables, functions, events, debugging.
- Show interest in computational thinking by participating in solving programming problems.

LANGUAGE CONTENT:
Interview video
Genre type: informative interview.</td><td><u>Contribution to specific competences</u>
1. Use computational thinking to solve problems, generating a creative and original product that responds to each of the challenges posed or generated through the observation of the environment.</td></tr>
<tr><td colspan="2">COGNITION</td></tr>
<tr><td><u>Learning goals</u>
1. To remember common types of errors in programming and to understand the process of debugging, how to identify problems and how to solve it.
2. To apply debugging techniques to identify and correct errors in the code, to evaluate the effectiveness of the debugging strategies and finally to create a solution that corrects the robot's performance.
3. Metacognitive: To peer-assess other interview videos.
4. Language: To apply programming vocabulary and explanations while answering questions in the interview and film it in a video.</td><td><u>Learning outcomes (standards)</u>
1.1 SS. name mistakes that they had made while programming.
1.2 SS. explain why knowing how to debug is useful while programming.
2.1 SS. solve errors in the code using debugging.
2.2 SS. test the effectiveness of some techniques that they had use.
2.3 SS. formulate correct codes for the robot’s action.
3.1 SS. recall concepts that helped them identify and fix errors in the program.
3.2 SS. compare the effectiveness of different debugging strategies they tried.
4.1 SS. use the formal aspects of the genre (information) to create an interview video.</td></tr>
</table>

	4.2 SS**. demonstrate** their understanding by answering different debugging strategies and how they applied them.
CULTURE	
Learning goals (idem)	**Learning outcomes (standards)**
To **remember** the importance of making mistakes in the process of learning and innovation and to **understand** how the debugging contributes to global advancements.	SS. **list** common mistakes that they do and that leads them to improve their learning. SS. **compare** how different cultures embrace mistakes in technology.
COMMUNICATION Coyle, Hood and Marsh (2010)	

LANGUAGE OF:

Key language: Loops, conditionals, operators, messages, variables, functions, events, debugging.

Language content (genre): Informative, interview video.

- **Structure:** Introduction, Questions, Answers, Follow-up Questions, Conclusion.
- **Language input:** Present simple tense explains facts and steps and wh-questions direct questions**:** used to ask for specific information or details.

Academic language:

To introduce the first point or step – **Firstly.**

To add another piece of information – **In addition.**

To provide a specific instance or illustration – **For example.**

LANGUAGE FOR:

Language for testing evaluating the effectiveness of debugging techniques: “Print statements helped find errors quickly”.

Language for solving applying debugging to fix code errors: “I fixed the loop to stop the infinite cycle”.

Language for recording documenting concepts that helped in debugging: “Breakpoints helped me find the issue”.

Classroom language

- **Group Work:** Test it.
- **Activities:** Explain, Describe, Show results.
- **Classroom Interaction:** What's the error? How to fix it?

LANGUAGE THROUGH:

Learning through peer interaction.

Language through interests.

Learning through interaction with technology while debugging.

Learning through watching the video of Zira-11.

CONTENT EVALUATION CRITERIA (decree 61/2022)

1.1 Know the basic fundamentals of block programming.

1.3 To collect information from the environment that allows us to obtain the necessary data to generate a product that provides a technological solution for a specific situation.

LANGUAGE EVALUATION CRITERIA (CEFR, 2018)

INTERVIEWING AND BEING INTERVIEWED → A2: Can answer simple questions and respond to simple statements in an interview.

ASSESSMENT TOOLS

For interaction	Thumbs up, thumbs down, language assistant.
For active observation	Active observation checklist.
For peer/self-evaluation	Peer-assessment checklist for assessing the interview video.
For summative assessment	Quizz.

ATTENTION TO DIVERSITY

General measures:

Text-to-speech tools: Allow students to use tools like text-to-speech for reading the debugging instructions or the code itself.

Flexible feedback methods: Giving them rubrics to make them know what they are evaluated.

LOST → HOTS:	HOST → LOTS:
Provide students with simplified versions of the program that have fewer lines of code or less complexity.	Students will design a program that contains intentional errors and then exchange their code with peers.

4.1.5. Challenge 5: Traffic city model

CHALLENGE 5: Traffic city model	
Description: Students design a city model with organized traffic, including streets, lights, and sensors. Working in teams, they create solutions for congestion and present their ideas. They explore traffic systems and reflect on their learning through self-assessments and peer feedback. **Final product:** Physical or digital model of a city with organized traffic, including streets, traffic lights, and sensors, and make a presentation to explain it. **Timing**: First term. (2nd of December – 17th of December) Monday (50 minutes) and Tuesday (50 minutes).	
CONTENT	
CURRICULAR CONTENT - Guided modelling process (drawings, diagrams, diagrams, manipulative objects, dramatizations, etc.) in the understanding and resolution of everyday problems. - Technological device-assisted design tools, for 2D and 3D representation and/or manufacture of parts applied to projects. - Simple techniques for teamwork and strategies for conflict management. Respect for the	**Contribution to specific competences** 1. Use computational thinking to solve problems, generating a creative and original product that responds to each of the challenges posed or generated through the observation of the environment. 2. Solve problems posed by applying knowledge of mechanics, electricity, design and programming, developing automated solutions, designing or building programmable and/or robotic control systems appropriate to their level.

rules and care in the use of tools. **LANGUAGE CONTENT:** Oral presentation Genre type: Explanatory presentation.	
COGNITION	
Learning goals 1. To **remember** the key components of a traffic system and to **understand** the different types of function that the traffic systems can do. 2. To **analyze** the different traffic system component and to **evaluate** different traffic management systems to reduce congestion. To **create** an innovative traffic management system for the future to solve problems. 3. **Metacognitive**: To complete a self-assessment rubric. 4. **Language**: To use descriptive and technical vocabulary to explain the features of their city model and how it improves traffic flow.	**Learning outcomes (standards)** 1.1 SS. **name** the most important components of traffic system. 1.2 SS. **classify** the components of a traffic system based on their functions. 2.1 SS. **break down** how traffic system components like streets, lights, and sensors work together. 2.2 SS. **rank** streets, lights, and sensors in order to to reduce congestion and urban chaos. 2.3 SS. **invent a new** traffic management system to solves future urban challenges. 3.1 SS. **explain** how they applied these concepts to solve problems and improve their projects. 3.2 SS. **describe** how they can apply the concepts they learned to future tasks. 4.1 SS. **use** the formal aspects of the genre (explanatory) to create a presentation. 4.2 SS. **compare** differences between past and present traffic

	systems and justify their improvements.
CULTURE	
Learning goals (idem)	**Learning outcomes (standards)**
To **remember** how urban traffic systems used to be in the past and to **understand** the most important traffic system used in each place depending on the size and the population.	SS. **list** a few traffic systems that used to be in the past in our cities. SS. **identify** the most important traffic system used in each place.
COMMUNICATION Coyle, Hood and Marsh (2010)	
LANGUAGE OF: **Key language:** Modelling, diagrams, schematics, manipulatives, dramatization, problem-solving. **Language content (genre):** Explanatory presentation, oral presentation. - **Structure: i**ntroduction, main body, conclusion. - **Language input:** Present simple tense: to explains facts. **Academic language:** To introduce the first step – **To begin with.** To explain the purpose – **In order to.** To show the outcome – **As a result.** To wrap up – **To summarize.** **LANGUAGE FOR:** **Language for identifying** and naming key traffic system components: “The key components are traffic lights, sensors, and streets”. **Language for breaking down** analyzing how streets, lights, and sensors work together: “Lights and sensors control traffic flow”. **Language for ranking** traffic system components based on effectiveness: “Sensors are the most effective, followed by lights and streets”. **Classroom language** - **Group Work**: Explain your design.	

- **Activities**: How does it reduce congestion? Why is this better than the old system?
- **Classroom Interaction:** What components are needed? How does this work together? What's the purpose of this part?

LANGUAGE THROUGH:

Language through interests.

Learning through peer interaction.

Learning through interaction with technology.

Learning through interaction with materials and instruments while building.

Learning through watching the video of Zira-11.

CONTENT EVALUATION CRITERIA (decree 61/2022)

1.1 Know the basic fundamentals of block programming.

2.3. Show orally or graphically the final product of the design projects, explaining the steps followed and the purpose of the project.

2.4. Develop 2D or 3D designs using prototyping techniques or different computer applications to build a specific object.

LANGUAGE EVALUATION CRITERIA (CEFR, 2018)

SPOKEN PRODUCTION→ A2: Can give a simple description or presentation of people, living or working conditions, daily routines. likes/dislikes etc. as a short series of simple phrases and sentences linked into a list.

ASSESSMENT TOOLS

For interaction	Random pick-up tools, language assistant.
For active observation	Observation journal: They make notes on how the students are doing on their dynamics.
For peer/self-evaluation	Oral feedback for assessing the presentation.
For summative assessment	Rubric to evaluate the presentation

ATTENTION TO DIVERSITY

General measures:

Choice in presentation method: Let students choose whether to present their final models orally, through a video, or via written reports.

Peer feedback: Incorporate opportunities for peer feedback and self-assessment using rubrics or reflective journals.	
LOST → HOTS: Use graphic organizers (e.g., mind maps, flowcharts) to help students visually organize their thoughts and understand the structure of the traffic system.	**HOST → LOTS:** Ask students to brainstorm solutions for a future problem (e.g., increasing population in cities, climate change, or the rise of autonomous vehicles).

4.2. Learning situation II: Time to recharge

This second learning situation, titled "*Time to recharge*", responds to the structure and organization offered in the corresponding **Table 5.** To start the learning situation, one of the children, Neon-X, will guide them through 5 challenges in order to accomplish them.

Table 5. LEARNING SITUATION II. Time to recharge

LEARNING SITUATION II. TIME TO RECHARGE.
Contextualization of the learning situation by Neon-X
In this learning situation, students will have to face Electrovorus, a monster that feeds on energy that we waste. Because of him, the city lights are always there, the solar panels have stopped working and the power goes out intermittently in the buildings. Thanks to the children, the city Zeta 9 can be saved, as they will carry out practical challenges, investigate renewable and non-renewable energy sources, design energy systems, repair solar panels.

Figure 5. Electrovorus

Source: Own creation made with artificial intelligence through the program "bing". https://www.bing.com/images/create.			
Timing	January- March.	**Genres**	Persuation Description Report (magazine article) Explanation text
Where?	This will take place in the main classroom, computer lab or the technology/robotics workshop. The final product will be presented in a large conference room.	**Context**	The students will receive a video from Neox- X explaining the situation in the city and showing images of the energy waste. https://youtu.be/33qjEY3097c.
Final product	The goal is to organize a **conference** teaching classmate about electricity, responsible energy use, and energy types, aimed at helping young children control energy and prevent Electrovorus from overtaking the city.		
Challenges			
- **Challenge 1**: Light Police! - **Challenge 2**: Solar power station - **Challenge 3**: Electro-pet - **Challenge 4**: Energy detectives - **Challenge 5**: City in blackout			

4.2.1. Challenge 1: Light police!

CHALLENGE 1: Light police!
Description: Students will design a poster with energy-saving tips for the classroom and track energy consumption changes over a week by following these tips. **Final product:** Energy-saving tips poster. **Timing**: Second term. (7th of January- 21 of January) Monday (50 minutes) and Tuesday (50 minutes).

<table>
<tr><th colspan="2">CONTENT</th></tr>
<tr><td>CURRICULAR CONTENT
- Energy and movement. Renewable energies and their influence on the contribution to the development of society.
- Promotion of curiosity, interest, motivation and initiative in the development and implementation of activities.
LANGUAGE CONTENT:
Tips on a poster
Genre type: Persuasion.</td><td><u>Contribution to specific competences</u>
3. Observe, understand and interpret the different situations in the environment to identify problems and seek solutions, acting individually and in groups to solve them, putting into practice the digital interconnection of devices with the internet.</td></tr>
<tr><th colspan="2">COGNITION</th></tr>
<tr><td><u>Learning goals</u>
1. To remember different examples of renewable energy sources and their benefits and to understand how renewable energy contributes to sustainable development in a city.
2. To apply strategies to track energy consumption over a week, to analyze patterns in energy usage before and after implementing the tips and to evaluate the importance of adopting energy-efficient habits in daily life.
3. Metacognition: To give and receive peer feedback.
4. Language: To create a poster with some energy-saving tips for your classroom.</td><td><u>Learning outcomes (standards)</u>
1.1 SS. list at list three types of renewable energy sources.
1.2 SS. describe how using renewable energy can improve quality of life.
2.1 SS. calculate the daily energy consumption of the classroom.
2.2 SS. compare energy consumption data from before and after applying energy-saving tips.
2.3 SS. rank the long-term impact of energy-efficient habits on the classroom.
3.1 SS. explain process behind their poster design choices.
3.2 SS. discuss what they would do differently in future projects.</td></tr>
</table>

	4.1 SS. **use** the formal aspects of the genre (persuation) to create a poster. 4.2 SS. **use** persuasive language to encourage energy-saving behavior.
CULTURE	
Learning goals (idem)	**Learning outcomes (standards)**
To **remember** different approaches countries, take to energy consumption and renewable energy implementation and to **understand** how different cultures view energy-saving habits.	SS. **list** at least three different sources of renewable energy used in various countries. SS. **compare** how energy-saving habits are different between countries.
COMMUNICATION Coyle, Hood and Marsh (2010)	
LANGUAGE OF: **Key language** Track, Monitor, Design, Rules, Energy consumption, Data, Measure, Change. **Language content (genre):** Persuasive tip poster. - **Structure**: Title, Introduction, Main Points, Call to Action. - **Language Input:** Persuasive phrases, benefits of saving energy and should/Shouldn't… reduce energy consumption, conserve resources, improve efficiency, leave devices on standby. **Academic language:** To introduce your main point – **Firstly**. To add supporting details – **In addition.** To strengthen your argument – **Furthermore**. **LANGUAGE FOR:** **Language for listing** renewable energy sources: “Solar, wind, and hydropower”. **Language for describing** how renewable energy improves quality of life “Renewable energy reduces pollution and provides sustainable power”.	

Language for calculating daily energy consumption of the classroom: “We use 50 kWh daily based on our devices”.

Language for explaining the design choices behind the energy-saving poster: “Bright colors and simple text for clarity”.

Classroom language

- **Group Work:** Let’s work together, Can you help me?, Discuss your design, Collaborate on the solution.
- **Activities:** Follow the steps, Test your solution, Try this approach, Check your results, Improve your design.
- **Classroom Interaction:** What worked well?, How can we improve this?, What’s the next step?, Does anyone have any suggestions?

LANGUAGE THROUGH:

Learning through peer interaction.

Language through interests.

Learning through interaction with technology while looking for information about sources.

Learning through watching the video of Zira-11.

CONTENT EVALUATION CRITERIA (decree 61/2022)
3.2. Use the volume of data generated by connected devices to perform an analysis of them and use this information.
LANGUAGE EVALUATION CRITERIA (CEFR, 2018)
PUBLIC ANNOUNCEMENTS→ A2: Can deliver very short, rehearsed announcements of predictable, learnt content which are intelligible to listeners who are prepared to concentrate.

ASSESSMENT TOOLS	
For interaction	Mini whiteboards, language assistant.
For active observation	Active observation checklist.
For peer/self-evaluation	Peer assessment by checklist for assessing the poster.
For summative assessment	Socrative.
ATTENTION TO DIVERSITY	

<table>
<tr><td colspan="2">General measures:
Flexible Assessment Options: Allow students to present their findings in different formats.
Group Work: Assign mixed-ability groups, ensuring peer support for students with Special Educational Needs.</td></tr>
<tr><td>LOST → HOTS:
Give them clear, step-by-step writing instructions to help them complete the final product with simple, structured guidance.</td><td>HOST → LOTS:
Use the different posters to predict using critical thinking, which will be the long-term energy savings.</td></tr>
</table>

4.2.2. Challenge 2: Solar power station

<table>
<tr><th colspan="2">CHALLENGE 2: Solar power station</th></tr>
<tr><td colspan="2">Description: Students will build a solar-powered circuit to run a motor or LED, create a circuit diagram, explain solar energy conversion, and assess efficiency. They will compare solar circuits to battery-powered ones and explore real-world solar energy applications.
Final product: small circuit with a solar panel to power a motor or LED light and its diagram.
Timing: Second term. (27th of January- 4th of February)
Monday (50 minutes) and Tuesday (50 minutes).</td></tr>
<tr><th colspan="2">CONTENT</th></tr>
<tr><td>CURRICULAR CONTENT
- Energy and movement. Renewable energies and their influence on the contribution to the development of society.
- Electrical and basic electronics: cables and connectors.
LANGUAGE CONTENT :
Circuit diagram
Genre type: description.</td><td><u>Contribution to specific competences</u>
2. Solve problems posed by applying knowledge of mechanics, electricity, design and programming, developing automated solutions, designing or building programmable and/or robotic control systems appropriate to their level.
3. Observe, understand and interpret the different situations in the</td></tr>
</table>

	environment to identify problems and seek solutions, acting individually and in groups to solve them, putting into practice the digital interconnection of devices with the internet.
COGNITION	
Learning goals	**Learning outcomes (standards)**
1. To **remember** the basic components of an electrical circuit and to **understand** the role of each component in the circuit and how they work together. **2.** To **analyze** circuits that are powered by solar energy and those who uses batteries. and to **evaluate** effectiveness of their solar-powered circuit in generating movement or light. Finally, to **create** a real-world application for solar energy. **3. Metacognition:** To predict their work while building it. **4. Language:** To draw and describe their circuit of the solar energy circuit.	1.1 SS. **list** a series of components that creates an electrical circuit. 1.2 SS. **explain** how a solar panel converts sunlight into electricity. 2.1 SS. **compare** the advantages and disadvantages of solar-powered circuits versus battery-powered. 2.2 SS. **assess** the efficiency of their circuit and suggest improvements. 2.3 SS. **invent** a real-world application for solar energy. 3.1 SS. **use** their predictions to plan how they will build the circuit. 3.2 SS. **compare** their predictions with the actual outcomes after assembling the circuit. 4.1 SS. **use** the formal aspects of the genre (description) to create a circuit diagram. 4.2 SS. **illustrates** the circuit for assembling a solar-powered circuit.
CULTURE	

Learning goals (idem)	Learning outcomes (standards)
To **remember** different ways countries, use solar energy and to **understand** how different countries approach access to renewable energy.	SS. **list** at least three countries leading in solar energy adoption. SS. **explain** how cultural factors influence a country to adopt renewable energy.

COMMUNICATION

Coyle, Hood and Marsh (2010)

LANGUAGE OF:

Key language: Circuit, Solar panel, Motor, LED light, Diagram, Energy conversion, Efficiency, Electricity.

Language content (genre): Description, circuit diagram

- **Structure:** Introduction, Materials, Diagram, Explanation.
- **Language Input:** Present simple**:** Describes general facts.

Academic language:

To introduce the first element – **Firstly**.

To give an example – **For instance**.

To highlight a detail – **In particular**.

To refer to an illustration – **As shown.**

LANGUAGE FOR:

Language for describing algorithms, sequences, routes, errors, instructions: “The algorithm guides the robot through each step to avoid obstacles”.

Language for comparing different routes and risks: “Route A is faster but has a higher risk of traffic”.

Language for explaining how sequences work, why an algorithm is effective or not: “The sequence ensures the robot moves in order but fails on sharp turns”.

Classroom language

- **Group Work**: Let’s work together, can you help me with this?
- **Activities**: Let’s share our ideas, discuss with your partner, what can we do next? Follow the steps carefully, Try this approach.

LANGUAGE THROUGH:

Learning through peer interaction.

Language through interests.
Learning through interaction with technology while creating the circuit.
Learning through watching the video of Neox 10.

CONTENT EVALUATION CRITERIA (decree 61/2022)

2.2. Make, in a guided way, a simple final product that solves a design problem, testing different prototypes as a team and safely using mechanical, electrical or programming materials.
3.2. Use the volume of data generated by connected devices to perform an analysis of them and use this information.

LANGUAGE EVALUATION CRITERIA (CEFR, 2018)

SUSTAINED MONOLOGUE: DESCRIBING EXPERIENCE →A2: Can use simple descriptive language to make brief statements about and compare objects and possessions.

ASSESSMENT TOOLS

For interaction	Mini whiteboards, exit slip, language assistant.
For active observation	Teacher diary checklist.
For peer/self-evaluation	Self-evaluation checklist for assessing the description of the diagram.
For summative assessment	Paddlet.

ATTENTION TO DIVERSITY

General measures:
Check list: Break down instructions into small, clear steps with checklists.
Peer- assistant: Use peer-assisted learning (PAL) so they can support each other.

LOST → HOTS:	**HOST → LOTS:**
Provide pre-cut wires and partially assembled circuits to reduce frustration.	Challenge them to modify their circuits, test efficiency, or create a new solar-powered device.

4.2.3. Challenge 3: Electro-pet

<table>
<tr><th colspan="2">CHALLENGE 3: Electro-pet</th></tr>
<tr><td colspan="2">Description: Students will design, program, and showcase a robotic pet that reacts to stimuli, documenting its development in a journal.
Final product: Program robotic pet that reacts to stimuli and explain its design in a journal.
Timing: Second term. (10th of February- 24th of February)
Monday (50 minutes) and Tuesday (50 minutes).</td></tr>
<tr><th colspan="2">CONTENT</th></tr>
<tr><td>CURRICULAR CONTENT
- Electricity and basic electronics: cables and connectors, actuators, circuits, sensors, motors, batteries (power sources).
- First designs and application in projects.
- Promotion of curiosity, interest, motivation and initiative in the development and implementation of activities.
LANGUAGE CONTENT:
Writing a journal article
Genre type: Report.</td><td><u>Contribution to specific competences</u>
3. Observe, understand, and interpret the different situations in the environment to identify problems and seek solutions, acting individually and in groups to solve them, putting into practice the digital interconnection of devices with the internet.</td></tr>
<tr><th colspan="2">COGNITION</th></tr>
<tr><td><u>Learning goals</u>
1. To remember basic programming concepts used to control robot and to understand how sensors react to stimuli and influence the behavior of the robotic pet.</td><td><u>Learning outcomes (standards)</u>
1.1 SS. name some of the basic programming concepts.
1.2 SS. describe how the sensor input is translated into an action.</td></tr>
</table>

2. To **analyze** the behavior of the robotic pet to determine if it reacts as expected to the stimuli. To **evaluate** the effectiveness of their robotic pet based on its response to stimuli and c**reate** possible future upgrades. **3. Metacognition:** To keep track of their progress. **4. Language:** To write a article about their pet and what it can do.	2.1 SS. **observe** and document the robotic pet's reactions to different stimuli. 2.2 SS. **rank** the behavior and accuracy of the robotic pets. 2.3 SS. **develop** potential upgrades to enhance the robotic pets. 3.1 SS. **use** their journal to critically document their problem-solving approach, detailing the strategies they employed to overcome challenges. 3.2 SS. **compare** their initial goals with the final outcomes. 4.1 SS. **use** the formal aspects of the genre (report) to create an article. 4.2 SS. **use** adjectives while describing the pet.
CULTURE	
Learning goals (idem)	**Learning outcomes (standards)**
To **understand** how different countries and cultures perceive robotic pets and to **analyse** why robotic pets are more common in some societies.	SS. **compare** attitudes towards robots in different cultures. SS. **explain** how robotic pets are used in different societies.
COMMUNICATION Coyle, Hood and Marsh (2010)	
LANGUAGE OF: **Key language:** Stimuli, Programming, Sensor, Reaction, Design, Blueprint, Development, Prototype. **Language content (genre):** Report, writing a journal article. - **Structure:** Introduction, Design, Development, Results, Conclusion.	

- **Language Input:** Objective, factual language to describe process and finding and past tense**:** used to describe completed actions and processes.

Academic language:

To introduce the first step – **Initially**.

To give an example – **For example.**

To explain the outcome **– As a result.**

LANGUAGE FOR:

Language for describing algorithms, sequences, routes, errors, instructions: "The sensor detects motion and triggers the pet to move forward".

Language for comparing different routes and risks: "Route A has fewer obstacles, but Route B is safer with more open space".

Language for explaining how sequences work, why an algorithm is effective or not: "The sequence works by following simple steps, but it's less effective in crowded environments".

Classroom language

- **Group work:** Let's collaborate, can you help? Share ideas, work together, Split the tasks.
- **Activities:** Follow steps, Test the circuit, assemble parts, adjust settings, Run the program.
- **Classroom Interaction:** What worked? What can we improve? How did you solve it?, Compare results, What did you learn?

LANGUAGE THROUGH:

Learning through peer interaction.

Language through interests.

Learning through interaction with technology while programming the algorithm.

Learning through interaction with materials and instruments while building.

Learning through watching the video of Neox 10.

CONTENT EVALUATION CRITERIA (decree 61/2022)

3.1. Know the processes that allow physical elements to be connected to the internet.

3.2. Use the volume of data generated by connected devices to perform an analysis of them and use this information.
LANGUAGE EVALUATION CRITERIA (CEFR, 2018)
WRITEN REPORTS AND ESSAYS→ A2: Can write simple texts on familiar subjects of interest, linking sentences with connectors like 'and,' 'because,' or 'then.'

ASSESSMENT TOOLS	
For interaction	Random pick-up tools, language assistant.
For active observation	Checklist.
For peer/self-evaluation	Self-evaluation checklist for assessing the article.
For summative assessment	Holistic rubric to evaluate the article.

ATTENTION TO DIVERSITY	
General measures: **Extra support:** Provide step-by-step visual guides. **Checklist:** Break complex tasks into small, manageable steps with a checklist.	
LOST → HOTS: Instead of writing full reflections, students complete fill-in-the-blank templates	**HOST → LOTS:** They create a persuasive pitch explaining their idea to their classmates.

4.2.4. Challenge 4: Energy detectives

CHALLENGE 4: Energy detectives
Description: Students will diagnose and fix electrical circuit faults, then create a video explaining their solutions. **Final product:** Short video explaining the issues of the electrical mystery and solutions they made. **Timing**: Second term. (25th of February- 10th of March) Monday (50 minutes) and Tuesday (50 minutes).

<table>
<tr><th colspan="2">CONTENT</th></tr>
<tr><td>CURRICULAR CONTENT
- Electricity and basic electronics: cables and connectors, actuators, circuits, sensors, motors, batteries (power sources).
- Promotion of curiosity, interest, motivation and initiative in the development and implementation of activities.
LANGUAGE CONTENT:
Making a video
Genre type: explanatory texts.</td><td><u>Contribution to specific competences</u>
1. Use computational thinking to solve problems, generating a creative and original product that responds to each of the challenges posed or generated through the observation of the environment.
3. Observe, understand and interpret the different situations in the environment to identify problems and seek solutions, acting individually and in groups to solve them, putting into practice the digital interconnection of devices with the internet.</td></tr>
<tr><th colspan="2">COGNITION</th></tr>
<tr><td><u>Learning goals</u>
1. To remember basic components of an electrical circuit and to understand the function of circuit components in an electrical system.
2. To apply their knowledge of circuit design to troubleshoot and solve issues, to analyze the electrical circuit to identify faults and predict the impact and to evaluate effectiveness of the solutions.
3. Metacognition: To reflect how they managed the process and how they could improve it.</td><td><u>Learning outcomes (standards)</u>
1.1 SS. name the key components of an electrical circuit.
1.2 SS. relate how the different parts of the circuit work together.
2.1 SS. demonstrate their ability to apply troubleshooting techniques to identify faults.
2.2 SS. classify different faulty circuit and their possible causes.
2.3 SS. grade the effectiveness of the solutions.
3.1 SS. analyze the challenges they faced and how they overcame them.</td></tr>
</table>

4. Language: To explain the issues and solutions through video making.	3.2 SS. **recognize** areas of strength and areas for improvement. 4.1 SS. **use** the formal aspects of the genre (explanation) to create a video. 4.2 SS. **use** visual aids to support their explanations.
CULTURE	
Learning goals (idem)	**Learning outcomes (standards)**
To **remember** different ways electricity is generated and distributed in various countries and to **understand** how access to electricity affects daily life.	SS. **list** different ways electricity is produced and distributed worldwide. SS. **compare** how daily life is affected in countries with stable electricity and not.
COMMUNICATION Coyle, Hood and Marsh (2010)	
LANGUAGE OF: **Key language:** Circuit, Fault, Connection, Troubleshoot, Diagnose, Motor, Battery. **Language content (genre):** Explanatory text making a video. - **Structure:** Introduction, Problem Description, Solutions, Conclusion. - **Language Input:** Present Simple Tense: mainly used to explain facts, instructions, or general information (e.g., "Water boils at 100¬∞C") and Imperative Form: when giving instructions or steps (e.g., "Click the button," "Follow the instructions"). **Academic language:** To indicate the subsequent stage – **Next.** To clarify particular details – **Specifically**. To conclude and wrap up – **In summary.** **LANGUAGE FOR:** **Language for identifying** and explaining circuit components and their functions: “The resistor controls the current flow”.	

Language for troubleshooting faults and classifying their causes: “The LED didn’t light up because the wire was loose”.

Language for evaluating solutions and reflecting on challenges: “We fixed it quickly but struggled to find the issue at first”.

Classroom language

- **Group Work:** Collaborate on the design, Discuss the faults, Work on the circuit.
- **Activities**: Identify the fault, Test the connections, Explain the steps.
- **Classroom Interaction:** How does the circuit work? What caused the issue? Can you show the solution?

LANGUAGE THROUGH:

Learning through peer interaction.

Language through interests.

Learning through interaction with technology while identify faults.

Learning through interaction with camaras and video apps.

Learning through watching the video of Neox 10

CONTENT EVALUATION CRITERIA (decree 61/2022)

1.3. To collect information from the environment that allows us to obtain the necessary data to generate a product that provides a technological solution for a specific situation.

3.2. Use the volume of data generated by connected devices to perform an analysis of them and use this information.

LANGUAGE EVALUATION CRITERIA (CEFR, 2018)

SUSTAINED MONOLOGUE: DESCRIBING EXPERIENCE→ A2: Can use simple descriptive language to make brief statements about and compare objects and possessions.

ASSESSMENT TOOLS

For interaction	Thumbs up / thumbs down, language assistant.
For active observation	Anecdotal records checklist.
For peer/self-evaluation	Peer-evaluation checklist for assessing the video.

For summative assessment	Gimkit: game-based quiz platform where students earn virtual money by answering questions correctly.

ATTENTION TO DIVERSITY	
General measures: **Colour diagram:** clear diagrams illustrating how electrical circuits work, with color-coding for each part. **Realia:** Offer real circuits for students to observe and interact with.	
LOST → HOTS: Break down the circuit building process into small, manageable tasks.	**HOST → LOTS:** To propose and test more than one solution to a problem.

4.2.5. Challenge 5: City in blackout

CHALLENGE 5: City in blackout	
Description: Students will design a poster for an energy conference showcasing a renewable source, its benefits, and its role in preventing blackouts. **Final product:** Poster for the energy conference about a type of energy highlighting how it works, its benefits, and how it could solve a blackout in a city. **Timing**: Second term. (11th of March- 25th of March) Monday (50 minutes) and Tuesday (50 minutes).	
CONTENT	
CURRICULAR CONTENT - Energy and movement. Renewable energies and their influence on the contribution to the development of society. - First designs and application in projects. **LANGUAGE CONTENT:** Create a poster Genre type: explanation.	**Contribution to specific competences** 3. Observe, understand, and interpret the different situations in the environment to identify problems and seek solutions, acting individually and in groups to solve them, putting into practice the digital interconnection of devices with the internet.
COGNITION	

<table>
<tr><th>Learning goals</th><th>Learning outcomes (standards)</th></tr>
<tr><td>1. To remember different types of renewable energy and to understand how a chosen type of renewable energy works.
2. To analyze the potential impact of the selected renewable energy source on reducing blackouts in cities and to create additional, compelling, and informative material for the conference.
3. Metacognition: To exchange peer-feedback with the method glow and grow.
4. Language: To present a poster in a conference and explain information collected about different energies.</td><td>1.1 SS. name at least three types of renewable energy sources.
1.2 SS. explain how their selected renewable energy works.
2.1 SS. classify the feasibility of their chosen energy source in addressing blackouts.
2.2 SS. design different materials for the conference.
3.1 SS. provide constructive feedback based on clear criteria.
3.2 SS. develop a deeper understanding of their personal strengths.
4.1 SS. use the formal aspects of the genre (explanation) to create a poster.
4.2 SS. organize and present information clearly by creating a poster.</td></tr>
<tr><td colspan="2">CULTURE</td></tr>
<tr><td>Learning goals (idem)</td><td>Learning outcomes (standards)</td></tr>
<tr><td>To remember different types of renewable energy and to understand the benefits of renewable energy in comparison to fossil fuels.</td><td>SS. name various types of renewable energy.
SS. summarize the advantages of renewable energy.</td></tr>
<tr><td colspan="2">COMMUNICATION
Coyle, Hood and Marsh (2010)</td></tr>
<tr><td colspan="2">LANGUAGE OF:
Key language: Renewable energy, Solar power, Wind energy, Hydropower, Geothermal energy, Benefits, Blackout.
Language content (genre): Explanation, create a poster</td></tr>
</table>

- **Structure:** Title, Introduction, Main Body, Conclusion, Call to Action.
- **Language input:** present simple tense, explains how things work and cause and effect**:** because, so, if, then.

Academic language:

To introduce the first point – **To begin with.**

To give an example – **For instance.**

To clarify a point – **This means that**.

To explain the outcome – **As a result.**

LANGUAGE FOR:

Language for assessing feasibility and designing conference materials: Solar panels work well in sunny areas, so we chose them for our flyer.

Language for tracking progress and reflecting on growth: I improved at teamwork and gave useful feedback on designs.

Language for organizing, balancing text and visuals, and presenting effectively: We used bold titles and icons to keep the poster clear and balanced.

Classroom language

- **Group Work:** Share ideas, Discuss, Collaborate, Plan.
- **Activities**: Research, Design, Organize, Create.
- **Classroom Interaction:** How does it work? What's the benefit?, Explain it, What's on your poster?

LANGUAGE THROUGH:

Learning through peer interaction.

Language through interests.

Learning through interaction with technology while searching for information.

Learning through interaction with people in the conference.

Learning through watching the video of Neox 10.

CONTENT EVALUATION CRITERIA (decree 61/2022)
3.2. Use the volume of data generated by connected devices to perform an analysis of them and use this information.
LANGUAGE EVALUATION CRITERIA (CEFR, 2018)
CREATIVE WRITING → A2: Can write very short, basic descriptions of events, past activities, and personal experiences.

ASSESSMENT TOOLS	
For interaction	Mini whiteboards, language assistant.
For active observation	Teacher diary checklist.
For peer/self-evaluation	Peer- assessment checklist for assessing the poster.
For summative assessment	Nearpod: interactive lessons that incorporate quizzes, polls, and real-time assessments.
ATTENTION TO DIVERSITY	
General measures: **Videos**: Display short video clips explaining how each renewable energy source works. **Peer- share: have** a peer share information to help explain difficult concepts.	
LOST → HOTS: Provide templates like Canva to guide students in designing their poster.	**HOST → LOTS:** Research real-world studies where renewable energy has been used.

4.3. Learning situation III: Fix the glinch

This third learning situation, titled "*Fix the glinch*", responds to the structure and organization offered in the corresponding **Table 6**. To start the learning situation, one of the children, Oria-22, will guide them through the process through the different challenges in order to achieve a good final result in the learning situation.

Table 6. LEARNING SITUATION III. Fix the glinch.

LEARNING SITUATION III. FIX THE GLINCH
Contextualization of the learning situation by Oria-22. In this learning situation, students will have to face Tecnomareus, a monster that has hacked every device in the city, causing disasters in homes, schools, and hospitals. Through different challenges, students will correct the failures they have caused in networks and computers, create solutions, and improve their relationship with others virtually, applying knowledge to return normality to the city.

Figure 6. Tecnomareus

Source: Own creation made with artificial intelligence through the program. "bing". https://www.bing.com/images/create.

Timing	March- June.	**Genres**	Instructions Explanation Persuasion Description Narrative
Where?	This will take place in the main classroom, computer lab, or robotics workshop.	**Context**	The students will receive a video from Oria-22 explaining the situation in the city and showing images of the chaos. https://youtu.be/CgGRVXSHmhs.
Final product	The goal is to create a **website** that teaches kids about the internet, AI, and virtual reality through different explanations of the challenges. These will prevent "Tecnomareus" from taking over the city again.		

Challenges

- **Challenge 1**: Virtual assistant rescue
- **Challenge 2**: Safe connection plan
- **Challenge 3**: IoT house
- **Challenge 4**: Let´s go to the museum
- **Challenge 5**: Hello robot

4.3.1. Challenge 1: Virtual assistant rescue

<table>
<tr><th colspan="2">CHALLENGE 1: Virtual assistant rescue</th></tr>
<tr><td colspan="2">Description: Students will design a basic virtual assistant in a context using Scratch. They will give some prompts explaining how it works and allow classmates to test the assistant by trying it.
Final product: Create a virtual assistant about a specific topic and explain the prompts to their classmates. https://scratch.mit.edu/projects/1155491019.
Timing: Third term. (31st of March- 22nd of April)
Monday (50 minutes) and Tuesday (50 minutes).</td></tr>
<tr><th colspan="2">CONTENT</th></tr>
<tr><td>CURRICULAR CONTENT
- Artificial intelligence as a response to learning through data collection and pattern creation. Principles for the use of AI.
- Strategies for machine learning.
- Use of simple computer applications for computer and mobile devices and introduction to artificial intelligence.
LANGUAGE CONTENT:
Prompting the code
Genre type: instruction.</td><td>Contribution to specific competences
4. Know and value the possibilities that artificial intelligence must act with machines or systems in a way that facilitates work and gradually improves it.</td></tr>
<tr><th colspan="2">COGNITION</th></tr>
<tr><td>Learning goals
1. To remember key concepts of artificial intelligence, machine learning, and data collection and to understand how AI learns from data collection and pattern recognition.
2. To apply the use of basic AI concepts by creating a simple virtual assistant.</td><td>Learning outcomes (standards)
1.1 SS. list examples of how AI is used in real-world applications.
1.2 SS. explain how AI systems learn from data collection and pattern recognition.
2.1 SS. demonstrate a basic virtual assistant that responds to user input.</td></tr>
</table>

To **analyze** different AI models and their effectiveness and to **evaluate** the accuracy and efficiency of the AI assistant's responses. **3. Metacognition:** To describe what they knew about AI and compare it at the end with their new knowledge. **4. Language:** They will write some prompts to explain how they design the assistant.	2.2 SS. **compare** different AI models and their effectiveness in responding. 2.3 SS. **assess** the accuracy and efficiency of the virtual assistant's responses. 3.1 SS. **explain** their initial perceptions of AI and how they have changed over time. 3.2 SS. **identify** the most valuable insights gained. 4.1 SS. **explain** how their virtual assistant works clearly and coherently. 4.2 SS. **anticipate** potential questions from their classmates. 4.3 SS **use** the formal aspects of the genre (instruction) to create a prompt.
CULTURE	
Learning goals (idem)	**Learning outcomes (standards)**
To **remember** the benefits and risks of working with AI and to **understand** how AI systems can be trained to fix in different communities.	SS. **list** the benefits and the risks of AI. SS. **explain** how AI systems are trained through data collection and pattern recognition.
COMMUNICATION Coyle, Hood and Marsh (2010)	
LANGUAGE OF: **Key language:** Virtual Assistant, Interaction, Algorithm IA, Orders, Response, pattern, Internet, Voice assistant. **Language content (genre):** Instructions, prompting the code. - **Structure:** Title, Objective, Step-by-Step Instructions, Code Example, Explanation, Testing/Output, Conclusion.	

- **Language Input:** Imperative verbs: define, create, write, declare, and cause and effect: When you enter a command, the assistant performs an action.

Academic language:

To introduce the initial step – **To start with.**

To give a specific case – **For example.**

To show how something works – **This demonstrates.**

To explain the outcome – **As a result**.

LANGUAGE FOR:

Language for identifying real-world AI applications and how AI processes data: "AI in maps finds the fastest route using traffic data".

Language for demonstrating, comparing, and evaluating AI models and virtual assistants: "This bot replies faster, but Alexa gives more accurate info".

Language for reflecting on AI perceptions and key learning insights: "I thought AI was just robots, but now I see it's in everyday tools".

Classroom language

- **Group Work:** Let's brainstorm, work together, Share your ideas.
- **Activities:** Follow the steps, test your virtual assistant, record your findings, Create your demo.
- **Classroom Interaction:** How does it work? What did you learn? Can you explain that again? What do you think happens next?

LANGUAGE THROUGH:

Learning through peer interaction.

Language through interests.

Learning through interaction with technology an IA.

Learning through watching the video of Oria 22.

CONTENT EVALUATION CRITERIA (decree 61/2022)

4.1. Know emerging computer or digital technological applications on artificial intelligence.

4.2. Integrate programming into machines or systems that allow their autonomy in a responsible way.

LANGUAGE EVALUATION CRITERIA (CEFR, 2018)

ADAPTED PLURILINGUAL COMPRHENSION→ A2: Can use simple warnings, instructions and product information given to find relevant information.

ASSESSMENT TOOLS	
For interaction	Mini whiteboards. Exit slips. Help of the language assistant.
For active observation	Active observation checklist.
For peer/self-evaluation	Self-evaluation checklist for assessing the instructions to writing steps.
For summative assessment	Analitic rubric to grade the writing steps.

ATTENTION TO DIVERSITY

Special needs students

- **Dyslexia**: visual supports such as cards with visuals, or activities with statement in bold text.
- **Lower level of English**: we can give them in all the sessions scaffolding so that they can follow the rhythm of the class, such as clear steps, demonstrate first, work with a partner, provide a list of important words, let them use a dictionary.

General measures:

- Multimodal input
- Visual organizer
- Realia
- Images
- Model of final products
- Video
- Questions
- Brainstorm
- Sharing learning goals or assessment tools

Symbols: Include icons or symbols in Scratch to help represent actions or events clearly.

<table>
<tr><td colspan="3">Examples: Create visual guides showing examples of common interactions with virtual assistants.</td></tr>
<tr><td colspan="2">LOST → HOTS:
Simplify the task by providing pre-made Scratch templates.</td><td>HOST → LOTS:
extend their virtual assistant by asking more specific questions.</td></tr>
<tr><td colspan="3">MATERIALS</td></tr>
<tr><td colspan="2">Human resources
- Teacher of ICT
- Auxiliar teacher of technology
- Language assistant

Physical resources
- Class materials (pencil, pen, colours, paper)
- Ipads or crombocks
- Digital board</td><td>Others
- Appendices
- Alexa
- Chatgpt and Scratch app
- Mini white boards
- Sandwich ingredient (bread, jam, knife)
- Big box
- Ball
- Bag
- Sticky notes</td></tr>
<tr><td colspan="3">PROCEDURES</td></tr>
<tr><td colspan="3">Session 1. AI Explorers (50 minutes)</td></tr>
<tr><td>Cognition</td><td colspan="2">1.1, 1.2, 3.1</td></tr>
<tr><td>Culture</td><td colspan="2">list benefits and risks of AI.</td></tr>
<tr><td>Timing</td><td>Activities</td><td>Grouping</td></tr>
<tr><td>5 min</td><td>Brainstorm: The teacher brings Alexa to class and asks the students what they think it is. Then, all the students share their thoughts while the teacher takes notes on the board.
<u>Reception scaffolding</u>: The language assistant can write on the board the sentence “I think it is…” so the kids can find it easier to participate in class.</td><td>Big group</td></tr>
<tr><td>10 min</td><td>Bingo key vocabulary: Each student gets a card with vocabulary words. The teacher calls out definitions, and students mark the correct word.</td><td>Individual</td></tr>
</table>

10 min	The first to complete a row, column wins by shouting "Bingo!". Appendix 1. **AI video:** Video presenting AI, data collection, and pattern recognition, there they will explain what it and their main objectives are. https://www.youtube.com/watch?v=G6de8L7cVvM While they watch the video, they will have to identify the words on their bingo vocabulary chart.	Big group
10 min	**Role play:** The students role plays short AI and human interactions using scenario cards while the rest of the class watches and writes on their mini whiteboards whether the AI is being helpful or risky. Appendix 2. Transformation scaffolding: while revising the before-during-after chart, we will make sure that the students understand the task by a thumbs up-thumbs down feedback.	Small group (5 groups of 5)
10 min	**AI sorting activity**: Students classify the examples of AI (Siri, Chatbots, Tesla), into categories: helpful AI vs. risky AI and justify their choices according to the last activity. Appendix 3.	Big group
5 min	**Exit ticket:** To leave the class each one has to say one thing they can do with AI today.	Individual
SCAFFOLDING		
RECEPTION: - Activation through brainstorm. - Exposure to the key language by a game. - Multimodal input by showing a video and crossing the words that appear. TRANSFORMATION: - Language for role-play. Appendix 4.		
Session 2. Who's the smartest assistant? (50 minutes).		

Cognition	2.2, 2.3	
Timing	Activities	Grouping
5 min	**Exposure to intention wall:** At the beginning of the class talks about the learning intention for that class and what they want to learn. Appendix 5. Reception scaffolding: The language assistant will write on the board the main learning intentions.	Big group
5 min	**IA cards:** Students will receive cards with images of different AI. First, they'll identify the AI based on the pictures, trying to guess what they are used for. Then each student will keep their card for the next activity. Appendix 6.	Big group
10 min	**Orias 22 video**: We have a video from our guide, Oria 22, who will explain the different types of AI we can find. While watching the video, the kids should raise their card with the AI image when it's being described in its category. We can play the video twice: the first time to watch it, and the second time to raise the card. https://youtu.be/yC0jrygq-vY.	Individual
15 min	**Testing different IA**: Students will compare three AI assistants to analyse their response quality, accuracy, personality and speed. They will ask the same set of questions: - *"Tell me a joke,"* - *"What is 2+2?"* - *"How do I make pancakes?"* Then, they will record their discoveries in the provided visual organizer to compare the different IA. Appendix 7.	Small group (5 groups of 5)

10 min 5 min	**Comparison chart:** Based on their AI's responses collected on the visual organizer, each team creates a visual representation of how their AI performed in four key characteristics. **Learning intention wall:** After finishing the exercise, they check if they think the achieved the goal or not.	Small group (5 groups of 5) Individual
SCAFFOLDING		
RECEPTION: - Sharing goals. - Activation through multimodal input by showing images and a video where participants are required to raise the images while watching the video. TRANSFORMATION: - Visual organizer: Table chart for comparing characteristics.		
Session 3. The great sandwich (50 minutes).		
Cognition	4.1	
Timing	Activities	Grouping
5 min 5 min	**Lighting round**: Students answer quick questions about the IA we learnt in the last session, and they will answer to the questions by the random stick selection tool. The language assistant check answers and give a brief explanation. Appendix 8. Reception scaffolding: The language assistant can present the question on the board to make it more visual. **Washing hands**: We play a video of a boy explaining how to wash their hands and ask the students to brainstorm the steps we need to do it. The teacher writes instructions on the board showing the writing frame of the instructions (tittle, materials, and steps), and ask the students to be clear and precise.	Individual Big group

	https://www.youtube.com/watch?v=x3QUtQQp8W4.	
10 min	**Explanation of the jam sandwich**: The teacher explains that the students will have to do the same to describe the instructions to make a jam sandwich. After that the teacher will provide the students with a visual organizer to write their steps. Appendix 9.	Big group
10 min	**Writing instructions**: Students in teams write detailed, step-by-step instructions for making a jam sandwich on their visual organizer.	Small group (5 groups of 5)
5 min	**Demonstration of the sandwich**: The teacher follows each team's instructions. If something is unclear, the teacher stops. After each attempt, students analyse what went well and what went wrong.	Big group
10 min	**Breaking down instructions**: Each group selects a daily activity and must write step-by-step instructions for making it. One of the volunteers will act like a robot and try the sequence. Appendix 10.	Small group (5 groups of 5)
5 min	**Self assessment:** Students will assess themselves using a checklist. Appendix 11.	Individual

SCAFFOLDING

RECEPTION:

- Activation through revising content.
- Multimodal input by showing a video, where participants are required to brainstorm the steps on it.

TRANSFORMATION:

- Visual organizer: A flowchart to write their steps.

PRODUCTION:

- Modelling: We gave them a model of an instruction text (hand washing).

- Language input: visual organizer providing them with important words they will need to write instructions. - Writing frame: Giving writing frame for the steps in the visual organizer. - Check list: Give them a checklist to see if it is good.		
Session 4. Broke the code (50 minutes).		
Culture	SS. explain how AI systems are trained through data collection and pattern recognition.	
Timing	Activities	Grouping
5 min	**Fill in the steps:** In pair, the students must identify missing details in instructions and work on completing them with clarity as they did in the other session.	Pairs
10 min	**Pattern recognition:** Student is asked to bring an object from outside, such as a leaf, rock, or stick, and place it in a cage or box. Then students must find a pattern between the objects. Once the have written all their patterns, we will ask the IA, to compare if they are the same.	Big group
15 min	**Trainers and IA learners:** We divide the students into “trainers”, who label images according to categories, and the “AI learners” who guess the categories based on patterns they are watching. Appendix 12.	Small group (5 groups of 5)
10 min	**Prediction game:** Show students a pattern and ask them to predict what comes next. After identifying the pattern, explain that this is like how AI predicts. Appendix 13.	Big group
10 min	**In my boat**: One student think about a pattern. The rest of students ask if their objects can enter to their boat trying to guess the pattern. After the pattern is identified, the next student creates their own.	Big group
SCAFFOLDING		
RECEPTIVE		

- Activation through the revise activity. - Multimodal input by realia with the outside objects. TRANSFORMATION - Design of Venn Diagram for comparing the answers.		
Session 5. Chatbot Buddy.(50 minutes).		
Cognition	2.1,3.2	
Timing	Activities	Grouping
5 min	**Spelling words:** Students stand in a circle, and the language assistant says a key vocabulary word. They pass the ball around, and each student spells the word aloud.	Big group
10 min	**IA video:** Show a video explaining how IA works. While watching the video they will have to search for the answer to a question they have been giving. https://www.youtube.com/watch?v=ttIOdAdQaUE Appendix 14.	Individual
10 min	**Topic selection**: The teacher will bring topics and display all of them in a bag, each group will take one topic, for example (healthy food, wild animals, countries). Appendix 15.	Big group
10 min	**Revise scratch**: Firstly, the teacher will provide students with a tree diagram that has the important Scratch commands, along with corresponding prompts that they need to use. Then, students will cut out the prompts and match them to the appropriate sections of the tree diagram by sticking them in the correct places. At the end they will have a complete visual organizer to scaffold the next activity. Appendix 16.	Small group (5 groups of 5)

15 min	**Start to program while watching the video:** Students will program their virtual assistant by following a video with instructions. https://www.youtube.com/watch?v=wP_OsxPbdXA.	Small group (5 groups of 5)
SCAFFOLDING		
RECEPTIVE - Activation through gaming of spelling. - Multimodal input by watching the video while answering the questions. TRANSFORMATION - Visual organizer: A tree diagram revising the commands.		
Session 6. Talk to the bot (50 minutes).		
Cognition	2.1,3.2, 4.2, 4.3	
Timing	Activities	Grouping
5 min	**Remember the key words:** The students will have to write on their mini whiteboard one word that they remember from last class. After time is up, the teacher will ask students for their words, and they will revise all concepts from the last lesson.	Big group
5 min	**Prompt's brainstorm:** Firstly, we can do a brainstorm about ideas that we can prompt in our project.	Big group
15 min	**Writing prompts:** Then we will provide a scaffolding for writing prompts that include sentence starters and a step-by-step diagram to make sure that they are prompting correctly. Appendix 17.	Small group (5 groups of 5)
10 min	**Add the Q and A**: Students will formulate a question to ask ChatGPT, they will request a series of questions and answers related to their topic. After receiving the responses, students will analyze the quality of the question by using a binary key that we will provide to guide their evaluation. Appendix 18	Small group (5 groups of 5)

5 min	**Test the assistant**: Students will ask different questions to see how well the assistant responds. They'll troubleshoot and refine their code to fix any errors.	Big group
5 min	**Sticky notes**: Give students a sticky note and ask them to write one valuable insight they gained in this challenge.	Individual

SCAFFOLDING

RECEPTIVE

- Activation through the vocab revision using the mini whiteboard game.
- Multimodal input by brainstorming about the prompt's topic.

TRANSFORMATION

- Prompting step by step diagram
- Visual organizer: Binary key to find out if it is a good question.

PRODUCTION:

- Modelling: We gave them a model of an prompts
- Language input: We provide them with some questions they can use in the step-by-step diagram
- Writing frame: How to write prompts.
- Check list: Checklist to assess the quality of the prompts.

4.3.2. Challenge 2: Safe connection plan

CHALLENGE 2: Safe connection plan

Description: Students will create a video ad on safe device use, covering passwords, privacy, and online respect to promote digital security.

Final product: They create a video ad about the safe use of connected devices, highlighting topics like passwords, privacy, and respectful behavior online.

Timing: Third term. (28th of April- 5th of May)

Monday (50 minutes) and Tuesday (50 minutes).

CONTENT

CURRICULAR CONTENT	Contribution to specific competences
- Network operation. Basic rules for the safe and efficient use of resources working individually, as a team and as a network, and strategies for solving problems in digital communication. **LANGUAGE CONTENT:** Advertisement video Genre type: persuasion.	5. Handle devices and tools safely and responsibly to work individually or together according to the needs of the educational context.
COGNITION	
Learning goals	**Learning outcomes (standards)**
1. To **remember** basic rules for the safe and efficient use of technology and to **understand** the importance of passwords, privacy, and respectful behavior in digital spaces. **2.** To **apply** strategies for responsible and respectful online behavior and to **analyze** different approaches to digital safety and evaluate their effectiveness, then, finally to **evaluate** the impact of unsafe digital behaviors on individuals and networks. **3. Metacognition:** To rate their prior knowledge writing it in a poster to correct it at the end. **4. Language:** To record an add video talking about safe use of technology.	1.1 SS. **list** basic rules for the safe and efficient use of technology. 1.2 SS**. summarize** common risks in digital spaces and their potential consequences. 2.1 SS. **Implement** best practices for digital security. 2.2 SS. **compare** different strategies for digital safety and assess their strengths and weaknesses. 2.3 SS. **assess** real-world cases of unsafe digital behavior and determine their impact. 3.1 SS. **compare** their initial understanding with their final knowledge. 3.2 SS. **discuss** about the most important key idea they have learned.

	4.1 SS. **use** the formal aspects of the genre (persuation) to create an add video. 4.2 SS. **demonstrate** critical thinking by evaluating the relevance of their chosen key idea.
CULTURE	
Learning goals (idem)	**Learning outcomes (standards)**
To remember basic safety rules for using connected devices and to **understand** the cultural differences in how digital privacy is viewed.	SS. **repeat** the essential safety rules for using connected devices. SS. **describe** how cultural values influence digital privacy.
COMMUNICATION Coyle, Hood and Marsh (2010)	

LANGUAGE OF:

Key language: Password, Privacy, Security, Online behavior, Safety, Network, Digital communication, Encryption.

Language content (genre): Persuasive advertisement video.

- **Structure:** Introduction, Key Points, Call to Action.
- **Language Input:** Should/shouldn´t: to encourage safe online behavior and appeal to emotions: Protect your privacy to stay safe online.

Academic language:

To introduce the main point – **First of all.**

To add supporting information – **In addition.**

To give a specific instance – **For example**.

LANGUAGE FOR:

Language for Identifying risks and Applying Digital Security: “Sharing passwords can lead to account theft.

Language for Comparing and evaluating digital safety strategies:” Two-step login is safer than just a password”.

Language for Reflecting on Learning and Growth: “Before, I didn’t know what phishing I was now do”.

Classroom language

- **Group Work:** Collaborate, share ideas, discuss, help each other.
- **Activities:** Research, identify risks, create script, plan, test, edit, explain.
- **Classroom Interaction:** What are the risks? How can we prevent this? Explain it again. What did you learn?

LANGUAGE THROUGH:

Learning through peer interaction.

Language through interests.

Learning through interaction with camaras and video apps.

Learning through interaction with researching information.

Learning through watching the video of Oria 22.

CONTENT EVALUATION CRITERIA (decree 61/2022)

5.1. Use devices and tools safely according to the needs of the educational context.

5.2. Securely and efficiently search for information to create digital content, working individually and together.

LANGUAGE EVALUATION CRITERIA (CEFR, 2018)

SUSTAINED MONOLOGUE: PUTTING A CASE → A2: Can present his/her opinion in simple terms, provided listeners are patient.

ASSESSMENT TOOLS

For interaction	Random pick-up tools, language assistant.
For active observation	Teacher diary checklist.
For peer/self-evaluation	Self-evaluation checklist for assessing the add video.
For summative assessment	Mentimeter.

ATTENTION TO DIVERSITY

General measures:

Video models: Show examples of well-structured ads so students have a clear reference.

Tech support: Ensure access to different tools to film and edit the video.

LOST → HOTS:	**HOST → LOTS:**

Give them a storyboard template where students visually explain the online risk instead of writing a summary.	Students create new digital laws to address modern online challenges.

4.3.3. Challenge 3: IoT house

CHALLENGE 3: IoT house	
Description: Students write an article in the school's magazine about new smart home systems they have created, explaining how they work and its benefits. **Final product:** New smart home systems presented in the school´s magazine. **Timing**: Third term. (6th of May- 19th of May) Monday (50 minutes) and Tuesday (50 minutes).	
CONTENT	
CURRICULAR CONTENT - Pluggable devices. Guidelines for the installation of devices that can be connected to each other and centrally controlled from a computer, tablet or mobile. - Programmed control systems and use of simulators and devices. **LANGUAGE CONTENT:** Article on school´s magazine Genre type: Report.	**Contribution to specific competences** 2. Solve problems posed by applying knowledge of mechanics, electricity, design and programming, developing automated solutions, designing or building programmable and/or robotic control systems appropriate to their level. 5. Handle devices and tools safely and responsibly to work individually or together according to the needs of the educational context.
COGNITION	
Learning goals **1. To remember** key concepts related to pluggable devices and programmed control systems and to **understand**	**Learning outcomes (standards)** 1.1 SS. **recall** key concepts related to pluggable devices and programmed control systems.

how connected devices interact within a smart home system. **2.** To **apply** the correct installation of pluggable devices based on provided guidelines, to **analyze** potential challenges in integrating multiple smart devices into a single system and to **evaluate** the effectiveness and security of different smart home configurations. **3. Metacognition:** To set personal goals for the end of the challenge. **4. Language:** To write a detailed article explaining the design, of their new smart home systems.	1.2 SS. **explain** how connected devices interacts together. 2.1 SS. **use** pluggable devices following the given installation guidelines. 2.2 SS. **compare** how different devices communicate with each other. 2.3 SS. **evaluate** the effectiveness of various smart home configurations. 3.1 SS. **recall** specific details or concepts related to the challenge. 3.2 SS. **assess** options and make judgments based on evidence**.** 4.1 SS. **use** the formal aspects of the genre (report) to create an article. 4.2 SS. **implement** specific technical terms when describing the components.
CULTURE	
Learning goals (idem)	**Learning outcomes (standards)**
To **remember** key elements of a smart home system and to **understand** different cultural attitudes towards privacy and data security.	SS. **list** key smart home devices and their functions. SS. **identify** cultural attitudes toward privacy and security in smart home.
COMMUNICATION Coyle, Hood and Marsh (2010)	
LANGUAGE OF: **Key language:** Smart systems, Integration, Pluggable devices, Programming, Control systems. **Language content (genre):** Report, article on school´s magazine - **Structure I**ntroduction, Description of the System, how it Works, Benefits, Conclusion. - **Language Input: Past tense:** *used to describe what has been done.*	

Academic language:

To add extra details – **In addition.**

To provide a specific case – **For example**.

To explain the outcome – **As a result.**

LANGUAGE FOR:

Language for Explaining and Evaluating Device Interactions: "Smart lights and thermostats use Wi-Fi to communicate".

Language for Installing and Setting Up Devices: "Follow the steps to connect to Wi-Fi and pair with the app".

Language for Reflecting on and Clarifying Smart Home Understanding: "I didn't get how devices worked together, but now I do".

Classroom language

- **Group Work:** Collaborate, Share ideas, Work together, Discuss, Contribute.
- **Activities:** Follow instructions, Set up, Test, Sketch, Create.
- **Classroom Interaction:** What works? Explain, how does it work? Improvements needed, Any issues?

LANGUAGE TRHOUGH:

Learning through peer interaction.

Language through interests.

Learning through interaction with technology.

Learning through interaction with materials and instruments while building.

Learning through interaction with researching information.

Learning through watching the video of Oria 22.

CONTENT EVALUATION CRITERIA (decree 61/2022)

2.2. Make, in a guided way, a simple final product that solves a design problem, testing different prototypes as a team and safely using mechanical, electrical or programming materials.

5.1. Use devices and tools safely according to the needs of the educational context.

LANGUAGE EVALUATION CRITERIA (CEFR, 2018)

WRITEN REPORTS AND ESSAYS→ A2: Can write simple texts on familiar subjects of interest, linking sentences with connectors.

ASSESSMENT TOOLS	
For interaction	Thumbs up / thumbs down, language assistant.
For active observation	Teacher diary checklist.
For peer/self-evaluation	Self-evaluation checklist for assessing the article.
For summative assessment	Plickers: use physical cards for real-time multiple-choice assessments.

ATTENTION TO DIVERSITY	
General measures: **Glossary:** give students a glossary of key terms. **Visuals**: Use diagrams or videos to explain smart home systems.	
LOST → HOTS: Provide a step-by-step installation guide with pictures and color-coded instructions.	**HOST → LOTS:** research real-world smart home applications and compare global smart home innovation.

4.3.4. Challenge 4: Let´s go to the museum

CHALLENGE 4: Let´s go to the museum	
Description: Students will create an art gallery with their drawings and add QR codes for additional information, displayed in the hallway for others to scan. **Final product:** Art gallery with their drawings and QR codes with extra information. **Timing**: Third term. (20th of May- 2nd of June) Monday (50 minutes) and Tuesday (50 minutes).	
CONTENT	
CURRICULAR CONTENT - Use of specific applications and software that allows you to recreate reality and bring objects to life for study	**<u>Contribution to specific competences</u>** 6. Know and use the different virtual or augmented reality systems and applications to explore the environment

- Introduction to editing and creating QR codes or augmented reality content - Development of markers for virtual, augmented and mixed reality applications. **LANGUAGE CONTENT:** Artwork gallery Genre type: Description	and enjoy interactive and enriching learning.
COGNITION	
Learning goals	**Learning outcomes (standards)**
1. To **remember** the usefulness of QR codes, augmented reality, and virtual reality and to **understand** how QR codes and augmented reality work to enhance the experience. **2. To apply** software apps to create artwork and enhance it with QR codes with reality content. To **analyse** different types of applications and software for creating augmented reality content and QR code and to **evaluate** the effectiveness of different markers in terms of accessibility, user experience, and educational value. **3. Metacognition:** To follow a rubric. **4. Language:** To write a description about the art works.	1.1 SS. **state** the role of QR codes and augmented reality in providing additional information. 1.2 SS. **explain** how QR codes and augmented reality work to enhance the experience. 2.1 SS. **use** software applications to create artwork and integrate QR codes with more information. 2.2 SS. **compare** different applications and software for creating QR codes. 2.3 SS. **assess** the effectiveness of various markers. 3.1 SS. **set** goals for themselves based on their reflections they made reading the rubric. 3.2 SS. **evaluate** their own learning process and track their progress throughout the project. 4.1 SS. **use** the formal aspects of the genre (description) to create an artwork description.

	4.2 SS. **organize** their written content logically and structure in a coherent way.
CULTURE	
Learning goals (idem)	**Learning outcomes (standards)**
To **remember** how QR codes and virtual reality work and to **understand** how technology can either enhance or limit the real-world experience.	SS. **state** how QR codes and virtual reality work. SS. **explain** how technology can either enrich or diminish the authenticity of real-world experiences.
COMMUNICATION Coyle, Hood and Marsh (2010)	
LANGUAGE OF: **Key language:** Application, Software, Augmented Reality, QR codes, Interactive, Markers, Virtual reality. **Language content (genre):** Description, artwork gallery. - **Structure** Introduction, Description of Artwork, QR Code Information, Conclusion. - **Language Input:** present simple tense: This painting depicts and descriptive adjectives: vibrant, subtle, elegant. **Academic language:** To start explaining the first aspect – **To begin with.** To add important points – **Moreover**. To emphasize a specific detail – **In particular.** **LANGUAGE FOR:** **Language for Identifying** and Explaining the Role of QR Codes and Augmented Reality: QR codes store information that AR can display interactively. **Language for Using** and Comparing Software for QR Code Creation and Artwork: “I prefer using Canva for its simple interface”. **Language for Assessing** Effectiveness and Setting Goals: “My goal is to make the artwork more engaging for users”.	

Language for Writing Descriptions for QR Codes: “This code links to a video tutorial on using the app”.

Classroom language

- **Group Work:** Share your ideas, collaborate on the design, discuss your progress.
- **Activities:** Create your artwork, integrate QR codes, write your descriptions
- **Classroom Interaction:** What did you learn? How can we improve this? Can you explain it again?

LANGUAGE THROUGH:

Learning through peer interaction.

Language through interests.

Learning through interaction with technology, IA and virtual reality.

Learning through interaction with materials and instruments while designing the artwork.

Learning through watching the video of Oria 22.

CONTENT EVALUATION CRITERIA (decree 61/2022)

6.1. Use the different virtual or augmented reality systems to facilitate learning processes.

6.2. Create projects in which virtual or augmented reality is included as a resource.

LANGUAGE EVALUATION CRITERIA (CEFR, 2018)

CREATIVE WRITING→ A2: Can write very short, basic descriptions of events, past activities, and personal experiences.

ASSESSMENT TOOLS

For interaction	Mini whiteboards, language assistant.
For active observation	Active observation checklist.
For peer/self-evaluation	Self-evaluation checklist for assessing the description of the artwork.
For summative assessment	Analitic rubric to evaluate the description of the artwork.

ATTENTION TO DIVERSITY

General measures: **Visuals:** Offer video tutorials on how QR codes and augmented reality work. **Writing support:** Provide sentence starters for artwork descriptions.	
LOST → HOTS: provide step-by-step printed instructions for creating QR codes.	**HOST → LOTS:** create a narrative that connects their artwork to a real-world storyline.

4.3.5. Challenge 5: Hello robot

CHALLENGE 5: Hello Robot	
Description: Students will program robots to communicate using blocks while they represent the short story they have written. **Final product:** Chatbots that represent their short story. **Timing**: Third term. (3rd of June- 17th of June) Monday (50 minutes) and Tuesday (50 minutes).	
CONTENT	
CURRICULAR CONTENT - Network operation. Basic rules for the safe and efficient use of resources working individually, as a team and as a network, and strategies for solving problems in digital communication. - Strategies for machine learning - Pluggable devices. Guidelines for the installation of devices that can be connected to each other and centrally controlled from a computer, tablet or mobile. **LANGUAGE CONTENT:** Write a short story with robots Genre type: narrative.	**Contribution to specific competences** 4. Know and assess the possibilities that artificial intelligence has to act with machines or systems in a way that facilitates work and gradually improves it. 5. Handle devices and tools safely and responsibly to work individually or together according to the needs of the educational context.

<table>
<tr><th colspan="2">COGNITION</th></tr>
<tr><td><u>Learning goals</u>
1. To remember basic concepts related to network operations, machine learning, and pluggable devices and to understand how robots can communicate with each other’s.
2. To apply their previous knowledge of programming to set up chatbots, then to evaluate the effectiveness of their programmed in the short story and finally create a real-life situation where chatbots are needed.
3. Metacognition: To assess their work by filling a star rubric.
4. Language: To write a short story that the chatbots can represent.</td><td><u>Learning outcomes (standards)</u>
1.1 SS. list the basic rules of network communication.
1.2 SS. identify how network communication enables devices to send and receive messages.
2.1 SS. use block-based programming to develop the communication system.
2.2 SS. grade the functionality and effectiveness of their robot communication system.
2.3 SS. develop new situations where robots need to communicate.
3.1 SS. identify gaps in their knowledge or areas of confusion.
3.2 SS. develop a greater awareness of their own thinking.
4.1 SS. use the formal aspects of the genre (narrative) to create a story.
4.2 SS. develop their creative writing skills.</td></tr>
<tr><th colspan="2">CULTURE</th></tr>
<tr><td><u>Learning goals (idem)</u>
To remember how AI and robots are used in communication across cultures. and to understand the benefits and risks of relying on AI for communication.</td><td><u>Learning outcomes (standards)</u>
SS. list three ways AI and robots are used in communication in different cultures.
SS. explain how AI communication systems can affect human relationships and cultural interaction.</td></tr>
<tr><th colspan="2">COMMUNICATION
Coyle, Hood and Marsh (2010)</th></tr>
<tr><td colspan="2"><u>LANGUAGE OF:</u></td></tr>
</table>

Key language: Program, Code, Block, Signal, Communication, Network, Device.

Language content (genre): Narrative, write a short story.

- **Structure:** *Beginning, Middle, End.*
- **Language Input** Descriptive language to tell the story through the chatbot and p**ast tense:** used to describe what happens in the story.

Academic language:

To begin the story – **Once upon a time**.

To introduce an unexpected event – **Suddenly**.

To conclude the story – **In the end**.

LANGUAGE FOR:

Language for Identifying and Explaining Network Communication: Networks connect devices through protocols like Wi-Fi and Ethernet.

Language for Developing and Evaluating Robot Communication Systems: "This system works well, but the range is limited".

Language for Reflecting on Learning and Identifying Knowledge Gaps: "I need to focus more on error handling in communication systems".

Language for Documenting and Simplifying Technical Concepts: "I simplified the explanation by using diagrams of data flow".

Classroom language

- **Group Work:** Collaborate, share ideas, help each other, discuss solutions, Work together.
- **Activities:** Test your code, Review the functionality, Modify the program, troubleshoot errors, Present your work.
- **Classroom Interaction:** What does your code do? How can you improve it? Can you explain that? What's the next step?

LANGUAGE TROUGH:

Learning through peer interaction.

Learning through interaction with technology, IA and virtual reality.

Learning through watching the video of Oria 22.

Language through interests.

CONTENT EVALUATION CRITERIA (decree 61/2022)

4.2. Integrate programming into machines or systems that allow their autonomy in a responsible manner.
5.1. Use devices and tools safely according to the needs of the educational context.
5.2. Securely and efficiently search for information to create digital content, working individually and together.4.2. Integrate programming into machines or systems that allow their autonomy in a responsible manner.

LANGUAGE EVALUATION CRITERIA (CEFR, 2018)

CREATIVE WRITING→A2: Can write an introduction to a story or continue a story, provided he/she can consult a dictionary and references (e.g., tables of verb tenses in a course book).

ASSESSMENT TOOLS

For interaction	Exit slips, language assistant.
For active observation	Active observation checklist.
For peer/self-evaluation	Peer-evaluation checklist for assessing the story.
For summative assessment	Analitic rubric to evaluate the story.

ATTENTION TO DIVERSITY

General measures:

Video record: Use video tutorials explaining the programming concepts and steps.

Own decision: Let students choose the theme for their robot communication system.

LOST → HOTS:	**HOST → LOTS:**
Break down the tasks into simplified, smaller steps and provide checklists or templates.	Create a crisis scenario where robots must communicate to solve it.

5. CONCLUSION

Finishing this Annual Syllabus has been an incredible learning experience and a personal challenge for me. I have put a lot of effort into understanding this approach, as I had not heard of it before I started this work. During this process, I have been able to learn how to design a syllabus from scratch, a very important skill for the career I am pursuing and for my future in general. Working on this project has been the beginning of my path towards bilingual teaching, but beyond that, it has shown me how essential it is to have a vocation, desire and dedication in your profession. Throughout my career I have thought that having a good combination of personal and academic skills is key to advancing in this profession, but it has not been until the realization of this syllabus that I have realized that there is another fundamental factor: desire and motivation. This path is not only about growing as a person, but also about helping others grow, especially the youngest, who are the ones who should be the true center of the educational process.

Throughout my career, I have constantly reflected on the educational principles that I consider fundamental, such as commitment, equality, justice, collaboration, and personal development. One of the things I liked the most during this process was gradually discovering the CLIL approach and its combination with the different content areas, such as STEAM or, in my case, technology and robotics.

I made a big bet by choosing this project, since I had not taken it before; However, I loved being able to do the Syllabus while discovering new things in class. Thanks to the motivation of my tutor, I decided to incorporate it into this project, and I think it was a good decision. The deeper I delved into the CLIL approach, the more I realized its advantages, especially because of its ability to integrate content and language learning. This integration also inspired me to include the methodology along with one of the most innovative subjects today: technology and robotics, mixing up with STEAM, which is key to offering students the opportunity to explore different fields of knowledge, aligned with the demands of the 21st century. A century where technology plays a fundamental role, and I

firmly believe that we must adapt to technological advances, integrating them into teaching so that students can face the challenges of the future.

To conclude, I would like to thank the Universidad Pontificia Comillas for the years I have been continuously learning, where I not only have acquired theoretical knowledge, but also significant practical experiences that have made me the teacher I am today. And, of course, I want to express my sincere thanks to Magdalena Custodio Espinar, the tutor of this CLIL syllabus, whom I would like to highlight for her constant support and kindness to me and my classmates. I must thank her for helping me "jump into the pool" and for never letting go of my hand in the process, so that I would feel safe. Without her professionalism and all the knowledge, she has taught me, I would not have been able to reach my full potential in the design of this Annual Syllabus.

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7. ANNEXES

Annex 1. Stage objectives in Royal Decree and the Decree of the CM.

Royal Decree 157/2022, of 1 March **Decree of the Community of Madrid**, 61/2022, of 13 July
a) To know and appreciate the values and rules of coexistence, to learn to act in accordance with them in an empathetic manner, to prepare for the active exercise of citizenship and to respect human rights, as well as the pluralism of a democratic society. b) Develop habits of individual and teamwork, effort and responsibility in studying, as well as attitudes of self-confidence, critical sense, personal initiative, curiosity, interest, and creativity in learning, and entrepreneurial spirit. c) To acquire skills for the peaceful resolution of conflicts and the prevention of violence, which will enable them to function autonomously in the school and family environment, as well as in the social groups with which they interact. d) To know, understand and respect the different cultures and differences between people, the equal rights and opportunities of men and women and the non-discrimination of persons on the grounds of ethnicity, sexual orientation or identity, religion or belief, disability, or other conditions. e) To know and use the Spanish language and, if any, the co-official language of the Autonomous Community and to develop reading habits. f) Acquire in at least one foreign language the basic communicative competence that allows them to express and understand simple messages and function in everyday situations.
g) Develop basic mathematical skills and initiate the resolution of problems requiring the performance of elementary calculation operations, geometric knowledge, and estimations, as well as being able to apply them to situations of their daily lives. h) To know the fundamental aspects of the Natural Sciences, the Geography, History and Culture. i) To develop basic technological skills and to be initiated in their use, to learning, developing a critical spirit in the face of its operation and the messages that receive and elaborate. j) To use different representations and artistic expressions and to be initiated in the construction of visual and audiovisual proposals. k) Value hygiene and health, accept one's own body and that of others, respect the differences and use physical education, sport, and nutrition as a means to promote personal and social development. l) Know and value the animals closest to humans and adopt modes of behavior that favor empathy and their care. m) To develop their affective capacities in all areas of the personality and in their relationships with other people, as well as an attitude against violence, prejudice of any kind and sexist stereotypes. n) To develop daily habits of healthy autonomous active mobility, promoting road safety education and attitudes of respect that have an impact on the prevention of traffic accidents.

Annex 2. Blocks, knowledge, skills, and attitudes.

LEARNING SITUATION	BLOCKS	Knowledge, skills and attitudes
L.S. Chaos on wheels.	A. Computational thinking	The interpretation and execution of simple algorithms are worked on through ordered instructions, routines, game rules, repetitive patterns, and block programming, incorporating fundamentals such as loops, conditionals, operators, variables, functions, events and debugging techniques. Programming extensions are applied in educational robotics, integrating music, drawing, sensors, and translation or text-to-speech tools. The phases of computational thinking are developed, such as the decomposition of tasks, the recognition of patterns and the creation of algorithms to solve problems, together with modelling through diagrams or dramatizations. In addition, interest, and participation in solving programming challenges is encouraged. In the field of design and manufacturing, manual and mechanical tools are used to build artifacts, understanding the operation of gears and pulleys, and technological resources are used for 2D and 3D design. Finally, teamwork, conflict management and respect for promoted.
	B. Mechanical-engineering (Design)	
L.S. Time to recharge.	C. Electricity	Basic concepts of electricity and electronics are addressed, including the use of cables, connectors, actuators, circuits, sensors, motors, and batteries as power sources. The relationship between energy and movement is studied, as well as the role of renewable energies in the sustainable development of society. In addition, first designs and their practical application in projects are carried out, encouraging curiosity, interest, motivation and initiative in the development and execution of the activities.

L.S. Fix the glitch.	D. Artificial Intelligence (AI)	Artificial intelligence is introduced as a learning process based on obtaining data and creating patterns, along with the fundamental principles for its responsible use. Machine learning strategies and the use of simple computer applications on computers and mobile devices are explored, as well as the operation of the network and the basic rules for using digital resources in a secure, efficient, and collaborative way. In addition, the installation and control of connectable devices, programmed control systems, the use of simulators and software to recreate reality, as well as initiation in QR code editing and the creation of content in augmented, virtual and mixed reality through the development of specific markers are addressed.
	E. Internet of Things (IoT)	
	F. Virtual or augmented reality	

Annex 3. Key, specific competences and evaluation criteria.

Key competences.	1. Linguistic Communication Competence (LCC) 2. Plurilingual Competence (PC) 3. Mathematical Competence and Competence in Science, Technology, and Engineering (MCTSTE) 4. Digital Competence (DC) 5. Personal, Social, and Learning to Learn Competence (PSLLC) 6. Civic Competence (CC) 7. Entrepreneurial Competence (EC) 8. Cultural Awareness and Expression Competence (CAEC)	
		Evaluation criteria
Specific competences.	1. Use computational thinking to solve problems, generating a creative and original product that responds to	1.1. Know the basic fundamentals of block programming. 1.2. Perform a set of systematic operations or algorithms that comply with a previously set pattern for the correct operation of the program.
	each of the challenges posed or generated through the observation of the environment.	1.3. To collect information from the environment that allows us to obtain the necessary data to generate a product that provides a technological solution for a specific situation.
	2. Solve problems posed by applying knowledge of mechanics, electricity, design and programming, developing automated solutions, designing or building programmable and/or robotic control systems appropriate to their level.	2.1. Apply the elementary knowledge of electricity and mechanics to the assembly of appliances. 2.2. Make, in a guided way, a simple final product that solves a design problem, testing different prototypes as a team and safely using mechanical, electrical or programming materials. 2.3. Show orally or graphically the final product of the design projects, explaining the steps followed and the purpose of the project. 2.4. Develop 2D or 3D designs using prototyping techniques or different computer applications to build a given object.
	3. Observe, understand and interpret the different situations in the environment to identify problems and seek solutions, acting individually and in groups to solve them, putting into practice the digital interconnection of devices with the internet.	3.1. Know the processes that allow physical elements to be connected to the internet. 3.2. Use the volume of data generated by connected devices to perform an analysis of them and use this information.

	4. Know and assess the possibilities that artificial intelligence has to act with machines or systems in a way that facilitates work and gradually improves it.	4.1. Know emerging computer or digital technological applications on artificial intelligence. 4.2. Integrate programming into machines or systems that allow their autonomy in a responsible manner.
	5. Handle devices and tools safely and responsibly to work individually or together according to the needs of the educational context.	5.1. Use devices and tools safely according to the needs of the educational context. 5.2. Securely and efficiently search for information to create digital content, working individually and together.
	6. Know and use the different virtual or augmented reality systems and applications to explore the environment and enjoy interactive and enriching learning.	6.1. Use the different virtual or augmented reality systems to facilitate learning processes. 6.2. Create projects in which virtual or augmented reality is included as a resource.

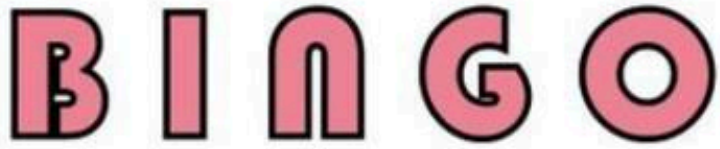
Annex 4. Temporalization.

Learning situation	Challenge	Temporalization	Sessions
Chaos on wheels	Decode the route!	2nd of September – 17th of September	6 sessions (45-50 min)
	Smart traffic lights	23rd of September – 8th of October	6 sessions (45-50 min)
	Robot race	14th of October - 5th of November	8 sessions (45-50 min)
	Degging day	11th of November – 26thof November	6 sessions (45-50 min)
	Traffic city model	2nd of December – 17th of December	6 sessions (45-50 min)
Time to recharge	Light police!	7th of January- 21 of January	6 sessions (45-50 min)
	Solar power station	27th of January- 4th of February	4 sessions (45-50 min)
	Electro-pet	10th of February- 24th of February	5 sessions (45-50 min)
	Energy detectives	25th of February- 10th of March	4 sessions (45-50 min)
	City in blackout	11th of March- 25th of March	5 sessions (45-50 min)
Fix the glinch	Virtual assistant rescue	31st of March- 22nd of April	6 sessions (45-50 min)

	Safe connection plan	28th of April- 5th of May	3 sessions (45-50 min)
	IoT house	6th of May- 19th of May	4 sessions (45-50 min)
	Let´s go to the museum	20th of May- 2nd of June	4 sessions (45-50 min)
	Hello robot	3rd of June- 17th of June	4 sessions (45-50 min)

8. APPENDICES

Appendix 1. Bingo cards.



INTERACTION	PATTERNS	ORDERS
IA	RESPONSE	VOICE ASSISTANT
ALGORITHM	VIRTUAL ASSISTANT	INTERNET

ALGORITHM	VIRTUAL ASSISTANT	INTERNET
VOICE ASSISTANT	ORDERS	PATTERNS
IA	ALGORITHM	RESPONSE

INTERNET	VIRTUAL ASSISTANT	ALGORITHM
PATTERNS	ORDERS	VOICE ASSISTANT
RESPONSE	ALGORITHM	IA

ALGORITHM	IA	VIRTUAL ASSISTANT
VOICE ASSISTANT	INTERNET	PATTERNS
ALGORITHM	RESPONSE	ORDERS

Appendix 2. Role-play scenarios.

SCENARIO 1

A student who can't see well uses a talking computer to help them read and learn, just like other kids in class.

SCENARIO 2

Farmers use technology to check the weather and see how their plants are growing..

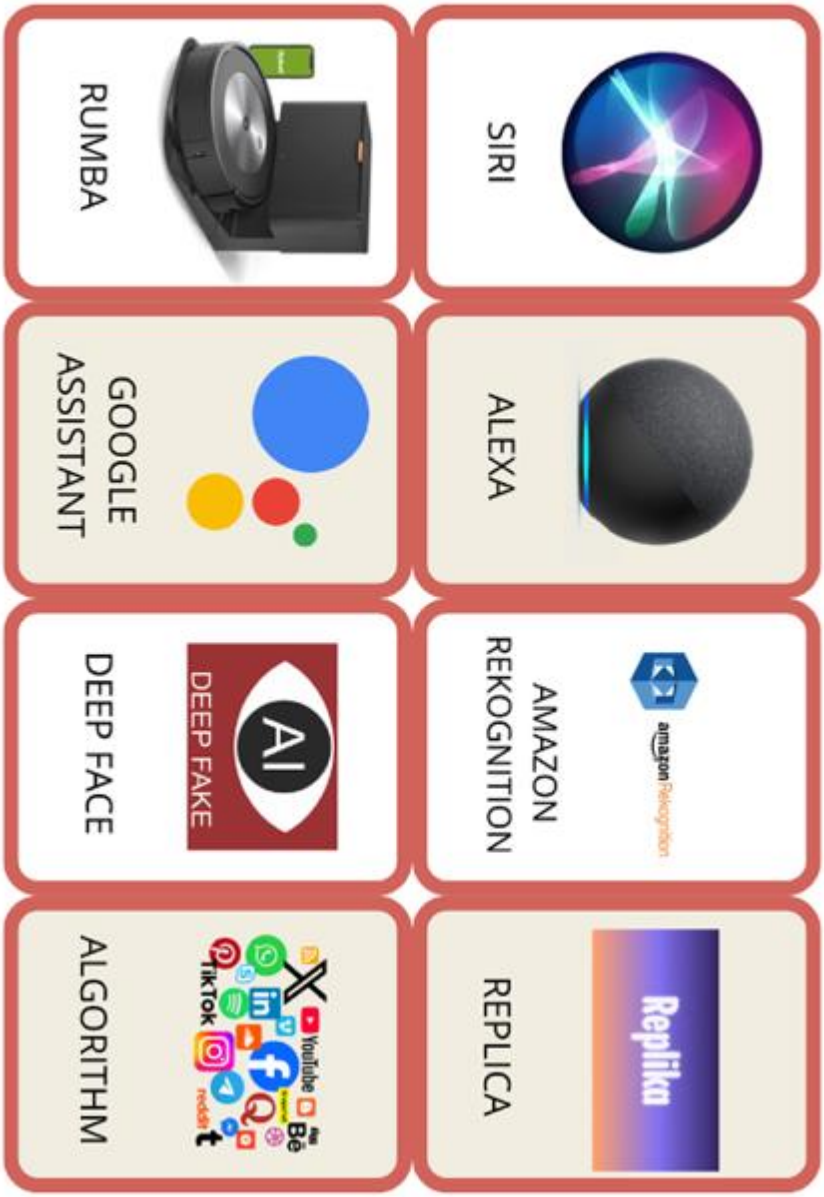
SCENARIO 3

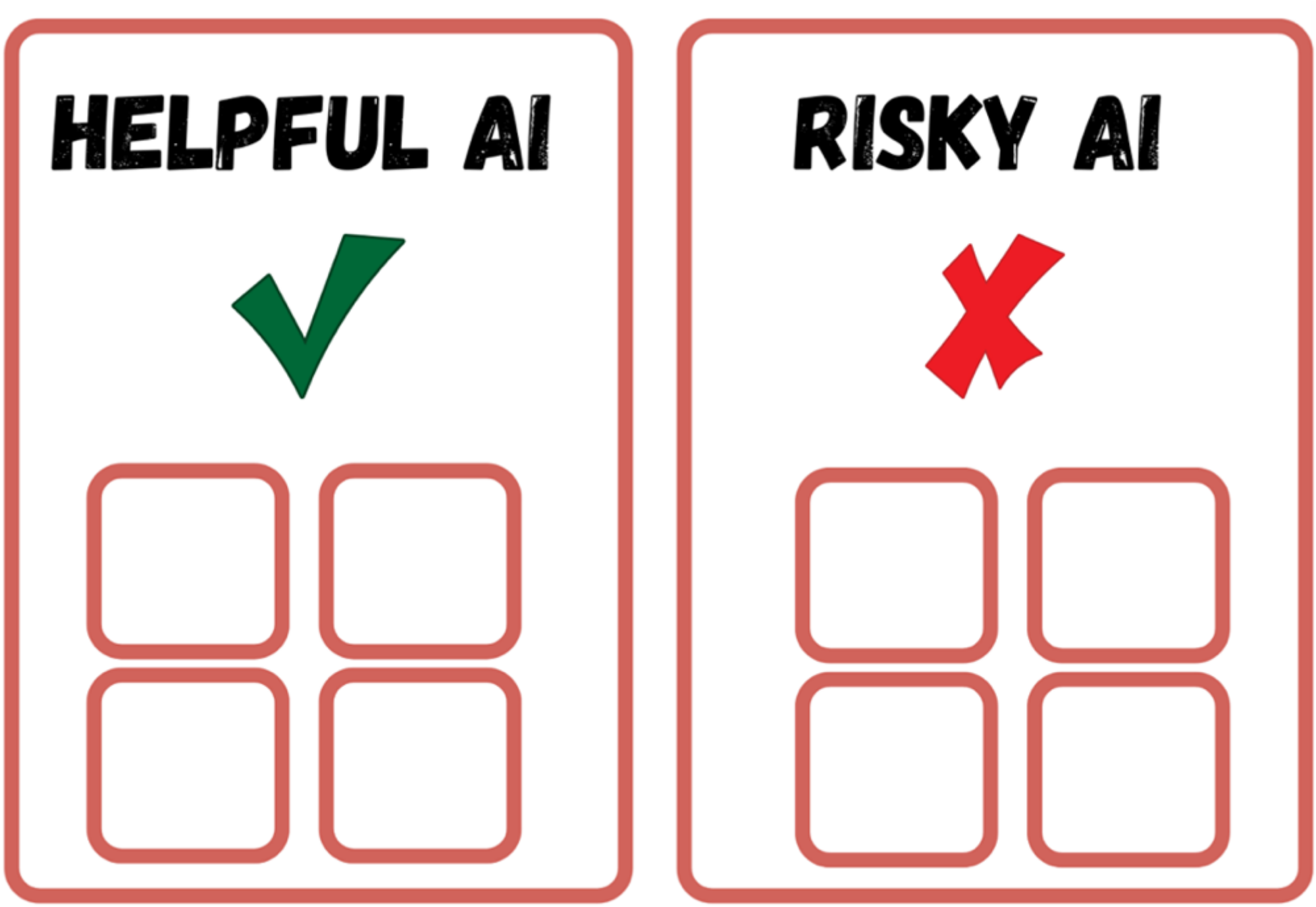
Someone makes a fake video that looks real, showing a famous person saying or doing something they never did.

SCENARIO 4

A self-driving car, which is supposed to drive without a human, gets into an accident because of a mistake.

Appendix 3. Helpful or risky IA.




HELPFUL AI
RISKY AI

Appendix 4. Step into character.

STEP INTO CHARACTER

BEFORE THE ROLE PLAY

Understand the scenario: Read the situation you're role-playing.
Know your role: Identify the character you will be playing.
Preparation questions:

- What does your character want?
- How does your character feel?
- What strategy or approach might your character take?

DURING THE ROLE PLAY

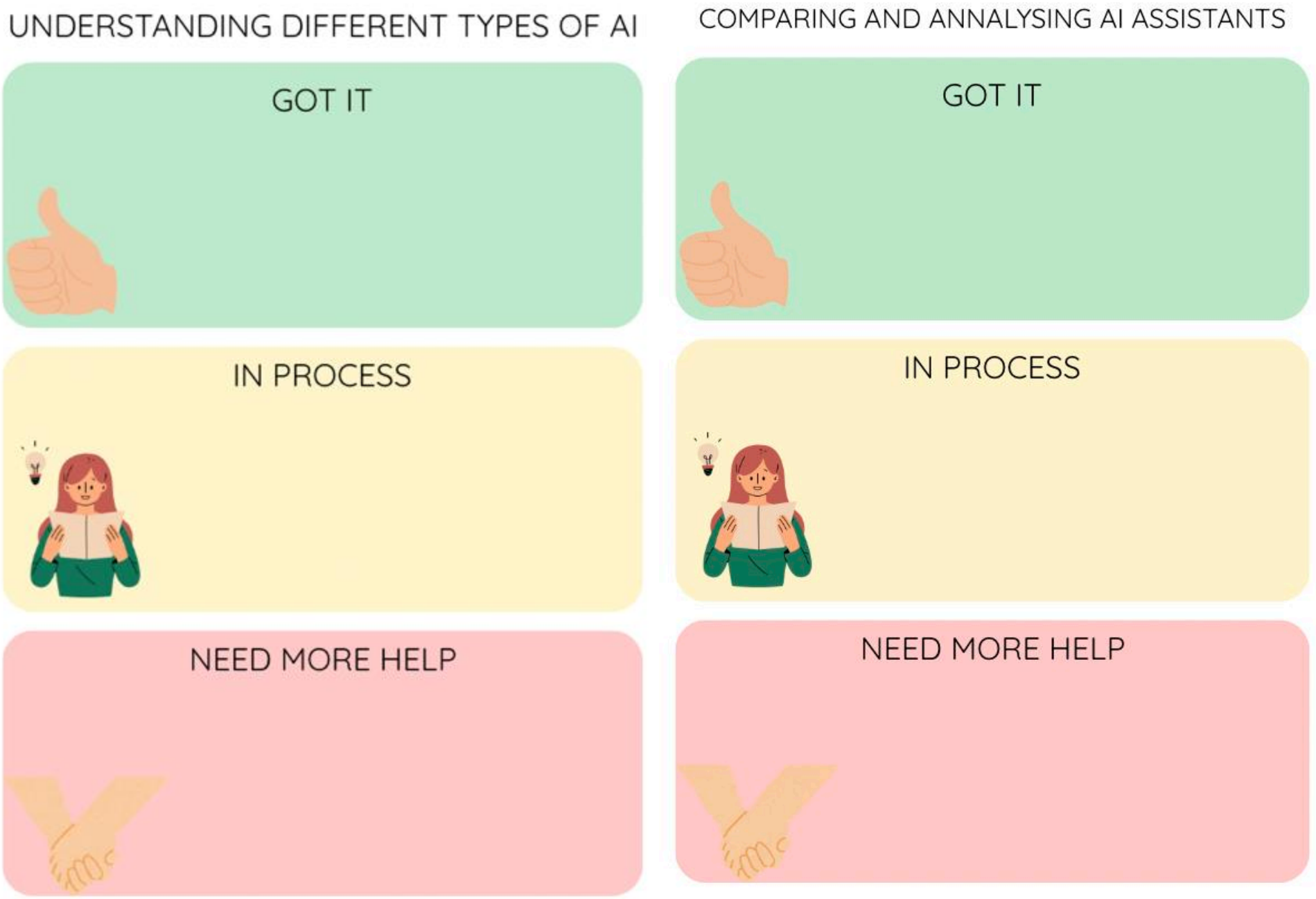
Stay in character: Speak, act, and respond as your character would.
Active listening: Pay attention to the other person's responses and adjust your actions.

AFTER THE ROLE PLAY

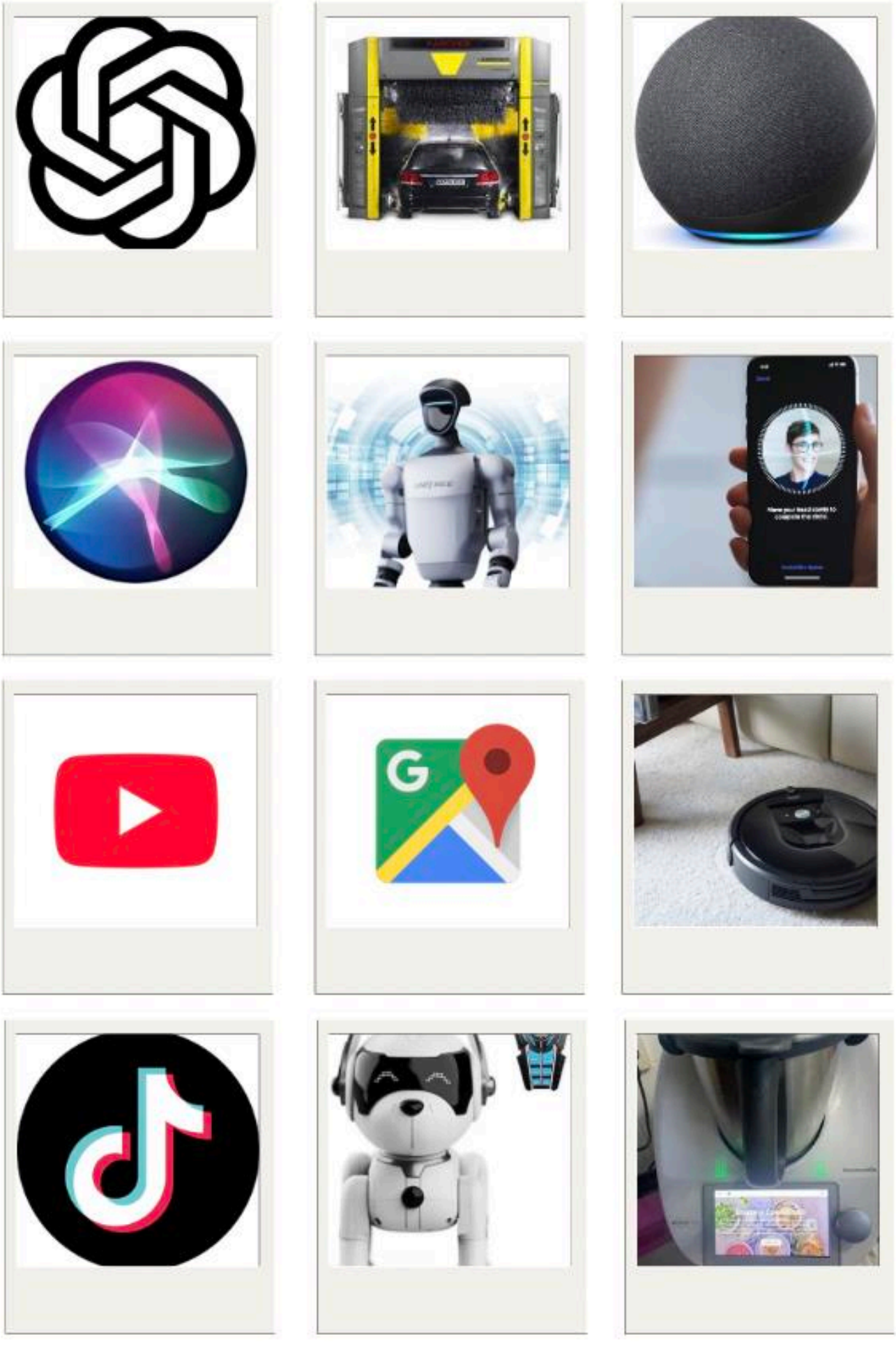
Review questions:

- What went well? What could be improved?
- How did the character's emotions and actions affect the outcome?
- What could be done differently next time?

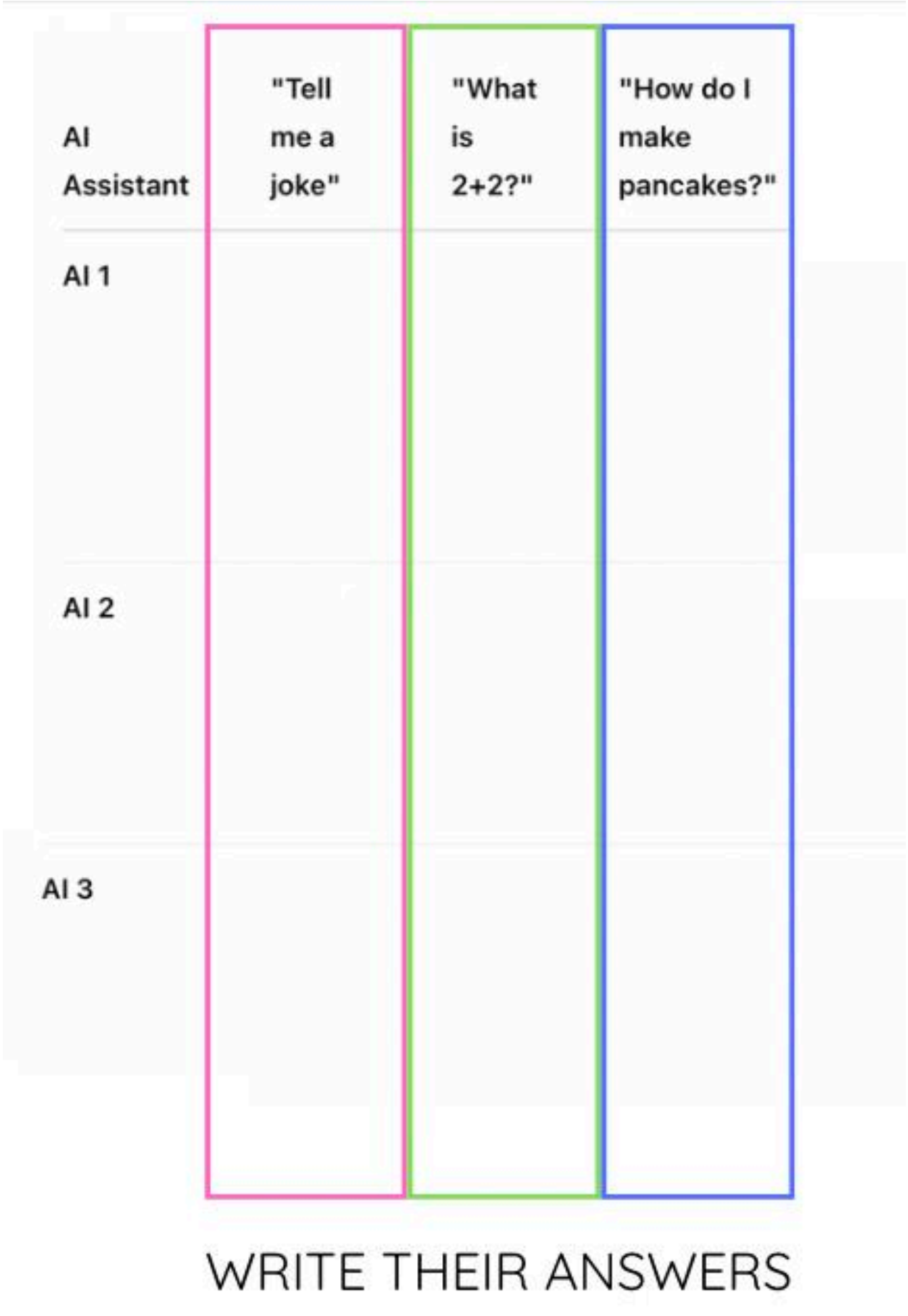
Appendix 5. Interaction wall.



Appendix 6. IA examples.

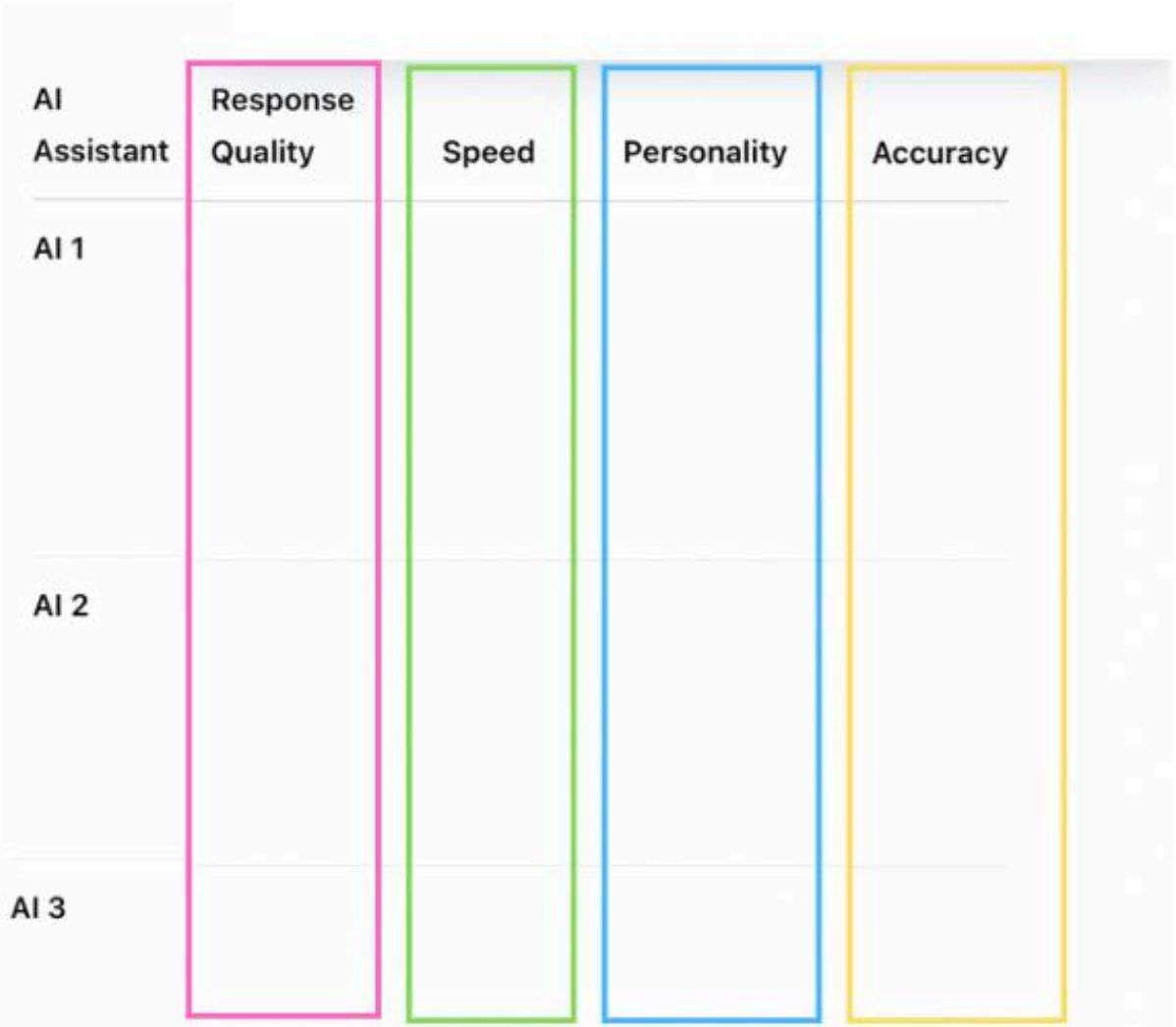


Appendix 7. Comparing IA.



AI Evaluation Rubric (0-20 Points)

Criteria	0-5 (Poor)	6-10 (Average)	11-15 (Good)	16-20 (Excellent)
Personality *(How engaging, natural, and human-like the AI is in responses)*	Robotic, lacks personality, responses feel stiff and unengaging.	Somewhat engaging, but still generic and mechanical.	Mostly natural, engaging tone with some personality.	Very human-like, engaging, and adaptive to different conversational styles.
Quality *(How well-structured, coherent, and detailed responses are)*	Responses are disorganized, unclear, and lack depth.	Provides basic but sometimes vague or inconsistent answers.	Responses are well-structured, informative, and mostly detailed.	Highly detailed, well-structured, and professionally written responses.
Accuracy *(Correctness and factual reliability of information)*	Frequently incorrect or misleading answers.	Some errors or outdated information, but mostly correct.	Mostly accurate, with rare minor mistakes.	Highly accurate, fact-checked, and reliable answers.
Speed *(Response time and efficiency of delivering answers)*	Very slow, delays in generating responses.	Some lag, but acceptable response time.	Quick and efficient responses with minimal delay.	Instant responses with excellent processing speed.



WRITE NUMBER BASED ON THE RUBRIC

Appendix 8. Questions about last class.

What is AI?

Can you name one type of AI we learned about today?

What did you learn from your IA card?

Which AI gave the best joke?

Which AI answered "What is 2+2?" the fastest?

Which AI gave the best pancake recipe?

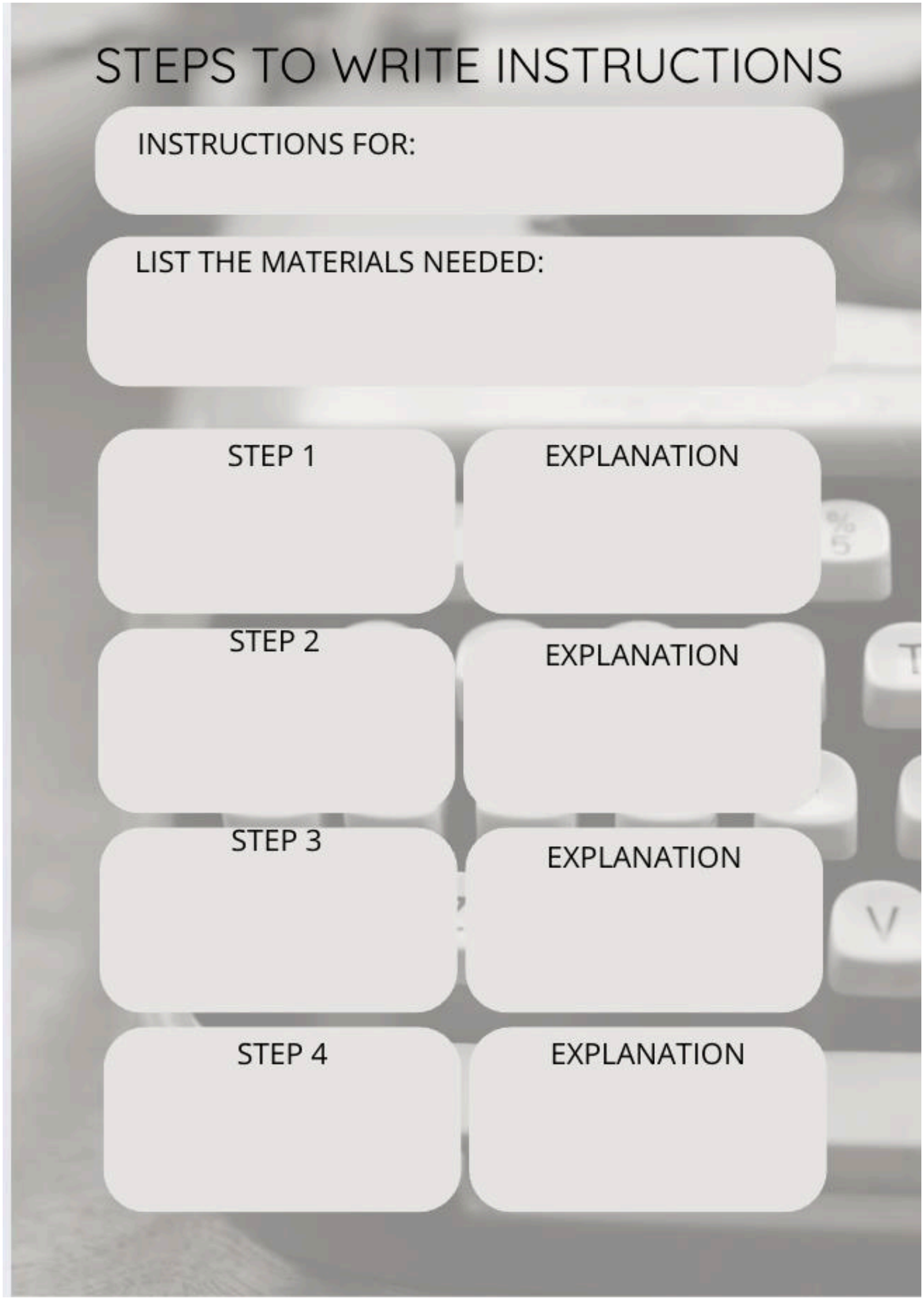
How did you know which AI was being described in the video?

Which AI had the friendliest personality?

Which AI was the most accurate in answering questions?

How well do you think you understood today's lesson?

Appendix 9. Steps to write instructions.



Appendix 10. Daily activities.

WASHING HANDS

SORTING LAUNDRY

TURN ON THE TV

BRUSH YOUR TEETH

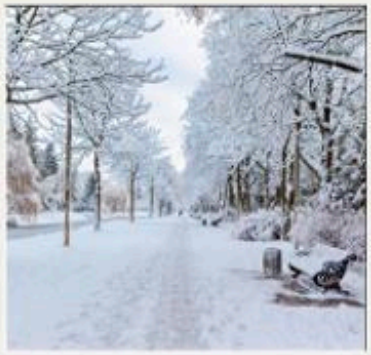
WRITE A LETTER

GO DOWN A SLIDE

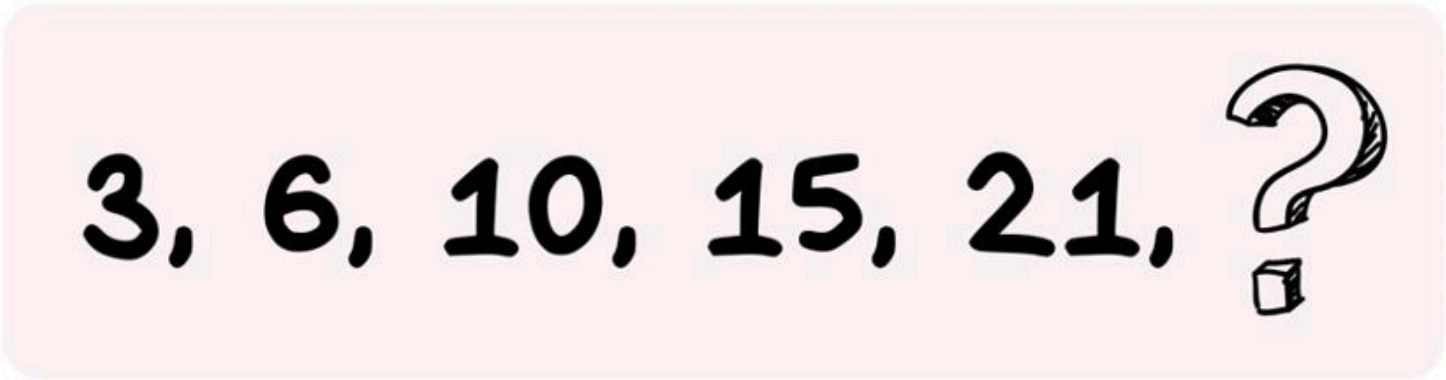
Appendix 11. Self- assessment, checklist.

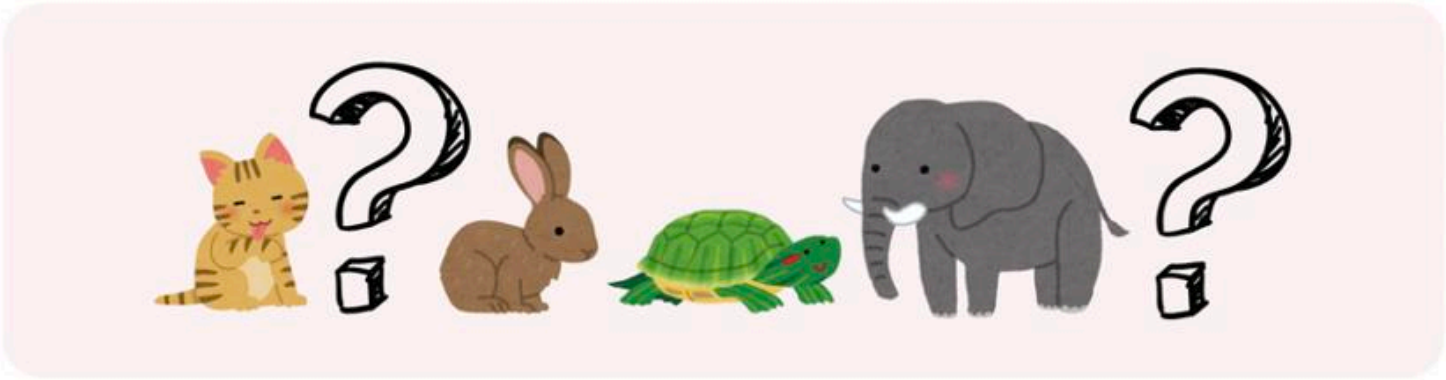
	GREAT JOB	PRETTY GOOD	STILL LEARNING
Did we understand the goal of the activity?			
Were the instructions clear?			
Were the steps you wrote in the right order?			
Did we work well as a team?			

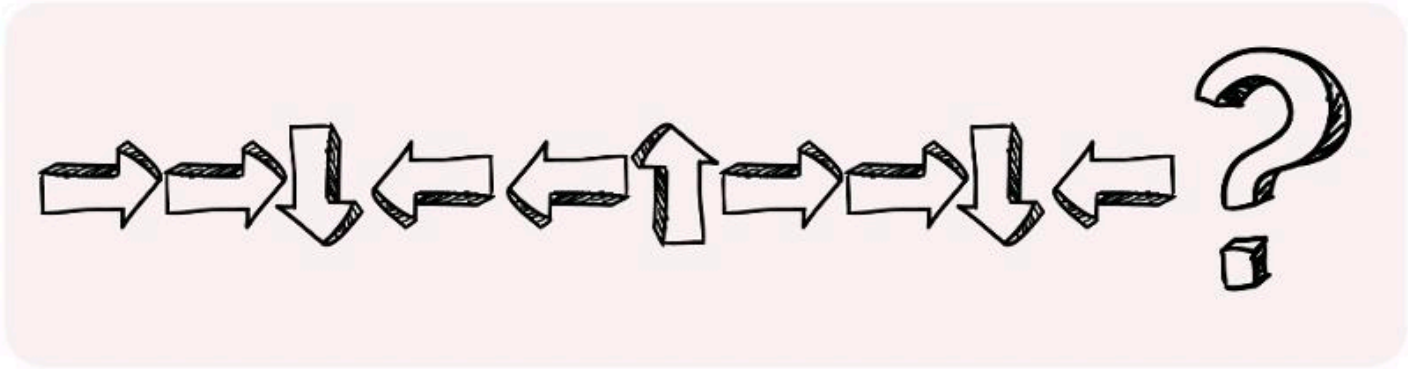
Appendix 12. Pattern unlock image cards.



Appendix 13. Patterns.







Appendix 14. Video questions.

How does Dr. Binocs define AI in the video?

What are the two types of AI mentioned?

Can you list some areas where AI is used, as discussed in the video?

What advantages of AI does Dr. Binocs highlight?

Does the video mention any potential downsides or challenges associated with AI?

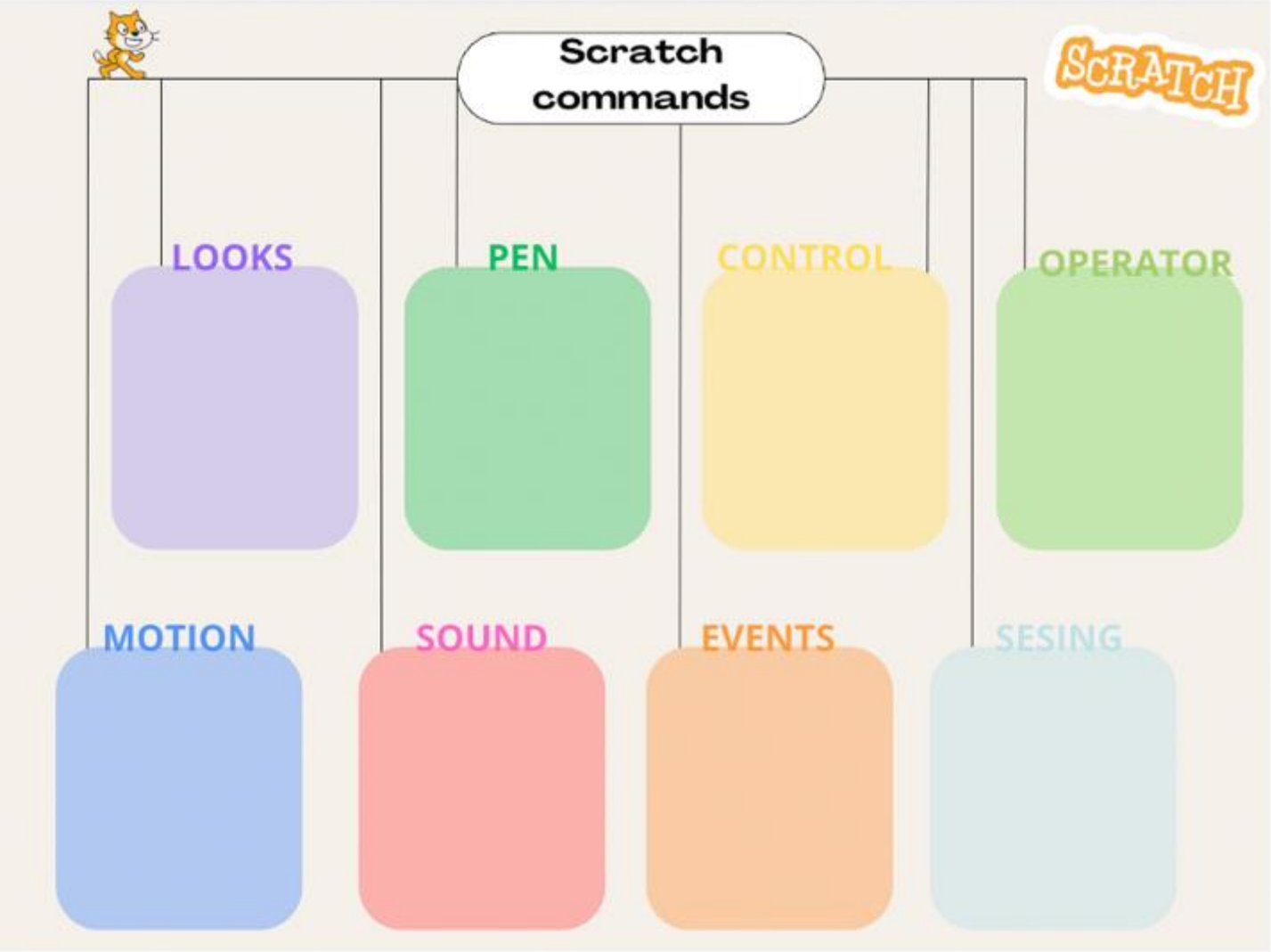
How does the video describe ChatGPT, and what role does it play in the context of AI?

What examples does the video provide of AI in everyday situations?

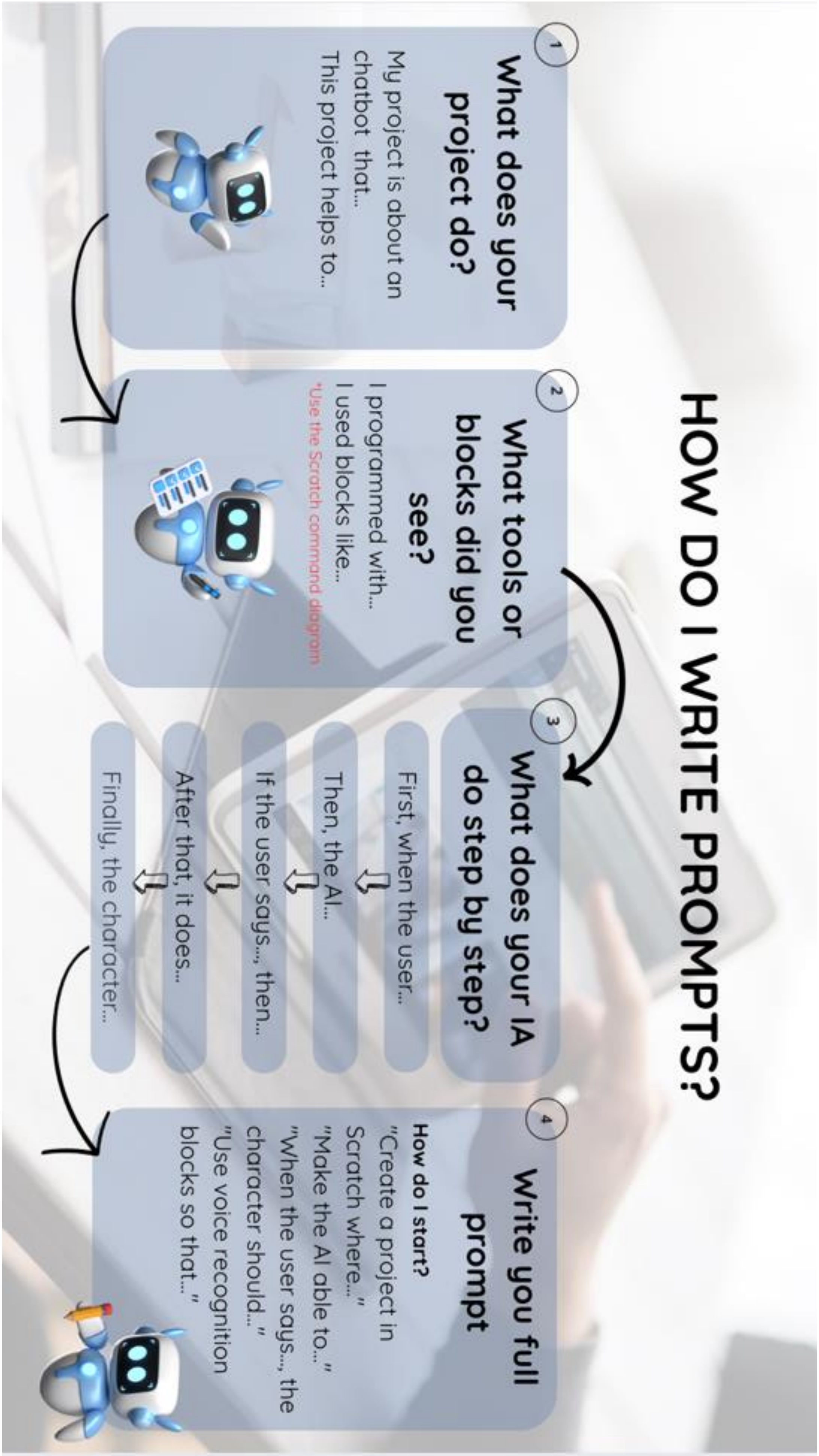
What predictions or possibilities about AI's future are discussed?

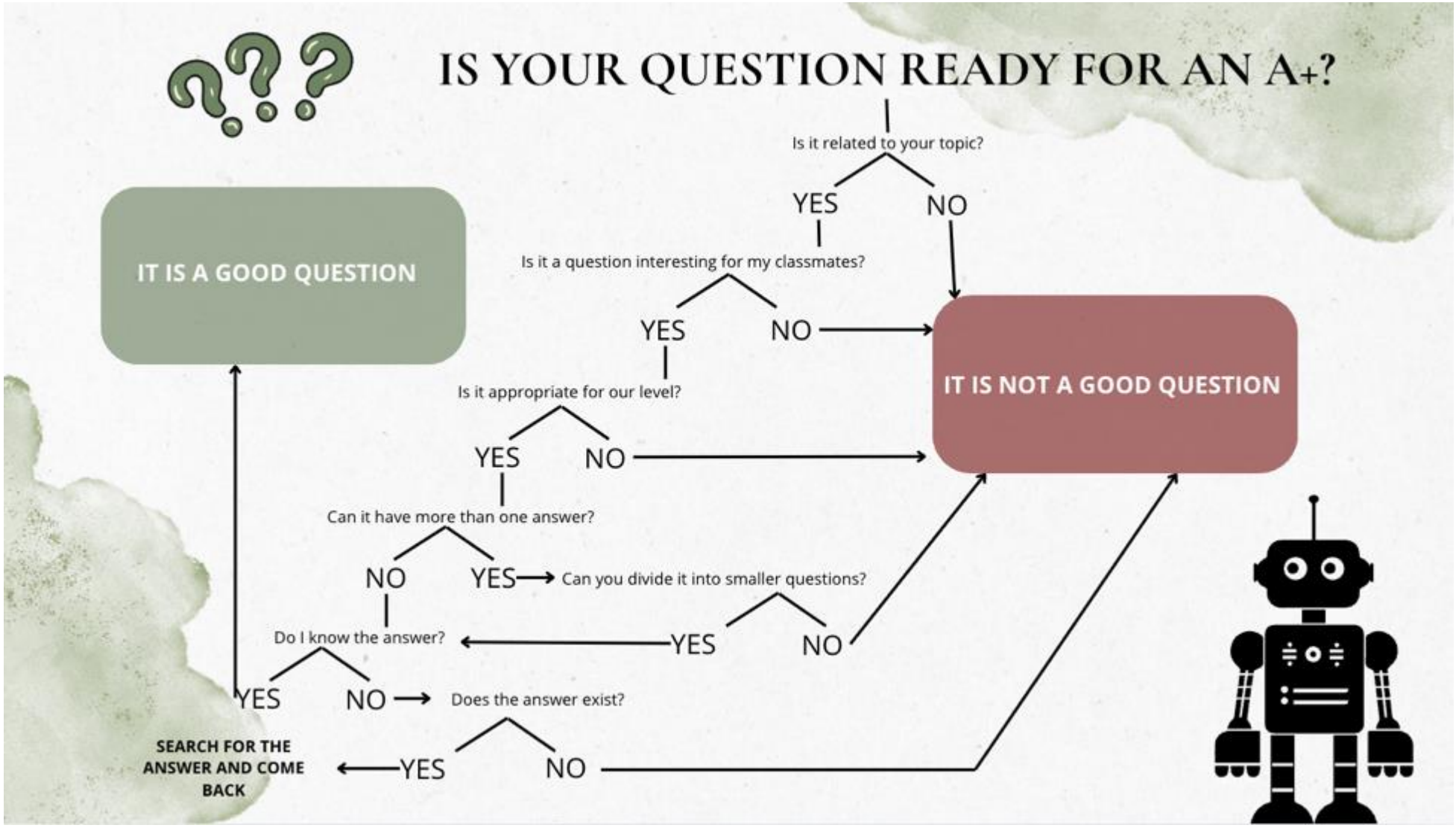
Appendix 15. IA topics.

Appendix 16. Scratch commands.



Appendix 17. How to write prompts.





Appendix 18. Binary key.