FACULTAD DE EDUCACIÓN DE PALENCIA

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Integrating gamification into EFL teaching in a bilingual primary school through a gamified unit proposal.

Integración de la gamificación en la enseñanza del inglés como lengua extranjera en un colegio bilingüe a través de una propuesta de UD.

TRABAJO DE FIN DE GRADO EN EDUCACION PRIMARIA

MENCION EN LENGUA INGLESA

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RESUMEN

El objetivo principal de este trabajo de fin de grado es explorar el potencial de la gamificación como estrategia metodológica para la enseñanza del inglés como lengua extranjera (EFL) en entornos de educación primaria bilingüe. Esta investigación analiza cómo los elementos de juego pueden integrarse eficazmente en el aula mediante una revisión teórica de la enseñanza bilingüe, el aprendizaje del EFL y la gamificación. Esta revisión permite demostrar mediante una nueva perspectiva educativa, la promoción de la motivación, la participación activa y el desarrollo de las competencias en inglés. Posteriormente, se presenta una propuesta de enseñanza con un sistema de gamificación diseñado e incorporado para estudiantes de tercer grado de primaria, que combina el contenido curricular de Ciencias Naturales con el desarrollo del inglés como lengua vehicular y medio de instrucción, siguiendo los principios de adquisición del lenguaje y las directrices del MCER y la LOMLOE.

Palabras clave: gamificación, aprendizaje bilingüe, estrategia activa de aprendizaje.

ABSTRACT

The main objective of this final project is to explore the potential of gamification as a methodological strategy for teaching English as a foreign language (EFL) in bilingual primary education settings. This research analyses how game elements can be effectively integrated into the classroom through a theoretical and methodological review of bilingual teaching, EFL learning, and gamification, which allows to demonstrate through a new educational gamified perspective the promotion of motivation, active participation, and the development of English language skills. Subsequently, a gamified teaching proposal for third-grade primary school students is presented, combining Natural Science curriculum content with English as a vehicular language and medium of instruction, following the principles of language acquisition and the guidelines of the CEFR and LOMLOE.

Key words: gamification, bilingual learning, active learning strategy.

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INTRODUCTION

In recent years, the educational landscape has experienced significant changes due to our current growing social, cultural and technological demands in different fields. In this context, English as a foreign language education (EFL) has obtained a particular relevance, especially in bilingual school settings where English is not only taught as a subject but also used as a medium of instruction and communication. In Spain, the implementation of a wide range of bilingual programmes in primary education has been clearly encouraged by both national and regional policies which aim to promote communicative competence in English, mainly through content and language integrated learning (CLIL) approaches.

It is crucial to acknowledge that the evolution of teaching has highlighted several needs which evidence that it is high time to innovate, look further and go deeper, far from traditional or conventional strategies that merely follow textbooks. It is our endeavour as educators to increase students' motivation, engagement, and autonomy. In response to those mentioned needs, new methodologies such as gamification have emerged as an innovative pedagogical tool that is based on the application of typical elements from games, such as points, levels, challenges, or rewards… to a non-game context like, in this case, education.

Gamification not only aims to grab the attention of learners, but it also contributes to active participation, collaboration, and emotional involvement by having meaningful learning experiences. Research has demonstrated that, in primary education, this active methodology shows great potential to support the development of key competences.

The integration of gamification with the CLIL approach, adhering to CEFR standards, presents a promising opportunity for bilingual classrooms where students acquire both multidisciplinary academic content and a foreign language.

As a result, considering the psychological nature of the scholars and the motivational influence of games their combination with the dual-focused concepts of CLIL can increase language acquisition while maintaining students' engagement with the content. Moreover, gamified learning experiences can provide more opportunities for communication, interaction and feedback in the target language, which are essential for the development of communicative competence in English.

For that reason, the present study will explore the benefits and challenges of integrating gamification into the teaching of English as a foreign language in bilingual primary schools. Additionally, a teaching proposal based on this gamified methodology will be developed to support both linguistic and curricular features. Thus, this research seeks to contribute to the innovation by promoting effective and motivating gamifying strategies that respond to the realities of today's bilingual classrooms.

To conclude, the structured organisation of the contents is divided in main sections: the theoretical and methodological framework in order to build a deeper knowledge and context of gamification before presenting and developing the unit proposal and finally the extracted conclusions.

JUSTIFICATION

One of the main reasons for conducting this investigation is the observable difference between pedagogical innovation and its practical application. Teachers are constantly required to adapt their strategies and approaches in order to respond to students' needs and diversity. Despite there being an abundance of research on new horizons in terms of emerging educational methodologies, such as gamification, teachers often lack accessible models or concrete proposals that can be directly applied within bilingual learning environments. In response to that current issue, this project also aims to solve that difference by designing a structured, contextualised and realistic teaching unit proposal built on current educational frameworks.

Furthermore, the reality of bilingual education in Spain demands flexible approaches that address both linguistic development and content proficiency. In this context, it is essential to design and evaluate gamified strategies, contemplating them as a useful opportunity to promote student´s involvement and respond to their specific developmental needs or characteristics by making adaptations to these ages. Consequently, new gamified strategies, proposals and tools will be provided to teachers in the direction that they will be able to adapt and implement them depending on their classroom needs.

Lastly, the justification for this paper has a dual purpose, first and foremost, to investigate the potential of gamification in bilingual primary schools and secondly, to translate those

findings into a concrete, adaptable teaching unit proposal that at the same time aligns with curriculum standards and promotes meaningful learning. For that reason, by doing so, this study contributes to the aim of improving educational quality through gamification as innovative technique established in the realities of primary school teaching.

OBJECTIVES

General objectives

- To analyse the concept of gamification from multiple perspectives in order to define it comprehensively and understand its educational applications.
- To examine the impact of gamification on student motivation and engagement in the EFL learning process.
- To investigate the benefits of using gamification in the teaching of English as a foreign language in bilingual contexts.

Specific objectives

- To design an engaging and educationally sound gamified teaching unit for a bilingual primary classroom, based on the CLIL methodology.
- To select appropriate game mechanics and narrative elements that enhance language learning outcomes.
- To elaborate a didactic proposal that aligns with the current Spanish and European educational guidelines (LOMLOE, CEFR)
- To assess the pedagogical value of gamification in primary education.
- To identify the main methodological approaches to teaching foreign languages to children and analyse their practical application in the foreign language classroom across the different stages of the primary education curriculum.
- To become familiar with the Primary Education curriculum and the curricular development of the foreign language area, with special attention to its educational objectives, contents, and evaluation criteria.
- To progressively develop communicative competence through the integrated practice of the four language skills (listening, speaking, reading, and writing) within the foreign language classroom.

METHODOLOGY

The methodology used in this final degree project has a doble purpose, it does not only follow a descriptive and analytical approach to deeply review academic literature related to gamification but also it deeps into both theoretical and methodological perspectives on game-based learning and communicative language teaching. Therefore, this methodology aims to demonstrate how gamification can be effectively integrated into EFL instruction through a task-based approach.

It also establishes a clear connection between theory and practice, due to a contextualized teaching unit plan that is offered too, considering the current legislative framework (LOMLOE, CEFR…) The dual focus on theoretical exploration and practical application ensures that the study remains both academically rigorous and pedagogically relevant.

THEORETICAL FRAMEWORK

CURRICULAR AND LEGISLATIVE CONTEXT OF EFL IN PRIMARY EDUCATION IN SPAIN

First and foremost, it is essential to begin by understanding the context of English as a Foreign Language (EFL) in primary education within the current curricular and legislative frameworks. From this point forward, the term 'EFL' will be used to refer to English as a Foreign Language.

Following this line, the teaching of EFL in Spanish primary schools is built by both national and regional legislation that, at the same time, relates to the principles and descriptors of the *Common European Framework of Reference for Languages* (CEFR).

Nowadays, the current educational model is defined by the LOMLOE as the national curriculum framework that includes competences, learning outcomes, methodologies, and assessment criteria for the formative and summative evaluation. Additionally, the Royal Decree (RD/157/2022) establishes the minimum teaching standard for Primary Education.

Following this line, the decree (D 38/2022) adapts the national education framework (Royal Decree 157/2022) to the specific educational and cultural context of the autonomic community, in this case Castilla y León. These Decree includes: the regional adjustments incorporating culturally specific contents to Castilla y León.

In this context, EFL is structured around three main blocks: Communication, Multilingualism and Interculturality, with learning strategies. Moreover, these blocks aim to promote functional language use in both oral and written forms, that contribute to developing cultural awareness and encouraging learner autonomy. Besides, in accordance with CEFR standards, the enhancement of the five primary language skills is emphasised and thoroughly integrated.

Last but not least, Castilla y León promotes bilingual education programmes through a CLIL-based methodology (Content and Language Integrated Learning), which integrates English into non-linguistic subjects. Thus, students' exposure to the foreign language is strongly encouraged by creating meaningful communicative contexts.

Having reviewed this legal and curricular framework, doubtlessly teachers must design motivating, inclusive, and competency-driven learning experiences. In this regard, innovative approaches such as gamification are increasingly recognised as valuable tools for promoting communicative competence, learner engagement, and intercultural understanding in EFL classrooms.

GAMIFICATION, DEFINITION AND FUNDAMENTAL CONCEPTS

Gamification has emerged as an impactful educational methodology that began to take shape around 2008. Hence, it is a relatively new concept that became widely recognised in the early 2010s. There are many perspectives and interpretations of what gamification entails. However, most of authors and experts agree that mainly consist in using typical elements from game design in non-games contexts such fields as education, marketing or business… with the aim of influencing behaviours and encouraging participation towards specific objectives depending on the regarded tasks.

Furthermore, Kapp (2012) regards gamification not only as a practical strategy for learning but also as an attitude or movement that encourages active participation and motivation. Yu-Kai Chou (2014) adds that gamification is about capturing the addictive and entertaining qualities found in games and applying those to real-world challenges or productive tasks. Further, Huotari and Hamari (2012) emphasize the importance of making non-game activities enjoyable, aiming to bring elements of fun into everyday tasks.

In terms of education, gamification is often linked to meaningful learning experiences. It can take many forms, such as interactive games, movement-based tasks, creative challenges, or digital tools. Additionally, González (2017) points out the use of gamification in professional training.

The DMC pyramid, gamification elements

According to Werbach and Hunter (2012), the elements of gamification can be organised into three interrelated levels: Dynamics, Mechanics and Components (DMC from now on). Moreover, these levels create a conceptual framework often visually represented as a pyramid, in which:

- Dynamics constitute the most abstract and overarching layer of the pyramid. Hence, they refer to both emotional and narrative elements that appear during the interaction between the player and the system. For instance, constraints, emotions (competitiveness, frustration, happiness, and curiosity), a coherent narrative that represents the story behind the composition and purpose of the gamified system and tasks, progression that gives a sense of self-improvement or growth to the player, and relationships (teamwork).

- Mechanics are established in the intermediate level of the pyramid; these are the processes responsible for the player's engagement, including rules, feedback, goals, and rewards. Thus, all these elements can generate user engagement and implement progression too.

- Components represent the concrete and tangible elements at the base of the pyramid; these are specific features like achievements, where a reward is given to the user in order to do something; points used to encourage users to do activities or some actions; badges as a visual representation of achievements; leaderboards as a ranking that informs users about their current situation, order or their power; content unlocking that a user needs to achieve something in order to unlock new content (scape rooms); and avatars that the player interacts with directly.

GAMIFICATION AS AN EDUCATIONAL TOOL IN PRIMARY SCHOOLS

Nowadays, gamification has become increasingly relevant in educational discourses as a promising methodology that guarantees both engagement and active learning in primary schools. Additionally, the integration of gamification into education is closely linked to the increasing digitalisation of classrooms. Prensky (2001) points out that the youngest generations from our current society, often referred to as "digital natives" are learners who clearly process information in different ways than other groups from the past. Responding to that issue, innovative and flexible teaching methods are required. Consequently, gamification responds to this demand by introducing playfulness and alternative forms of instruction and assessment, breaking away from more traditional pedagogical models.

Among the key voices in this field, Karl M. Kapp (2012) offers a comprehensive and pedagogically definition:

"Gamification is using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning and solve problems." (Kapp 2012, p. 10)

As he rightly explains, gamification does not simply mean placing a decorative, game-like layer of points or badges on top of learning activities. As a result, he makes criticism of this superficial and usually naive conception, commonly called "*pointsification*", as reducing the educational potential of this active methodology. This author perceives gamification as meaningful experiences that respect the motivational structure of the game, such as challenges, feedback, time, clear goals, and progress which is personally relevant.

Kapp's vision points out that children learn best when they are emotionally engaged, cognitively stimulated, and socially connected. These three key factors can be accomplished through a gamified learning experience. Following this line, game thinking, therefore, is not just entertainment; it is the structure, motivation, and narrative that lead to purposeful learning.

He also emphasises the crucial role of aesthetics and storytelling (narrative) as fundamental dimensions of gamification. The design of learning experiences that are both immersive and emotionally charged enables students to take on active participation in their learning path.

For instance, instead of designing and implementing a unit about scientific contents such as ecosystems by following the conventional textbook and its written task, it has a greater impact to work on ecosystem contents through a gamified proposal whose purpose and narrative are about saving endangered species in groups. Consequently, an ordinary science unit becomes a rich, engaging, interdisciplinary experience that integrates the acquisition of knowledge with empathy and collaboration.

From another perspective, gamification promotes independent learning and formative assessment by taking advantage of the feedback approaches that are integrated into gamified tasks. Although games provide ubiquitous points or indicators of progress for students, they can also develop self-regulatory skills and stimulate perseverance through this type of constant feedback. Aspects of gamification can be fixed to the features of the LOMLOE and CEFR related to students' assessment, competence-based education, or meaningful and inclusive learning.

Lastly to conclude, Karl Kapp's (2012) teaching approach of gamification provides opportunities for young learners to engage more fully, think more critically, and learn more richly by emphasising into the deeper details of gamified learning experiences. Rather than focusing only on superficial rewards, his approach promotes greater learning engagement.

GAMIFIED BILINGUAL ENVIRONMENTS

It has been proven by several pieces of conducted research that gamified bilingual learning environments promote learner motivation, participation and enjoyment from a linguistic perspective. Flores (2015) stated that gamified EFL learning situations develop communicative competence because the more learning becomes interactive and engaging, the better results are obtained from students who are more willing to take risks and explore the language.

Moreover, according to Szabó and Kopinska (2023), one of the key benefits of applying gamification in language learning is that it helps students to progress at their own rhythm while promoting cooperation and individualised assessment.

THEORETICAL FOUNDATIONS OF GAMIFICATION IN EFL

Vygotsky (ZPD)

Vygotsky's sociocultural theory is aligned with the integration of gamification in English as a foreign language due to its outlining the importance of social interaction in the development of higher cognitive functions. Further, according to this theory, learners construct knowledge most effectively when they engage in meaningful communication with more capable peers and educators, what Vygotsky termed the Zone of Proximal Development (ZPD) as the space between what a learner can do independently and what they can achieve with guidance.

Mainly for that reason, by incorporating cooperative tasks, including gamified environments which are carefully designed to provide learners with structured challenges that gradually increase in complexity, encouraging growth through guided interaction strongly align with Vygotsky's framework.

Brunner, *Language Acquisition Support System (LASS)*

Proposals based on game´s structure provide clear and predictable frameworks such as missions, challenges, and levels that integrate scaffolding approaches in early language interactions. For example, a digital escape room with repetitive instructions and defined phases helps students internalise linguistic patterns by using English purposefully to solve problems together, reinforcing the idea of language as a cultural tool and vehicle of communication. Those mentioned arguments clearly evidence pedagogical connections between Brunner's theory and gamification.

Chomsky, *Language Acquisition Device (LAD)*

Chomsky's vision defends the innate learner's ability to acquire language when they are exposed to sufficiently structured linguistic data. Reasoning that, from a gamification perspective, learners are constantly provided with both rich and contextualised inputs, including interactive narratives such as role-playing and text-based missions as tasks. Therefore, continuous opportunities are offered to students with the aim of engaging them with the target language. As a result, these activities simulate real communication scenarios, making the input not only comprehensible but also relevant.

Besides, a gamified learning environment can adapt and adjust its linguistic input according not only to the student's level but also to their learning rhythm. In this line, this feature also resonates with the already mentioned concept of scaffolding too.

Finally, gamified tasks often incorporate dynamic feedback systems and progressive language challenges. For instance, in an educational game, initial instructions may be simplified with visual or verbal cues, while later phases must introduce more complex linguistic structures, promoting gradual autonomy and deeper language acquisition. All in all, the language input clearly includes different complexity based on learners' performance.

Csikszentmihalyi, the concept of *flow*

Csikszentmihalyi (1990) explains this concept of f*low,* that can be directly linked to gamification for various reasons to be explained below.

Flow is defined as a psychological state in which individuals are completely absorbed in an activity, experiencing deep enjoyment, focused attention, and a sense of control. Follow this premise: gamified environments achieve this state in relevant ways where learners face clear goals, immediate feedback, and challenges that match their skills. For that reason, all of these key elements mentioned are core conditions for entering the flow state.

As this author argues in the section “understanding flow” of his seminal work, flow is a consequence of two psychological processes: differentiation and integration.

On one hand, differentiation describes how individuals increase in complexity and self-awareness by becoming more capable and skilled after a flow experience.

On the other hand, integration occurs when a learner's thoughts, feelings, intentions and actions are orientated toward a single goal, and they experience internal harmony and balance with the surrounding environment.

Certainly, both processes are clearly facilitated in gamified EFL classrooms. For instance, when a student engages in a language task centred around gamified challenges with a clear objective, they enhance their linguistic and cognitive abilities (differentiation) while simultaneously focusing their attention, motivation, and emotions towards an act of meaningful communication (integration).

METHODOLOGICAL FOUNDATION

TASK-BASED LANGUAGE TEACHING (TBLT) AND GAMIFICATION

“TBLT creates a dynamic and learner-centred approach to language teaching that promotes both the practical use of language and deeper cognitive processing, making it an effective strategy for advancing language education” (Olusegun, 2024, pp. 4, 5).

This approach offers a bridge between theoretical insight and classroom implementation that also can be related to gamification features.

According to Olusegun (2024), language learning has a greater impact on students through contextualised communicative situations among peers, rather than simple grammar exercises. Hence, this method follows a three-stage pedagogical sequence whose key components promote both students´ autonomy and purposeful communication. Further, there are mainly three stages: the pre-task, the task, and the post-task:

Firstly, the pre-task phase introduces learners to the topic and necessary targeted language or specific word bank input with short model demonstrations. Helping students to activate their prior knowledge and to build confidence is essential for preparing them to engage with the main tasks. Secondly, the task cycle, which includes the main communicative activity, requires students to work in pairs or groups. During this phase, teachers adopt a guided role, supporting interaction without directly intervening in the communication process.

Lastly, the post-task phase consolidates learning through reflection and analysis. This phase provides opportunities to focus on feedback and assessment.

All in all, stages must consider task complexity that lines up with learners' prior knowledge, learning rhythm, and cognitive or linguistic skills. For that reason, by gradually increasing complexity, the TBLT method promotes not only sustained engagement but also language development.

Having exhaustively studied TBLT principles, it is strongly proven that the implementation of the task-based language teaching method can be naturally related to the gamification method because both share a methodological foundation. In this way, the combination and implementation of both methods contribute to creating a promising new EFL approach in bilingual primary real contexts.

GAMIFIED ASSESMENT IN EFL AND ICT TOOLS

It is hugely important as educators to integrate Information and Communication Technologies (ICT) in gamification for creating and supporting interactive learning environments; we must take advantage of this useful ICT tools that clearly offer promising opportunities with beneficial educational outcomes above all respecting to EFL perspective. Thus, digital platforms such as *Kahoot*, *Quizizz*, *Educaplay*, and *Genially* are well-known for their gamifying content and ability to motivate students. In particular, *Genially* has been distinguished for its intuitive and accessible interface which allows gamification of content and offers rich interactive communicative experiences, which is especially valuable for language learning. (Castillo-Cuesta, 2022, citing González, 2019).

The use of these mentioned apps in gamified EFL contexts have several advantages including learner-centred proposals that capture students' attention with observable lower stress level that reduces anxiety and boosts learners' confidence with the target language. Every single child has opportunities to interact and participate developing communication features in real situations.

In the didactic unit developed for this project, special emphasis will be placed on leveraging the advantages of ICT-based gamification tools, with a particular focus on exploiting the opportunities offered by *Genially* as a narrative hooked for gamification and *Plickers* as an evaluation tool.

PROPOSAL

SCHOOL AND CLASSROOM CONTEXT

This teaching proposal (unit) is implemented in a semi-private bilingual primary school; it is designed to 3rd grade of Primary Education. The school is strongly committed to educational quality and innovation, integrating English as a vehicular language in various subjects such as Natural Science, Social Science, Arts and Crafts, and English. The teaching staff is actively engaged in professional development and in the application of active methodologies that foster student autonomy and intercultural awareness. The centre also participates in European initiatives such as e-Twinning having the possibility to organise collaborative projects. Digital tools and interdisciplinary programmes, including STEAM, reading plan, bilingual plan and Living Together, are regularly integrated into classroom practice. The Bilingual Programme is designed to improve students' overall language

proficiency, integrating EFL methodology into content areas and supporting vocabulary development, functional language use, and language awareness through CLIL-based instruction and collaborative learning. It also promotes linguistic competence in both L1 and L2, encouraging students to use English in meaningful, real-life contexts across the curriculum.

Finally, it is important to highlight that, based on the group where I carried out my teaching placement, none of the students had any diagnosed special educational needs. Nevertheless, this unit is fully adaptable to the diverse needs that may arise in any classroom. It provides inclusive learning opportunities for all students, encouraging collaborative work in which each learner takes on a specific role or responsibility adapted to their individual needs. This approach promotes inclusion by helping every student feel valued and useful within the group. In addition, the resources included in the appendix follow a colour-coding system for key vocabulary. Although this unit is implemented during the second term, the students are familiar with this colour-coding system, because they had been working with it since the first term.

JUSTIFICATION

This teaching unit proposal emerges as a result of direct classroom observation and reflective teaching practice, during my internship in a bilingual primary school where I had the opportunity to observe the use of isolated gamification elements implemented by my mentor teacher, such as quiz competitions in which students earned points. Although this was a minor inclusion of game-based learning, its impact on students' attitude, and overall motivation towards learning was both evident and significant for me. Consequently, motivated by these observations, I began to reflect on the potential effects of applying a complete and coherent gamification methodology, rather than using individual game-like strategies.

To conclude, I redesign and gamify the implemented unit from my practice period motivated by the obtained results in the classroom when gamified components were presented, where learning outcomes exceeded expectations most of the time.

As a result, I develop a unique and structured gamification system fixed in my unit and in educational principles and adapted to the realities of the classroom. Therefore, my purpose is to demonstrate through clear arguments and conclusions the benefits that gamification can offer when it is adapted and fully integrated to a whole unit.

INTRODUCTION

"It usually requires a minimum of about 21 days to effect any perceptible change in a mental image." Maxwell Maltz (1960)

This unit is composed of 21 lessons where EFL and Natural Science contents (NS) are combined. Students will embark on a thrilling learning journey across the United Kingdom, travelling through Scotland, Ireland, Wales and England. Each destination brings new scientific challenges, experiments, and cultural discoveries, all guided by local characters who need their help. To do so, a gamified structure in each lesson guarantees teamwork by completing main missions together in each country and earning rewards, all of that related to a narrative hook.

Science and literacy contents are fully integrated, due to learners being able to develop their language skills (writing, reading, listening and speaking) and work on different types of texts (instructions, descriptions, comparisons, expository texts) through real-life communicative contexts, while at the same time they are working on contents related to the matter and its properties.

TEMPORALIZATION AND LENGTH

The unit begins on Friday, March 7th, just before British Science Week (March 8th–17th, 2025), making this near British Science Week the perfect time to start a science journey. Students will first study the context of this event before accepting the challenge to become scientists for 21 days (lessons) through missions, experiments by travelling around the UK. The temporalization follows this calendar, go to appendix 1

OBJECTIVES

General objectives

- ✓ To identify and classify the three states of matter.
- ✓ To understand how heating and cooling cause changes in the state of matter.
- ✓ To distinguish between physical and chemical changes in matter.
- ✓ To explore how thermal energy is transferred through different materials.
- ✓ To relate transformations of matter to real-life, everyday contexts through experiments and examples.
- ✓ To develop basic scientific inquiry skills and communicative strategies in English.

- ✓ To use English as a vehicular language to access and express scientific content in an integrated and meaningful way.

Specific objectives

- ✓ To classify materials into solids, liquids, and gases based on observable physical properties.
- ✓ To describe and explain the changes of state (melting, evaporation, freezing, and condensation) and relate them to heating and cooling processes (temperatures).
- ✓ To differentiate physical changes (reversible) from chemical changes (irreversible) using concrete examples (shaping clay, rusting of metal, apple oxidation).
- ✓ To conduct simple hands-on experiments to observe and analyse changes in matter.
- ✓ To apply acquired scientific knowledge to explain common daily situations (melting ice, drying clothes).
- ✓ To investigate how thermal energy is transferred through materials by identifying conductors and insulators in a guided experiment using metal, wood, and plastic spoons.
- ✓ To record observations accurately, interpret data, and draw conclusions through the scientific process.
- ✓ To participate actively in group tasks, respecting others' ideas and working collaboratively toward common goals.
- ✓ To follow safety instructions, procedural guidelines, and roles during scientific experiments.

Teaching objectives and pedagogical rationale of the unit

- ✓ To demonstrate how gamification can serve as a powerful driver of motivation, engagement, and linguistic production in bilingual primary education.
- ✓ To offer a practical example of how game-based structures (missions, rewards, characters) can be meaningfully integrated into a CLIL framework to boost both content and language learning.
- ✓ To promote the use of collaborative learning and self-assessment through structured challenges that foster autonomy and responsibility.
- ✓ To provide a replicable model of how digital tools and narrative hooks (Genially, interactive maps) can enhance the effectiveness and creativity of instructional sequences.
- ✓ To empower students to become active participants in their learning process, combining critical thinking, experimentation, and communication skills across subjects.

METHODOLOGY

Task-based method

As it has been mentioned before according to Olusegun (2024), this interdisciplinary unit is based on the principles of Task-Based Learning (TBLT) methodology, and it is closely connected to a specifically designed gamification system. The TBLT approach promotes the development of communicative competence through real-world tasks that require learners to use the target language with a clear purpose. Starting from this premise allows for a natural integration with the gamified structure and its core elements, where students engage in main missions (main tasks) that connect with the key learning objectives, while side missions (sub-tasks) provide optional reinforcement or extension activities, depending on each learner's rhythm and interests.

Each learning experience is oriented towards a final mission (final task), which consists of a group project presentation. At the end of each week, students present their final product orally before “travelling” to the next country or moving to the next level. This final task is not only a synthesis of the content covered but also serves as a performance-based assessment, allowing students to demonstrate their understanding and communicative skills in a real contextualised communicative context.

For that reason, a total of three weekly final products will be created by students, one for each country visited during the whole unit. Hence, their outcomes will be additionally documented and tracked in their personal travel journal, where students can record their progress such as their prior knowledge, contents they have already worked on, reflections, questions and new discoveries. Alongside this, students will have a traveller passport which visually represents their progress between levels with stamps from each country before taking the plane to the next one.

Finally at the end of this unit, when students reach England, all groups will present their final travel journal in a special event before the Royal Family, not only including things that caught their attention but also including doubts they encountered. This final moment will act as a comprehensive assessment, highlighting both the acquired contents and the personal engagement of each learner.

Gamification system and core elements

This unit is carefully designed and planned to incorporate key elements of gamification, encouraging students to be motivated, collaborate, and engage in learning experiences. As

Jane McGonigal (2011) states, games have the power to improve real-life skills such as problem-solving and teamwork when applied meaningfully. Therefore, the core game-based components and their educational functions in this unit are explained in detail in this section.

Routines

Weekly routines: arrival routine, (every Monday) they will arrive to the next country as it is planned in their travel journey. Consequently, they have followed the same structure in every destination after landed. First, in groups they pick up their "luggage" that is a suitcase or box with all the materials and resources that are required to complete main missions in that country. Manage correctly those materials in right times is the role of the equipment manager from each group.

Then, each team has a passport that they have created earlier. Every Monday, the student in charge must place the corresponding stamp on the group's travel passport at the "Passport Control Corner," where stamps are provided to visually track progress according to the gamified narrative. Additionally, this student must move their group's logo along the country route on the map, symbolizing arrival at the new destination.

Going-away routine (every Friday) At the end of their internship in that country they do the peer assessment and self-assessment, based on the total punctuation of each group the EPs graphic is updated.

Daily routines: (at the beginning and ending of each lesson)

- EFL lessons: at the beginning of each session, students briefly talk about the date and weather in English to activate prior knowledge. At the end, they reflect on what they learned using simple structures to reinforce oral expression.
- Natural Science lessons: every session begins with a brainstorming activity to activate students' prior knowledge related to the scientific content of the day. At the end, learners participate in a class discussion and write a short reflection in their travel journal to consolidate what they have learned.

Challenges and main missions: these core missions that also represent the tasks in TBLT are designed to follow a weekly final product, integrating both Natural Science and EFL learning goals. They are introduced at the beginning of each lesson and relate to the curricular contents and learning outcomes.

Rewards and points: this gamified unit implements a dual reward system to foster engagement and motivation. Experience Points (Eps) are awarded weekly through peer and self-assessments that give feedback on quality, precision, creativity, use of language,

scientific content, collaboration and goal setting. Pounds (£) are also given every day for completing main missions, students use their saves to "pay for transport" to the next country, encouraging financial planning and math skills. They can also be spent on postcards/stickers to customize travel journals, fostering Cultural Awareness and Expression (CAE) through exploration of regional culture.

Level system: a progression system is carefully designed in this unit in which each country represents a level of increasing difficulty, with sciences content moving from more concrete and familiar concepts to higher concepts that require more abstraction.

Roles and teamwork: material manager, recorder, map and stamp officer for the passports, pound keeper, speaker.

Ranking: Each group´ total pounds and EPs are tracked weekly on a board (both economic success and quality or fame). The main objective of this ranking tracker is to encourage students not only to participate actively but also to strive for excellence and collaboration by fostering healthy competition and motivation to improve both their scientific skills and language proficiency.

Finally, this mentioned resource will be visually displayed and updated, allowing students to track their progress and set goals for upcoming challenges.

Clear and achievable goals: these goals are aligned with the learning objectives, and are framed as meaningful challenges, not just schoolwork, including clear task descriptions, realistic expectations adapted to their ages and learning rhythm and scaffolding strategies for vocabulary and language structures.

DEVELOPING LANGUAGE SKILLS THROUGH GAMIFICATION

The Common European Framework of Reference for Languages (CEFR) outlines five key language skills: listening, reading, spoken interaction, spoken production and writing (Council of Europe, 2020). These enable assessments of communicative competence in language learners of all levels. If we take the context of this gamified unit, it attempts to link language learning and content learning in Natural Science through meaningful and goal-oriented learning tasks presented as main missions. Following this line, gamification not only increases motivation and participation, but also creates authentic opportunities to develop each of the CEFR skills in a dynamic and collaborative contexts.

- Listening: students are always listening, whether through teacher input, audio-visual materials, classroom instructions, peer talk, or gamified challenges. Regarding the educational missions that require students to follow steps on an experiment, or to solve

challenges (melting ice, testing for density), during the "Science Tour", learners must process short oral texts that are supported by the use of gestures, visual aids, and frequent repetition. This practice is consistent with the A1 descriptor of the CEFR*: "Can understand familiar words and very basic phrases concerning themselves, their family and immediate concrete surroundings, when people speak slowly and clearly."*

- Reading: is developed through a short variety of texts that are worked throughout the unit and specifically where missions involve a step-by-step process or description (for example, in the case of the Scotland stage when learning about density or England with the final recap task). As a result, the texts are adapted to A1 level: short, clear, and supported with images or demonstrations in the classroom. In CEFR, learners at A1 level include *"Can understand familiar names, words and very simple sentences, for example, on notices and posters or in catalogues."* The gamified design facilitates reading as an active tool for exploration.

- Spoken interaction: gamification encourages oral interaction through teamwork. In this unit, learners must discuss with peers, give instructions, ask for materials, and solve problems during collaborative tasks (building a floating boat in the Scotland stage or doing experiments). These interactions reflect CEFR A1 goals such as: *"Can interact in a simple way provided the other person is prepared to repeat or rephrase things at a slower rate."* The game context gives students a reason to speak and reduces anxiety by making communication purposeful and playful.

- Spoken production: students are exposed to short oral productions in order to share their group findings, explaining processes or describing what happens in an experiment. For instance, learners are able to describe orally physical changes that they can see when ice is melted, using the correct word bank and simple tenses or structures. This is based on the descriptor *"Can use simple phrases and sentences to describe where they live and people they know."* In this case, the context is scientific content that they can see during the experiments and demonstrations instead of personal information, but the linguistic level remains appropriate.

- Writing: the students are able to complete worksheets and writing in a "travelling science journal," which documents their learning and reflections throughout the unit. Pupils write short texts, for example, descriptions of the experiment, simple comparisons.

KEY COMPETENCES AND SPECIFIC COMPETENCES

Key competences

Linguistic communication (LC): students develop their speaking, listening, writing, and reading skills in English through daily interactions, missions, challenges, and weekly team presentations. This process contributes to promoting effective communication in real, contextualised situations.

Multilingual competence (MC): students are able to explore contents and to complete different tasks by using English as a vehicular language and as a medium of communication in different cultural contexts of each country.

Mathematical Competence and Competences in Science, Technology, and Engineering (STEMC): students apply basic math (money management with pounds)

Personal, social, and learning-to-learn competence (PSLLC): the project fosters autonomy, responsibility, and teamwork, encouraging students to reflect on their learning process and interact respectfully within their teams.

Citizenship competence (CC): promotion of values like cooperation, tolerance, and respect help students become active and empathetic global citizens.

Digital competence (DC): digital tools are integrated in the lessons (virtual maps, presentations), developing creative use of technology.

Entrepreneurial competence (EC): students are able to take initiative, solve problems, encouraging creativity and decision-making.

Competence in cultural awareness and expression (CAE): students work on this competence by exploring the UK countries.

Specific competences

This section involves the specific competences about Natural Science and Literacy, they will be developed, although their descriptors appear in the appendix 1

Natural Science:

Specific Competence 2, scientific research and exploration of the natural environment

Literacy:

Specific Competence 1, to understand the overall meaning and essential information in brief and simple oral, written, and multimodal texts on familiar and everyday topics relevant to the students' personal experiences, needs, and interests.

Specific Competence 2, to express short oral messages with basic information about every day and relevant topics for students, using verbal and non-verbal resources with guidance, and paying attention to rhythm, stress, and intonation.
Specific Competence 5, to apply scientific knowledge to interpret phenomena

LOMLOE´S CONTENTS

Natural science

A. Scientific culture

1. Introduction to scientific activity.
Inquiry procedures appropriate to the needs of the investigation (observation over time, identification and classification, pattern seeking, model creation, research through information gathering, experiment with variable control…)

Basic scientific vocabulary related to the different investigations.

Encouragement of curiosity, initiative and perseverance in carrying out the various investigations.

3. Matter, Forces and Energy
Heat: changes of state, conductive and insulating materials, measuring instruments, and applications in everyday life. Importance of energy saving. Implementation of responsible energy consumption habits.

Reversible and irreversible changes that matter undergoes from an initial to a final state, identifying the processes and transformations that occur in matter in everyday situations.

English as a foreign language (EFL)

A. Communication.
– Basic and commonly used strategies for understanding and expressing short, simple, and contextualised oral, written and multimodal texts.
Basic knowledge, skills and attitudes that allow pupils to begin mediating in everyday situations.
– Basic and commonly used communicative functions appropriate to the context and the communicative situation: greeting, saying goodbye, introducing oneself, describing people, objects, places, asking for and exchanging information about everyday matters, asking for help and permission, giving directions and instructions.

– Basic and familiar conversational conventions and strategies in commonly used synchronous or asynchronous formats to start, maintain and end communication, take and give turns, ask for and give directions

– Basic strategies for formulating hypotheses about meaning through the understanding of linguistic and paralinguistic cues.

C. Interculturality.

– The foreign language as a means of communication and interaction with people from other countries, and to learn about different cultures and ways of life.

Science contents from the unit:

States of matter: classification of materials as solids, liquids or gases according to their features

Density**:** basic understanding about how some materials sink and others float

Changes of state: melting, freezing, evaporation, and condensation, identifying how heating and cooling affect matter (temperature)

Physical changes: reversible changes, such as changes in shape or state

Chemical changes: irreversible changes, such as combustion or oxidation.

Thermal energy: understanding the role of heat in changing the state of matter.

Scientific inquiry skills: making predictions (hypotheses) observing and recording data from the experiments. And daily applications through examples of matter changes in real-life contexts (melting ice, drying clothes, lighting a candle, rust on metal).

Integration between Science and Literacy Contents

Contents from science and literacy are fully interrelated and integrated in several manners, for instance tasks involving the description of experiments, written worksheets or the lecture of instructional and expository simple texts. Accordingly, this significant integration not only supports the CLIL approach but also it encourages the acquisition of both curricular content and communicative competence in the foreign language, in line with the objectives of the bilingual programme at this school

LESSONS

All individual lesson planification is fully developed and can be found in the appendix 2. Although, this lesson overview includes detailed objectives, and assessment criteria too.

LESSON OVERVIEW

<table>
<tr><th colspan="4">Week 1, Scotland</th></tr>
<tr><td>Contents</td><td>Learning objectives</td><td>Learning outcomes</td><td>Assessment criteria</td></tr>
<tr><td>Scotland
EFL, Instructional texts</td><td>To introduce the structure, linguistic features and key elements of instructional texts (goal, materials, steps, sequencing).
To produce short, clear instructional texts through guided and collaborative writing.
To promote meaningful language use in authentic, content-integrated tasks.
To encourage the use of English as a tool for solving problems and completing missions.</td><td>Students identify the components of instructional texts (goal, materials, steps) when analysing examples.
Students write short instructional texts using imperatives and sequencing words.
Students actively participate in group tasks, expressing ideas clearly and supporting their decisions.</td><td rowspan="2">These criteria are applied to both EFL and Natural Science areas. In Scotland, the learner is expected to meet or approach the following standards:
- Science content understanding:
Correctly identifies the states of matter demonstrated in the experiment.
Describes the properties of solids, liquids, and gases in an adequate way.
Understands and can explain how density determines sinking or floating.
Follows the scientific method to make predictions, observations, and conclusions.
- Use of language:
Uses sequence words to organize the instructions.
Writes or speaks simple imperative sentences clearly (cut the paper).
Identifies and uses the vocabulary related to materials and the float/sink process.</td></tr>
<tr><td>Scotland
Natural Science: states of matter and density</td><td>To identify and classify materials as solids, liquids, or gases based on their observable properties.
To understand the basic characteristics of each state of matter (shape, volume, compressibility)</td><td>Students make predictions and conduct simple experiments to test material properties.</td></tr>
</table>

	To develop observation skills by exploring real objects and materials	Students record results in group charts using basic English structures and scientific word banks.	Confidently expresses the process and results using short, structured and clear simple sentences. - Communication and collaboration: Actively participates in team missions by sharing ideas and making decisions. Demonstrates turn-taking skills and cooperatively participates during the experiment. Contributes their input to the weekly group presentation. Actively listens to others and is respectful when responding to peer feedback or questions.
WEEK 2, Northern Ireland			
Northern Ireland EFL, descriptive texts and cause-effect structures	**Learning objectives** To introduce and reinforce the structure and communicative function of descriptive and cause-effect texts. To support learners in producing oral and written language related to observable scientific phenomena. To develop the ability to use causal connectors (*because*, *so*, *as a result*)	**Learning outcomes** Students orally describe the characteristics of ice cream and weather conditions. Students identify and use basic cause-effect structures *"The ice melts because the plate is hot"* Students report results of experiments using descriptive and causal language.	**Assessment criteria** These criteria are applied to both EFL and Natural Science areas. In Northern Ireland, the learner is expected to meet or approach the following standards: - Science content understanding: Identifies changes of state in a correct way, for instance solid to liquid is melting.

	and descriptive vocabulary effectively. To encourage collaborative learning through the creation of informational materials (leaflets).	Students create a leaflet describing their thermos design using structured written descriptive texts.	Describes the effect of heat on matter using simple cause-effect reasoning. *This ice cube melts because of the heat* Makes hypotheses and observes results during the experiments. - Language use: Uses descriptive simple sentences in present tense during the classroom demonstrations. *The ice cube is a cold solid. The ice is melting.* Applies comparative reasoning using simple structures *This ice cube melts faster than that one.* - Communication and collaboration: Participates or attempts to participate with confidence in oral explanation of results, showing initiative. Listens and respects other peers' opinions and teachers' indications. Contributes to the final mission in the weekly group presentation with personal input.
WEEK 2 **Northern Ireland** Natural Science: changes of state and thermal energy	**Learning objectives** To recognize and define the four changes of state (melting, freezing, evaporation, condensation) To examine how temperature change affects states of matter through hands-on experiments. To investigate the concept of thermal energy by exploring conductors and insulators. To use the scientific method (hypothesis, observation, recording data, and conclusion) in a group inquiry task.	**Learning outcomes** Students correctly identify changes of state and relate them to specific temperature conditions. Students carry out experiments using ice, water, heat from candles, and record results using visual tools. Students distinguish between materials based on heat transfer (metal, plastic, wood). Students apply acquired scientific knowledge to design and test an insulating object (homemade thermos).	

<table>
<tr><th colspan="4">Week 3, Wales</th></tr>
<tr><td>WEEK 3
Wales
EFL, Comparative texts</td><td>Learning objectives
To understand and produce comparative structures in oral and written form.
To describe scientific phenomena using simple comparative and descriptive sentences.
To compare results from experiments using comparative language.</td><td>Learning outcomes
Students use comparative structures such as "the first ice cube is bigger than the second one " and "the first ice cube melts faster than the second one"
Students write short comparative sentences about experiments performed in class.
Students present and compare their hypotheses and results using appropriate sentence structures.</td><td rowspan="2">Assessment criteria
These criteria are applied to both EFL and Natural Science areas. In Wales, the learner is expected to meet or approach the following standards:
- Science content understanding:
Explains in simple terms what is a chemical or a physical change
Identifies evidence of a chemical change or physical change
Compares the differences between physical changes (reversible) or chemical changes (irreversible)
- Language use:
Applies comparative structures to describe evidence that make the difference among the provided materials during the scientific manipulation or experimentation.
Produces both oral and written short comparative sentences based on the results.
Connects ideas and organises them using basic linking word.</td></tr>
<tr><td>WEEK 3
Wales
Natural Science, Chemical and physical changes</td><td>To understand the differences between physical and chemical changes
To identify daily examples of physical changes (melt ice, shape clay)
To recognise daily examples of chemical changes (burn wood, rust)</td><td>Students can associate physical reactions to reversible changes and chemical reactions to irreversible changes.
Students name examples of both physical and chemical changes in real-life contexts and classroom experiments.</td></tr>
</table>

And lava lamp experiment	To observe how different materials interact in a mixture (oil, water, effervescent tablet)	Students describe what a physical change and chemical change are in simple terms. Students can predict what happens when oil and water are mixed. Students can describe the movement of bubbles in the lava lamp experiment using terms such as float, sink	- Communication and collaboration: Participates in group experiments and discussions by sharing ideas and different perspectives Takes part in the weekly group presentation in Wales. Participates in the lava lamp experiment following steps safely and responsibly
Week 4, England			
WEEK 4 **England** EFL, Questions and expository texts	**Learning objectives** To consolidate content knowledge and language skills through question generation. To apply correct question structures in English. To work collaboratively and use peer feedback constructively.	**Learning outcomes** Students formulate content-based multiple-choice questions related to previous sessions with guided support. Students revise peers' questions and provide constructive suggestions.	**Assessment criteria** These criteria are applied to both EFL and natural science areas. In England, the learner is expected to meet or approach the following standards: - Science content understanding Shows integrated understanding of the contents from each visited country by explaining experiments or gathered results.

WEEK 4 **England** Natural Science, Review and presentation of science contents	To review key Natural Science content in an interactive, gamified way.	Students participate in a live quiz reviewing unit content. Students use their previously created questions to test peers. Students receive personalised diplomas acknowledging their effort and progress.	Participates and answers correctly the questions from the final science tournament. - Language use Understands what an expository text Produces, with enough clarity, an expository text summarising the travelling journal that gathers the information about the whole experience. Applies literacy content during this final assessment week, such as linking words and word banks from each science content. Contributes to creating adequate questions for the final tournament. - Communication and collaboration Shows enthusiasm and initiative in compiling the travelling journal as a final product of the whole unit/learning experience. Participates in the final tournament, respecting other peers. Demonstrates during the whole gamified unit attitudes such as health competitiveness and teamwork.

EXPECTATIONS

At the end of this unit all the children must

- Students must be able to identify and name the three states of matter (solid, liquid, and gas)
- Students must be able to understand that thermal energy is the energy that comes from heat.
- Students must be able to differentiate between examples of physical and chemical changes
- Students must be able to understand that heating or cooling can change the state of a material
- Students must be able to explore the concept of density trough the lava lamp experiment with liquids such as vegetal oil and water.
- Students must be able to produce simple descriptive texts in English related to scientific phenomena.
- Students must be able to follow and produce simple instructional texts related to experiments.
- Students must be able to participate actively in gamified learning tasks, demonstrating motivation and cooperative behaviour.

At the end of this unit most of the children should

- Students should be able to classify materials based on their capacity of transfer heat quickly or well.
- Students must be able to recognise that the state change processes can be reversed (water freezing, and water melting)
- Students should be able to produce comparative texts to explain differences between physical and chemical changes.
- Students should be able to use sequencing language and imperative verbs to explain procedures orally and in writing.
- Students should be able to collaborate effectively in group projects and peer-assessment activities, showing responsibility and respect.

At the end of this unit some of the children could

- Students could explain simple real-life examples of changes of state
- Students could identify examples of chemical and physical changes
- Students could use scientific word bank referred to matter to discuss the states of matter and its changes of state
- Students could produce coherent expository texts to present scientific findings in English.
- Students could lead short oral presentations or exhibitions about their scientific experiments
- Students could reflect critically on their learning process and set goals for improving their English and scientific understanding.

EVALUATION AND ASSESMENT

Go to the appendix 3

Assessment from the teacher

The main assessment instrument used throughout the unit was an analytical rubric specifically designed to align with the LOMLOE curriculum. This rubric was constructed based on official evaluation criteria and descriptors from both the Natural Science and English areas and clearly connected to the corresponding specific competences and key competences. The objective is to create a comprehensive and formative approach to evaluation by gathering enough daily evidence and information from each student and tracking their evolution through the unit, it reflects visible continuing progress.

This rubric pays special attention to the weekly final presentations (mission about final products) and to both the quiz using *Plickers* and the final presentation of their gathered evidence and progression in the travel journal that is also presented the last day.

Self-assessment,

Students complete a rubric with colours about themselves every week,

Peer assessment (earn EPs)

At the end of each week, each students uses a target to score one random classmate from their group. The score goes from 1 (never) to 4 (always).

They score four key aspects about how the classmate works in the group. Then, all four scores are added to get a total score between 4 and 16.

At the end of the week, the total points of all group members are added together and converted into Experience Points (EPs) like this:

Total score (4-16)	Eps earned
15-16	+ 20 EPs
12-14	+15 EPs
8-11	+10 EPs
4-7	+5 EPs

CONCLUSIONS

This final degree project has examined the convergence of gamification as an innovative methodology, bilingual education, and the instruction of English as a foreign language in primary schools. Consequently, it is substantiated through both theoretical analysis and practical pedagogical proposal based on the current legislative framework and CLIL approach. For that reason, several relevant conclusions can be drawn based on the analysis carried out and the gamified unit proposal.

Firstly, gamification as an educational tool offers more than a motivational supplement. Having reviewed theoretical arguments of several authors and having observed the beneficial results during the practicum, I can clearly confirm that gamification has a strong pedagogical coherence that strongly increases student motivation by fostering engagement with the contents and creating an immersive learning environment.

This educational methodology goes far from being limited to points and rewards. The truly effective gamified system involves the design of purposeful learning experiences based on both clear and achievable goals, dynamic feedback and emotionally compelling narratives through real-life challenges that students must face to prove their abilities, such as problem-solving, and develop their competences at the same time.

Secondly, the narrative structure is key to achieving meaningful engagement; thus, the development of a weekly storyline full of challenges or missions involves a scientific journey with a planned itinerary across the UK. That allows students to use English in real contextualised situations, promoting communication and confidence in sharing ideas among peers in an immersed educational adventure. Consequently, this ongoing narrative serves as

a unifying thread for content, language learning, and teamwork, due to it transforming routine conventional classroom tasks into missions with purpose and emotional resonance.

For that reason, in light of the theoretical foundations and the proposal presented, all mentioned before clearly align with Vygotsky's (1978) sociocultural theory, which emphasises the role of interaction and context in language development, as well as with Bruner's (1960) advocacy for discovery-based learning through engaging and meaningful experiences. Finally, drawing from Csikszentmihalyi's (1990) concept of flow, gamified learning environments are shown to promote both differentiation and integration, two psychological processes that are crucial for deep and lasting learning. These mechanisms were clearly fixed in the proposed teaching unit, where students advanced through meaningful linguistic and cognitive challenges across a gamified journey through the United Kingdom.

Thirdly, it has been demonstrated that CLIL methodology and gamification are highly compatible due to the simultaneous development of both scientific contents and literacy, by integrating English and Natural Science through meaningful missions within a gamified framework, that also contributes to fostering healthy competitiveness during the whole unit. For that reason, students communicate themselves using English as a vehicular language to complete real tasks such as building a floating boat or presenting experiment results, which promote the development of the five language skills according to the CEFR in authentic, contextualised ways.

In fourth place, as it is mentioned before, this investigation was motivated by the observed gamified classroom routines implemented in the school where I had the pleasure of being during my practicum. These small, gamified routines were positively received by students and demonstrated potential for greater development. As a result, the observing, analysing and reflecting on these dynamics daily, let me conclude on the feasibility of progressive implementation. Building on this, the full unit has proved that those elements can be expanded into a coherent and structured proposal, proving that gamification can be scaled up from isolated techniques to a full curriculum sequence.

Fifthly, another extracted conclusion is that game mechanics or elements and educational goals must be aligned. The planification of the proposed unit demonstrated to me that not all

game elements are inherently effective. As educators, we must select mechanics such as narrative missions, experience points, collaborative challenges and role distribution that truly contribute to both language acquisition and the internalisation of curricular content. All in all, the key lies in aligning those elements with the intended learning outcomes or expectations that teacher have from the students and ensuring a balance between playfulness and rigour.

In conclusion, the TFG showed that gamification can change traditional classroom practice into meaningful, motivating and pedagogically useful learning experiences when carefully designed and situated in a CLIL framework. The project provided new opportunities for other implementations and research on topics including long-term impacts, student perception and differentiation of gamified units.

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APPENDIXES

APPENDIX 1

CALENDAR AND TEMPORALIZATION

(British Science Week) March 8th to March 17th, 2025.						
MARCH						
Monday *EFL*	**Tuesday** *Natural Science*	**Wednesday** *Natural Science*	**Thursday** *EFL*	**Friday** *Science + English*	St	Sn
				7 Spain **Introduction**	8	9
10 Scotland	**11** Scotland	**12** Scotland	**13** Scotland	**14** Scotland Final project	15	16
17 Northern Ireland	**18** Northern Ireland	**19** Northern Ireland	**20** Northern Ireland	**21** Northern Ireland Final project	22	23
24 Wales	**25** Wales	**26** Wales	**27** Wales	**28** Wales Final project	29	30
APRIL						
31 England	**1** England	**2** England	**3** England	**4** England TGT + final presentation	5	6

SPECIFIC COMPETENCES AND DESCRIPTORS

Natural Science, specific competences with their descriptors

2.1 Formulate questions and make predictions, showing curiosity and respect for the nearby natural environment. (LCC1, STEM2, SC4)

2.2 Search for information from different safe and reliable sources, using it in investigations related to the natural environment and acquiring basic scientific vocabulary. (LCC2, LCC3, DC1, DC4)

2.3 Carry out guided experiments when the research requires it, using different simple inquiry techniques, safely handling instruments, making accurate observations and measurements, and recording them properly. (STEM1, STEM2, STEM4, PSL4, PSL5, SC4)

2.4 Propose possible answers to the questions posed about the natural environment, through the interpretation of information and the results obtained. (LCC1, LCC2, LCC3, STEM2, DC1, PSL5)

2.5 Present the results of investigations about the natural environment in different formats, exploring basic scientific language and explaining the steps followed. (LCC1, CPC2, STEM2, STEM4, DC2, DC4, PSL4, PSL5)

Literacy

Specific Competence 1, descriptors:

1.1 Recognise and interpret the overall meaning and key information, as well as previously indicated words and phrases, in short and simple oral, written and multimodal texts about familiar and everyday topics related to personal relevance, needs, interests and close to students' experiences, across different formats. (LCC2, LCC4, STEM1, CEC1, CEC2)

1.2 Select and apply, with guidance, basic and appropriate strategies in everyday communicative situations relevant to students, grasping the overall meaning and processing explicit information in short and simple oral, written and multimodal texts on familiar topics. (LCC2, LCC3, PC1, STEM1, CPSCC5)

Specific Competence 2, descriptors:

2.1 Orally express short phrases with basic information about familiar and meaningful topics for students, using verbal and non-verbal resources with guidance, while paying attention to rhythm, stress and intonation. (LCC1, PC1, CC1, CC3, CPC4)

2.3 Select and apply, with guidance, appropriate strategies to express short and simple messages according to communicative intentions, using physical or digital supports and resources with assistance, depending on the needs of each moment. (LCC3, PC1, PC2, STEM1, CD2, CPSCC5)

Specific Competence 5, descriptors:

5.2 Use, under guidance, knowledge and strategies to improve their ability to communicate and learn the foreign language, relying on the group and on resources. (LCC3, STEM1, CD2, CPSCC4, CE

APPENDIX 2, DEVELOPMENT OF EACH LESSON

- EFL: English as foreign language
- NS: Natural Science

SPAIN, introduction

1. EFL + NS introduction

The unit begins with an introductory session set in Spain, which serves to stimulate curiosity and allow the thread of the story to set the scene for the rest of the learning experience.

The teacher informs the students that they will embark on a journey through the United Kingdom by exploring scientific concepts. This adventure will take them across Scotland, Ireland, Wales, and England, focusing on the states of matter and other related topics. Furthermore, each country represents a phase of the learning process in this gamified journey, and each week introduces students to their next mission, experiment, or language challenge in order to generate excitement in the learning process. Additionally, to connect the unit with real-world cultural content, students are introduced to the British Science Week, a national event in the UK to celebrate science, technology, engineering and maths (STEM), for that reason the unit is expected to start in an specific date during March, having this session as an introduction before the science week allows student to have a deeper context of the unit´s purpose and narrative.

In this session, students receive their travelling journals, where they will collect information, complete tasks, reflect on their learning, and track their progress. Moreover, they receive a map of the journey across the four countries. The teacher explains the gamification system, including how students earn experience points (EPs), collect “pounds” to buy transport for the journey, and complete main missions in each country.
As a result, students ultimately understand the storyline, objectives, tools and rules of the unit. Although they can clearly describe their adventure at this point, they are more excited to get started and actively engage with both content and language learning using a gamified approach.

SCOTLAND

2. **EFL: instructional texts (I)**

Students are introduced to the structure and key elements of instructional texts through a collaborative gamified task. Firstly, as a warm-up a model instructional text is presented on the board highlighting its basic components (title, goal, materials and steps with imperatives, pictures and sequencing connectors).

In groups the receive the pieces as a “text puzzle” of the printed version from the previous analysed text but cut into its component parts and scrambled. Students must collaboratively read, organise, and reconstruct the text in the correct order.

Finally, when the instructional text is completed, each group presents their reconstructed version and justifies their decisions.

3. **Natural Science, lesson 2: states of matter**

The main task occurs over three missions in various locations across Scotland, where local characters need help from the students.

First phase: solids (Scottish Highlands): the students will take part in an exploration of the properties of solids, by manipulating a few materials, including rocks, sand, and sponges, as a result they will note whether it kept its shape, its hardness, and if it could stack. Using short simple instructional phrases, and following short step-by-step instructions, the students would test the properties of solids and record their observations in a checklist. This activity not only developed the students' scientific knowledge of solids but allowed them to begin developing their instructional language.

Second phase: liquids (Loch Ness): the students will be helped to measure and compare volumes of water in several different containers representing a variety of volumes to become familiar with the concept that liquids take the shape of their container but remain the same volume. They will then create their own short instructional text that includes the use of imperatives and sequencing words. In addition, they will sketch to formulate a guide entitled, "How to compare the volume of liquids in different containers."

Third phase: gases (Scottish Coast): students will investigate the behaviour of gases and how they expand to fill available spaces. This will help them understand the properties of gases through the activity of inflating a balloon and using a diffuser. They would conduct simple

experiments where students would engage to observe gases and would be tasked with writing/drawing descriptive texts about what they observed using cause-effect language.

4. EFL, create an instructional text

The lesson starts with a brief recap of the structural elements of instructions such as title, materials, steps with imperative verbs, sequencing connectors. Then the new challenge from a local character is introduced.

Secondly, it takes place a visual sequencing task where students see on the board a series of pictures representing the steps to build a small boat, but these are presented in mixed order. Further, the groups must sequence the images correctly, discussing and reasoning together based on prior knowledge, logic, and language cues.

Thirdly, they start to write a simple instructional text following the steps from the previous images. To support the writing process and comprehension, word bank of action verbs in imperative form with pictograms are provided. In addition, students must pay attention to sequencing connectors such as firstly, secondly, then and finally to begin each step.

This structure ensures that all learners follow the same sentence pattern, increasing confidence and output quality.

5. Natural Science, density and floatability

Students are asked to participate in a hands-on scientific investigation focused on floatability and density. The challenge requires developing both teamwork skills and following scientific method steps (instructional text). Hence, students test a set of classroom and everyday materials such as cork, plastic, sponge, wooden stick, stone, foils… additionally each group has a materials chart with pictures, names, and columns for hypotheses, observations, and results.

Learners are encouraged to predict whether each item will float or sink, using basic English structures, test the materials one by one in a large container of water and finally record their observations and results in the group worksheet.

6. EFL + NS weekly final product

This final lesson in Scotland is designed as a consolidation task where learners integrate content knowledge (states of matter and density) with the linguistic and procedural skills developed in the previous EFL lessons about instructional texts.

The final mission is divided into 3 phases:

First phase, comparing and correcting their instructional texts: each group compares their self-written instructional text from the previous EFL lesson with the official version of the boat-

building instructions now projected on the board. They discuss in groups questions such as: What steps are similar? Or What steps or materials are missing? Even, Is the order correct?

Second phase, boat construction as final mission: students use the corrected model instructions to build a small floating boat. The objective is to apply their knowledge of materials and density, previously explored lessons ago through experiments with floating and sinking.

This final product requires teamwork, interpretation of instructions, and basic problem-solving.

Third phase, assessment and feedback: when the construction is completed and its floatability tested, students are asked to engage in both self-assessment and peer-assessment using visual rubrics. These rubrics evaluate on one hand the quality and accuracy of the instructional text (clarity, order, use of connectors and imperatives), an on the other hand the functionality of the boat (stability, ability to float, straight construction).

Ath the end, the self-assessment and peer assessment ceremony from the whole visit in Scotland is taken place.

NORTHERN IRELAND

7. EFL, descriptive texts and cause-effect

This lesson is dedicated to deal with descriptive texts, their structure and their function. It starts with a warm-up phase to activate prior knowledge and connect with sequencing skills previously practised in Scotland (instructional texts EFL lessons), highlighting the importance of ordering information logically.

The local character is presented with a problem-solving challenge; she explains that her ice creams melt quickly, and her customers are unhappy, but she doesn't understand why. The students' mission is to help her to describe what is happening to her ice creams, discovering that mainly it happens on sunny days because of heat.

In groups, by turns, they describe the ice cream characteristics, such as its colour, shape, flavour, and temperature. After that, they describe what the weather is like and how it affects the different phenomena they are watching.

- Cloudy and cold days, what happens to the ice cream?
- Sunny and warm days, what happens then to the ice cream?

To conclude, they present orally their descriptions both about the weather and the state of the ice crem, associating the weather conditions to the melted ice creams, then they solve the main mission problem. Understanding at the same time how to describe and the purpose of descriptive texts.

8. Natural Science, changes of state

During this lesson, focus is brought up to help students describe changes of state (melting, freezing, evaporation and condensation) using descriptive texts combined with basic cause-effect structures. Additionally, through hands-on manipulation of familiar materials and scaffolded observation tasks, students gain experiential knowledge of how matter behaves when exposed to temperature changes.

Students' role is *scientists in action*: they manipulate, observe, and formulate simple hypotheses, involving spontaneous oral use of descriptive language.

The main mission is composed of 4 different stations dedicated for each change of state.

- Melting station (solid to liquid) an ice cube is placed on a warm ceramic plate with a candle under it. Students observe how it melts due to heat.
- Freezing station (liquid to solid) water is placed in a freezer (or pre-frozen ice is shown), demonstrating the reverse of melting.
- Evaporation station (liquid to gas) water is heated more and more in the ceramic plate with the candle adding even one more candle to multiply the temperature, and vapour is observed, showing the transition from liquid to gas.
- Condensation station (gas to liquid) a cold mirror placed above steam reveals water droplets, modelling the process of condensation.

To accomplish the main mission, they must conduct the four different experiments by measuring temperatures and following instructional texts already practised before (step-by-step procedures); additionally, experiments are required to be recorded in order to remember in an accessible way those contents in the next lessons. Finally, learners complete a worksheet in groups based on the scientific method.

From a linguistic perspective, descriptive type of text is developed in real experiences through experiments as students describe what they can feel, touch and see during the process *"An ice cube is a cold solid" "the ice is hard and cold, but now it is water." "Water flows because it is a liquid" and* begins to integrate cause-and-effect language structures, appropriate for their A2 level. That would be the focus of the next EFL lesson by watching and analysing again the recorded videos from the conducted experiments. Then, they can produce simple statements such as *"The ice melts because the plate is hot."*

9. EFL, type text cause-effect (II)

Reinforcing the previous mission of the las Natural Science lesson, focus is brought up to the recorded videos from the previous conducted experiments about changes of state. Allowing students to describe changes of state (melting, freezing, evaporation and condensation) starting from what they have already experienced.

Students' role: they become reporters**;** they communicate results using specific language structures. Including, an explicit and guided focus on oral/written production using causal connectors and more elaborated descriptive structures.

Simple cause-effect structures are presented to explain these changes of state deeply, such as "water evaporates when it gets hot"; as a result, students practise orally in groups with guided support matching simple cause-effect sentences and descriptions to images of the changes of state.

The main mission asks students to observe the recorded experiment again where ice melts and water evaporates. They describe the process in groups, using descriptive sentences supported by cause-effect connectors. Their task is to help a local character, who is a weather reporter; they must explain the changes happening to water in different conditions by carrying out different experiments with both provided materials and checklists to record their results.

10. Natural Science, thermal energy and temperature

Students are involved in this main mission by helping a new local character, owner of a spoon workshop; he wants to know, "Which spoon melts ice faster?"

The main objective of the mission is to introduce the concept of thermal energy, understood as the transfer of heat from warmer to cooler objects. Students investigate how heat behaves differently depending on the material's properties, distinguishing between conductors such as metal and insulators such as plastic and wood.

To do so, students work in groups and receive both checklists to record their results or observations and three types of spoons: metal, plastic, and wood. Firstly, before the experiment, learners are guided to make predictions and record their hypotheses, thinking orally and discussing what spoon they think will melt ice faster.

Then, they put an ice cube on each spoon and observe which melts faster, with all spoons on the same table at the same time. It is important to outline that a timer is used to control the observation period, and a simple chart supports the recording of results.

From an EFL and natural science perspective, this main mission is built on the instructional texts explored in previous sessions and introduces simple cause-effect language structures such as *"The ice melts because the spoon is metal"* or *"The plastic spoon does not conduct hot well"*. At the end of the session, students classify the materials based on their ability to transfer heat and reflect on the results using basic descriptive language in English (A1 level).

11. EFL + NS weekly final product presentation, create a thermos and its leaflet

This final mission allows students to apply their understanding of changes of state and thermal energy while they are practicing the use of descriptive texts.

Students are asked for help to design an effective homemade thermos able to keep drinks at the right temperature.

Firstly, to warm up students remember the specific concepts they have studied: changes of state, evaporation, condensation, melting and freezing; and the role of thermal energy in these processes. They explore how heat conductors and insulators affect the temperature retention of liquids. Through hands-on experimentation with different materials, students test which ones better insulate or conduct heat.

Once their results are gathered and analysed, students select the everyday material based on their experiments.

Lastly, in groups they create a leaflet using descriptive texts, highlighting the materials used, the function of the thermos, and explaining how it helps maintain the temperature of a drink.

Ath the end, the self-assessment and peer assessment ceremony from Northern Ireland is taken place

WALES

12. EFL, comparative texts (II)

During this lesson, the main mission is not only to carry out two simple experiments recalling concepts already worked on, such as changes of state, but also to deepen the concept of melting while simultaneously practising comparative structures. To support so, guided observation and structured output are crucial; students connect scientific processes by introducing themselves to comparative texts.

Experiment 1: same-sized ice cubes are placed on different ceramic plates. The first ice cube has one candle underneath, while the second one ice cube has two candles underneath.

First and foremost, students start with the initial description, describing what they see using basic comparative structures. "*There are more candles. There are two candles under this ice cube and only one under the other one". "The number of candles is different / the same."* Then, the phase of prediction writing and scientific hypotheses is introduced, where learners are guided to make predictions about which ice cube will melt faster and why. For instance, *I think the one with two candles will melt faster because it has more heat.* To continue with, the experimentation and the recording of scientific results is taken place, students observe the melting process, record what happens, and discuss the changes using comparative language. Each group fills in a results table comparing their predictions with the actual outcome. 2nd *Ice Cube melts faster than the 1st ice cube. Our prediction was correct / not correct.* Finally, they reflect on the accuracy of their hypotheses and what they have learnt finally, they produce short comparative written sentences and present them orally in their group.

Experiment 2: this experiment follows exactly the same structure and steps as the first one, both here instead of having two candles, both ceramic plates have only one candle underneath, but one ice cube is clearly bigger than the other one.

Same process: initial description (*the second ice cube is bigger than the first one),* prediction writing, experimentation and results recording, and lastly, reflection.

Students observe how the smaller cube melts faster and write or say comparative sentences: "*The small ice cube melts faster than the big one."* "*The second ice cube is bigger than the first one."*

13. Natural Science, physical changes and chemical changes

The learning objective of the session is to distinguish between physical changes (reversible) and chemical changes (irreversible) through direct experimentation and guided inquiry. Students carry out simple experiments to observe each type of change.

Station 1: physical changes (changes of state and shape) Students manipulate materials such as modelling clay or folding papers to demonstrate the change of shape; moreover, they change the state of ice cubes by melting them or melting chocolate. The objective is to recognise that they are reversible changes because the material is the same (clay, paper, water and chocolate).

Station 2, chemical changes (oxidation and combustion) Experiments and demonstrations related to chemical changes are shown to the student: combustion (burning papers by the teacher) and oxidation (pouring vinegar into baking soda by the teacher). They are able to

identify those changes as irreversible because they become different substances or materials, like ashes in the case of the burnt paper.

Each group receives a table to predict, observe, and classify each change as physical or chemical. Additionally, students are encouraged to use cause-effect sentence structures to describe what happens, *"It changed because we mixed two materials"*, or *"It is a chemical change because it is a new material."*

14. EFL, comparative texts (II)

In this lesson, students engage again with comparative texts, through examining and making simple comparisons regarding physical and chemical changes. At the start of the lesson, students review comparative structures (bigger than, more solid, changes quicker) and write short sentences comparing two science experiments from earlier sessions. The students work in pairs using visuals to assist their writing. The lesson provided opportunities to develop science reasoning, as well-advanced English language development through CLIL - based strategies.

15. Natural Science, lava lamp experiment

This main mission starts by checking the required materials (oil, water, food colouring, a transparent bottle, a spoon, effervescent tablets). After that, the whole class watch a video that demonstrates and illustrates the process, to do so in groups they revise each step to create the lava lamp.

When they have already all prepared, it takes place the observation and description of the phenomena created by the chemical reaction of the materials, at this moment, While observing the bubbling and separation of liquids, students write or dictate descriptive sentences using the structure practiced in prior EFL *"there are bubbles" "it is a chemical change" "the oil is on the top" "water have different density than oil" "the food colour moves slowly"*

To conclude, they reflect about the process and clean up.

16. EFL + NS:

The final task requires students to complete a comparative table showing differences between physical and chemical changes. To face this challenge, they must describe what happens using comparative structures and identify the type of change.

To do so, real images of different changes are provided such as melting chocolate, modelling clay, burning paper, dissolving salt. Students must identify correctly it is a chemical or physical change and name it too such as oxidation and combustion or in contrast, change of state and change of shape.

At the end, the self-assessment and peer assessment ceremony from Wales is taken place

ENGLAND

The visit to this country is used mainly as a review, evaluation and final assessment of the previous

contents. The evaluation is composed of the final presentation of the travel journal and the *Plickers* quiz.

17. EFL, questions

The main mission or task from this EFL lesson in England is to collaboratively create content-based questions for the final review quiz using appropriate question structures and terms that they have already worked on. The lesson starts with a whole class guided modelling phase, where both teacher and students planned 3 or 4 example questions based on key contents from previous countries. Each question is written together, focusing on correct structure, content relevance, and appropriate vocabulary. For instance, how many changes of state are there? Ice turns into water; we call it melting. After that, each group is assigned the task of creating 2 original questions per country visited in the unit. Firstly, the questions must be based on the science and language contents learnt in each country. Secondly, they must be written in correct English using proper question structures and appropriate for the quiz format. In this case with multiple choices, students must create 3 false choices and 1 correct. To support the questions' creation, learners are encouraged to use class materials, their travel journals, posters, and vocabulary resources as references. Finally, the groups exchange their questions with another team for peer revision. Then after reviewing, each group selects their best 4 questions and submits them to the teacher for possible inclusion in the final class quiz.

18. EFL, expository texts and preparation of the final presentation

The lesson starts with a brief reflection and discussion led by the teacher on the purpose and structure of expository texts, emphasizing the use of English as a vehicular language to express themselves, the correct use of sequencing connectors such as *first*, *then*, *finally* to increase fluency, and clear information. Thus, students are guided to collaboratively draft a group script that summarizes their learning journey across the countries visited during the unit. Their discourse must include these parts:

- The Introduction students introduce themselves as a group, by stating the names of the members and their group name. They explain that they are going to present their Travel Journal, which documents the learning experiences and scientific discoveries made throughout the unit.

- The body is the main part of the presentation consists of a structured explanation of what the group learned in each country describing scientific contents, linguistic focus and main tasks completed.
- Conclusion: group reflection on their overall experience or favourite moment.

After completing the written draft, groups practice their oral presentation, focusing on fluency, pronunciation, turn-taking, and main communication features, non-verbal language. At the same time, the teacher provides scaffolded language support and immediate feedback to guide students' improvement.

19. Final presentation

Each group presents their Travel Journal following the structured draft rehearsed in the previous EFL session. The presentation includes a general introduction of the group; a summary of the scientific content explored in each country and a conclusion with personal reflections on the project.

Then, peer assessment and self-assessment of the whole unit are taken place though evaluation tools as a visual rubric.

20. Plickers

During this lesson, students engage in a collaborative, gamified review of all the scientific content explored throughout the learning journey. This final task is based on a classroom quiz using *Plickers*, a digital formative assessment tool promoting ICT use, that allows students to answer multiple-choice questions interactively while the teacher collects real-time data. All the questions used in the quiz have been previously designed by the groups

21. EFL + NS final presentation of the travel journal quiz

To foster a positive emotional closure for the unit, the students will be given a set of postcards representing the various countries they had visited on their gamified travel unit (Scotland, Ireland, Wales, England). On their own, the students choose the postcard of the country they most enjoyed, colour it, and then on the back, they write a brief reflection on what they enjoyed most from their travel experience in that country. They will also write a personal dedication to one teammate, thanking them for working together.

They will exchange postcards in the group so that every student receives one, promoting inclusion, and fostering a sense of community and acknowledgement from each other. This friendly gesture shows the shared learning experience and contributes to improve peer relationships in the classroom environment.

Last but not least, celebrating each student's achievements and progress throughout the unit, personalised diplomas will be given to each learner. This ritual acknowledges their effort and provides motivation for future learning endeavours

APPENDIX 3, EVALUATION

CRITERIA	competences	Exceeds expectations (3)	Meets Expectations (2)	Approaching Expectations (1)	Needs Improvement (0)
Scientific Knowledge and Conceptual Understanding					
1.1 Classification of states of matter	STEM1, CCL2	Classifies materials into solids, liquids, and gases and provides examples, showing a deep understanding.	Correctly classifies materials into solids, liquids, and gases using appropriate vocabulary and gives common examples.	Partially classifies materials into solids, liquids, and gases but may confuse some states or use limited vocabulary.	Struggles to classify materials into states of matter and shows little understanding of the differences.
1.2 Changes of state (melting, freezing, etc.)	STEM1, CCL2, CPSAA4	Clearly explains changes of state, relating each process accurately to heating or cooling, and provides real-life examples with confidence.	Correctly describes the main changes of state and relates them generally to heating or cooling processes.	Shows basic understanding of some changes of state but has difficulty relating them to heating or cooling	Cannot explain changes of state or incorrectly associates processes with heating or cooling.
1.3 thermal energy	STEM1, CCL3,	Compares, and justifies the behaviour of heat conductors and insulators using examples from experiments and daily life.	Understands the basic concept of thermal energy and its effect on states of matter, and correctly identifies some common heat conductors and insulators	Shows partial understanding of thermal energy but has difficulty relating it to heat transfer; identifies partly heat conductors or insulators	Has little understanding of thermal energy or heat transfer, and cannot identify the difference between heat conductors and insulators

1.4 Physical and chemical changes	STEM1, CCL2, CPSAA1	Accurately differentiates between physical (reversible) and chemical (irreversible) changes with detailed examples	Correctly identifies physical and chemical changes with simple examples.	Shows some confusion between physical and chemical changes or provides unclear examples.	Can not distinguish between physical and chemical changes.
1.5 Density	STEM1,	Makes well-reasoned predictions, experiments accurately, interprets results with clear arguments, builds a functional boat	Makes reasonable predictions, participates correctly in the experiment	Participates with support but partly difficulties on interpreting results or building the boat	Does not understand the experiment and density concept, additionally does not show collaboration in the group

CRITERIA	competences	Exceeds expectations (3)	Meets Expectations (2)	Approaching Expectations (1)	Needs Improvement (0)
Scientific Inquiry and Experimental Procedures					
2.1 Formulates simple hypotheses before the experiment	STEM1, CCL3, CE3	Formulates clear, hypotheses showing curiosity	Formulates simple and mostly relevant hypotheses with some guidance.	Attempts to formulate hypotheses but they are unclear	Does not formulate hypotheses or hypotheses are irrelevant
2.2 Follows instructions and carries out the experiment step by step	CE3, CCL1, CPSAA4	Follows all instructions independently, showing careful attention to detail and safety throughout the experiment.	Follows instructions with minor support, completes most steps correctly and safely	Needs frequent reminders or support to follow instructions and complete steps.	Does not follow instructions or perform the experiment correctly.
2.3 Uses materials properly, recognising their properties	STEM1, CE, CPSAA3	Uses all materials demonstrating clear understanding of their properties and purposes.	Uses materials mostly correctly with occasional guidance	Uses materials with difficulty and inconsistent understanding of their properties.	Misuses materials
2.4 Records data from the experiment in checklists	CCL3, STEM1	Records data accurately showing attention to detail and organisation.	Records data clearly with minor omissions	Records data partially missing key observations.	Does not record data or records it inaccurately.
2.5 Describes and discusses findings using simple scientific language in English	CCL3, MC, CE3,	Expresses findings clearly, using accurate and appropriate scientific vocabulary and	Describes findings using simple scientific terms	Attempts to describe findings but language is unclear	Unable to describe or discuss findings meaningfully in English.

		language confidently in English.			

CRITERIA	competences	Exceeds expectations (3)	Meets Expectations (2)	Approaching Expectations (1)	Needs Improvement (0)
Communication and Language					
3.1 Understands and follows oral and written instructions in English	CCL1, MC, CE3	Understands and follows both oral and written instructions	Understands and follows basic oral and written instructions with minimal support.	Understands instructions partially; often needs repetition or guidance.	Has difficulty understanding and following oral or written instructions, even with support.
3.2 Uses appropriate vocabulary related to matter and experiments (melting, solid, heat conductor...)	CCL3, MC, STEM1	Uses subject-specific vocabulary confidently	Uses appropriate vocabulary correctly in simple situations with some support.	Uses limited or incorrect vocabulary	Rarely uses or understands the relevant vocabulary, even with help.
3.3 Expresses results and observations orally using simple structures	CCL3, MC	Communicates results and observations clearly	Explains results in simple English with acceptable accuracy and coherence.	Struggles to express ideas clearly	Cannot express observations or results orally
3.4 Participates actively in group discussions using English	CPSAA1, CCL3, MC, CE3	Engages consistently in group discussions	Participates in group discussions using English	Participates occasionally; English use is limited	Rarely participates in group interactions; avoids using English.

			when prompted or guided.		
Attitudes and behaviour					
4.1 Demonstrates curiosity and interest in learning through hands-on activities	STEM1, CE3, CPSAA1	Shows continuous curiosity and enthusiasm for learning	Participates with interest in hands-on activities	Shows occasional interest	Rarely shows interest or curiosity
4.2 Collaboration and teamwork	CPSAA1, CC, CE3, CCL3	Consistently collaborates effectively, respects peers' ideas	Works well with others; listens and contributes when guided.	Participates in group work with support; sometimes struggles with cooperation.	Has difficulty working in a team; often disrupts or avoids collaboration.

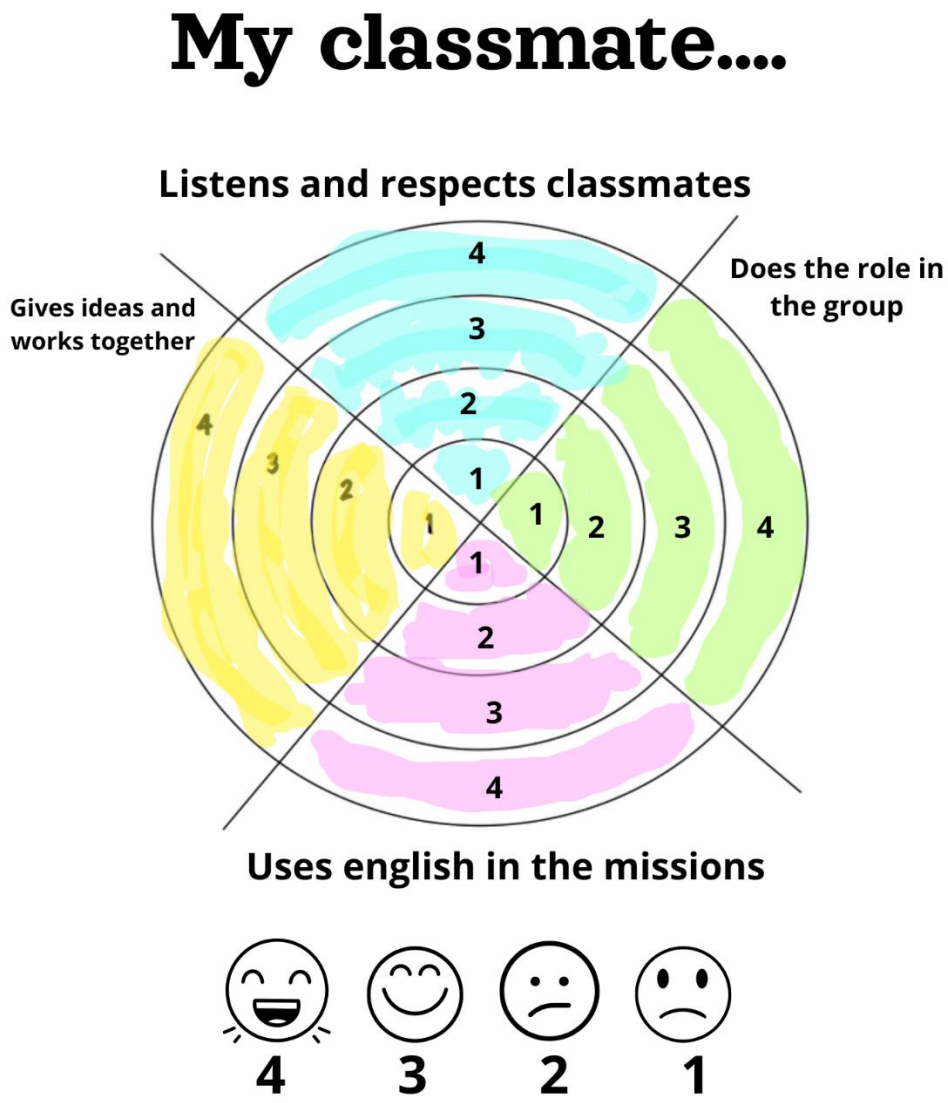
CRITERIA	Competences	Exceeds expectations (3)	Meets Expectations (2)	Approaching Expectations (1)	Needs Improvement (0)
Gamified features of the unit to valuate					
Weekly final projects at the end of each country	CPSAA1, CC, CE3, CCL3	Shows clear scientific understanding using clear communication in English with the team and other peers	The final product of each week is correctly explained with adequate use of language and teamwork	The output shows limited clarity or detail, and the collaboration is irregular.	Shows little contribution to the project, lacks scientific understanding, struggles with language use
Travel journal and its presentation	CPSAA1, CCL3, MC, CE3	Presents a well-organised and detailed journal with clear scientific content	Journal and presentation show accurate scientific content and correct language	The oral presentation or even the journal has lack clarity including language	The journal is unfinished, some parts are missing
Final quiz in *Plickers* (formulating questions and correctly answering)	CCL1, MC, CE3	Formulates accurate several questions about scientific contents of		Formulates accurate some questions but with a few errors, or does not	

		the unit and correctly answers most of them		show understanding in the answers	

Self-assessment

Skill				
Listening	I can understand instructions and the word bank of this week in science experiments and English lessons			
	I can understand short explanations			
Speaking	I can ask and answer simple questions in group missions			
	I can describe an experiment using simple sentences			
Reading	I can read and understand the missions			
	I can follow written instructions in experiments or tasks.			
Writing	I can write simple sentences in my Travel Journal about what I saw			
	I can complete short texts with key science words			

Peer assessment related to Eps points



Resources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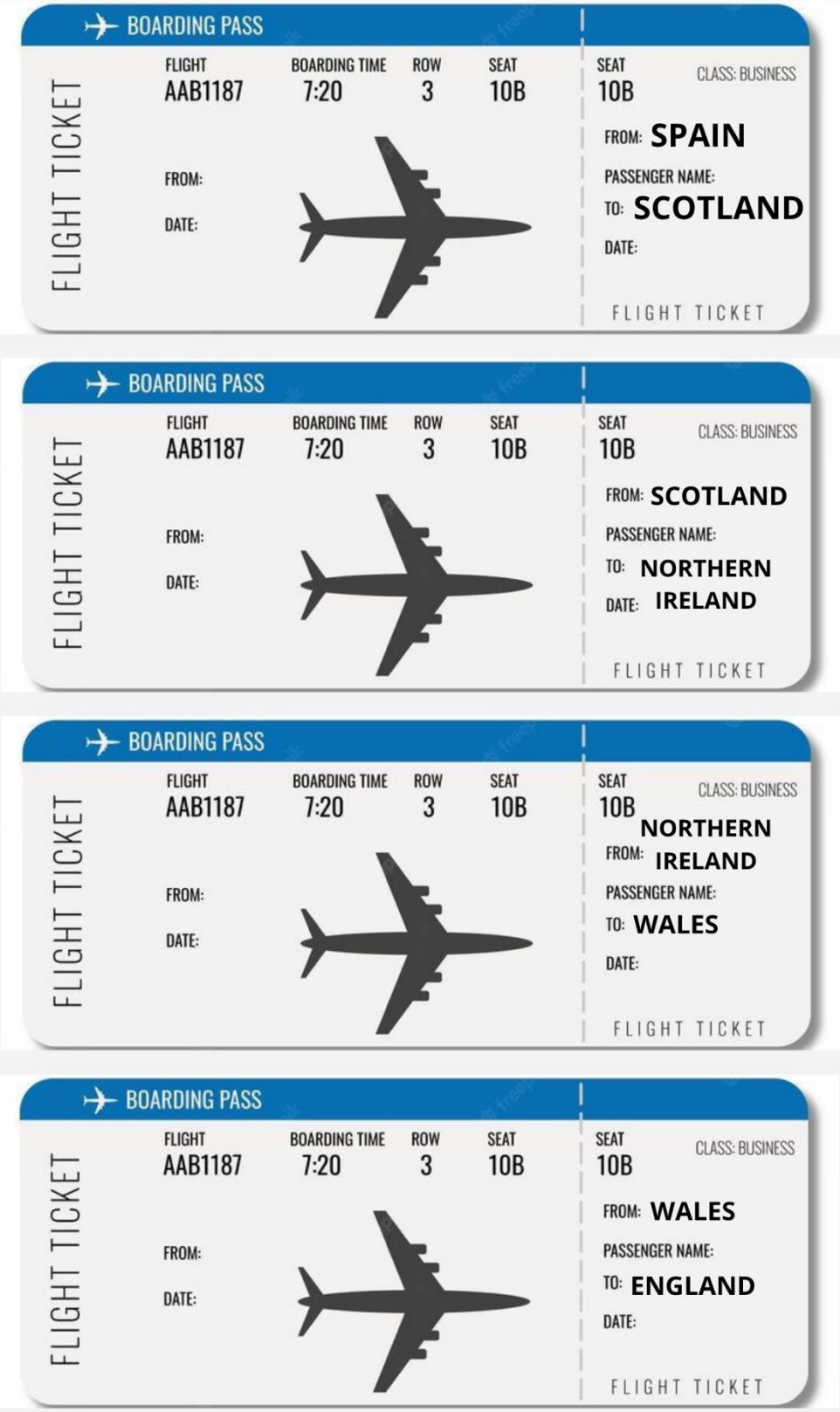
Tickets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Reward, pounds

Introduction

Worksheet for each experiment and scientific main mission

Name: _____ Country of the mission:_____

Group:_____ Date:____

QUESTIONS AND MAIN MISSION

Reward:

HYPOTHESIS

MATERIALS

INSTRUCTIONS

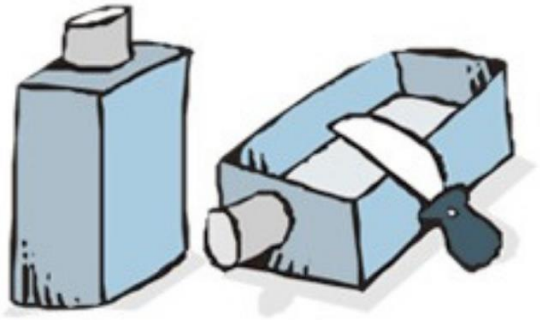
OBSERVATIONS AND RESULTS

CONCLUSIONS

Scotland

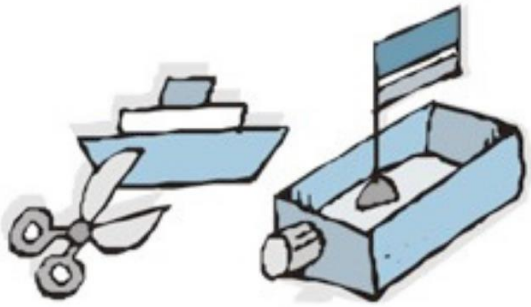

re:enjoy
Semi skimmed
Milk
Pritt
Materials:
• Scissors
• Water
• Glue
• Milk carton
• Sticks
• Scottish flag

Scotland



1.Cut the top of the milk carton
Use scissors.
It looks like a box

Cut the Scottish flag



Glue the flag to the stick
Glue the boat sticker to the milk cartoon

Decorate your boat

Float your boat, put it on water

Wales

Materials:

- 1 clear plastic bottle (empty)
- Water
- Vegetable oil
- Food colouring (any colour)
- 1 fizzy tablet (like Alka-Seltzer)

Steps:

1. Fill the bottle with water, about 1/4
2. Add oil to the bottle. Fill it to the top.
3. Wait – the oil and water do not mix!
4. Add a few drops of food colouring. The colour goes into the water.
5. Break the fizzy tablet in two. (You can use half now, and half later.)
6. Drop the tablet into the bottle.
7. Watch the bubbles go up and down!
8. Turn off the lights
9. Use a flashlight under the bottle, it looks like magic!

Northern Ireland