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USING METHODOLOGIES BASED ON NEUROSCIENCE TO IMPROVE STUDENTS' LEARNING IN A CLIL CONTEXT

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ABSTRACT

This MA dissertation aims to design a learning situation in a CLIL Geography and History classroom of 1st SCE that improves student learning. To this end, this paper will conduct a literature review to lay the foundations for including neuroscience-based methodologies in a CLIL context. In addition, SEL, Mindfulness and PBL will be described as examples, presenting their benefits individually and together with CLIL methodology. On this basis, a project called "If we could start again" will be developed. Its aim is to raise students' awareness of the climate emergency while working on the appearance of the first civilisations of the Ancient Ages. It involves creating a sustainable civilisation in a new world with the appropriate characteristics for people to survive mentally, emotionally, and physically.

Keywords: CLIL, Neuroscience, SEL, mindfulness, PBL, learning, brain, Secondary Education.

RESUMEN

El presente trabajo de fin de Máster tiene como objetivo diseñar una situación de aprendizaje en un aula CLIL de Geografía e Historia de 1º de ESO que mejore el aprendizaje del alumnado. Para ello, se va a desarrollar una revisión bibliográfica que permita sentar las bases para la inclusión de metodologías basadas en la neurociencia en un contexto CLIL. Además, se describen el ASE, Atención Plena y ABP como ejemplos, presentando sus beneficios individuales y junto con la metodología CLIL. Partiendo de esto, se lleva a cabo un proyecto llamado “Si pudiéramos volver a empezar de nuevo”. Su objetivo es concienciar al alumnado de la emergencia climática al mismo tiempo que se trabaja la aparición de las primeras civilizaciones de la Edad Antigua. Esta implica crear una civilización sostenible en un mundo nuevo con las características adecuadas para que las personas puedan sobrevivir mental, emocional y físicamente.

Palabras clave: AICLE, Neurociencia, ASE, Atención Plena, aprendizaje, cerebro, Educación Secundaria.

1. INTRODUCTION

Nowadays, due to the relevance of English as a lingua franca, bilingualism and bilingual education have gained high prominence worldwide. Particularly in Europe, this has led to the development of the Content and Language Integrated Learning (CLIL) methodology, defined as a "dual-focused educational approach in which an additional language is used for the learning and teaching of both content and language" (Coyle et al., 2010, p.1). It is very successful not only because it enhances linguistic skills and content knowledge but also since it contributes to developing intercultural and critical thinking skills. Specifically, according to Coyle (2010), "Spain is rapidly becoming one of the European leaders in CLIL practice and research" (p. viii).

Furthermore, due to the need to understand more deeply how the human brain works to improve the teaching-learning process, educational neuroscience appears (Peiro, 2022). It allows us, as teachers, to know and understand the nervous system and the brain, facilitating the understanding of students' behaviour and attitudes, learning strategies, attitude, or classroom environment. Hence, it is a first step towards improving teacher training and preparation and, consequently, the quality of teaching. (Kandel et al., 2005; Gómez-Galán et al. (2016). In this line, it has been demonstrated that cognitive and emotional processes share neural networks, as emotions can provoke physiological changes in the body and perceptions in the brain. Therefore, using methodologies that seek to create a positive and motivating environment in the classroom is one of the best learning tools (Guillén, 2017; Damasio, 2019). Among the methodologies based on neuroscience and how the brain learns, we can highlight Social and Emotional Learning (SEL), Mindfulness and Project-Based Learning (PBL) (Guillén, 2017; Sousa, 2021; Do Amaral & Fregni, 2021).

Finally, this educational project has been structured in the following sections: the Master's Dissertation objectives; a theoretical framework that sets out the research evidence that substantiates the need to implement it; the lesson plan, including the school contextualisation and its required curricular elements; and, then, the expected results and conclusions following the stated objectives.

2. OBJECTIVES

2.1. General Objective

- To design a learning situation that improve students' learning in the CLIL classroom through methodologies based on neuroscience.

2.2. Specific Objectives

- To conduct an exhaustive review of the scientific and academic literature related to the importance of including neuroscience in the classroom and, specifically, in the CLIL context.
- To know how the bilingual brain works when learning to use the most effective tools in a CLIL classroom.
- To know how emotions affect students learning and how using Social and Emotional Learning (SEL) and Mindfulness to manage these emotions benefits the teaching-learning-process.
- To design a CLIL lesson plan within the Geography and History area that integrates SEL, Mindfulness and Project Based Learning (PBL) methodologies, with the aim of improving students' learning and promoting their socio-emotional well-being.

3. LITERATURE REVIEW

3.1. CLIL methodology

3.1.1. Origin

The CLIL concept was created by David Marsh in 1994 to describe the applied linguistics stream claiming that foreign language learning (henceforth, FLL) is more successful within other subjects (Gómez-Parra, 2016). However, there is evidence of ancient ethnic groups which used bilingualism and plurilingualism for subsistence. Then, between the 16th and 18th centuries, the European pedagogues Comenius and Bel were already referring to foreign language learning (henceforce, FL) by integrating meaningful subject content. Indeed, Bel wrote content-integrated textbooks to teach the language of real-life situations. Subsequently, in the mid-20th century, various geographic, demographic, and economic issues led to the need for integrated language and content programmes, which implied the creation of some bilingual programmes, such as Canadian immersion. (Hanesová, 2015, p. 8).

3.1.2. Fundamental Elements of CLIL

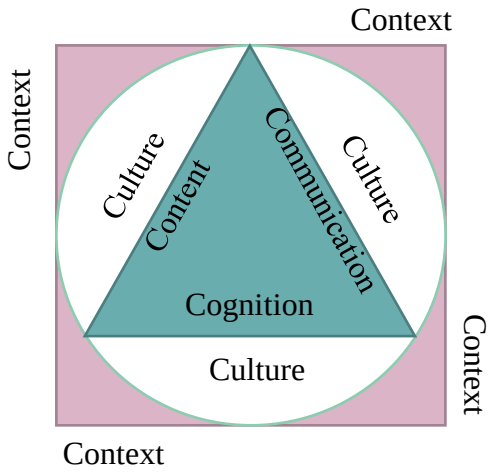
Mehisto et al. (2008) consider CLIL as an innovative and unique bilingual methodology due to the aspects that distinguish it from others. Those outstanding characteristics are:

- It is a dual approach that integrates language and content, giving prominence to both.
- It fosters learning skills acquisition, seen as the third element of CLIL due to its relevance for integrated learning and achieve language and content objectives.
- CLIL is considered as an "umbrella term" since it covers diverse educational approaches and varieties. Indeed, it stands out for its flexibility and versatility, as it can be adapted to the different contexts varying time and intensity of the exposure.

Besides, Coyle et al. (2010) state that CLIL integrates four different but interrelated and contextualized components into the teaching-learning process through the 4Cs Framework. These are: Content, Communication, Cognition and Culture (see Figure 1).

Figure 1.

The 4C's Framework



Note. Adapted from *CLIL: Content and Language Integrated Learning*, (p.12), by D. Coyle et al., 2010, Cambridge University Press.

3.1.2.1. Content

It is the subject matter. It provides a means of reflection and interpretation which enables the development of cognitive skills. From this point of view, disciplinary content knowledge does not imply the accumulation of knowledge but rather the creative construction of knowledge and skills through generation, planning and production of ideas.

3.1.2.2. Communication

Language is a means for communication and learning. Therefore, this element deals with using language to learn while learning to use languages in real communicative contexts. To this end, Coyle et al. (2010) suggest the Language Triptych, a conceptual representation that connect both content and language objectives. It provides a framework for the analysis of the vehicular CLIL language from three interrelated perspectives:

- Language OF learning: needed to access concepts and skills.
- Language FOR learning: needed to function in a FL environment (e.g., Class language).
- Language THROUGH learning: generated in the teaching-learning process.

3.1.2.3. Cognition

It is linked to learning and critical thinking skills. That means we must challenge learners to think and review as well as engaging them to create their own interpretations. To this end, Meyer (2010) states that to achieve learning in CLIL lessons, we need to develop High Order Thinking Skills or HOTS (analyse, evaluate, and create) of the Bloom Taxonomy revised by Anderson and Krathwohl (2001). It implies that students interact and negotiate with their peers, make decisions, create things, and evaluate themselves and each other.

3.1.2.4. Culture

It involves classroom treatment of the cultural and social aspects of the learning content and language (Custodio Espinar, 2018). As shown in Figure 1, it envelops the other three, as all necessarily occur within a cultural environment. Besides, it has a key role in language learning since it is linked to native traditions, customs, and values. Therefore, building a plurilingual and pluricultural repertoire and enhancing plurilingual comprehension are paramount to acquiring the pluricultural and plurilingual competences (Council of Europe, 2020).

3.1.3. Core features of CLIL

From a methodological point of view, Mehisto et al. (2008, p. 29) consider that CLIL is characterised for the following core features:

- It has multiple foci, facilitating subject integration and programming under a cross-curricular approach to encourage reflection on learning processes.
- It promotes a safe and enriching learning environment, which increases learners' confidence and enhances their willingness to experiment with language and content.

- It brings authenticity to the classroom when teachers use authentic materials, cases, and contexts, as learning is connected to real situations.
- It facilitates active learning by providing students with opportunities to cooperate, investigate and make decisions.
- Scaffolding. We must facilitate language acquisition, promote creativity and critical thinking, and allow students to learn through cognitive and language challenges.
- Co-operation. All the stakeholders must cooperate in the teaching-learning process. That implies cooperative work among CLIL and non-CLIL teachers and involving parents, the local community, authorities, and employers of future citizens.

Although CLIL does not proceed from a foundation based on Neuroscience or Neuroeducation, it fulfils some of their principal aspects. Among them, CLIL provides a positive environment for learning. As learners experience positive emotions, their active engagement is encouraged, increasing their interest and participation. Thus, as their brain is more activated, they learn and acquire language and content better (Dietrich and Evans, 2022).

3.2. Integrating Neuroscience in the CLIL classroom

3.2.1. Brief approach to Neuroscience – Neuroeducation – Neurodidactics

Neuroscience is "a branch of science that deals with the anatomy, physiology, biochemistry, or molecular biology of nerves and nervous tissue and especially their relation to behaviour and learning" (Merriam-Webster Medical Dictionary, 2023). Following Morris & Sah (2016), its relationship with Education has been investigated for years. Indeed, the first decade of the 21st century was defined as the *"decade of the brain"* due to advances in the understanding of the relationship between the brain and behaviour (Schwartz, 2015). Hence, neuroscience has expanded our insights into how the brain learns, prompting the emergence of two disciplines: Neuroeducation and Neurodidactics.

Neuroeducation is an inclusive approach that brings science closer to education so that teachers can learn about those aspects that improve learning (Guillén, 2017). It implies using knowledge about how the brain works to optimise the teaching-learning process (Mora, 2021; Bueno, 2019). On the other hand, Neurodidactics is a branch of neuroscience that aims to design effective and efficient teaching and learning strategies to promote further brain development, thereby improving teaching practice and at the same time the development of lifelong learning skills in learners (Gómez Ortíz & Vázquez Domínguez, 2018, p.10).

Hence, the difference between these two concepts is that Neuroeducation refers to the knowledge of the brain related to Education and Neurodidactics to the methods applied in the classroom (García and Garrido, 2018). In short, the aim of integrating these disciplines in our classrooms is to provide teachers with new tools to improve their students' learning.

Nevertheless, to understand the learning process, it is necessary to comprehend the basis of this phenomenon: the brain functioning. According to Benávidez & Flores (2019), the learning process and the brain reinforce each other. That is, while learning is a product of the brain, the brain improves with learning, as exposure to novelty and change is the most stimulating factor for the brain. In this sense, due to the relevance of knowing the brain and its learning functions to achieve its full potential, we will devote the next section to this purpose.

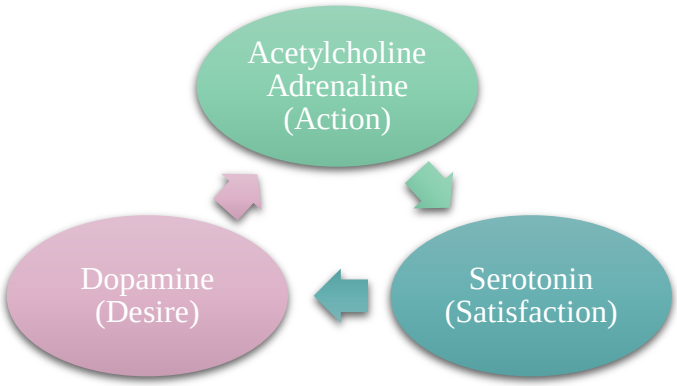
3.2.2. The brain: characteristics, parts, and functions

Velásquez et al. (2009) defined the human brain as a biological and social organ responsible for all functions and processes related to thought, intuition, imagination, action, writing, emotion, consciousness, and others (p.334). Dehaene (2020) affirms that learning is one of its vital principles due to its enormous capacity for plasticity. That is because it contains millions of neurons (cells of the nervous system that communicate with each other through nerve impulses) interconnected to form neural networks or *synapses*. These neurons adjust their connections according to the signals they receive. Thus, the brain can reorganise itself and adapt to the environment according to its experiences (Dehaene, 2020; Ortíz, 2015; Guillén, 2017).

However, the brain does not store all our experiences throughout life but selects the most significant ones and imprints them on synapses. This synaptic plasticity is modulated by neurotransmitters, which temporarily modify how neural networks work, influencing learning (De La Barrena & Donolo, 2009; Guillén, 2017). Folloswing Lucas-Oliva et al. (2022), dopamine is one of the most influential neurotransmitters in this process and is linked to the sensation of pleasure. High doses of dopamine in the neocortex can increase different skills, such as creativity, concentration, analytical capacity, and general motivation (Damasio, 2019; Willis, 2021). Dopamine increase also causes the secretion of others, such as acetylcholine, that enhance "alertness, focus, memory, and prefrontal cortex executive functions" (Willis, 2010, p. 172) or serotonin, which is associated with satisfaction and favours memory consolidation processes (Squire & Dede, 2015). Thus, this interplay of neurotransmitter sequences forms the basis of the D.A.S. Circuit (see Figure 2) (W. de Fox, 2013), where the neurotransmitters influence each other.

Figure 2.

Diagram of the D.A.S. Circuit Operation.



Note. From "Neurodidactics to Language Teaching and Learning: The Emotional Approach" (p.1459), by I. Lucas-Oliva et al., 2022, *Theory and Practice in Language Studies*, *12*(8).

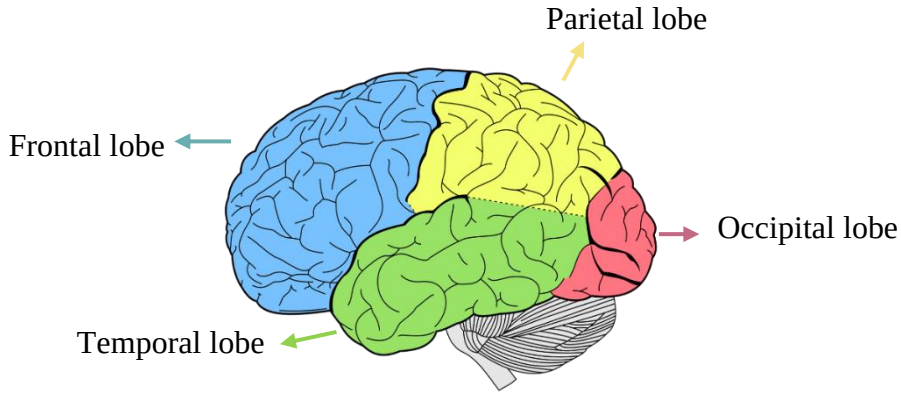
In this sense, several studies show the importance of dopamine in the subcortical area to improve language acquisition in young bilingual environments (Chandrasekaran et al., 2014; Vaughn & Hernández, 2018). Hence, teaching content in a FL not only sustains but also enhances students' motivation and learning (Lasagabaster, 2011; Navarro Pablo & García Jiménez, 2018).

However, several authors like Guillén (2017) and Dehaene (2020), acknowledge that brain plasticity is limited and decreases with age. They speak of a "sensitive period" in which plasticity is at its maximum, and after this, learning becomes more complex but not impossible. As each brain region has a specific function, synaptic overproduction will occur in distinct places, causing several sensitive periods that open and close at separate times (Dehaene, 2020). Specifically, concerning second language learning, Dehaene (2020) notes that second language learning decays more slowly because the brain modelled itself on the first language. Indeed, he specifies that phonology is one of the skills that decline most rapidly with age, while vocabulary is the least affected, as adults continue to have a similar level of plasticity as children. Besides, Hartshorne et al. (2018) found that brain plasticity for grammar learning declines slowly during childhood but sharply at around age seventeen. For this reason, they suggest starting to learn other languages before age ten, as well as travelling and interacting with native speakers to achieve full linguistic potential.

As brain plasticity varies from region to region, it is essential to know the brain structure. We will focus on the *Cerebrum*, the largest and most developed part of the brain. It is divided into two hemispheres (left and right), and each of them into four lobes with different functions (see Figure 3) (Guillén, 2017).

Figure 3.

Human Brain Anatomy



Following Guillén (2017) and González & Hornauer-Hughes (2014), these are:

1. The *occipital lobe* is responsible for visual recognition.
2. The *temporal lobe* is responsible for auditory processing. It contains the Wernicke's area, which enables understanding of language and two deeper structures that will be described in depth later: hippocampus and amygdala.
3. The *parietal lobe* is responsible for stimulus perception. It contains some Circumvolutions, devoted to phonological, writing, semantic, and reading processing.
4. The *frontal lobe* is the largest one. It contains Broca's area, associated with speech ability, and Bordmann's area, which participates in syntactic processing. Besides, it includes the prefrontal cortex, which is involved in personality and motor and executive functions.

Additionally, the human brain has deeper structures which are influential in learning, such as the limbic system, which is in charge of regulating emotions and plays a crucial role in learning and memory, as it determines what is worth learning, an especially relevant phenomenon for education (Oxford Concise Medical Dictionary, 2020). The limbic system interacts with other brain areas and includes several components, some of them fundamental for learning, such as the Amygdala and Hippocampus.

- The amygdala is a dual small almond-shaped structure located under each brain hemisphere. It is associated with emotions, memory, the reward system, stress, instinct, and the human body's *fight-or-flight* responses (Oxford Concise Medical Dictionary, 2020). Moreover, it plays a crucial role in learning and remembering as it selects relevant memories according to the emotional impact (Todd et al., 2012; Gallo, 2014).

- The hippocampus is a pair of seahorse-shaped organs located under each temporal lobe. It is connected to the amygdala, and its main function is linked to memory and learning (Purves et al., 2008). It is responsible for creating and consolidating memory as well as converting short-term memories into long-term memories (Boeree, n.d.; Kelly, 2018).

3.2.3. Learning processing

3.2.3.1. Emotions as a motor learning

Rotger (2017) defines emotions as the psychophysiological reactions to certain stimuli from a relevant object, person, place, event, or memory, which send information to the brain and prepare us for a specific action (p.23).

Regarding emotional development, the prefrontal cortex, and the limbic system, especially the amygdala and hippocampus, are essential since they contain the neural circuits that encode emotion. Ibarrola (2014) states that emotions activate and maintain curiosity and attention increasing interest in discovering new things. Ultimately, these are the cornerstone of all learning and memory processes; if they are inhibited due to fear or a stressful situation, a reduction in learning may occur (Mogollón, 2010; Benávidez & Flores, 2019). In this regard, Mora (2021) speaks of the indissoluble cognition-emotion binomial, emphasising that "there is no reason without emotion" (p.24). In other words, he affirmed that the ideas elaborated in the neural circuits of the cerebral cortex are already impregnated with emotional meaning. Therefore, teachers must consider the significance of emotion when working with content and language in our CLIL context since, depending on this emotional impact, we will or will not achieve students' knowledge acquisition (Lucas-Oliva et al., 2022).

3.2.3.2. The four pillars of learning

Following Dehaene (2020), human beings are not only remarkable for synaptic plasticity but also for having four main functions that maximise the speed of information extraction. These are what he calls the *four pillars of learning*, as all of them are crucial for the stability of our mental constructions. These pillars are:

- Active Engagement (Curiosity)

Active Engagement is closely related to attention and refers to the principle that information undergoing more complex processing is more likely to be recalled (Stirrups, 2020). Following Dietrich & Evans (2022), it occurs solely in our brain while it is focused and generates new mental models actively. To this end, students' brains must be alert and active, striving to internalise new concepts by constantly rephrasing them and updating mental models.

Additionally, Dehaene (2020) states that “one of the foundations of active engagement is curiosity—the desire to learn, or the thirst for knowledge” (p. 220). Curiosity is a brain mechanism that detects what is different from the everyday environment, activating excitement and stimulating attention focused on the new (Kamenická, 2022; Mora, 2021). Following Guillén, (2017), curiosity creates states of intrinsic motivation that increases initial attention, resulting on knowledge production. Thus, the brain understands that searching for knowledge and making decisions that leads to obtaining that knowledge is pleasurable and exciting (W. de Fox, 2013; Mora, 2021). Therefore, maintaining children's curiosity is one of the key factors in successful education since it is one of the emotions that most favours learning (Ibarrola, 2015).

At the neurological level, the brain circuits activated by curiosity are located in the limbic system and other structures, such as the prefrontal cortex. Some studies have shown that curiosity activates both reward and pleasure areas, as well as others related to learning and memory (Kidd & Hayden, 2015). As mentioned, CLIL is fundamental for this element since it acts on students' curiosity and enhances their active engagement, improving their learning.

- Attention

Mora (2021) sees attention as a window in the brain through which information from the world is learned and memorised (p.45). It plays a crucial role in learning since there is no explicit memory or knowledge without it. However, attention is complex, as it gets neurons scattered throughout the cerebral cortex and thalamus to assemble, activating the mechanism of consciousness (Dehaene & Changeux, 2011). Besides, it is worth recalling the importance of awaken emotion and curiosity to achieve activating this attentional focus.

The role of attention goes beyond its capacity to amplify learning. According to Dehaene (2020), it also participates in "long-term potentiation" as an increase in neural activation empowers and strengthens synapses. As an example of FLL, he explains that when learners pay attention to a new word, it spreads in their cortical circuits up to the prefrontal cortex, increasing its possibility of being remembered. Otherwise, those words to which no attention is paid remain in the sensory circuits without reaching their memory. Nevertheless, attention is not a single brain mechanism but a set of multiple attentions depending on the context (Ibarrola, 2015; Ortega et al., 2018). Indeed, Posner & Dehaene (1994) distinguished between: *alertness*, which allows us to know when to pay attention; *attention orientation*, which shows what to pay attention to; and *executive control*, which decides how to process the information we pay attention to. Hence, teaching students managing their attention is crucial to achieve successful learning and we should do it in all our subjects, even the CLIL ones.

- Consolidation (Memory)

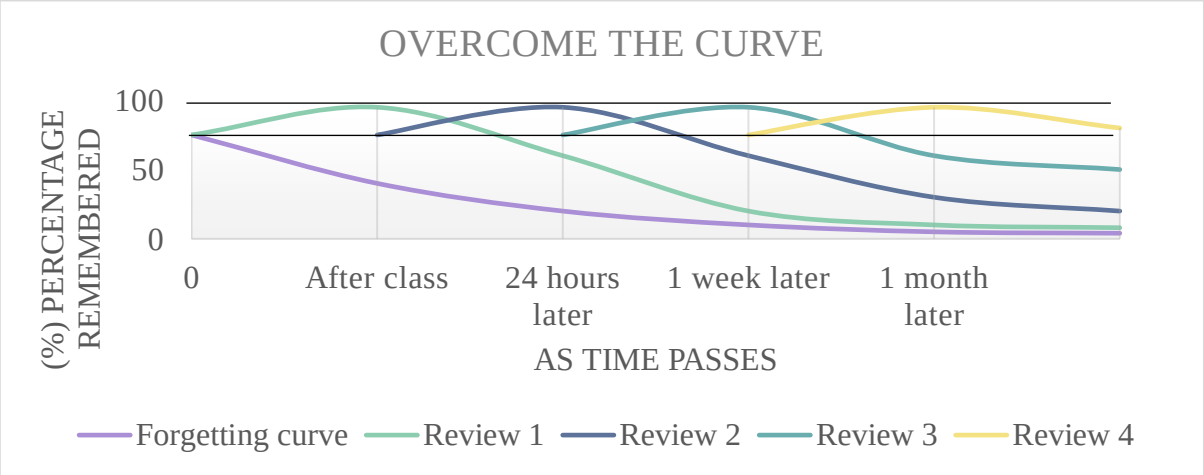
Memory is the process by which knowledge acquired is retained over time and its subsequent recall and use (Mora, 2021, p. 55). Kamenická (2022) distinguishes between:

- Short-term memory: temporal information storage and information selection.
- Long-term memory: retains information over time.

Consolidation refers to long-term memory formation through gene expression and protein synthesis that modify synapses of specific brain structures (Sosa et al. 2018). However, consolidation needs repetition and spacing out of learning (Dehaene, 2020). That consists of distributing long-term reminder sessions to overcome Hermann Ebbinghaus's forgetting curve (Vaca & Lucas, 2021). As shown in Figure 4, the forgetting curve shows the pattern of forgetting new information as time passes and shows the exponential decrease in the probability of recalling an item over time (Reddy et al., 2016, p. 1817). Conversely, the other curves show how spaced repetition allows individuals to remember the information, strengthening memory recall (Amiri et al., 2017).

Figure 4.

Overcome the Forgetting curve.



Note: Adapted from The Forgettin Curve [Image], by Whittman, 2018.

As consolidation proceeds, children retrieve content directly from memory, and the prefrontal activity fades away (Ansari & Dhital, 2006). When a piece of content is integrated into long-term memory, the cortex resources are freed up for other tasks (Dehaene, 2020). Hence the need to incorporate it in the CLIL classroom. We can activate students' prior knowledge before learning a new concept or starting a new topic (Dochy et al., 2002), as this memory reactivation enhances the interaction between the hippocampus and neocortex promoting memory strengthening and long-term storage (Schlichting & Preston, 2014).

- Error feedback

For decades, the oldest and most well-established theories of learning and memory (e.g., those of Bandura, 1986 or Skinner, 1953) and some traditional methodologies (e.g., grammar-translation or audiolingual methods) considered errors as a sign of failure that should be avoided (Metcalfe, 2017). Consequently, many methodologies have prioritised content memorisation and repetition without allowing space for error, decreasing students' motivation and self-confidence (Stevenson & Stigler, 1994).

Nonetheless, Kornell et al. (2009) demonstrated that people remembered the correct answers considerably better when they had an error than when they had not. Likewise, Metacalfe (2017) states that considerable research has confirmed that making errors has better results on correct answer recall than error-free studies, provided these are followed by feedback. Thus, feedback acquires great relevance since it enhances retention and memory, even when the participant chooses the correct answer (Butler et al., 2008, p. 1). It may occur because of the surprise factor, which arises when the brain detects a gap between expectations and the results, generating a positive emotional impact (Dehaene, 2020; Ruiz, 2020). That is, if they were unsure of their response and the answer is correct, the resulting 'error signal' still triggers a brain stimulus that enhances learning (Butler et al., 2008).

Therefore, nowadays we must acknowledge the significance of error as an opportunity to reflect on and correct prior knowledge in our CLIL classroom. Following Ibarrola (2015), students need to have some control over what happens in the classroom, negotiate, and make decisions and mistakes. In this way, pupils will develop a positive attitude towards learning and problem-solving.

3.2.4. How bilingualism affects the brain

Authors like Kim et al. (1997) believed that languages were anatomically separated in Broca's area. However, several studies show that all learned languages involve the same neural structures (Briellmann et al., 2004). Indeed, specific frontal, temporal and parietal regions and some subcortical structures are functionally specialised in linguistic processing for both languages (Costa & Sebastián-Gallés, 2014).

Moreover, following Parker Jones et al. (2012), language processing in bilinguals is more complex than in monolinguals and involves larger brain areas. The main difference is that bilinguals have higher language processing needs due to the additional need to control the two languages and the requirement to resolve lexical competence. Besides, it is worth mentioning that posterior or sequential bilinguals differ from simultaneous bilinguals by the more extensive

activation of the language region of the brain (Perani et al., 2003; Green & Abulatebi, 2013). It is due to the increased effort to adapt the control processes to the demands of a second language learned later in life. (Berken et al., 2016). Therefore, it is still difficult to fully describe the relationships between these structural changes and their roles. Nevertheless, bilingualism is shown to have effects on the functional and structural chracteristics of various cortical and subcortical grey matter structures, as well as on the white matter tracts connecting these regions (Costa & Sebastián-Gallés, 2014; Pliatsikas et al., 2020). In addition, it also affects behavioural and neural functions in language processing, even in the bilingual's dominant first language, but without being detrimental to it (Pérez-Cañado, 2018; Mechelli et al., 2004).

Regarding the effects of bilingualism on executive control circuits, Nicolay, and Poncelet (2015) tested some executive control abilities (alerting, selective attention, divided attention, switching, response inhibition and interference suppression) in immersed and monolingual children in a longitudinal study. They showed that immersed children outperformed monolinguals on all these executive control processes except for inhibitory control. Similarly, another study demonstrated quantitative differences in grey matter density (GMD) in the inferior parietal region in bilinguals compared to monolinguals (Mechelli et al. (2004). Pliatsikas et al. (2020) also found positive effects of bilingualism on the white matter tracts, which provide connectivity between brain regions. In other words, bilingualism modifies the brain's structure and functions and improves functional connectivity. Consequently, it can be affirmed that bilingualism causes people to have better neural plasticity, memory, and executive functions (Perani & Abutalebi, 2005; Roselli, 2022).

3.3. Methodologies based on Neurodidactics

Following Guillén (2017), we can directly train executive functions in different ways, such as through physical exercise, emotional education or promoting bilingualism. Nonetheless, Diamond & Ling (2016) suggests that the most beneficial interventions are those that work executive functions indirectly in line with neuroeducation's proposals. To this end, Guillén proposes some strategies that are based on neuroeducation. Among them, we highlight social-emotional education and mindfulness due to the potential of emotions and emotional management in learning; and project-based learning since allows students to learn while fostering their autonomy, participate actively and take responsibility for their actions. Moreover, both can be used in a CLIL context, helping students to reinforce their knowledge.

3.3.1. Social and Emotional Learning (SEL)

Social and Emotional Learning (SEL) is defined by CASEL (2020) as "an integral part of education and human development" (p.1). It allows people acquire and apply the knowledge, skills, and attitudes to improve intrapersonal and interpersonal relationships. It is composed by five interrelated areas of competence (CASEL, 2020, p.2). These are:

- *Self-awareness*: the ability to identify and comprehend own emotions, thoughts, and values and how they influence behaviour.
- *Self-management*: the ability to manage own emotions, thoughts, and behaviours.
- *Social awareness*: the ability to identify and comprehend others' emotions, thoughts, and values, as well as empathise with them regardless of gender, culture, or context.
- *Relationship skills*: the ability to establish and maintain healthy and supportive relationships as well as to interact effectively with diverse individuals and groups.
- *Responsible decision-making*: the ability to make constructive decisions about personal behaviour and social interactions in multiple situations. It includes evaluating actions' pros and cons for personal, social, and collective well-being.

CASEL (2020) establishes four elements crucial to achieve effective implementation of this approach. These are represented by the acronym SAFE and are: *Sequenced* (coordinated set of training approaches), *Active* (active learning), *Focused* (developing the five SEL competencies) and *Explicit* (targeting specific social and emotional skills and attitudes) (p.3).

3.3.1.1. Mindfulness as part of SEL

Mindfulness can be a great complement to SEL in the classroom since it can provide pupils and teachers with tools to foster personal growth (Mortimore, 2017; Sanger & Dorjee, 2016). This concept was defined by Kabat-Zinn (2003) as "the awareness that arises through paying attention, on purpose, in the present moment, non-judgementally" (p. 145). As Thera (2017) states, it has historically been called "The heart" of Buddhist meditation, as it is based on a specific meditation that not only involves mindfulness, but also a sense of affection, sincerity, and compassion towards oneself in the process of emotional regulation.

In the OECD report, Schleicher (2018) shows Mindfulness as an essential adaptive skill to change the way of life of future citizens. Including mindfulness in the classroom with SEL is paramount to equip students with non-academic skills such as perseverance, self-control, empathy, and courage, which are essential for achieving academic success and a facilitating the

learners' well-being. Hence, mindfulness is becoming increasingly influential in fields such as, psychology, neuroscience, and education (Williams and Kabat-Zinn, 2011).

3.3.1.2. Benefits of using SEL and Mindfulness in the CLIL classroom

Unfortunately, many students suffer from language anxiety in the CLIL classroom. It involves feeling negative emotions when using a language that is not the mother tongue (MacIntyre & Gregersen, 2012, p. 103). It often occurs in people with a negative self-perception about language level, low self-esteem, and excessive fear of error (Oteir & Al-Otaibi, 2019).

Tan & Martin (2016) and Berger et al. (2014) assert that Mindfulness and SEL benefit students and teachers in diverse aspects, such as improving self-esteem and self-concept or reducing language anxiety. From a neurological perspective, some studies have demonstrated that mindfulness meditation makes the amygdala less activated, and reduced in size, increasing the ability to respond, rather than react, to a complex situation (Desbordes et al., 2012; Hölzel et al., 2010). Conversely, Mindfulness makes the hippocampus more active, essential for learning, memory, and regulating the amygdala (Goldin & Gross, 2010).

In this line, some studies about SEL-based activities concluded that these help students become more competent in regulating and connecting emotions and behaviours, stress management, empathy, or problem-solving. It allows them to understand their emotions, observe the causes and always look for solutions, and have a more adaptive attitude to any difficulties in their lifelong language learning process. Thus, SEL and Mindfulness contribute to a positive atmosphere and better classroom management (Coskun, 2019; Durlak et al., 2011; Schonert-Reichl et al., 2015; Brown et al., 2012). Furthermore, Mortimore (2017) establishes a relationship of the Coyle's 4Cs Framework and SEL as she affirms both include intrapersonal, interpersonal, and cognitive competences. A possible interpretation of their interrelationship is:

- *Culture*. Coyle et al. (2010) distinguish between two levels of culture: the macro (societal values and well-being and interpersonal intelligence) and micro (individual's emotions). Integrating SEL in the CLIL classroom could optimise both as it includes social values, the class climate, and personal insights (Mortimore, 2017).
- *Cognition*. Including SEL in CLIL increase the understanding of "what we feel, why we feel it and why we behave as we do" (Mortimore, 2017, p. 130). It connects the cognitive and affective domains and enhances self-knowledge, improving emotion management and metacognitive learning (Anderson, Krathwohl & Bloom 2001).

- *Communication*. Language is essential to make our emotions visible. In CLIL, pupils can learn to name, accept, and discuss emotions using the FL. Besides, comprehending, and conceptualising Emotions improves Emotional Intelligence and language learning.
- *Content* (academic knowledge and experiential learning). It includes learning about the brain's functions, plasticity and SEL benefits as well as learning self-regulation processes, and improving social skills or self-knowledge through active discovery.

Moreover, the author relates both methodologies using the mentioned acronym SAFE, showing how the core competences correlate with CLIL teaching approaches (see Table 1).

Table 1.

A possible correlation between the SEL SAFE and CLIL.

	SEL S.A.F.E.	*CLIL EQUIVALENT*
SEQUENCED	*Connected and coordinated.*	*Bloom taxonomy (LOTS & HOTS)*
ACTIVE	*Active learning to help students master new skills and activities.*	*E.g., learn by doing.*
FOCUSED	*Emphasises developing personal and social skills.*	*E.g., collaborative tasks, teamwork…*
EXPLICIT	*Targeting specific social and emotional skills.*	*Aimed to integrate the 4C's with culture as a central pivot.*

Note. Adapted from "The importance of developing social and emotional learning (SEL) within the CLIL classroom, with special reference to Spain" (p.131), by L.J. Mortimore, 2017, *Encuentro, 26.*

Therefore, considering the influence of Mindfulness and SEL in the development of EI, the benefit of applying them in our lessons seems evident. It not only improves students' cognitive skills but also their social and emotional competences. It fosters leaners' empowerment and satisfaction, creating an empathetic and comfortable climate, key for their learning (Srinivasan, 2014; Schonert-Reichl et al., 2015).

3.3.2. Project-Based Learning (PBL)

Guillén (2017) considers Project-Based Learning (PBL) as teaching through case studies and discussion or inquiry-based learning that arouses students' curiosity, encourages their autonomy, favours cooperative work, and provides learning experiences linked to the real world that make greater interdisciplinarity possible (p.149).

According to Do Amaral & Fregni (2021), PBL is a student-centred approach essential to fostering lifelong learning since it provides students with opportunities to construct knowledge, actively recall and reflect on their learning. Besides, it supports metacognition processes, considered by neuroscientists the main aspects to enhance learning. This approach consists of proposing a question or real-life problem that students have to solve cooperatively by researching or discovering (Bender, 2012; Savery, 2015).

As it is a learner-centred approach, students' voice is the centre of the learning experience (Crumly, 2014). With projects, students have the tools and opportunities to develop their creativity, self-reflection and critical thinking since students can cooperate, contrast ideas, make decisions, and even evaluate themselves and each other (Guillén, 2017) .Thus, the teacher acquires different roles, such as planning and developing realistic and authentic problems and materials; facilitating and monitoring the students and the learning process; engaging and stimulating students to solve problems; and evaluating the learning process and the methodology itself (Madoyan, 2016; Cevallos-Torres & Botto-Tobar, 2019).

Based on these statements and following Dehaene's (2020) four pillars of learning, we can affirm that PBL is a great methodology to achieve lifelong learning.

- Using PBL in a CLIL classroom

As Sánchez-García & Pavón-Vázquez (2021) state, PBL shares many of its principles with those of CLIL. Among them, they highlight the increase of participation, the fostering of students' collaboration and cooperation, the discovery process, experimentation, and research. Besides, Stoller (2006) affirms that PBL benefits linguistic learning since "it creates purposeful opportunities for language input, language output and explicit attention to language-related features" (p.32). Likewise, it offers students with a safe environment as it changes classroom environments through experimental activities (Sánchez-García & Pavón-Vázquez, 2021). Therefore, these methodologies increase pupils' motivation, as they can share their thoughts and ideas, increasing their strengths, self-esteem, and interest in learning (Stoller, 2006).

Moreover, like CLIL, PBL provides students with an active role, as they have to cooperate with their peers to discover, develop and apply their knowledge (Stoller & Myers, 2020). In this sense, the main objective of cooperating and collaborating in both methodologies is to provide students with opportunities to use knowledge in real-life situations and be able to transfer this knowledge in new situations (Larmer et al., 2015).

In short, combining CLIL with those methodologies based on neuroscience has innumerable benefits for students, such as the improvement of both language and content learning. For this reason, teachers should do more research and training on these methodologies and others based on neuroscience, as many teachers do not know them. Indeed, from own experience, many educators usually think that SEL or Mindfulness are methodologies that can only be used in learning situations focused on Emotional Intelligence. That is a misconception, as developing emotional and conflict management or empathic behaviour skills are part of the eight key competences established in Royal Decree 217/2022 of 28 March. In this sense, we should include them in all the learning situations to make students emotionally competent, bring joy to the classroom, improve student attention and ensure long-term memory and lifelong learning.

Having said that, we will now develop a learning scenario in a CLIL context of a 1st year of Compulsory Secondary Education (from now on, CSE). In it, we will show how it is possible to include SEL, Mindfulness and PBL together with CLIL methodology in a Geography and History class. For this purpose, the following section will deal with a justification of the situation, the contextualisation of the school, the curricular development and the sessions that make up the learning situation.

4. LESSON PLAN

4.1. Justification

In this section, we will develop a learning situation based on a cooperative project in a CLIL environment within the subject of Geography and History for a 1st CSE class. Its name is *If we could start again.* It is conducted in the second term and consists of creating a new and sustainable civilisation in a new world similar to ours. For this, we will consider the first civilisations of Ancient Mesopotamia, Egypt, Greece, and Rome.

It complies with Coyle's et al. (2010) 4Cs Framework. Students acquire a series of knowledge and content actively using High Order Thinking Skills, use the FL for communication, and experiment with different sociocultural and sociolinguistic elements from different cultures. It also fosters the acquisition of the five SEL competences. In many warm-up or wrap-up activities, we share how we feel, pay attention to our body and breathing, and learn how to manage our emotions. Furthermore, during the project, students set goals, participate actively, communicate with their peers, cooperate, negotiate, resolve possible conflicts, and make responsible decisions.

Finally, this proposal is linked to these Sustainable Development Goals (ODS) of the 2030 Agenda (United Nations, 2015):

- Goal 5 (Gender equality) and 10 (Reducing inequalities): designing a more socially, politically, and economically equitable civilisation.

- Goal 6 (Clean water and sanitation), and 13 (Climate action): acknowledging the importance of drinking water and climate for human survival.

4.2. Contextualisation

Regarding the school context, the bilingual school is situated in a small region in southeast Córdoba, where the main economic activities are olive harvesting. Moreover, most families expect their children to complete their studies, and they cooperate actively through the Parents' Association (PA), the School Council and cohabitation.

The school is well-equipped with buildings and spaces for varied activities. Although there is no specific English classroom, our class is big enough to have different corners (reading corner, and investigation corner), an Interactive Digital Board (IDB), laptops and tablets.

Concerning the students' profile, this school is composed of 200 students, divided into Early Childhood Education, Primary Education, and the First Cycle of Secondary Education. Specifically, our group is composed of 12 students from 12 to 13 years old from the 1st Grade of Secondary Education. It is heterogeneous regarding cognitive, socio-affective and motor

development since it is a time when pupils vary greatly. While some still have childhood behaviours, others are experiencing puberty, especially girls. Thus, we need to focus all that energy on teamwork.

As for attention to diversity, one of the students has special educational needs due to her visual impairment. She needs an access adaptation, which will be described later. Moreover, we find pupils who are fast finishers and others who are slower, so we will propose some reinforcement and extension activities to attend to their needs as well.

4.3. Curricular relationship

Having described the contextualisation of the classroom, we are going to establish the curricular relationship considering Royal Decree 217/2022 of 29th March.

4.3.1. Secondary Education Stage Objectives

The mentioned Royal Decree establishes in its article 7 the Objectives to be achieved in the Secondary Education stage. As it is a CLIL learning situation, our main goal is the Stage Objective "i)": To understand and express themselves in one or more FL appropriately.

However, we will achieve others throughout the learning situation:

b) To develop and consolidate discipline, study, individual and teamwork habits […].

c) To value and respect the difference between sexes and equal rights and opportunities between them. To reject stereotypes that imply discrimination between men and women.

d) To strengthen their affective capacities in all areas of personality and in their relationships with other people, as well as reject violence, prejudice of any kind, and sexist behaviour and resolve conflicts peacefully.

e) To develop basic skills in using information sources to acquire new knowledge critically. To develop basic technological competences […].

g) To develop an entrepreneurial spirit and self-confidence, participation, a critical sense, personal initiative, and the ability to learn, plan, make decisions and assume responsibilities.

k) To [...] respect differences, strengthen habits of care and bodily health and incorporate physical education […] to promote personal and social development. [...] Critically assess social habits related to health, [...] care, empathy, and respect for […] the environment, contributing to their conservation and improvement.

4.3.2. Specific Competences and Evaluation Criteria

In Annex II, Royal Decree 217/2022 29th March establishes the Specific Competences that learners should be able to perform in activities and the Evaluation Criteria to be used when assessing learning. The ones to be developed in this learning situation are described in Table 1:

Table 1.

Specific Competences and Evaluation Criteria.

	SPECIFIC COMPETENCE	EVALUATION CRITERIA
GEOGRAHY & HISTORY (G&H)	1. To search for, select, process, and organise information on relevant topics from […] the past, […].	1.2. Contrast and argue about issues and events of [...] the Ancient Ages [...].
	3. To understand the main challenges faced by different societies over time, […].	3.1. Acquire and construct relevant knowledge of the world […] of history, through [...] research and project work [...].
	5. To critically analyse historical and geographical approaches explaining the construction of democratic systems […].	5.1 Identify, interpret, and analyse the […] social, political, economic, and religious organisation […].
	7. To relate the cultures and civilisations that have developed throughout ancient history, [...].	7.1. Relate the cultures and civilisations developed throughout ancient history, [...].
FOREIGN LANGUAGE (FL)	1. To understand and interpret the general meaning and most relevant details of texts […].	1.1 Interpret and analyse the overall meaning and the specific, explicit information of short, simple […] texts […].
	2. To produce original, medium-length, simple texts […].	2.2 Organise and write short […] texts with appropriateness to the communicative situation […].
	3. Interact with other people with increasing autonomy, using cooperative strategies […].	3.1 Plan and participate in short, simple interactive situations on everyday topics […] and showing empathy and respect […].

4.3.3. Key Competences and Operational Descriptors

Following the indications of Council Recommendation 2018 on key competences for lifelong learning, Royal Decree 217/2022 of 29th March establishes eight key competences, concreted into Operational Descriptors. Table 2 shows those to be worked on in the proposal.

Table 2.

Key Competences & Operational Descriptors.

KEY COMPETENCES AND OPERATIONAL DESCRIPTORS					
Competence in Linguistic Communication (CLC): by interacting in the FL coherently and appropriately in different contexts and for diverse communicative purposes.					
G&H		**FL**	CLC1	**BOTH**	CLC2, CLC3, CLC5
Multilingual Competence (MC): by using different languages appropriately and effectively for learning and communication.					
G&H	MC3	**FL**	MC1, MC2	**BOTH**	
Competence in Science, Technology, Engineering and Mathematics (STEM): by understanding the world using mathematical thinking, scientific, technology, and engineering methods to transform the environment in a committed, and sustainable way.					
G&H	STEM3, STEM5	**FL**	STEM1	**BOTH**	
Digital Competence (DC): by using digital technologies in a safe, sustainable, critical, and responsible way for learning, working, and participating in society.					
G&H	DC1	**FL**		**BOTH**	DC2
Personal, Social, and Learn-to-Learn Competence (PSL2LC): by reflecting on, knowing and accepting oneself; promoting constant personal growth; and acquiring learning strategies to learn and remember information.					
G&H	PSL2LC1	**FL**	PSL2LC5	**BOTH**	PSL2LC3
Citizen Competence (CC): by exercising responsible citizenship.					
G&H	CC2	**FL**		**BOTH**	CC3 CC4
Entrepreneurial Competence (EC): by acting on opportunities and ideas, using the specific skills needed to generate valuable results for others.					
G&H		**FL**		**BOTH**	EC1
Cultural Awareness and Expression Competence (CAEC): by understanding and respecting how ideas, opinions, feelings, and emotions are expressed and communicated creatively in other cultures and through a wide range of artistic and cultural manifestations.					
G&H	CAEC1	**FL**	CAEC 2 CAEC3	**BOTH**	

4.3.4. Contents (Basic Knowledge)

Royal Decree 217/2022 of 29th March defines Basic Knowledge as the knowledge, skills and attitudes that constitute the contents of a subject or field whose learning is necessary for the acquisition of the specific competences (p.7). In Table 3, Basic knowledge of both Geography & History and FL are described.

Table 3.

Basic Knowledge.

	BLOCK	BASIC KNOWLEDGE
GEOGRAPHY & HISTORY	A. Challenges of today's world	- Spatial location. - Management of devices, applications, and digital platforms.
	B. Societies and territories.	- Social inequality and power struggles in the Ancient Age. - The invisible people of history: women, slaves, and foreigners. - The political organisation in the ancient world. - The struggle for survival and social status in ancient times. - The human footprint and environmental, historical, and cultural heritage protection.
	C. Civic engagement	- Respect and acceptance of others. Non-discriminatory behaviours and against any segregating attitude. - Environmental awareness. Respect and care for the planet. - Identifying and managing emotions and their repercussions on individual and collective behaviour. - Lifestyle differences in current and past societies.
FOREIGN LANGUAGE	A. Communication	- Basic communicative functions appropriate to the communicative context: situating events in time; asking for and exchanging information on everyday matters; offering, accepting, and refusing help; partially expressing basic emotions; narrating past events; expressing opinion. - Basic linguistic units, such as expression of quantity and quality, space and spatial relations, time and temporal relations, affirmation, negation, interrogation, and exclamation. - Vocabulary relating to personal identification, places, leisure and free time, everyday life, health, climate, and natural environment.

		- Basic spelling conventions and communicative meanings. - Basic conversational conventions and strategies for taking and giving the floor, asking, and giving clarifications and explanations, collaborating, debating, etc. - Basic tools for comprehension, production, and co-production; and virtual platforms for educational collaboration (virtual classrooms, collaborative digital tools, etc.) for project development.
	B. Multilingualism	- Basic strategies and tools for self-assessment and co-assessment, analogue and digital, individual, and cooperative.
	C. Interculturality	- The FL as a means of interpersonal communication, as a source of information and as a tool for personal enrichment.

4.4. Timing: Lessons' organisation

As the group of 1st grade of CSE has three hours per week devoted to Geography and History, our didactical proposal will take place for 4 weeks, within a total of 11 lessons (of 1 hour each). As the Final product consists of creating a new civilisation based on Ancient Age civilisations, each lesson is devoted to work on a significant characteristic. The sessions are:

- Session 1. First approach to ancient civilizations.
- Session 2. We find ourselves in a new world.
- Session 3. What is the best climate for survival?
- Session 4. Let's find essential foods and jobs!
- Session 5. Learning about money system and currencies.
- Session 6. Choosing type of government and social class structure.
- Session 7. How can we create a sustainable civilisation?
- Session 8. Thinking about art and leisure time.
- Session 9. We also have myths and legends.
- Session 10. Finishing our Padlet.
- Session 11 (Final product). Let's show our new civilisations!

4.5. Methodology

According to Royal Decree 217/2022 of 29th March, we should provide students with an eclectic approach, integrating distinct methodologies based on pupils' needs. Moreover, it suggests using an action-based approach where students can communicate in real situations and be autonomous social agents responsible for their learning process (p.132). To achieve that, we have included various learner-centred methodologies in this didactic proposal: PBL, SEL, CLIL, Action-Oriented Approach, Cooperative Learning, Flipped, classroom, Computer-based language learning (CALL) and Mobile-assisted language learning (MALL). In this case, students become active by interacting, investigating, negotiating, making decisions, and reflecting on their learning. With our guidance, students can build their knowledge, developing their HOTS, problem-solving skills, critical thinking, and key competences.

Likewise, we include the main aspects of Neuroscience. Activities are based on new experiences, and diverse materials, technologies, games, and groupings, generating positive emotions and curiosity. Besides, students have chances to learn from errors and feedback, consolidate learning with active spaced recall and work on their personal growth. To this end, we propose Mindfulness practices, some of which are from Kaiser (2016). (APPENDIX A)

Furthermore, efficient group management is crucial. Depending on the number of group students, the aim of the activity will be different, affecting children's learning and social development. For this reason, this didactic plan fosters individual, pair, group, and whole class work. As for classroom arrangement, we will consider clusters, as they favour interaction, communication skills and cooperation. Thus, we will use it most of the time, as they work very well together since every student has a role and feels responsible within the group.

Lastly, to maintain the organisation of the class in cooperative groups or pairs, we use the website *Bouncyballs*[1]. It has many coloured balls that jump in case of too much noise. It is a way to promote cooperative work and interaction without shouting.

4.6. Measures to Attend to diversity

According to Organic Law 3/2020 of December the 29th, which modifies Organic Law 2/2006 of May the 3rd, we must consider pupils needs and interest to reach their maximum personal, social, and emotional development. Hence, we attend to different diversity:

[1] BouncyBalls (n.d). https://bouncyballs.org/

- **Mixed-ability groups**

Some measures to cope with students needs and interests are:

1. Reinforcement and extension activities. These serve to help students overcome learning obstacles and reach the objectives successfully or expand on the acquired learning in a motivating way. Examples: Must-do & Can-do table to set smaller objectives in order of relevance (APPENDIX B), Duolingo, Investigation corner (attractive books, English games with different levels of difficulty, Ted-Ed videos about ancient times).
2. Peer tutoring: helping others each other according to their needs and abilities.

- **Universal Design for Learning (UDL)**

We should adjust pedagogical process to varied learning needs and paces to engage students and prepare them for lifelong learning (Figueroa et al., 2019). To this end, we consider in Table 4 the UDL principles by CAST (2019) and the UDL Wheel by Díaz (2022).

Table 4.

Universal Design for Learning.

PRINCIPLES: Provide multiple means of…	**RESOURCES**
Representation (*What to learn?)*	MindMaps *Popplet, WordReference WordWall, TalkBack,* Youtube, *Pixabay ...*
Action & Expression (*How to learn?)*	*Map, Google Documents, Duolingo*, oral expositions, debates…
Engagement (*Why learn?)*	*Padlet, Rubystar, Mentimeter, Mindfulness...*

- **Specific Educational Needs**

As mentioned, one student has specific needs due to her low vision. As se has tunnel vision, she needs to be situated in a very centred distance of the IDB or teacher. Besides, her tablet and laptop are programmed with accessibility settings to facilitate her vision, for example, she uses TalkBack and Badabolka with headphones, which tells aloud each element she selects. Lastly, for the rotating paper, she needs more time to write her ideas.

4.7. Materials and resources

Mehisto (2012) defines learning materials "as information and knowledge that are represented in a variety of media and formats, and that support the achievement of intended learning outcomes". He affirms that materials play a crucial role since they do not only help to communicate information but also promote critical thinking and learning autonomy. For this reason, we have considered different materials:

- **Printed materials**: KWL table, worksheets, checklists, crossword puzzle, teacher's notebook, students' notebooks, rubrics, Líkert scale.
- **Visual materials**: MindMaps, online flashcards.
- **Audio materials**: songs.
- **Audiovisual materials**: IDB, tablets, laptops, online games, apps and websites (LiveWorkSheets, Azgaar's Fantasy Map Generator, Footprintcalculator…).
- **Cooperative digital tools**: Popplet, Google Drive document.

4.8. Interdisciplinarity

It plays a key role in promoting an integral education, as we usually work on similar aspects from different curriculum areas. Thus, integrating them is an excellent opportunity for students to find interconnections between subjects. In this case, as the learning situation implies creating a new civilisation, we can include other subjects. The most outstanding are:

- **Spanish language and literature**: learners normally use their mother tongue (L1) as a reference for understanding the FL mechanisms. Thus, in this situation, students are potentiating their communicative competence in the FL and their mother tongue.
- **English as a foreign language**: as this a CLIL context, students use the FL language as a vehicle for communication, enhancing their communicative competence.
- **Technology and Digitalisation**: during this learning situation, students use digital devices. Thus, they are going to face possible simple technical problems, be aware of the threats of the web, learn how to store information securely, using different learning platforms, among others.
- **Biology and Geology**: through this project, students will take advantage of the knowledge on climates they are learning in this subject. Besides, we will work on the ecological footprint, presenting solutions for reducing it in our future civilisation.
- **Maths**: a civilisation also needs a currency. Thus, students will learn what is the money system, and investigate about different currencies, their history and value compared to the Euro.

4.9. Transversality

One of our aims as teacher is to foster the students' integral education. A*rticle 6 of Royal Decree 217/2022* establish in its pedagogical principles for Secondary Education that we also must work on transversal elements to prepare students for the current and future society. In particular, the following transversal elements are especially considered in the didactic proposal:

- Reading comprehension and oral and written expression
- Audiovisual communication and Digital Competence
- Critical and Scientific Spirit
- Emotional and Values Education
- Gender equality
- Creativity
- Sustainability Education and responsible consumption
- Mutual respect and cooperation among equals

4.10. Step-by-step planning

Table 5.

Step-by-step planning.

<table>
<tr><td>Key:</td><td colspan="4">L: listening; S: speaking; R: reading; W: writing
Re: remember; Un: understand; Ap: apply; An: analyse; Ev: evaluate; Cr: create
Cm: communication; Cg: cognition; Ct: content; Cu: culture.
W: whole class, g: groups, p: pairs, i: individual</td></tr>
<tr><td colspan="5">SESSION 1: FIRST APPROACH TO ANCIENT CIVILIZATIONS</td></tr>
<tr><td colspan="2">Areas involved</td><td colspan="3">Geography and History, FL, Spanish Language, Technology and Digitalisation, Physical Education.</td></tr>
<tr><td colspan="2">Materials & resources</td><td colspan="3">IDB, Quiz show game, KWL table, videos, worksheet, tablet, teacher's notebook.</td></tr>
<tr><td colspan="2">SEL</td><td colspan="3">Self and Social awareness, Self-Management and Relationship skills.</td></tr>
<tr><td colspan="5">ACTIVITIES SEQUENCY AND TIMING</td></tr>
<tr><td rowspan="2">Warm-up</td><td colspan="4">1. (10 min.). Quiz show game (APPENDIX C) in the IDB. Then, fill in the KW parts of the KWL table on the previous knowledge of the Ancient Age (APPENDIX D).</td></tr>
<tr><td>Cogn.: Ev</td><td>Language: L, S, R, W</td><td>4Cs F.: Cm, Cg, Ct</td><td>Grouping: W & I</td></tr>
</table>

<table>
<tr><td rowspan="5">Development</td><td colspan="4">Watch The Ancient Age[2] and Mesopotamia & Ancient Egypt[3]. It is divided into three stages, and the 1-2-4 cooperative technique is used in the two last stages.</td></tr>
<tr><td colspan="4">2. Pre-listening (10 min.). Do a brainstorming: name and describe the first Ancient Age civilizations. Connect to our village's Roman remains.</td></tr>
<tr><td>Cogn.: Cr</td><td>Language: L, S</td><td>4Cs F.: Cm, Cg, Ct, Cu</td><td>Grouping: W</td></tr>
<tr><td colspan="4">3. While-reading (15 min.). Complete the rows labelled "1" individually using The Ancient Mesopotamian and Egyptian civilisations worksheet (APPENDIX E).</td></tr>
<tr><td>Cogn.: An</td><td>Language: R, W</td><td>4Cs F.: Cm, Cg, Ct, Cu</td><td>Grouping: I</td></tr>
<tr><td rowspan="3">Wrap-up</td><td colspan="4">4. Post-reading (15 min.). Share impressions in pairs and write conclusions on the rows labelled "2". Repeat it in groups with the last rows. Finally, speakers share their conclusions, and one volunteer creates a Common Analysis document in a tablet.</td></tr>
<tr><td>Cogn.: Ev</td><td>Language: L, S, R, W</td><td>4Cs F.: Cm, Cg, Ct, Cu</td><td>Grouping: P & G</td></tr>
<tr><td colspan="4">5. (10 min.). Approach to Mindfulness: develop a first conscious breathing using the video Belly Breathing: Mindfulness for Children[4] and share impressions.</td></tr>
<tr><td>Cogn.: An</td><td>Language: L & S</td><td>4Cs F.: Cm, Cg, Cu</td><td>Grouping: W</td></tr>
<tr><td>Notes</td><td colspan="4">Flipped classroom: access EdPuzzle to watch two short videos about Ancient Greece[5] and Roman Empire[6] and answer some questions.</td></tr>
<tr><td colspan="5">SESSION 2: WE FIND OURSELVES IN A NEW WORLD</td></tr>
<tr><td colspan="2">Areas involved</td><td colspan="3">Geography and History, FL, Spanish Language, Technology and Digitalisation.</td></tr>
<tr><td colspan="2">Materials & resources</td><td colspan="3">IDB, online flashcards, laptops, checklist, teacher's notebook.</td></tr>
<tr><td colspan="2">SEL</td><td colspan="3">Self and Social Awareness, Self-management, Relationship skills.</td></tr>
<tr><td colspan="5">ACTIVITIES SEQUENCY AND TIMING</td></tr>
</table>

[2] Happy Learning English (21st March 2017). *The Ancient Age / Educational Video for kids* [Video file]. YouTube. https://youtu.be/k544jQEleQM

[3] Ancient Egyptians (21st December 2020). *Mesopotamia & Ancient Egypt Similarities & Differences* [Video file]. YouTube. https://youtu.be/RRfuqYFkE1E

[4] The Mental Health Teacher (12th May 2020). *Belly Breathing: Mindfulness for Children* [Video file]. Youtube. https://youtu.be/RiMb2Bw4Ae8

[5] Happy Learning English (19th February 2019). *Ancient Greece / Educational Videos for Kids* [Video file]. Youtube. https://youtu.be/IUZKg3KdtYo

[6] Happy Learning English (21st November 2017) *Roman Empire / Educational Videos for Kids* [Video file]. Youtube. https://youtu.be/b9bcohqsTGk

Warm-up	**1. (9 min.). Studysmarter flashcards C**in the IDB for reviewing. Students can use their group joker, but each group only can use it one time. **2. (1 min.).** Develop a *1-Minute MeditationT*[7].			
	Cogn.: Ev	**Language:** L, S, R	**4Cs F.:** Cm, Cg, Ct, Cu	**Grouping:** W
Development	**3. (10 min).** Explain the Project, describing the objectives, the timing, and the final product. Then, create three groups of four people and distribute roles.			
	Cogn.: Un	**Language:** L, S	**4Cs F.:** Cm, Cg, Ct	**Grouping:** W
	4. (20 min.). Flipped Classroom. Search for information about one of the learnt civilisations, using laptops and a checklist.			
	Cogn.: Ap & An	**Language:** L, S, R, W	**4Cs F.:** Cm, Cg, Ct, Cu	**Grouping:** G
	5. (15 min.). Compare and discuss the information obtained from different civilisations. To do this, each group tell the information according to a specific aspect.			
	Cogn.: An & Cr	**Language:** L, S, R	**4Cs F.:** Cm, Cg, Ct, Cu	**Grouping:** W
Wrap-up	**6. (5 min.).** Short assembly to share impressions. Say the most striking things, justify critically and how they would like to create the civilisations.			
	Cogn.: Ev & Cr	**Language:** L, S	**4Cs F.:** Cm, Cg, Ct, Cu	**Grouping** W
Notes	Home: Access *Azgaar's Fantasy Map Generator*[8] website to familiarise themselves with it and facilitate its subsequent use in the classroom.			

SESSION 3: WHAT IS THE BEST CLIMATE FOR SURVIVAL?	
Areas involved	Geography and History, FL, Spanish Language, Technology and Digitalisation, Biology and Geology.
Materials & resources	IDB, *Random Wheel*, laptops, LiveWorkSheets activity, Map Generator, teacher's notebook.
SEL	All

ACTIVITIES SEQUENCY AND TIMING				
Warm-up	**1. (9 min.).** *Civilisations' Random Wheel* for reviewing (APPENDIX C). It has 3 rounds, and each group will have 50 seconds to answer in each round. **2. (1 min.).** Develop the *Butterfly body path* Mindfulness practice.			
	Cogn.: Ev & An	**Language:** L, S, R	**4Cs F.:** Cm, Cg, Ct, Cu	**Grouping:** W

[7] Calm (5th April 2019). *1-Minute Meditation* [Video file]. Youtube. https://youtu.be/F7PxEy5IyV4
[8] Azgaar / Fantasy-Map-Generator (n.d.). https://azgaar.github.io/Fantasy-Map-Generator/

Development	**3. (15 min).** Use climates and climate change knowledge from Biology and Geology. Complete Spanish climates LiveWorkSheets on their laptops.			
	Cogn.: Ap	**Language:** L, S, R, W	**4Cs F.:** Cm, Cg, Ct, Cu	**Grouping:** P
	4. (10 min.). Exchange results in groups and help each other understand errors. Each writer notes common mistakes and correct answers.			
	Cogn.: An & Ev	**Language:** L, S, W	**4Cs F.:** Cm, Cg, Ct, Cu	**Grouping:** G
	5. (20 min.). Design the civilisation map on *Azgaar's Fantasy Map Generator* in a laptop, filling in the information gradually throughout the situation. Firstly, choose an area of the fictitious map according to the climate, and location of rivers and relief. (APPENDIX F)			
	Cogn.: Cr	**Language:** L, S, R, W.	**4Cs F.:** Cm, Cg, Ct.	**Grouping** G
Wrap-up	**6. (5 min.).** English *Pass the secret!* game (Similar to Spanish *The broken telephone*).			
	Cogn.: Cr	**Language:** L, S	**4Cs F.:** Cm, Cg, Ct, Cu	**Grouping:** W

SESSION 4: LET'S FIND ESSENTIAL FOOD AND JOBS!	
Areas involved	Geography and History, FL, Spanish Language, Technology and Digitalisation.
Materials & resources	Paper strips, reading text, IDB, Popplet website, Crossword puzzle, Map Generator, teacher's notebook.
SEL	Self and Social Awareness, Relationship Skills, R. Decision-making.

ACTIVITIES SEQUENCY AND TIMING				
Warm-up	**1. (10 min.).** Questions strips! review. Each group writes four questions on a paper strip following a topic. The teacher collects and distribute them so that each group answers another group's questions in 3 minutes. Lastly, share and discuss answers.			
	Cogn.: Ev.	**Language:** L, S, R, W	**4Cs F.:** Cm, Cg, Ct, Cu	**Grouping:** G
Development	Reading: essential natural resources, foods, and jobs to survive mentally, physically, and emotionally in a civilization with running water and light. Three stages.			
	3. Pre-reading (10 min). Popplet Brainstorming about natural resources, foods, and necessary jobs to start a civilisation.			
	Cogn.: Cr.	**Language:** L, S	**4Cs F.:** Cm, Cg, Ct	**Grouping:** W
	4. While-reading (15 min.). Underline the text with different colours and complete a crossword puzzle about the text.			

	Cogn.: Ap & An	**Language:** L, S, R, W	**4Cs F.:** Cm, Cg, Ct	**Grouping:** G
	5. Pos-reading (15 min.). Discuss with the group which jobs they would like to choose and locate on the map the important elements (fields, livestock, blacksmiths, etc.).			
	Cogn.: Cr.	**Language:** L, S, R.	**4Cs F.:** Cm, Cg, Ct	**Grouping:** G
Wrap-up	**6. (10 min.).** Write a card saying one or two positive qualities of the person of their right and suggest what jobs he or she would be good at, regardless their gender, physical aspect or religion. Then, each student read his or her card aloud.			
	Cogn. skills: Cr.	**Language:** L, S, R, W	**4Cs F.:** Cm, Cg, Ct.	**Grouping:** W
SESSION 5: LEARNING ABOUT MONEY SYSTEM AND CURRENCIES				
Areas involved	Geography and History, FL, Maths, Spanish Language, Technology and Digitalisation.			
Materials & resources	IDB, Kahoot, Popplet, Google Drive document, and Padlet websites, laptops, teacher's notebook.			
SEL	All			
ACTIVITIES SEQUENCY AND TIMING				
Warm-up	**1. (8 min.).** Kahoot!: review learning from the previous session. **2. (2 min.).** Meditation: *What have I heard?*			
	Cogn.: Ev	**Language:** L, S, R	**4Cs F.:** Cm, Cg, Ct, Cu	**Grouping:** W
Development	**3. (10 min).** Popplet brainstorming (monetary system, currencies…)			
	Cogn.: Cr	**Language:** L, S	**4Cs F.:** Cm, Cg, Ct, Cu	**Grouping:** W
	4. (20 min.). Seek information the monetary system and origin of metal coins. Each group must search three currencies (some of them from English-speaking countries) and compare them in a Google document following the template.			
	Cogn.: An & Cr	**Language:** L, S, R, W	**4Cs F.:** Cm, Cg, Ct, Cu	**Grouping: G**
	5. (15 min.). Share results in the IDB and discuss what currency they prefer for their civilisation. Today's writer creates the first entry in their Padlet (APPENDIX G).			
	Cogn.: Cr	**Language:** L, S, R, W	**4Cs F.:** Cm, Cg, Ct	**Grouping:** G
Wrap-	**5. (5 min.).** Greeting by showing a positive emotion.			
	Cogn.: An	**Language:** L, S.	**4Cs F.:** Cm, Cg,	**Grouping:** W

NOTES	**Flipped classroom:** watch a video about Responsible decision-making[9] and complete the worksheet with the practical case (APPENDIX H)

SESSION 6: CHOOSING TYPE OF GOVERNMENT AND SOCIAL CLASS STRUCTURE	
Areas involved	Geography and History, FL, Spanish Language, Technology and Digitalisation.
Materials & resources	IDB, *Quiz show* game, poster, laptops, notebooks.
SEL	Self and Social awareness, Relationship Skills, R. Decision-making.

ACTIVITIES SEQUENCY AND TIMING				
Warm-up	**1. (10 min.).** *Quiz show* game (APPENDIX C) in the IDB, emphasizing the government and social class of the learnt civilizations.			
	Cogni.: Ev	**Language:** L, S, R	**4Cs F.:** Cm, Cg, Ct, Cu	**Grouping:** W
Development	**Engagement with a story.** As they are in high government, the King of the United Kingdom, who is no longer in the European Union, asks them to research and choose a type of government to negotiate a unification of civilisations.			
	2. (35 min). *Gallery work* to search for information about two types of governments and make a poster (APPENDIX I).			
	Cogn.: Cr.	**Language:** L, S, R, W	**4Cs F.:** Cm, Cg, Ct, Cu.	**Grouping: G**
	3. (10 min). Flipped classroom. Each civilisation group chooses the 2 favourite types of government and makes a pros and cons table analysing if they respect for human rights, gender equality and inclusion. Then, choose one responsibly.			
	Cogn.: Ev & Cr	**Language:** L, S, R, W.	**4Cs F.:** Cm, Cg, Ct	**Grouping:** G
Wrap-up	**4. (5 min.).** 1-Minute Meditation paying attention to the environment and describe it (*Right now, I see... Right now, I hear... Right now, I smell... Right now, I feel...*).			
	Cogn.: An	**Language:** L, S.	**4Cs F.:** Cm, Cg.	**Grouping:** W

SESSION 7: HOW CAN WE CREATE A SUSTAINABLE CIVILISATION?	
Areas involved	Geography and History, FL, Biology and Geology, Spanish Language, Technology and Digitalisation.

[9] Changing Lanes Coaching (8th June 2020). *How to make a TOUGH decision: Quantitative Pros and Cons Technique* [video file]. YouTube https://youtu.be/IVi9jgVsrUM

Materials & resources	IDB, *Random Wheel*, Mentimeter, Footprintcalculator[10], Rotating paper, tablets, teacher's notebook.			
SEL	Self-awareness, Self-Management, Relationship Skills, Responsible Decision-making.			
ACTIVITIES SEQUENCY AND TIMING				
Warm-	**1. (10 min.).** *Civilisations' Random Wheel* for reviewing (APPENDIX C).			
	Cogn.: Ev	**Language:** L, S, R.	**4Cs F.:** Cm, Cg, Ct, Cu	**Grouping:** W
Development	**2. (10 min.).** Develop a brainstorming session using two wordclouds (*Mentimenter*), one on words related to Sustainable Development and one on the footprint.			
	Cong.: Cr	**Language:** L, S	**4Cs F.:** Cm, Cg, Ct	**Grouping:** G
	3. (10 min.). Calculate Ecological Footprint on the web *Footprintcalculator* using a tablet and write down relevant routines that are bad or good for environment.			
	Cong.: An	**Language:** R, W	**4Cs F.:** Cm, Cg, Ct	**Grouping:** I
	3. (20 min). Propose different solutions for the new civilisation to generate less ecological footprint using the *Rotating Paper* cooperative technique. For this, each group takes turns answering a question included on a sheet of paper.			
	Cong.: Ev & Cr	**Language:** L, S, R, W	**4Cs F.:** Cm, Cg, Ct	**Grouping:** G
Wrap-up	**4. (10 min.).** Pay attention to a sound that disappears. To calm breathing, sit in a circle and use a triangle to make a sound. Students raise their hands when they notice it is over.			
	Cong.: An.	**Language:** L, S	**4Cs F.:** Cm, Cg	**Grouping:** W
SESSION 8: THINKING ABOUT ART AND LEISURE TIME				
Areas involved	Geography and History, FL, Spanish Language, Technology and Digitalisation, Physical Education.			
Materials & resources	IDB, Open the box game, notebooks, laptops, teacher's notebook.			
SEL	Self-awareness, Self-Management, Relationship Skills, R. Decision-making.			
ACTIVITIES SEQUENCY AND TIMING				
Warm-	**1. (10 min.).** *Open the box* game (APPENDIX C) to review content, where each group select a box for another group, which must read and answer the question that appears.			

[10] *What is your Ecological Footprint?* (n.d.). Global Footprint Network. https://www.footprintcalculator.org/home/en

	Cogn.: Ev	**Language:** L, S, R	**4Cs F.:** Cm, Cg, Ct, Cu	**Grouping:** W
Development	**2. (25 min).** *Jigsaw method* cooperative technique. Watch videos and specialise in an aspect of Greek or Roman art or entertainment (art, architecture, sport, and daily life) and then, share with the rest of their group and write it their notebooks.			
	Cogn.: Cr	**Language:** L, S, R, W	**4Cs F.:** Cm, Cg, Ct, Cu	**Grouping:** G
Wrap-	**3. (5 min.).** Mindfulness Stretching paying attention to each part of the body.			
	Cogn.: An	**Language:** L, S	**4Cs F.:** Cm, Cg	**Grouping:** W

SESSION 9: WE ALSO HAVE MYTHS AND LEGENDS	
Areas involved	Geography and History, FL, Spanish Language, Technology and Digitalisation.
Materials & resources	IDB, Mind-Map, Myth worksheet, Myth web, Checklist, colour pencil, teachers' notebook.
SEL	Self-awareness, Self-Management, Relationship Skills, Responsible Decision-making.

ACTIVITIES SEQUENCY AND TIMING				
Warm-up	**1. (8 min.).** Studysmarter flashcards. Review knowledge from the previous sessions in the IDB. Students can use their group joker, but each group only can use it one time. **2. (2 min.).** Meditation: *What have I heard?*			
	Cogn.: Ev	**Language:** L, S, R	**4Cs F.:** Cm, Cg, Ct, Cu	**Grouping:** W
Development	As Somnus is a well-known Roman God in our village, each group selects a myth about this god from the repository of myths provided, reads it, and investigates both content and language used. Three stages.			
	2. (10 min). Do a brainstorming on a Mind Map (APPENDIX J) to describe Somnus. Some of the questions foster the use of past tenses unconsciously.			
	Cogn.: Cr.	**Language:** L, S.	**4Cs F.:** Cm, Cg, Ct, Cu	**Grouping:** W
	4. (15 min.). Highlight with different colours the past tenses and unknown vocabulary and complete the "Analysis of a myth" table in their tablets (APPENDIX K).			
	Cogn.: An	**Language:** R, W	**4Cs F.:** Cm, Cg, Ct, Cu	**Grouping:** I
	5. (20 min.). Write a myth about Somnus or another Ancient God cooperatively, considering a visual organiser *Myth web* and a *Checklist* (APPENDIX L).			
	Cogn.: Cr.	**Language:** L, S, R, W	**4Cs F.:** Cm, Cg, Ct, Cu	**Grouping:** G

Wrap-up	**5. (5 min.).** Debate: *The role of myths in ancient times* following a debate script.			
	Cogn.: Cr.	**Language:** L, S	**4Cs F.:** Cm, Cg, Ct, Cu	**Grouping:** W

SESSION 10: FINISHING OUR PADLET	
Areas involved	Geography and History, FL, Spanish Language, Technology and Digitalisation.
Materials & resources	IDB, Padlet, laptops, teacher's notebook, classroom materials.
SEL	All

ACTIVITIES SEQUENCY AND TIMING				
Warm-	**1. (10 min.).** Complete the Outline review of the learning situation.			
	Cogn.: Ev & Cr	**Language:** L, S, R, W	**4Cs F.:** Cm, Cg, Ct, Cu	**Grouping:** W
Developmen	**2. (45 min).** Make decisions about their civilisation. Besides, complete their cooperative Padlet with the help of a checklist to add all the necessary items to their entries.			
	Cogn.: Ev & Cr	**Language:** L, S, R, W	**4Cs F.:** Cm, Cg, Ct, Cu	**Grouping:** G
Wrap-	**3. (5 min.).** Short assembly to share feelings, preferences, and common feedback.			
	Cogn.: Ev & Cr	**Language:** L, S	**4Cs F.:** Cm, Cg	**Grouping:** W
Notes	Home: Create a script of the exhibition (9-10 minutes per group) and review it.			

SESSION 11 (FINAL PRODUCT): LET'S SHOW OUR NEW CIVILISATIONS!	
Areas involved	Geography and History, FL, Spanish Language, Technology and Digitalisation.
Materials & resources	IDB, Padlet, speech scripts, Map generator, rubrics, Likert scale, KWL chart, teacher's notebook.
SEL	Self-Management, Social Awareness, Relationship Skills, Responsible Decision-making.

ACTIVITIES SEQUENCY AND TIMING				
Warm-up	**1. (5 min.).** Prepare learners to perform their final product in front of their parents with general positive feedback.			
	Cogn.: Cr.	**Language:** L, S	**4Cs F.:** Cm, Cg	**Grouping** W
Developmen	**2. (35 min).** Exhibitions Day! In the Multiple-Purpose Room, project the cooperative Padlet and Map on the IDB. While one group presents, the others assess them.			
	Cogn.: Ev & Cr	**Language:** L, S, R, W	**4Cs F.:** Cm, Cg, Ct, Cu	**Grouping:** G

	3. (15 min). Evaluate group peers and do self-assessment completing the last part of the KWL chart. Students provide feedback to the teacher with Socrative.			
	Cogn.: Ev	**Language:** L, S, R, W	**4Cs F.:** Cm, Cg, Ct	**Grouping:** G
Wrap-up	**4. (5 min.).** Meditation together sitting in a circle, holding hands, and paying attention to a song that is playing, e.g., *Om Ganesha*[11]. The teacher helps shift their attention to their breathing, to the peers' hands, to their feelings, etc.			
	Cogn.: An	**Language:** L, S	**4Cs F.:** Cm, Cg	**Grouping** W

4.11. Learning Assessment

The evaluation follows the principles expressed in Article 15 and Annex II of the Royal Decree 217/2022 of 29th March. It establishes that learning assessment must be continuous, formative, and integrative. Furthermore, we must consider various assessment instruments adapted to pupils' needs. Hence, we will consider these types of assessments and instruments.

1. **Initial assessment (at the beginning):** to assess learners' prior knowledge and detect some difficulties. To this end, we will use the KWL table mentioned above, where students write down everything they know about the topic in the *Know section*, according to items given by the teacher.
2. **Formative assessment (continuos assessment):** to check students' daily work and effectiveness of the learning situation. Thus, this allows us to identify areas of strength and weakness and, consequently, to make changes in the learning process. To this end, we will use the following tools: daily activities, notebooks, Google documents, KWL table, and common feedback.
3. **Summative assessment:** developed at the end of the learning situation to check if students have reached the Evaluation Criteria. To this end, we will use the final product (Padlet, Map, exhibition), rubrics, and Likert scale.
4. **Teacher assessment**. We will evaluate **my performance and programming**, employing several tools (e.g., *continuous observation*, *classroom diary*, *SWOT analysis* (APPENDIX M) *and students' feedback with Socrative*).

[11] Sam Garrett (9 may 2020). Om Ganesha [video file]. YouTube. https://www.youtube.com/watch?v=ZU5EhhroAfk

5. CONCLUSIONS

As shown throughout this Master's Dissertation, the significance of implementing neuroscience-based methodologies in a CLIL context is undeniable. The bilingual brain is much more complex than the monolingual one, as it activates larger regions. Thus, it is essential to know about its processes to be able to offer materials and techniques that potentiate its functionality. In turn, bilingualism affects students' brains positively since it increases the amount of white and grey matter and improves executive control skills.

In this sense, one thing that monolingual and bilingual brains have in common is the four pillars of learning proposed by Dehaene (2020). Emotions is the learning driver of all learners. If they are positive, learners feel curious about new experiences, pay more attention, and participate actively in the classroom. Therefore, integrating SEL and Mindfulness in the CLIL classroom can help students and teachers maintain those positive emotions, understand own and others' emotions, create healthier relationships and make critical decisions.

Besides, as shown in the proposal, we must understand that it does not consist of creating a learning situation that only addresses emotions but introducing them throughout the year. For example, Mindfulness is a practice that can begin with a 1-minute meditation in the classroom and continue as a routine in everyday situations (e.g., eating or walking). Hence, we can put our grain of sand in improving students' well-being and reduction of the automatic thinking that causes so much anxiety in people. Furthermore, as mentioned, one of our goals as teachers is to create active, competent, and responsible citizens. If we integrate other methodologies based on neuroscience, such as PBL, learners can participate in different real-life situations and acquire strategies for research, cooperation, learning and knowledge consolidation.

Finally, following the 2030 Agenda (United Nations, 2015), achieving quality education for all children is the SDG4. From our field, we can promote the use of teaching methodologies and strategies adapted to children's needs, ensuring an inclusive and equitable education. That is, the more we know about how children's brains work, the better we can adapt to any learning situation and the more competent they will be.

«Tell me and I forget, teach me and I remember, involve me and I learn»

*(*Xun Kuang, 312-230 BC).

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7. APPENDICES

7.1. APPENDIX A: Mindfulness games and practices

Some Minfulness practices:

- *Approach to Mindfulness. Belly breathing*. Students have a first approach to mindfulness. Firstly, the teacher asks questions like: *Do you know how to breath with the belly? Have you ever paid attention to any part of your body? How did you feel?* Afterwards, an excerpt of the video Belly Breathing: Mindfulness for Children used to develop a first conscious breathing, using both hands to focus attention on the movement of the belly. We must tell students that it is ok if they lose concentration or have other thoughts. When it happens, they just need to be aware of it, let it go and bring their attention back to their breathing. Then, they share their impressions without judging them, as each person can feel something different.
- *1-Minute meditation*. The students sit comfortably in their chairs, with their feet straight on the floor and their back straight. They can place their hands on their thighs with their palms facing upward and close their eyes. Then they should follow the teacher's instructions or a video, such as the one shown as an example in the didactic proposal.
- *Describing our environment*. This can be similar to the 1-minute meditation but in this case the teacher will tap on the shoulder of a pupil, who has to say what is happening at that moment. They can use one of these options: R*ight now, I see... Right now, I hear... Right now, I smell... Right now, I feel...* The other students have to pay attention to what their classmates say as well. At the end, they can share their impressions, as not everyone hears or feels the same thing. That is, a sound may seem soothing to one person and annoying to another.
- *Mindfulness stretching*. As the learners are familiar with stretching from Physical Education, this practice is easy to develop. It consists of stretching consciously, paying attention to what we feel in each muscle we stretch. This is a way of teaching students that Mindfulness is not just a meditation, but a way of life. The aim is to become more present in everyday situations.
- *Joining meditation*. This consists of sitting in a circle and holding hands. Then, students close their eyes and pay attention to a song chosen by the teacher according to their needs and interests, e.g., the mentioned Om Ganesha. If they want to, they can hum or sing the song as they may know the selected one. The teacher guides the students to shift their attention to their breathing, their body, emotions, the temperature of colleagues'

hands, etc. It is an exercise that not only allows for relaxation and awareness but also creates an atmosphere of cohesion.

Practices adapted from Kaiser (2016):

- *Butterfly body path*. It consists of closing the eyes and imagining a butterfly flying around you. The teacher guides the activity by saying which parts of the body the butterfly would land on. It helps students maintain their focus on their bodies, keeping their minds conscious and in the present moment.
- *What have I heard?* For this activity, students will sit in a circle. First, students will be asked to close their eyes and try to pay attention to the sounds and noises that can be heard outside the classroom for 1 minute. around them. Then, three volunteers ask a question about what they have heard and those who agree raise their hand.
- *Paying attention to a sound that disappears*. To calm the students' breathing, they sit in a circle and close their eyes. The teacher will use a triangle to make a sound and the children should pay attention to the sound until it stops. When they stop listening to it, they raise their hands silently until they think they all have their hands up, when they open their eyes. Finally, the teacher asks them how they feel.
- *Pass the secret!* The English adaptation of the broken telephone. Everyone sits in a circle. The activity consists of sending a short message to one person in the group. To do this, first pass it on to the partner on the left, so that it is passed from one person to another until it reaches the right person. The person should say: "message received, my partner has told me that...".
- *Greeting by showing a positive emotion* (adaptation of Greeting with the eyes). It consists of walking around the area and greeting colleagues with a gesture that represents a positive emotion, e.g., a smile (joy). After a couple of minutes, the teacher asks how they feel and if they have noticed that others' emotions have influenced them.

7.2. APPENDIX B: Must-do & Can-do table

7.3. APPENDIX C: Wordwall games

Figure C1.

Quiz show game.

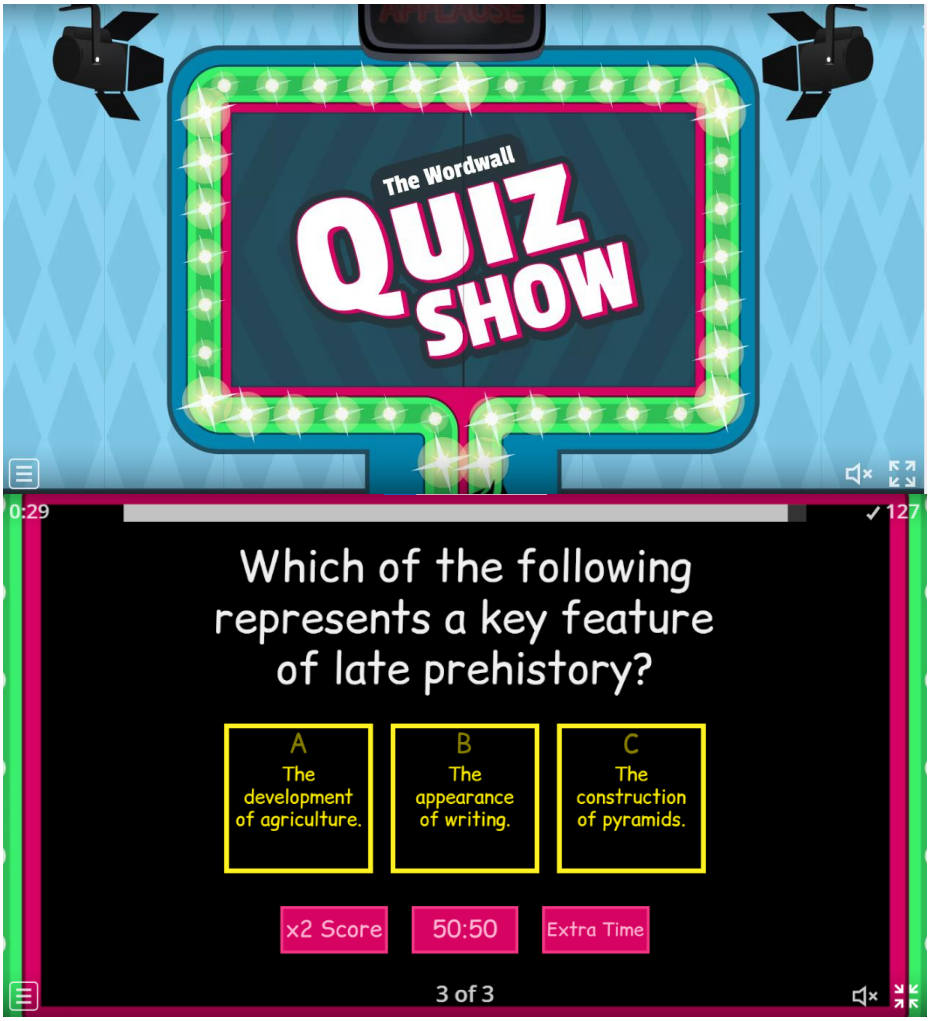


Figure C2.

Random Wheel.

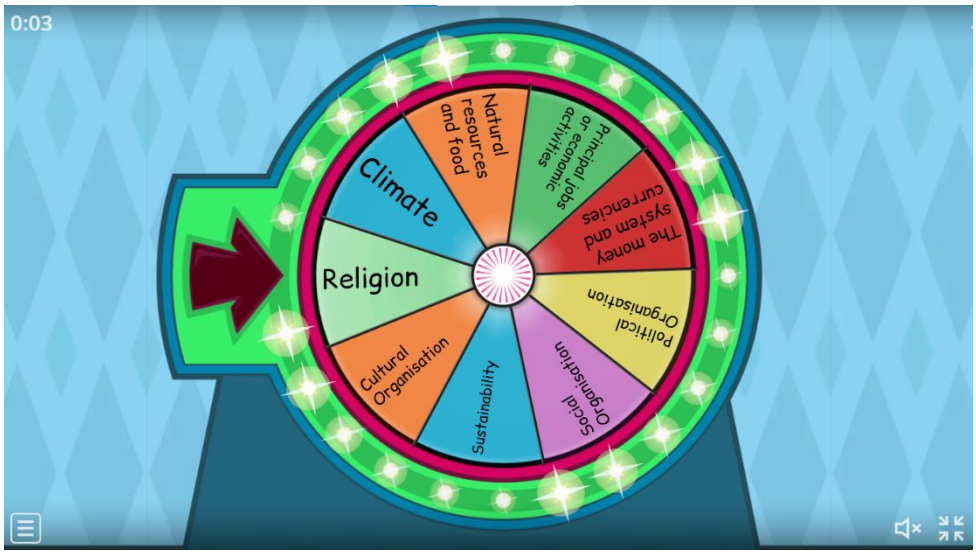
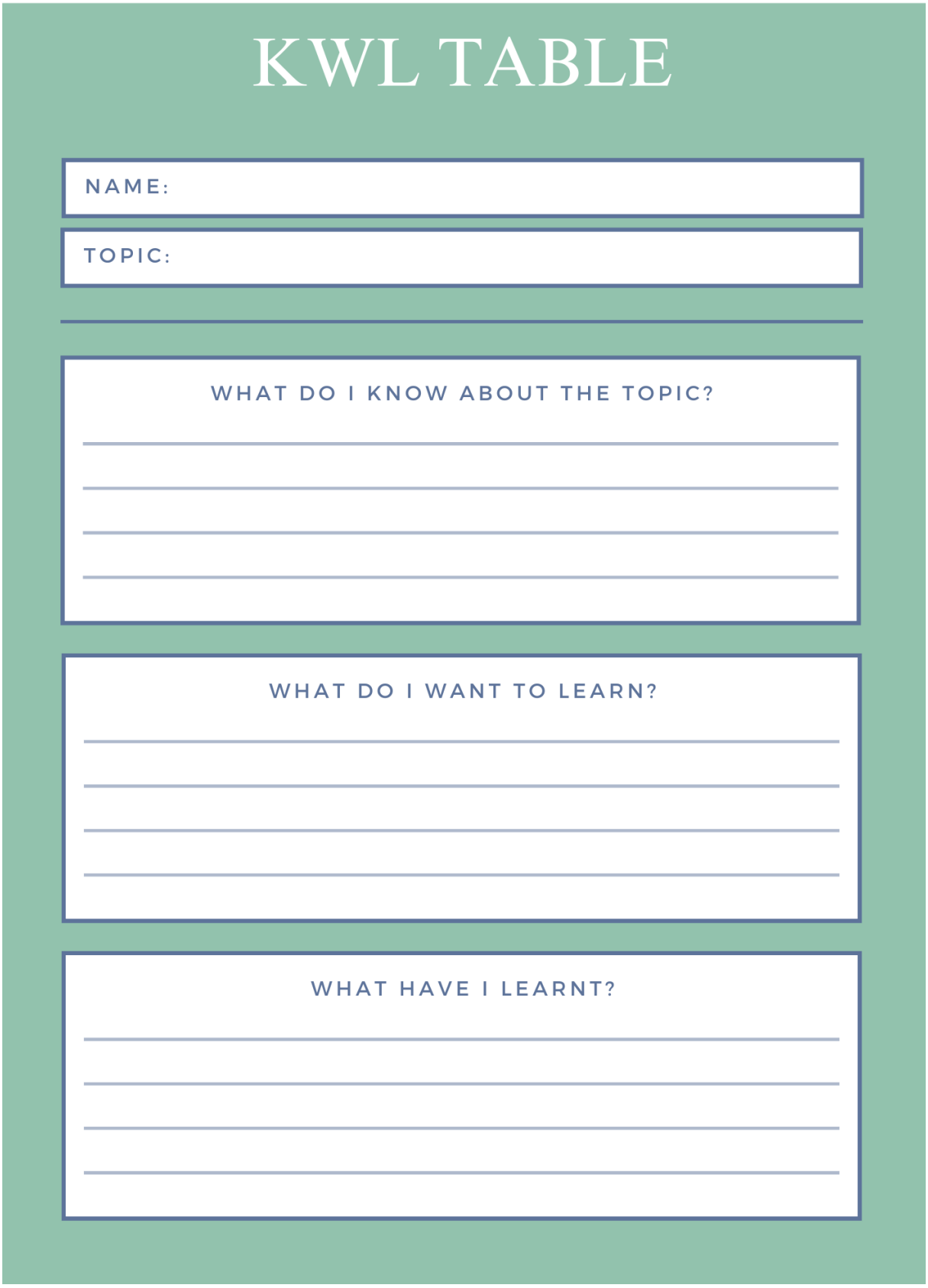


Figure C3.

Open the box.

7.4. APPENDIX D: KWL Table



7.5. APPENDIX E: The Ancient Mesopotamian and Egyptian civilisations

Figure E1.

Mesopotamia 1-2-3 cooperative activity.

The Ancient Mesopotamian and Egyptian civilisations

		MESOPOTAMIA
GEOGRAPHY	1	
	2	
	3	
RELIGION	1	
	2	
	3	
ADVANCES	1	
	2	
	3	
POLITICAL STRUCTURE	1	
	2	
	3	
ECONOMY	1	
	2	
	3	
SOCIAL STRUCTURE	1	
	2	
	3	

Figure E2.

Egypt 1-2-4 cooperative activity.

The Ancient Mesopotamian and Egyptian civilisations

		EGYPT
GEOGRAPHY	1	
	2	
	3	
RELIGION	1	
	2	
	3	
ADVANCES	1	
	2	
	3	
POLITICAL STRUCTURE	1	
	2	
	3	
ECONOMY	1	
	2	
	3	
SOCIAL STRUCTURE	1	
	2	
	3	

7.6. APPENDIX F: Azgaar's Fantasy Map Generator

Figure F1.

New random map.

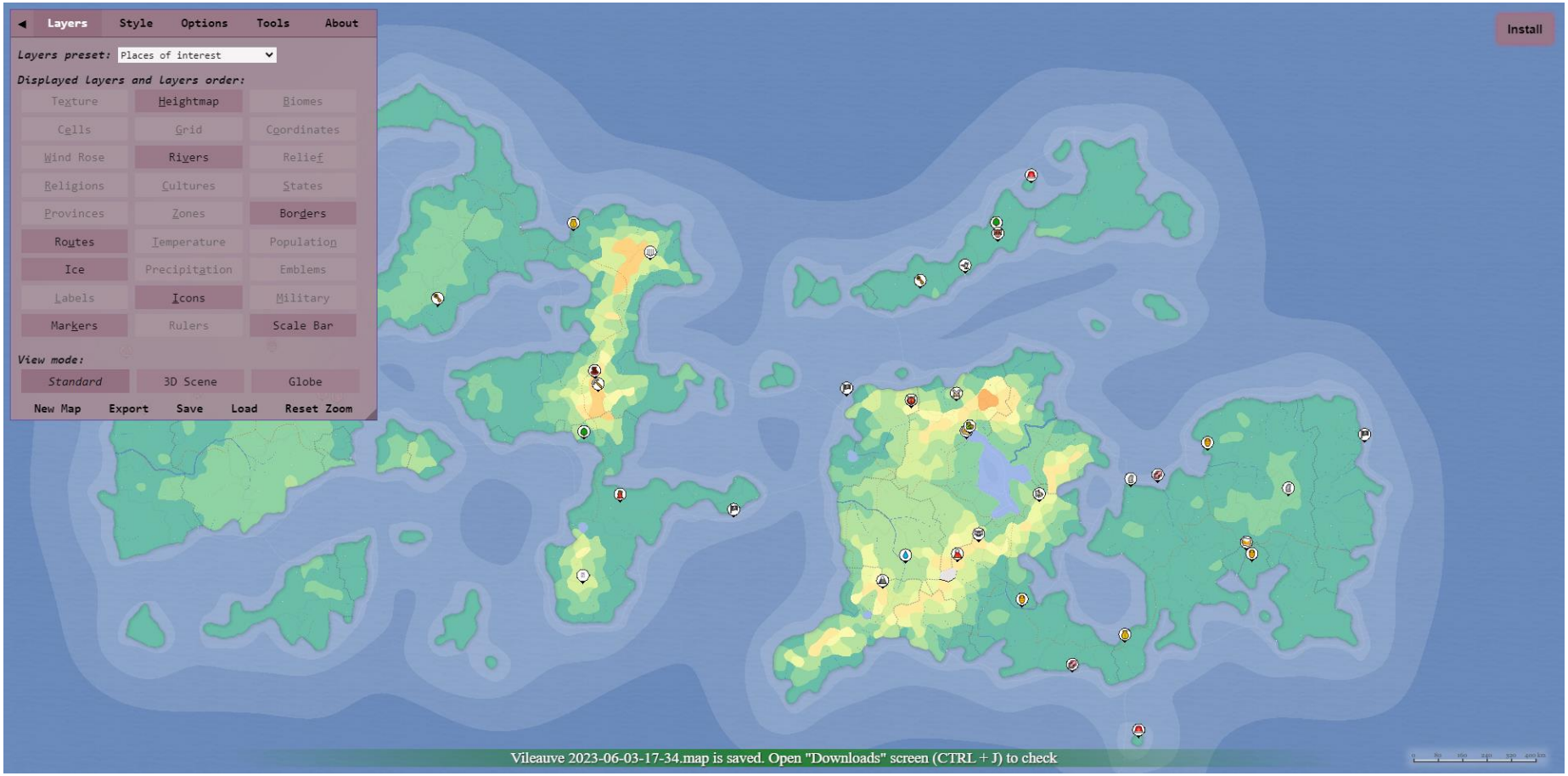


Figure F2.

Navigation window. Possibility to choose kinds of maps and characteristics.

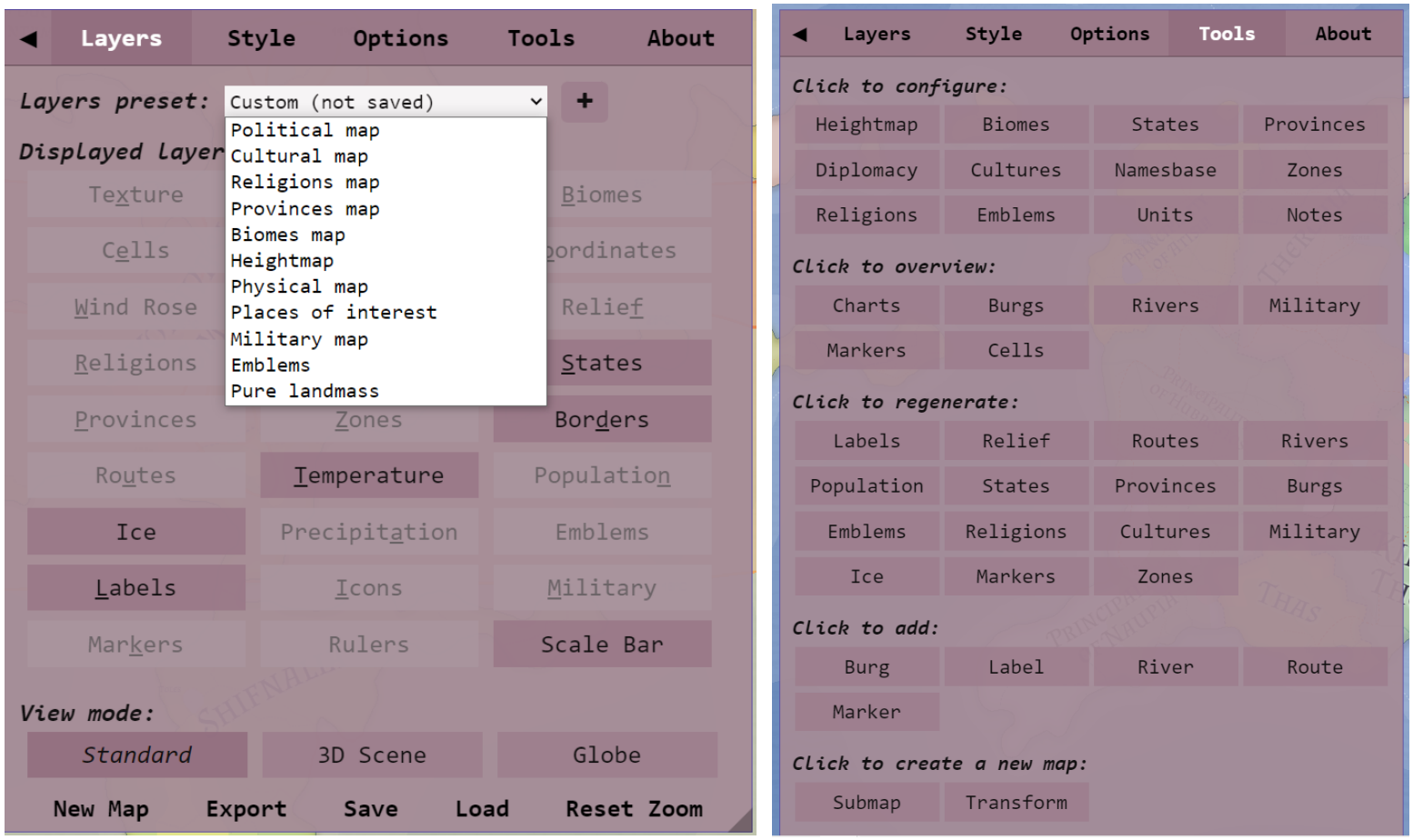


Figure F3.

Observing temperature and other climatic conditions to choose the place.

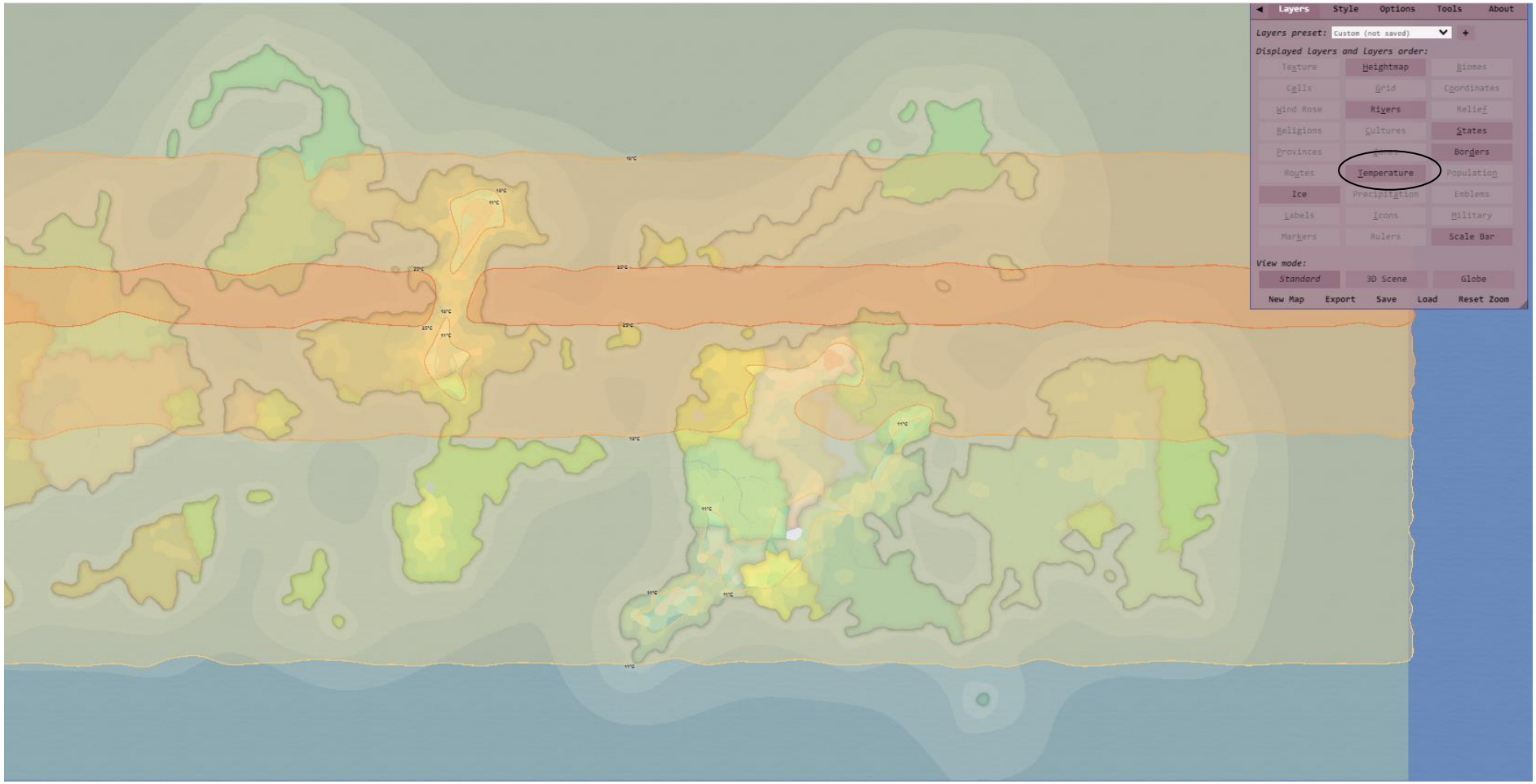


Figure F4.

Edit Label.

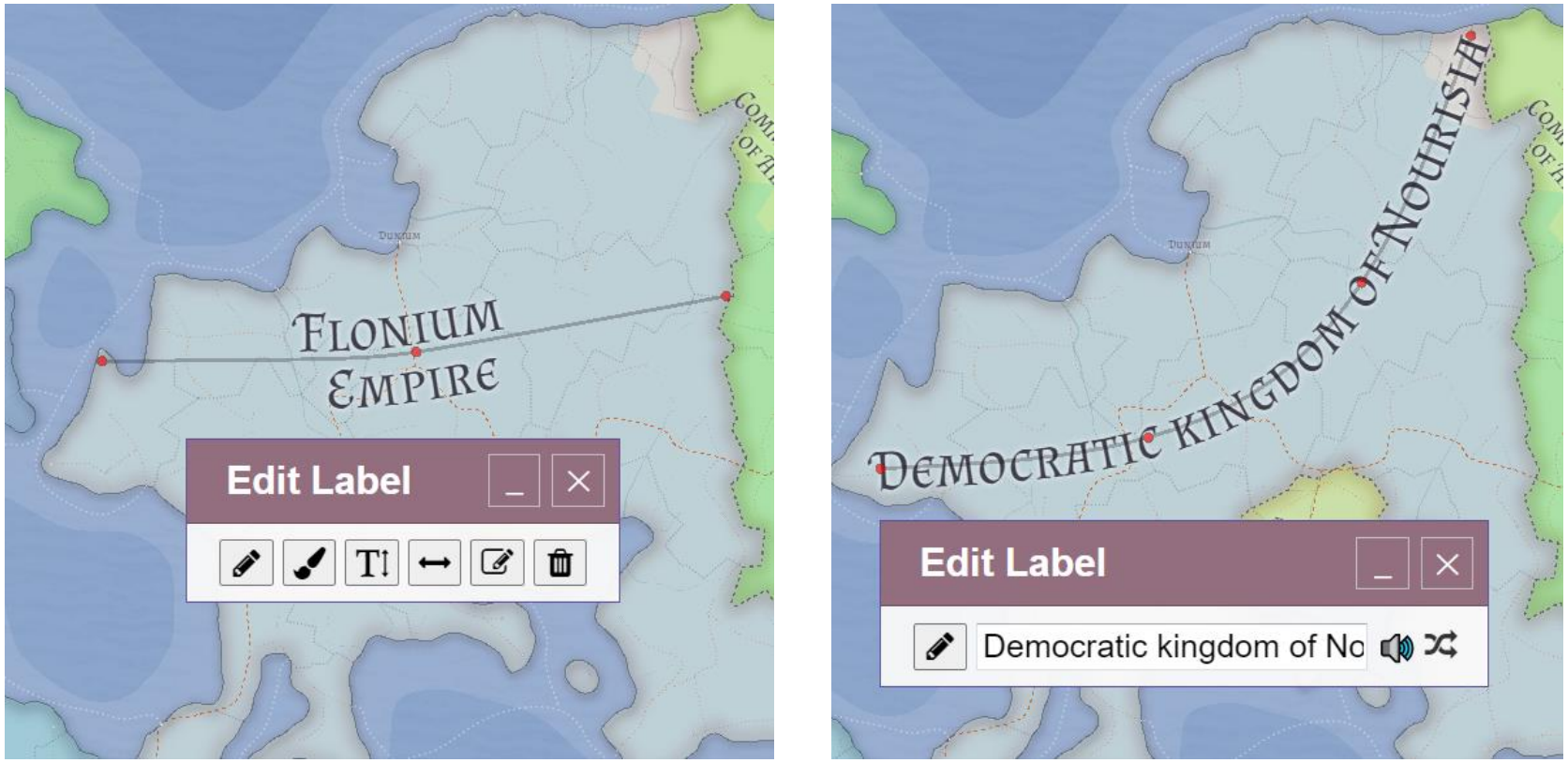
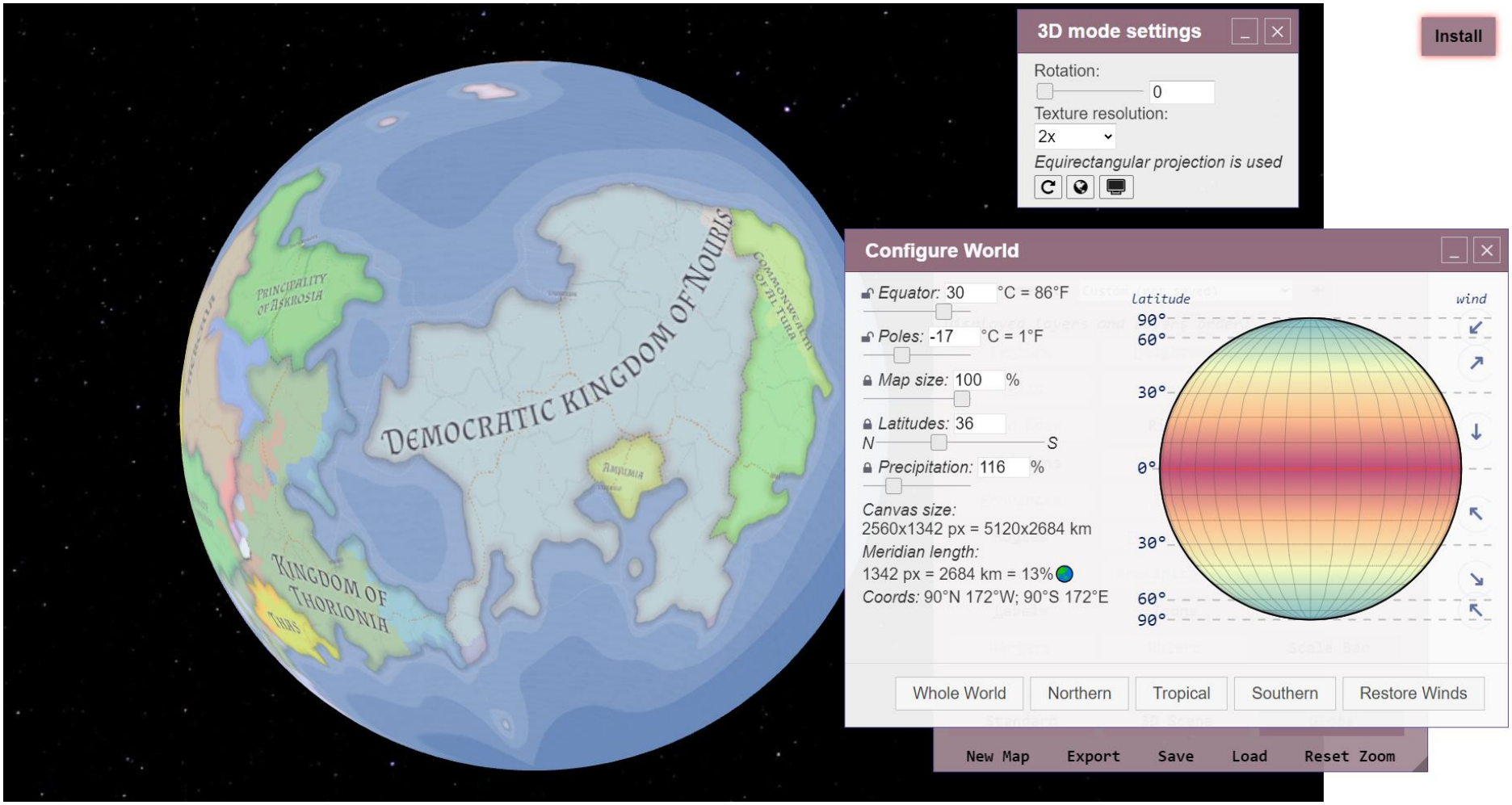
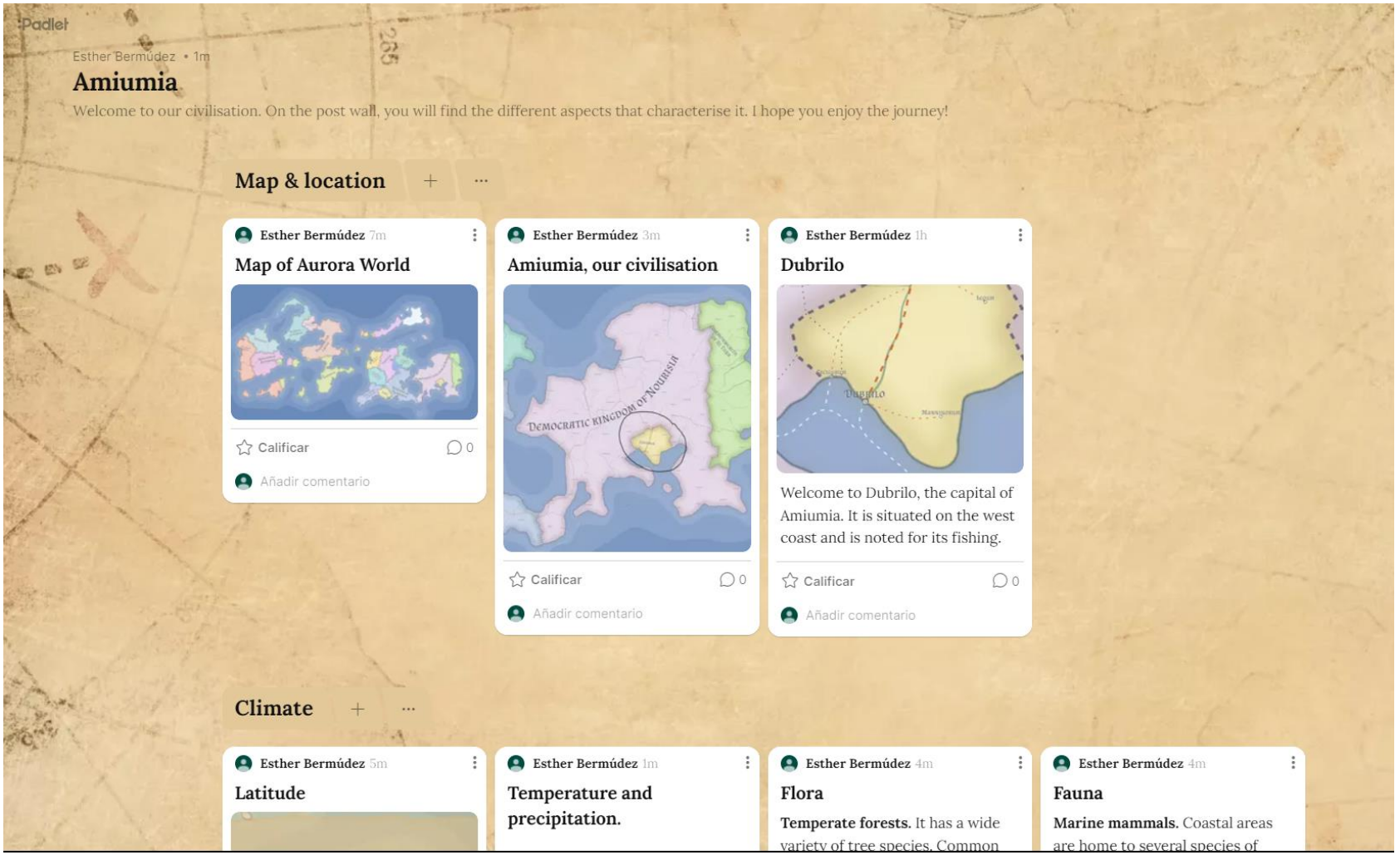


Figure F5.

Globe configuration.



7.7. APPENDIX G: Cooperative Padlet[12]



[12] Bermúdez Luque, E. (2023). Amiumia. Padlet. https://padlet.com/estherbermudez18/amiumia-t408po8b9756a0r9

7.8. APPENDIX H: Responsible decision-making table.

MAKING DECISIONS

1st. What are the options?

2nd. Make a pros and cons table. Write them and indicate the value of each item.

PROS	CONS

3rd. Make the decision.

4th. Analyse and value the results.

7.9. APPENDIX I: Gallery work

In four groups of three, search for information about two types of governments. With this info, create a mind map or infographic.

Figure I1.

Groups.

GROUP	A	B	C	D
POSTER	Democracy and Aristocracy	Dictatorship and Theocracy	Republic and Oligarchy	Monarchy and its types

Then, each group component is assigned a number from 1 to 3, and all the 1's, all the 2's, and all the 3's are located into three groups.

Figure I2.

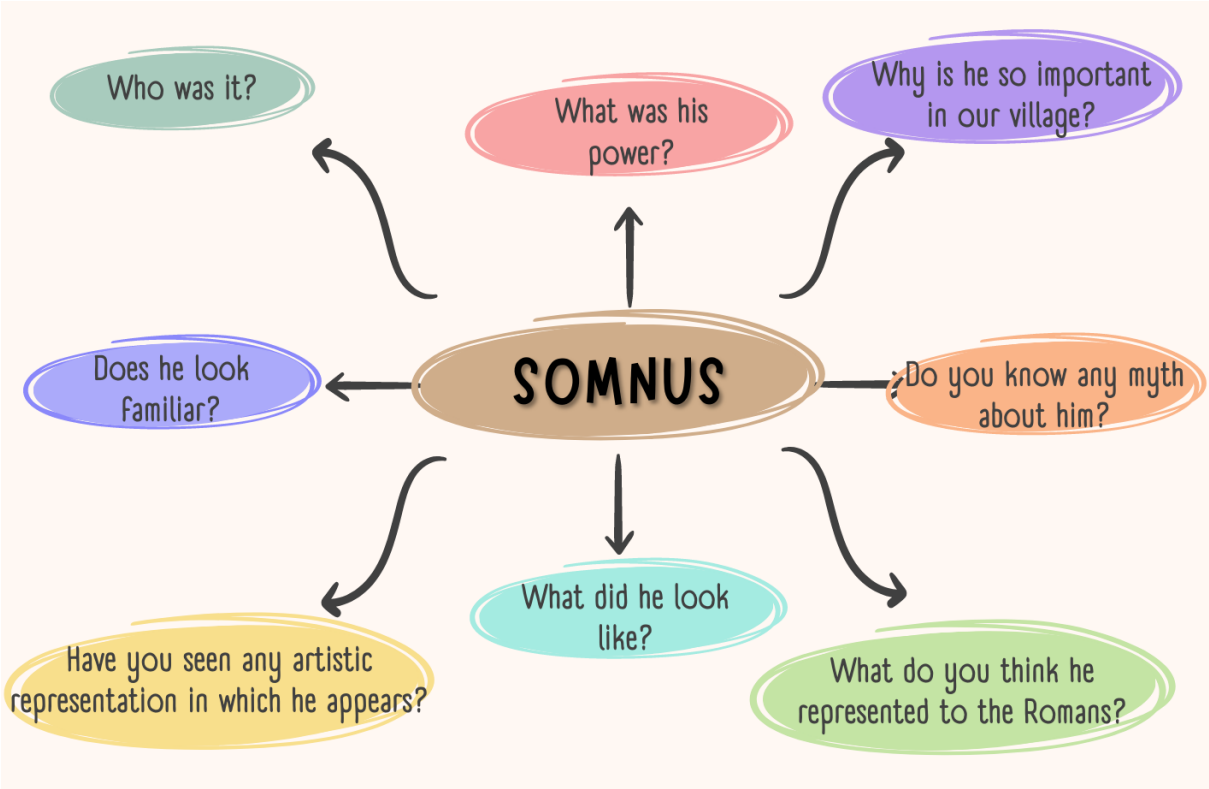
Gallery work groups.

GROUP	A	B	C	D
POSTER	Democracy and Aristocracy	Dictatorship and Theocracy	Republic and Oligarchy	Monarchy and its types

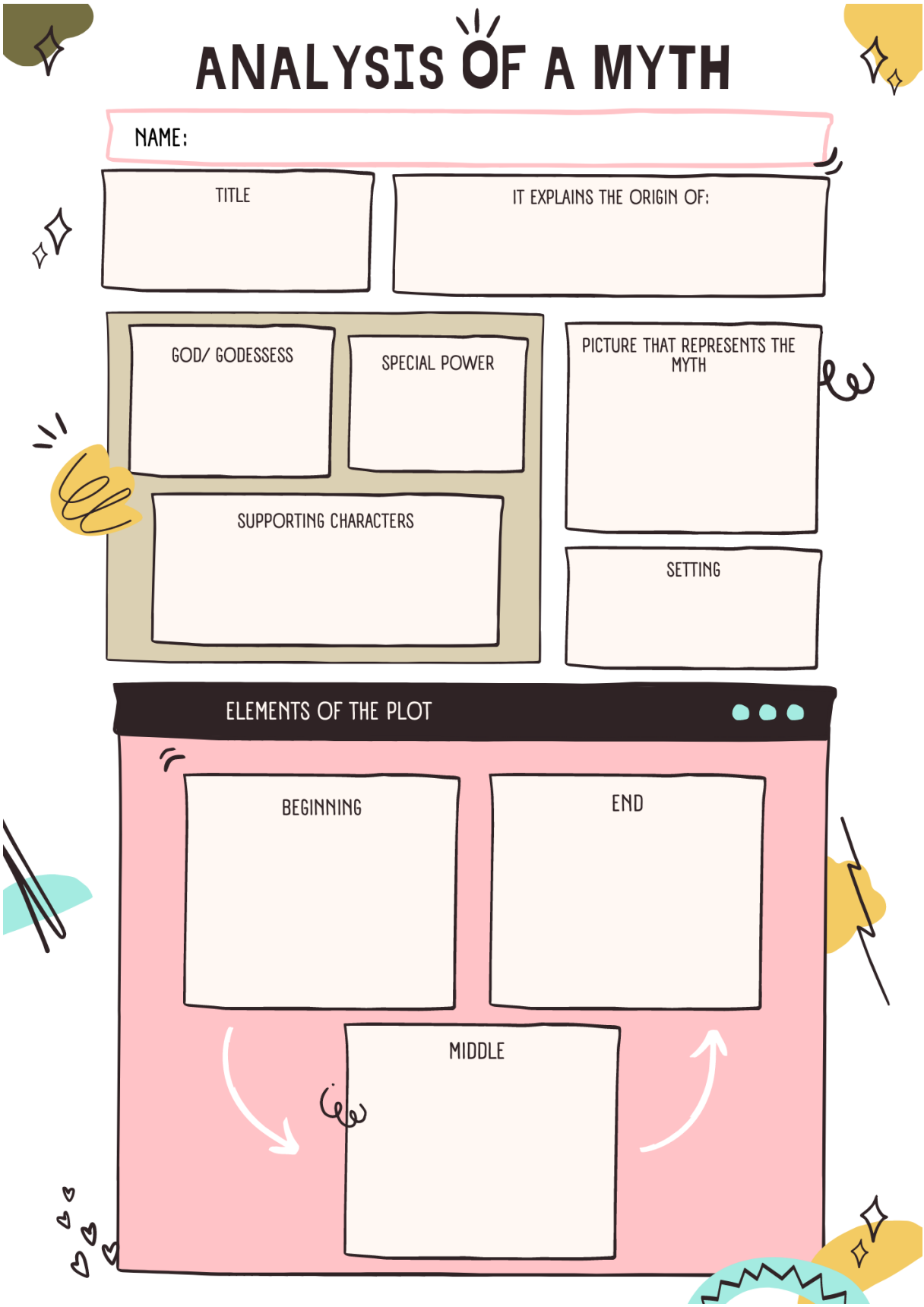
GROUP 1	GROUP 2	GROUP 3

Thus, each new group will have a representative of each scheme who explains the investigated types of government to the other components. After 3-4 minutes, they rotate to the next one, and the representative explains it to the rest of the group. When they have gone through all four schemes, each group member will have explained the information about the investigated types of government to the rest of their new groups.

7.10. APPENDIX J: MindMap



7.11. APPENDIX K: Analysis of a myth



7.12. APPENDIX L: Myth web and Checklist

Figure L1.

Myth web.

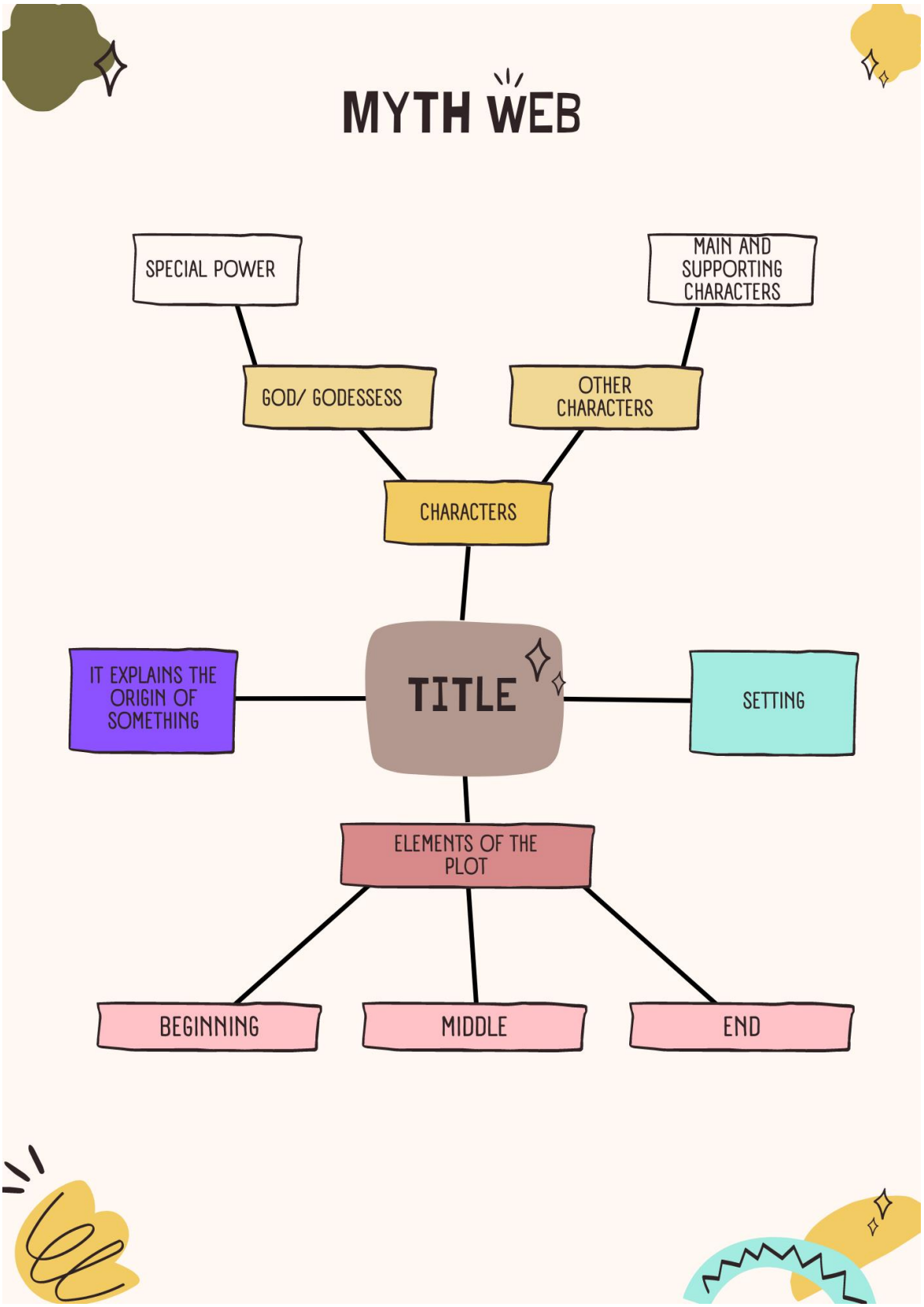
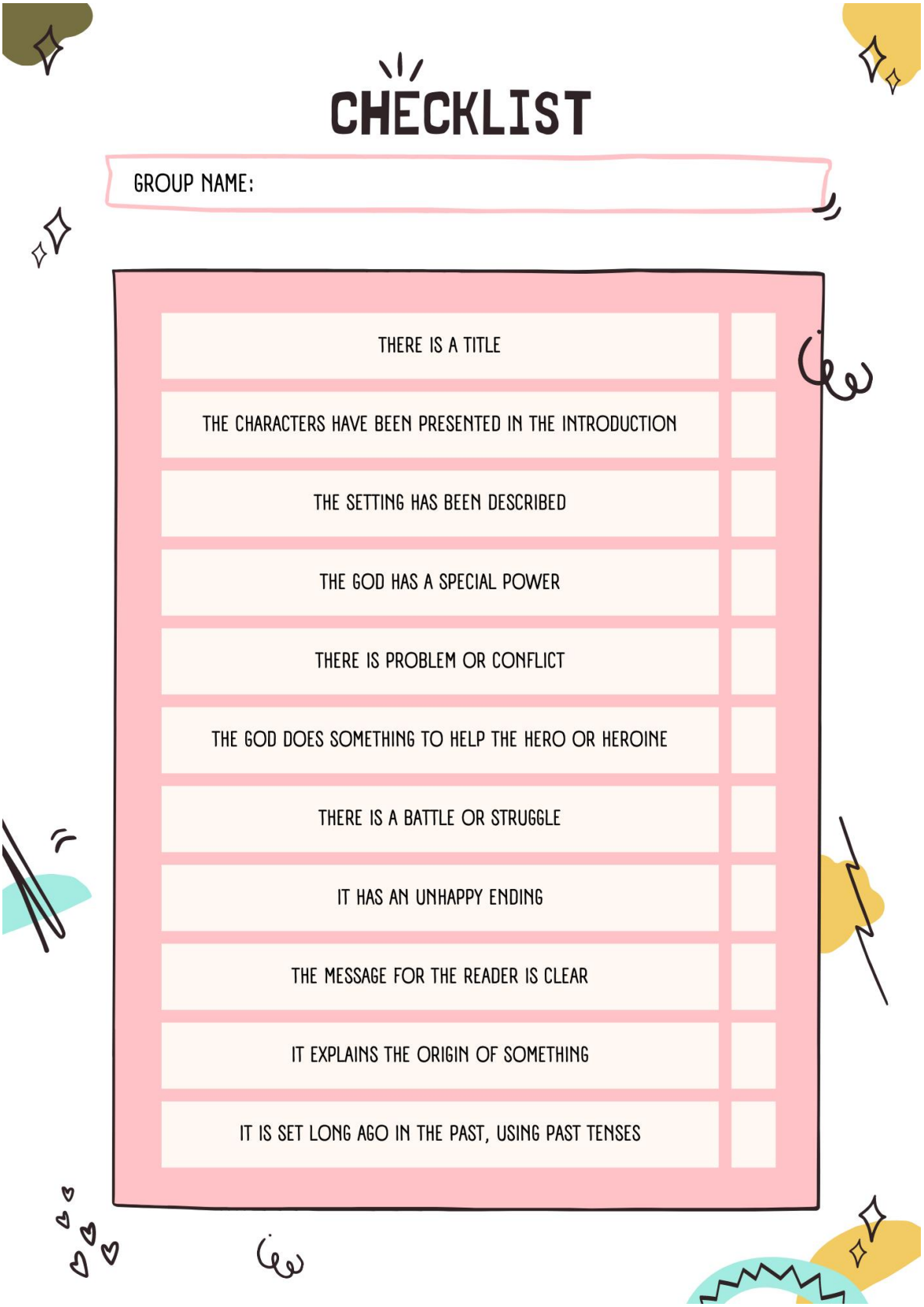


Figure L2.

Checklist.



7.13. APPENDIX M: SWOT Analysis